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Maternal Health Literacy, Antenatal Care, and Pregnancy Outcomes in Lagos, Nigeria

Olubunmi Adanri
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Walden University

College of Health Sciences

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Olubunmi Adanri

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2017

Abstract

Maternal Health Literacy, Antenatal Care, and Pregnancy Outcomes in Lagos, Nigeria

by

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MA, Illinois State University, 2000

BS, University of Lagos, Nigeria, 1988

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Health

Walden University

June 2017

Abstract

Maternal mortality, an example of poor maternal health outcomes, is widely accepted as an indicator of the overall health of a population. One of the Millennium Development Goals was reduction in maternal mortality by 3 quarters by 2015. These goals were not met in Nigeria and it is important to look at some of the reasons why. Education has been shown to have positive impact on pregnancy outcomes; however, the characteristics of pregnant women, their health literacy level, their usage of antenatal care services and how these impact pregnancy outcomes are yet to be analyzed in Lagos, Nigeria. Guided by the social cognitive theory and health belief model, the purpose of this cross-sectional quantitative study was to determine if there is a relationship between maternal health literacy, antenatal care visits, development of medical conditions during pregnancy, and pregnancy outcomes (measured by healthy or unhealthy baby) in Lagos, Nigeria. The research question for this study tested if there was a relationship between these variables. Lisa Chew's health literacy assessment tool was used in a sample of 130 women in Shomolu local government in Nigeria who met the inclusion criteria. Using binary logistic correlations, only problems developed during pregnancy is statistically significant with pregnancy outcomes ($p < .05$). The results suggested an increase in problems developed during pregnancy most likely will increase the chance of having negative pregnancy outcomes. Results from this study could promote positive social change by helping health professionals identify the characteristics of at-risk women during antenatal education sessions. The results could also help health professionals in the development of targeted antenatal care interventions.

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Dedication

This study is dedicated to my husband, Dr. Adebayo A Adanri, for taking this journey with me, supporting my efforts, and encouraging me all the way. This is also dedicated to my children, Adetayo, Adejoke and Tolulope Adanri, for your support and understanding, especially when I could not give you my undivided attention due to studying and researching; you guys are simply the best. What I want you to take out of this journey is that you can achieve anything you set out to do if you are committed and have the support of your family. Understand your support system as a solid foundation, nurture the relationship, and put God as your foundation. Also, this study is dedicated to women all over the world-those who have successfully carried their pregnancy to term, those who tried and could not conceive, those still trying to conceive, and those who have lost their lives trying to conceive or give birth. You are more than mothers; you are providers and great contributors to Mother Earth. May your hearts and homes be filled with happiness, love, peace, and contentment.

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I know it came as no surprise that I would embark on this doctoral journey; what could be surprising is the time it took me to finally go back to school. On this journey, I appreciate the help and support of my committee chair, Dr. Diana Naser, my committee member, Dr. Shari Jorissen, and my URR, Dr. Egondy Onyejekwe, for their patience, guidance, and thoughtful feedback. Thank you for questioning and pushing me to challenge my ideas. I also want to thank all the faculty members for their diligence and commitment to excellence. My family deserves my appreciation for their unrelenting support. I specially want to thank Eng. and Mrs. Falobis for their contribution to this journey. Thank you to all my sisters and friends for the nickname, “Prof.” I just couldn’t let you all down, could I? Thank you to my brother, Dr. Blessing Adeoye, and to all who have invested in me in different ways and have helped me to reach this point in my academic journey. This has been an interesting and rewarding journey, and I look forward (expectantly) to what the future offers.

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Chapter 1: Introduction to the Study

Introduction

The World Health Organization (WHO; 2014c) defined maternal mortality as the ratio of the number of maternal deaths per 100,000 live births. Complications from pregnancy and maternal deaths are common in both developing and developed countries, and in 1990 approximately 523,000 mothers died of childbirth when compared to 289,000 deaths in 2013 (WHO, 2014b). Although this was a marked decrease in maternal mortality, this number is still unacceptable. The deaths primarily occurred in low and middle-income countries and may have been avoidable through the availability of proper antenatal care (WHO, 2004).

In sub-Saharan Africa, 1 in every 40 women die as a result of childbirth compared to 1 in 3,300 deaths in Europe (WHO, 2014a). In Nigeria, 1 in 13 pregnancies results in the death of the mother (United Nations International Children's Emergency Fund [UNICEF], n.d.). Although medical reasons such as preeclampsia, hemorrhage, and sepsis have been the cause of these deaths it is important to find ways to reduce avoidable maternal deaths through education and antenatal communication (Obiechina et al., 2013). One of the seven Millennium Development Goals (MDG) set by the United Nations (UN) was to reduce maternal mortality by 75% by the year 2015 (Say et al., 2014), but this goal was not achieved in Nigeria (Oye-Adeniran et al., 2014). Although there have been research studies done on maternal mortality in Nigeria (Bukar et al., 2014; Obiechina et al., 2013), researchers have focused mainly on medical causes of maternal deaths while

few focused on other underlying causes of maternal mortality (Okereke et al., 2013; Ozumba & Nwogu-Ikojo, 2008).

To successfully reduce maternal mortality there is a need to improve maternal pregnancy and delivery outcomes by studying education and other socio-determinants of health necessary for the improvement of the health of these pregnant women (UN, 2011). In this study, I specifically focused on health literacy level, maternal characteristics, and antenatal care usage to see how they are associated with maternal pregnancy outcomes in order to inform healthcare professionals about how to best convey the messages about antenatal care to mothers so that maternal complications can be avoided. Results from this study could be used to promote positive social change by helping health professionals identify the characteristics of at-risk women during antenatal education sessions. The results from the study could also be used in the development of targeted antenatal care interventions. This may potentially help to reduce maternal health complications and improve pregnancy outcomes.

In this chapter, I will provide a brief overview of the study by explaining the background of the study, the problem statement focused on the gap that I intended to fill with this study, and the purpose of the study. I will also explain the research question variables of the study and the theories that were used to guide this study. Different terms used in the study will be included in this chapter as well as an explanation of the nature of the study, limitations, and significance.

Background of the Study

Zozulya (2010) indicated that a woman dies every 10 minutes as a result of childbirth and pregnancy in Nigeria, and the WHO (2014b) found that Nigeria has the second highest maternal rate in the world with over 40,000 maternal deaths every year. More than half a million women die every year as a result of complications during pregnancy and childbirth and it is important to find ways to improve the pregnancy outcomes of pregnant women and new mothers in order to reduce maternal mortality (Veneman, 2007). The causes of high maternal mortality and examples of poor pregnancy outcomes are many and varied. Ujah (2005) attributed a high maternal mortality to lack of resources or inability to pay for hospital cost, healthcare personnel's inability to detect obstetric emergencies early enough, and the inability to perform cesarean sections when necessary. The National Population Commission (Nigeria) and ICF International (2014) reported 31% of women between the ages of 15 and 24 and 54% of women between the ages of 45 and 49 years were illiterate which indicates that the education level of the population needs to be addressed. If women are illiterate, this may result in them not being able to read or understand written health materials that are given to them by health providers. This has the potential to negatively impact their ability to make informed pregnancy health decisions, especially if they need to be made quickly (Zozulya, 2010).

Lower education levels have been found to be correlated to higher maternal mortality (Karlsen et al., 2011). Poor literacy is found to be higher in patients with low educational attainment and this may lead to communication difficulties that may affect health outcomes (Adhoc Committee on Health Literacy, 1999). However, early antenatal

care and skilled attendance during delivery, access to skilled health workers, and improvement in basic education are some of the ways to improve maternal health and reduce maternal mortality (Veneman, 2007). According to Veneman (2007), education helps to build habits and behaviors that could have a positive impact on a woman's health because educated women may have more ability to access health information, to know what their options are, and be able to better gauge the quality of the care that they are receiving.

Antenatal visits have been found to reduce the occurrence of maternal deaths (Taguchi et al., 2004). Normally, when women become pregnant, they visit a medical facility to talk to a health professional about the state of their health and the child they are carrying. Ali and Adam (2011) noted that inadequate antenatal care and maternal education were predictors of maternal mortality in the Sudan. There is a need to investigate the provision and use of antenatal care services, the literacy level of the women who use these services, and maternal characteristic of the women who use the services in relation to maternal health outcomes. Antenatal education has been seen as a positive approach to preparing pregnant women for the experience of childbirth (Anya, Hydera, & Jaiteh, 2008). However, Anya et al. (2008) did not examine if there is a relationship among the number or adequacy of antenatal visits, a pregnant woman's level of education, the characteristics of these pregnant women, and pregnancy outcomes in Nigeria. This study was needed to fill a gap in the literature by examining the relationship between maternal characteristics, particularly health literacy level; antenatal care service usage; and pregnancy outcomes for women in Lagos, Nigeria.

Problem Statement

Many women do not receive adequate antenatal care due to factors such as poverty and lack of knowledge about options (Singh, Bloom, Haney, Olorunsaiye, & Brodish, 2012). Researchers have looked at how education level is related to maternal mortality in Nigeria (Mojekwu & Ibekwe, 2012) and how early antenatal visits can help with detection and treatment of adverse pregnancy related outcomes (Adekanle & Isawumi, 2008), but I found no study where the researchers examined this education gap, maternal characteristics, or if how the women utilized antenatal care has any potential impact on maternal pregnancy outcomes. Therefore, the problem that I addressed in this study was the high rate of maternal mortality and adverse pregnancy related outcomes by studying the predictive relationship between maternal health literacy level, the number of antenatal visits, timing of the first antenatal care visit, development of medical conditions during pregnancy, and pregnancy outcomes (which is healthy or unhealthy baby) in Lagos, Nigeria.

Purpose of the Study

The purpose of this cross-sectional quantitative study was to examine the high rate of maternal mortality and adverse pregnancy-related outcomes by studying the predictive relationship between maternal health literacy level; the number of antenatal visits; timing of the first antenatal care visit; development of medical conditions during pregnancy; and pregnancy outcomes (birth status of child, which is either healthy or unhealthy baby) in Lagos, Nigeria. A better understanding of how maternal education level and maternal characteristics impact pregnant women's utilization of antenatal care

will help in framing messages about expectations during pregnancy and give a better understanding of the needs of women that use antenatal services. This information could be used by the health system to change the way antenatal messages are delivered to pregnant women. To improve health literacy, health professionals could use this information to develop powerful antenatal care interventions for women at any level of education and ensure adequate and necessary care is received, which, ultimately, may improve maternal pregnancy and health outcomes (Alexander & Kotelchuck, 2001; Bhutta, Darmstadt, Hasan, & Haws, 2005; Carroli, Rooney, & Villar, 2001; Ickovics et al., 2007).

Research Question

The following research question and hypotheses guided this study:

Research Question: What is the predictive relationship between maternal health literacy levels; the number of antenatal visits; timing of the first antenatal care visit; development of medical conditions during pregnancy; and pregnancy outcomes (birth status of child, which is either healthy or unhealthy baby) in Lagos, Nigeria?

H₀: There is no statistically significant predictive relationship between maternal health literacy level; the number of antenatal visits; timing of the first antenatal care visit; development of medical conditions during pregnancy; and pregnancy outcomes (birth status of child, which is either healthy or unhealthy baby) in Lagos, Nigeria.

H_A: There is a statistically significant predictive relationship between maternal health literacy level; the number of antenatal visits; timing of the first antenatal care visit; development of medical conditions during pregnancy; and pregnancy outcomes (birth status of child, which is either healthy or unhealthy baby) in Lagos, Nigeria.

The independent variables I examined in this study were maternal health literacy, frequency of antenatal visits, number of antenatal visit, timing of the start of antenatal care, and problems developed during pregnancy. The dependent variable was pregnancy outcomes, measured by birth status of child, whether a healthy or unhealthy baby.

Theoretical Foundation

In order to integrate this study within a cohesive body of knowledge, I used two interrelated theories to explain the relationship between the independent variables (maternal health literacy, frequency of antenatal visits, number of antenatal visit, timing of the start of antenatal care, and problems developed during pregnancy) and the dependent variable (pregnancy outcomes). The two theories were social cognitive theory (SCT) and the health belief model (HBM). I will provide a brief overview of the theories in the following subsections but will discuss the theories in more detail in Chapter 2.

Social Cognitive Theory (SCT)

SCT explains how people obtain and maintain certain behavioral patterns and how these behaviors can be modified (Bandura, 1998). The central tenet of the model that I focused on in this study was self-efficacy in the participants. Self-efficacy is how a

person assesses his or her ability to exercise control over certain events that affect their lives or their capability to achieve a level of performance (Bandura, 1989). Specifically, measuring variables that are related to what they know, what they need to know, how they can go about adding to their current knowledge, and how they apply the knowledge. The concept of outcome expectations, which is an expectation that adoption of a behavior would lead to desired outcomes (Bandura, 1998), is one of the concepts from SCT that I explored in this study. SCT was relevant to the study because of the relationship between acquisition of learning through skills and self-efficacy and how this impacts human behavior. I anticipated that the participants in this study would value the outcome of a healthy pregnancy (healthy baby), so there would be an incentive to want to learn how that could be achieved

The Health Belief Model (HBM)

The HBM is a cognitively-based model that originated from the psychological theories of stimulus response theory and cognitive theory (Hochbaum, Rosenstock, & Kegels, 1952). The HBM focuses on mental processes as they pertain to why people accept preventive health services and why people would not adhere to health regimens (Hochbaum et al., 1952) and the theory has been used to explain many health education practices and changes in health behaviors (Glanz, 2008). The likelihood of someone taking preventive action, as proposed by the HBM, depends on the person's perception of vulnerability to the condition, the perception that consequences of the condition would be serious, the perception that taking precautionary behavior would effectively prevent the condition, and that the benefit of reducing the threat of the condition exceeds the cost of

taking the action (Redding et al., 2003). The constructs of the HBM are perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy (Hochbaum et al., 1952). The HBM provided insight into factors that the pregnant women participants perceived as threatening to the outcome of their pregnancy and helped to explain the characteristics these women possessed that cued them to taking action.

Nature of the Study

I used a quantitative cross-sectional study design to collect data from woman who has been pregnant or given birth in the Shomolu local government area, Lagos, Nigeria. Data were collected through the use of surveys since they can be used to gain reliable and practical information concerning the wellbeing and functional health of a community or an individual from a patient or individual point of view (Quality Metric, 2013). I administered the survey to women over 18 years old who had been pregnant or given birth in the Shomolu local government area in Lagos, Nigeria. To increase the response rates, face-to-face administration of the survey was conducted, but only women who could speak and/or read English were surveyed.

I assessed the health literacy level of participants by asking them the 16 questions from Dr. Chew's Literacy Screening Questions (Chew, Bradley, & Boyko, 2004) and measured antenatal care usage by Kotelchuck's Adequacy of Prenatal Care Utilization (APNCU) Index (Koroukian & Rimm, 2002). Antenatal care was measured as adequate plus, adequate, intermediate, or inadequate maternal care visits based on the month antenatal care began and the number of antenatal visits. The dependent variable was

pregnancy outcome, measured by birth status of child which included either a healthy (1) or unhealthy (0) baby. I used logistic regression and multiple linear regression to analyze data.

Definitions

Antenatal care: Antenatal care is also known as prenatal care, and it is the care that a pregnant woman receives from organized health care services (Banta, 2003). These two terms are used interchangeably but antenatal care was used in this study.

Frequency of antenatal visit: For this study, frequency of visits referred to how often the women attended antenatal care.

Health literacy: The degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions (Ratzan & Parker, 2000).

Maternal characteristics: In this study, maternal characteristics included the following: education level, age, occupation, income, religion, and cultural beliefs

Maternal health: The overall physical health of the mother during pregnancy and during the postnatal period (WHO, 2014). This includes the antenatal care a pregnant woman receives and the postnatal care of the woman.

Maternal health literacy: Maternal health literacy is “the cognitive and social skills (that) determine the motivation and ability of women to gain access to, understand, and use information to ensure positive health outcomes for them and their children” (Renkert & Nutbeam, 2001, p. 381). This term, as used in this study, is comparable with the term *health literacy*.

Maternal mortality: The WHO 10th International Statistical Clarification of Health Disease defines maternal mortality as

The death of a woman from pregnancy-related causes while pregnant or within 42 days of termination of the pregnancy, irrespective of the duration of pregnancy and the site of pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes. (WHO, 2014c, para. 2)

Maternal mortality ratio (MMR): The number of maternal deaths in a given year per 100,000 live births during the same year (WHO, 2014).

Maternal pregnancy complications: Health problems that occur during pregnancy that can impact the mother's health (CDC, 2014). Maternal pregnancy complications include anemia, urinary tract infection, hypertension, gestational diabetes, mental health issues (CDC, 2014) and complications from malaria.

Number of antenatal visit: For this study, number of antenatal visit referred to the total number of antenatal visits a pregnant made during the participant's last pregnancy.

Pregnancy outcomes: In this study, the birth status of child, which was either a healthy or unhealthy baby.

Assumptions

One of my assumptions in this study was that the Shomolu local government area was representative of Lagos State demographic and socio-economic characteristics due to its central location and inclusion of upper, middle, and lower class residents (Lagos State

Government, 2011). The assumption that led to this study was that all pregnant women would want to have positive pregnancy outcomes and would want to protect themselves and unborn babies from harm (Anya, Hy dara, & Jaiteh, 2008). The extent to which women do this may depend on their education and characteristics. The survey instruments were self-administered and the administration format was face-to-face. It was also assumed that the responses from the participants were true and accurate and that they were not coerced to participate in the study. Lastly, it was assumed participants would include both educated and uneducated women.

Scope and Delimitations

The results of this study were specific to Lagos, Nigeria, which could limit the generalizability of the results. It may be possible to generalize the interventions regarding culturally appropriate messages developed using health literacy tools to other parts of Nigeria and even other parts of Africa with similar socio-economic, ethnic, and religious distributions. In addition, my analysis for this study was specific to females who had been pregnant and/or have given birth in the past, who resided in Shomolu, Lagos, Nigeria. Lagos State is considered one of the most affluent states in the country (Lagos State Government, 2014) and, although there have been studies conducted in the northern and eastern parts of Nigeria, the results from these studies cannot be generalized to an urban population like Lagos. I did not conduct this study in a hospital but focused on women who had been pregnant to gather information about their antenatal practices. I was interested in the characteristics pregnant women have in common and the differences in their antenatal usage and education. In analyzing theories to use for the study, I

considered the theory of planned behavior developed in 1980 by Ajzen and Fishbein because it explains individuals as rational decision makers who consider options and implications of a behavior before engaging in it (Glanz, Rimer, & Viswanath, 2008). However, because there are many motivational factors that may determine whether a pregnant woman performs a specific behavior (like using antenatal care services) or not and because attitude, perceived behavioral control, and subjective norms were not being studied, the theory was not used.

Limitations

Potential limitations associated with this study included the use of self-reported data, which can introduce recall bias (Creswell, 2007). In this study, I used a face-to-face, self-administered survey because of the ability of ensuring feedback and completion of the questions and assisting participants who may have questions (Creswell, 2007). Although this method may have reduced nonresponse bias, it did not provide anonymity and participants might not have truthfully answered sensitive questions (Creswell, 2007). To guard against this, Pannucci and Wilkins (2010) suggested the use of a validated scale. The scale I used was already validated and I also dropped off questionnaires for participants who were busy or did not want to complete the survey form with me there. These were picked up in a sealed envelope, and this could have reduced nonresponse bias. Also, Frankfort-Nachmias and Nachmias (2008) suggested researchers ensure that the questions asked are not threatening by asking participants to rate how uneasy they felt other people would feel about the questions or rate the degree of difficulty in answering

the questions. Although not all biases in the study could be controlled, the awareness of the presence of bias allowed thorough scrutiny of the results (Sica, 2006).

Another limitation for this study was the lack of data from women who had died giving birth. Although this data would have provided rich information about what they went through, data cannot be collected from a dead person and collecting data from the family of a dead, pregnant woman may have brought unpleasant memories and the information provided may have only been hearsay. Furthermore, the study was limited to women 18 years and over because women under the age of 18 are considered minors and would have needed adult consent to participate in this type of study.

Significance of the Study

There have been studies conducted in the northern and eastern parts of Nigeria where researchers looked at the etiology of maternal deaths and the association between education level and maternal mortality (Idris, Gwarzo, & Shehu, 2007; Ifenne et al., 1997; Ikeako, Onah, & Iloabachie 2006). In my review of the literature, I did not find studies that were focused on the Shomolu local government area of Lagos State, which is located in the southern part of Nigeria. Also, some studies have been conducted in rural areas of Nigeria (Gazali et al., 2012; Kabir, Iliyasu, Abubakar, & Sani, 2005; Okereke et al., 2013), but the results from these studies cannot be generalized to an urban population like Lagos. None of the existing studies mentioned the characteristics of women and adequacy of antenatal visits or how these could impact pregnancy outcomes. Therefore, the findings from this study could bring attention to the importance of maternal literacy and access to antenatal care as some of the ways to reduce maternal death in the south-

western part of Nigeria. When these variables are studied along with the numbers of antenatal care visits, it could help to understand how a woman's education level, health literacy level, and adequacy of antenatal care, and characteristics could impact pregnancy outcomes. Furthermore, I did not find a study that had been carried out in Nigeria on maternal literacy level and pregnancy outcomes using a health literacy instrument. This study could be a pioneering study using a validated tool for maternal health literacy on the impact maternal characteristics and maternal literacy have on the way women attend to antenatal messages and how this could impact pregnancy outcomes.

The study is significant to theory because it builds on the existing theory and explored potentials for future theory development as it relates to women health care and pregnancy outcomes in the developing countries. In the study, I explored the reliability and validity of the instrument used in a different geography and culture.

This study offered a unique opportunity to advance practice and knowledge in public health education and health delivery services. The results from this study may help to infer the potential impact of a pregnant woman's characteristics on birth outcomes and influence on the MMR in this area; this could lead to suggestions for ways of reducing maternal mortality. The positive social implications are that the results of this study could help health practitioners develop culturally appropriate educational messages during antenatal and postnatal sessions and also find a way to ensure pregnant women receive adequate antenatal care services.

Understanding the health literacy level and health care needs of pregnant women may lead to educational and training opportunities to empower women in the study area and Nigeria in general.

Results from this study could promote positive social change by helping health professionals identify the characteristics of at-risk women during antenatal education sessions and assisting with the development of targeted antenatal care interventions. This may potentially help to reduce maternal health complications and improve pregnancy outcomes.

Summary

Maternal mortality remains a great concern around the world despite the fact that there are preventable measures available. Women, especially in Nigeria and in other developing countries, are still dying as a result of pregnancy-induced complications. In this study, I examined the association between maternal characteristics including education level, adequacy of antenatal visits, the development of medical conditions during pregnancy, and maternal pregnancy outcomes.

Researchers have shown that there is correlation between women's education level and health care decisions ((Babalola & Fatusi, 2009). In this study, I examined the participants' education level and how that could impact their health decisions. I also looked at other maternal characteristics to see how these affect the way a pregnant woman attends to antenatal care and how this could impact pregnancy outcomes. The independent variables were maternal health literacy, frequency of antenatal visits, number of antenatal visit, timing of the start of antenatal care, and problems developed during

pregnancy. The dependent variable was pregnancy outcomes, and it was measured by the birth status of the child, which is either a healthy or unhealthy baby.

In Chapter 1, I provided an overview of the purpose of the study, the research question and how the question would be answered, outlined the scope and theoretical framework for the study, the research design, assumptions, limitations, and significance of the study. In the next chapter, I will provide a literature review, which included the review and analysis of the existing research to find the gap that I attempted to fill with this study. Chapter 2 will also include my thought process behind the selection of the literature I used in the study and the databases used to search for literature relevant to the study.

Chapter 2: Literature Review

Introduction

One of the major concerns of the global community is maternal mortality (Hogan et al., 2010). Researchers have indicated that maternal age, marital status, education level, and occupation all play significant roles in identifying women who are at high risks for pregnancy complications that could lead to maternal deaths (Romero-Gutierrez et al., 2007). It is unfortunate that in this age of improved technology and medical advances that some women are still having negative pregnancy outcomes that may result in death (Oye-Adeniran et al., 2010). Characteristics such as education level, age, occupation, income, religion, and cultural beliefs could be factors in whether or not a woman uses antenatal care services during her pregnancy, and it has been reported that having antenatal care and access to antenatal information throughout pregnancy increases the chance of having a successful pregnancy and healthy child (Anya et al., 2008). Antenatal care provides the opportunity for pregnant women to receive information and education about pregnancy and how to have successful pregnancy outcome. Researchers have shown that educated women when compared to uneducated women have better pregnancy outcomes (Harrison, 1985).

I conducted this study to examine the association between maternal health literacy, antenatal care, development of medical conditions during pregnancy, and pregnancy outcomes in Lagos State, Nigeria. While researchers in the northern and eastern parts of Nigeria have shown a positive relationship between maternal education and better pregnancy outcome (Idris et al., 2007; Ifenne et al., 1997; Ikeako et al., 2006),

this relationship remains to be examined in the southwestern part of the country. Also, health literacy is critical in health communication, and the health literacy level may limit a patient's understanding of their medical conditions, thereby creating a barrier in discussing their health risks and treatment options (Davis et al., 2008).

In 2000, 149 UN members adopted eight MDGs as international agenda for the 21st century to ensure a just, peaceful, prosperous world (UN, 2015)). The leaders committed to reduce extreme poverty and to strive to achieve these goals by year 2015 (UN, 2015). The MDGs were adopted to:

Eradicate extreme poverty and hunger; achieve universal primary education; promote gender equality and women empowerment; reduce child mortality; improve maternal health; combat HIV/AIDS, malaria and other diseases; ensure environmental sustainability; and develop a global partnership for development. (UN, 2015, para. 4)

As a result of the importance attached to maternal mortality, the goal of MDG 5 was to reduce the MMR by three quarters, between 1990 and 2015 (UN, 2015) and improvements were made worldwide. In 2013, there were 289,000 maternal deaths globally and this estimate showed a 45% decline from the figures obtained in 1990 (UNICEF, 2013). The WHO indicated that maternal mortality rate globally was 210 maternal deaths per 100,000 live births in 2013 compared to 380 maternal deaths per 100,000 live births in 1990 (UNICEF, 2013). While this reduction shows progress and a movement towards the achievement of the MDG 5, these numbers should be concerning

especially since two continents, Africa and Asia, make up 86% of global deaths with 62% and 24% respectively (UNICEF, 2013).

According to the 10th revision of the International Statistical classification of Health Diseases, maternal death is defined as:

The death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes (UNICEF, 2013, p. 3).

Causes of maternal deaths have been classified as direct and indirect. The direct causes of maternal deaths are deaths that occur as a result of complications due to pregnancy or management of the pregnancy (Hogan et al., 2010). In essence, the death would not have occurred if the woman had not been pregnant. Indirect causes of maternal mortality are a result of preexisting conditions aggravated by the pregnancy state (Hogan et al., 2010). Many reasons have been advanced for maternal deaths, so the knowledge of the final cause or causes of maternal death is important to study to ensure provision of resources to help improve the incidence of maternal mortality.

In this study, I explored the influence of maternal characteristics, antenatal care utilization, and maternal health literacy on pregnancy outcomes in Shomolu local government area of Lagos state, Nigeria. This topic is important because a woman's characteristics and health literacy level may mean the difference between understanding and attending to antenatal messages that could impact pregnancy outcomes and can also

make a difference in the reproductive behavior and health of the woman (Schnell-Anzola, Rowe, & LeVine, 2005).

The chapter will begin with an overview of the literature search followed by a discussion of the theoretical constructs for this study, SCT and the HBM. I will also provide a historical and geographical overview of Nigeria as a nation and the demography of the people of Lagos state before moving on to discuss maternal mortality in Africa and in Nigeria. Also, in this chapter I will examine the historic overview of health services and health provision in Nigeria, the role of women in the society, women's education, and antenatal education. In the rest of the chapter, I will focus on the discussion of the variables addressed.

Literature Search Strategy

Google Scholar, PubMed, ProQuest, Science Direct through Walden University and Ebscohost were the primary library databases I used to search for materials for this literature review. Various search terms like *maternal health and Africa*, *maternal mortality and Africa*, *antenatal care*, *pregnancy and disabilities*, *maternal deaths in Nigeria*, and *pregnant women and education level in Nigeria* were used, but the ones that yielded the most results were *maternal health* combined with *Africa* and *women's health* combined with *maternal mortality* and *antenatal care*. Although my search was limited to articles published in English, the date of publication was not necessarily limited to the last 10 years. This was because of the dearth in current literature on the topic and the need to look at what research was conducted historically on maternal mortality in Nigeria.

When sorted by topic, I retrieved 2,307 articles, and when filtered to the last 10 years, the search yielded 2,023 articles and sources. Only academic and peer-reviewed articles were reviewed for this study, and when sorted with those criteria, 574 articles were retrieved. A search through dissertations and theses was also conducted and three dissertations were retrieved from the Walden Library database of thesis and dissertations. A similar search from all dissertation and theses databases produced 78 results. The search terms I used were *maternal health and Africa*, *maternal mortality and Africa*, *antenatal care*, and *education*. Since only 78 dissertations were retrieved with those terms, the references of the dissertations were searched for additional articles. The final articles selected for review were included if they addressed maternal mortality; maternal health; antenatal care; postnatal care; and women's health in developing countries, in Africa and especially in Nigeria.

My search on maternal morbidity in Nigeria yielded 3,281 results, but when it was filtered by journal as the content type 111 articles were found. Also, Medline was searched for articles published anytime with a combination of the search terms of *maternal health literacy*, *maternal education level*, and *maternal mortality level worldwide*. There were 25,005 materials retrieved for global maternal mortality. When I conducted the same search limited to Africa, 1,291 articles were retrieved. A search for maternal mortality in Nigeria yielded 668 articles. For maternal health search, only 303 articles were retrieved, most of which were not applicable to the study. A combined search of maternal mortality and maternal health literacy on Medline produced six articles for Nigeria with only two articles applicable for the study; a similar search for

Africa produced five results with only one article on literacy. When maternal health literacy was used as search term for Nigeria only 11 articles were retrieved and only three articles were applicable for the study.

I needed background information on Nigeria to explain the history, culture, location, and social economic factors in the country that affect maternal health. In order to find this background information, I used the specific search terms of *Africa, Nigeria, Lagos, Lagos state, Shomolu, Lagos Island, Ministry of Health in Nigeria, Health system in Lagos state, the most populous city in Africa* and *location of Lagos state*. The Google search engine was used for information on Lagos and Nigeria because I found more information with credible sources this way. However, there was limited information on the history and demography of the Shomolu local government, so the information I retrieved from the Lagos State government website was used. Information from the Lagos State ministry of health was also used. Shomolu local government maintains a website, but at the time of the study, there was no information relevant to this topic found there.

To search for a health literacy tool, I reviewed many websites, but the most productive search was through Health and Psychosocial Instruments database accessed through the Walden University Library. My search for health literacy assessments yielded 53 results of articles where some sorts of health literacy assessment tools were used. However, when a limiter of *adult health literacy* was used, only 14 results were retrieved. There were no results for *maternal health literacy*. Of the 14 results retrieved,

11 were in English and of the 11 results that were in English, five of them used a short or abbreviated version of the health literacy tool.

Theoretical Foundation

In the development of a research study, theory provides a fundamental ground to start from and which to determine the methods and direction for the research study (McEachan, Lawton, Jackson, Conner, and Lunt (2008). According to McEachan, Lawton, Jackson, Conner, and Lunt (2008), theory can guide how behavior may be changed and allows a researcher to evaluate the reason(s) for the occurrence of the change and whether the changes in behavior are due to changes in one theory or another. The choice of a theory used in public health research shapes the way a study is constructed. I used SCT and the HBM for the theoretical framework of this study.

Social Cognitive Theory (SCT)

SCT has been used to explain behavior as how interaction between behavior, interpersonal factors, and a person's environment all interact and determine each other (U.S. Department of Health and Human Services, 1989). Determinants of a behavior in SCT are not only the intrinsic factors, which makes a person a product of the environment, rather SCT posits humans have influence on what they do, what their individual characters are, and how they respond to their environment, thereby defining their environment (U.S. Department of Health and Human Services, 1989). Because these factors work together, change in one is expected to affect the others. SCT explains how personal, behavioral, and environmental factors influence each other how these behaviors can be modified (National Cancer Institute, 2005).

Bandura (1998) posited that self-efficacy, outcome expectancies, and goals will change a health behavior. This is because behavioral change and the maintenance of the new behavior is as a result of the expectations of the outcome that could result from the new behavior and the expectations of an individual's capability to perform the new behavior (Strecher, DeVellis, Becker, & Rosenstock, 1986). This theory can be used as a conceptual framework that helps in understanding factors influencing human beings and how learning occurs (Glanz et al., 2008). Human functioning is a mutual interaction between environmental factors, behavior, and personal factors like outcome expectancies and self-efficacy (Ford et al., 2002).

Since the interplay of personal, environmental, and behavioral factors are explained by SCT in program intervention, I used the theory to analyze how the environmental factors such as home, work place, and community; behavioral factors such as following doctors' instruction, asking for clarification of instruction, and antenatal care visits; and personal factors such as hygiene, health of the mother, literacy level, and ability to comprehend written and oral instructions all work to affect a pregnant woman's behavior. Availability of health care facilities, access to care, transportation availability, and education of young girls are environmental factors that I explored using SCT in this study. When a community places emphasis on the education of their girls and efforts are made to ensure that pregnant women understand the antenatal messages and early warnings of pregnancy complications, there is possibility of reduction in maternal deaths due to awareness and literacy level (Jain & Bisen, 2012). Social support during

pregnancy may reduce anxiety and encourage the use of medical facilities, which could lead better pregnancy outcomes (Elsenbruch et al., 2007).

Since SCT focuses on acquisition and maintenance of certain behavioral patterns, I used components of the theory such as self-efficacy, outcome expectations, and enactive learning, in this study. The focus on acquisition of learning through self-efficacy and skills was expected to lead to change in pregnant women's behavior because knowing that they have the power to protect their pregnancy by following some guidelines would be empowerment for the pregnant women. Observational learning is one of the concepts of SCT (Glanz et al., 2008) and by watching the actions and behaviors of other pregnant women, pregnant women may be more likely to adopt their behavior, which is the expectation of the intervention. According to Bandura (1998), to change a behavior, a person will have to believe that such a change will lead to certain outcome.

One of the tenets of the SCT is that human behaviors are determined by incentives and expectations (Bandura, 1998). These expectancies are self-efficacy expectations. There are environmental cues and outcome expectancies, which is belief about how an individual's behavior will influence outcomes. In order to improve pregnancy outcomes and support the pregnant women's own health and well-being antenatal/antenatal care programs should be available to all pregnant women. Ford et al. (2002) concluded that women who are unmarried, from a low social economic background, under the age of 20 and who have less than a high school education are often at risk for obtaining inadequate antenatal care. This study looked at the education level and social economic status of the

women attending antenatal care to evaluate the impact of education on the usage of antenatal care services.

Health Belief Model (HBM)

HBM was used to understand how individuals relate to health-related matters. The model was originally developed by Rosenstock and Kegels in the 1950s to explain poor usage of preventive care services (Edberg, 2007). The HBM seeks to explain that for an individual to take actions that would prevent an adverse health condition, the individual must perceive they are susceptible and they must perceive the condition as serious (Edberg, 2007). Thus, for a pregnant woman to utilize the available antenatal care services, they must perceive their condition, pregnancy, as serious and that they are susceptible to pregnancy complications.

The HBM theory is based on the assumptions that if a person feels that taking an action could help to improve a negative health condition, the person would likely take action; a person has a positive expectation that taking the recommended action would be effective at preventing negative health conditions and the person believes she can take the actions (Glanz et al., 2008). There are six constructs in the model: a) self-efficacy--a person's confidence in his or her ability to take action in respect to that behavior, b) perceived barriers to taking the suggested action, c) perceived severity in one's opinion about the seriousness of the health matter and what the consequences are, d) perceived susceptibility is the chances of getting the condition, e) perceived benefits of taking an action, and f) cues to action and self-efficacy in respect to that action (Glanz et al., 2008).

Austin, Ahmad, McNally, and Stewart (2002) examined factors influencing breast and cervical cancer screening behavior in Hispanic women in Toronto and found embarrassment, fear of cancer, cultural beliefs, and limited ability to speak English as major perceived barriers to cancer screening. Although many women understand the usefulness of mammography in successfully detecting breast cancer early they do not see themselves as vulnerable if they have no family history of the disease or do not have the symptoms, thus they consider screening for breast and cervical cancer as unnecessary (Austin et al., 2002). This is an important area to focus on because many women may not go for antenatal care if they are physically healthy or unaware of the importance of antenatal care (Gazali, 2012). The HBM was used in this study to assess perceived susceptibility of pregnancy complications by the pregnant women as a result of not knowing what to look for during pregnancy. Also, perceived severity of the complication awareness would be measured by asking questions relating to pregnant women's knowledge of what could happen during pregnancy and how to find answers. Perceived barriers to attending antenatal clinics would also be included to gain understanding of how these beliefs and barriers affect maternal health.

Literature Review

The review of literature gathered information on the maternal health in Africa, characteristics of Nigerian women, causes of maternal health problems in Nigeria, health literacy, and how early antenatal care can be beneficial to both the mother and the unborn child.

Maternal Mortality in Africa

One of the MDGs adopted by the international community in 2000 is improving maternal health (WHO, 2014). Although a number of countries have reduced their maternal death level since 1990 the decrease is still far from the intended numbers needed to meet the MDG5 (WHO, 2014). The MDG5 was not met as a result of the high number of maternal mortality, in developing world as 99% of maternal deaths occur in developing countries but over half these deaths occur in sub-Saharan Africa (WHO, 2014). The trend in maternal mortality in Africa is concerning. The lifetime risk of maternal deaths ranges in 1 in 4,000 in developed countries, but the risk is 1 in 38 women in sub-Saharan Africa (UNICEF, 2013).

Sub-Saharan Africa alone accounted for 62% of global deaths in 2013. Africa has a 100% to 200% increase in rates in maternal death with a ratio of 1:15 women dying from pregnancy (Abdoulaye, 2005; UNICEF, 2013). Some of the reasons that have been suggested for the high rate in maternal deaths in Africa include hemorrhage (30%), sepsis (18%), eclampsia (13%), and complications from abortion (10%; Abdoulaye, 2005). This is different from the developed countries where hypertensive disorders such as eclampsia are the primary causes of maternal mortality and hemorrhage accounts for only 13% and (Alvarez, Gil, Hernandez, & Gil, 2009). Indirect causes, which are preexisting disease not caused by pregnancy but are made worse by pregnancy, represent 20% of the total deaths (Alvarez et al., 2009). Alvarez et al. (2009) found that in countries where women had higher education, the MMR were lower and in these countries, there was overall increase in the general health of the population. This could be because education shapes

the way a person thinks or acts. Smith-Greenaway (2013) also found a relationship between a mother's former education and lower risk of child mortality.

Maternal Mortality in Nigeria

Several reasons have been put forward for the high rate of maternal mortality in Nigeria. Many of these reasons deal with medical causes of maternal mortality and morbidity. Obeichina et al. (2013) showed that hemorrhage, sepsis, pre-eclampsia, and ruptured uterus were the major direct causes of maternal mortality in this area and Bukar et al. (2014) showed that most maternal in deaths in Yola, northern part of Nigeria, were caused by preeclampsia/eclampsia, obstetric hemorrhage, and severe anemia. It is not unusual for pregnant women to be anemic during pregnancy, but severe anemia has been found to contribute significantly to maternal morbidity and mortality (Broek, 2003). The World Bank data revealed that 58% of pregnant women in Nigeria suffer from anemia. Although this medical cause will not be included in this study, it is important to be aware of this, learn how health care workers address this during antenatal visits, and identify implications for those who do not utilize antenatal services.

Pregnancy Complications/Disability

According to the WHO (2005), maternal deaths can result from pregnancy related complication which can occur during pregnancy, child birth or postpartum period. While 11% to 17% of the deaths occur during childbirth, approximately 50% to 70% of the deaths occur in postpartum period (WHO, 2015, p. 5) and this makes it important to know what the pregnant women are taught and how the messages are developed during antenatal period to handle complications that could occur during pregnancy. Ashford

(2002) noted that the leading causes of death and disability of women in the productive age, between 15-44 years, in developing countries is maternal complications. This is because the disabilities that affect these women in the prime of their lives are preventable and can occur during or after birth and can last as long as life time (Koblinsky, 2012).

These complications could be described as direct and indirect causes. Direct causes are mainly as a result of complications resulting from error of omission, intervention or incorrect treatment which could results from the following four major direct causes: hemorrhage, infection, eclampsia and obstructed labor (WHO, 2005). In Nigeria, one of the leading maternal complications is hypertensive disorder which may be preexisting or induced by pregnancy and this could have severe consequences on the mother and child (Singh et al., 2014). It has been reported that 5% to 10% of pregnancies in Nigeria are complicated by hypertensive disorder and is a major cause for hospitalization during the antenatal period (Singh et al., 2014). Early antenatal intervention will help to reduce incidence of progression of preeclampsia to eclampsia and better care for women who may be at risk of developing further diseases. Indirect causes of pregnancy complication that may lead to disability include malaria, hepatitis, diabetes, cardiac disease, malaria and sexually transmitted diseases and anemia; they pose health risk to the mother and unborn child (Ashford, 2002).

Nigeria

With a population of 134 million, Nigeria is 2.04% of the world population (National Population Commission [NPC] and ORC Macro, 2013). Nigeria is the most populated country in Africa and one of the 10 countries with the highest population (NPC) [Nigeria] and ORC Macro, 2013). Nigeria lies between latitudes 4°16' and 13°53' north and longitudes 2°40' and 14°41' on the eastern side. Nigeria is bordered by Cameroon in the east, Niger in the north, Benin in the west and by Badagry in the South and approximately 850 kilometers of the Atlantic Ocean (Nigerian Demographic and Health Survey, 2008). The fourteenth largest country in Africa, Nigeria has a total land area 923,768 square kilometers (Nigerian Demographic and Health Survey, 2008). In 1960, Nigeria received independence from Britain (Adetunji, 1992). Nigeria has an estimated 374 ethnic groups with different dialects but these groups can be grouped into three major groups, Yoruba, Igbo, and Hausa. Currently, there are 36 states in Nigeria and a Federal Capital Territory (FCT; Nigerian Demographic and Health Survey, 2008).

Population Distribution

The population of Nigeria is not evenly distributed across the country. While the country is divided into north, south, east and west mainly because of language and culture, some areas are densely populated while others are sparsely populated. According to the Nigeria Demographic and Health Survey (NDHS; 2008), the Nigerian average population density in 2006 was estimated at 150 people per square kilometer and states like Lagos (South), Abia, Akwa Ibom, Imo, and Anambra (all in the Eastern part of Nigeria) were considered most densely populated states (NDHS, 2008). The colonial era

and pre-establishment of medical services pointed to the fact that getting antenatal care is essential during pregnancy, labor, and post-delivery. As far back as 1930 the usage of health provider either by faith organizations or traditional healers have been associated with positive maternal outcomes but there are social and economic reasons that made access to these services not accessible to all (Adetunji, 1992).

Lagos State, Nigeria

Nigeria is divided into three regions: the northern region, the eastern region and the southern region. The study will be carried out in the southern part of Nigeria, specifically in Lagos state. Lagos state has been chosen because it is the most industrial state in the southwestern part of Nigeria and it has more mixed population than any part of Nigeria (Lagos State Government, 2011). Many residents of Lagos state are from the north, east, west, and southern part of Nigeria and foreigners also mainly reside in Lagos State.



Figure 1. Map showing some of the local government area boundaries of Lagos State. Reprinted with permission from Lagos State government.

Lagos state is the smallest state in Nigeria but the most populous in the nation (Lagos State Government, 2011). According to the UN (2012), it is one of the one of the world's five largest cities by 2005. Metropolitan Lagos is home to over 85% of the State population (Lagos State Government, 2011). Lagos State is different and unique in characteristics when compared to the rest of the nation. Unlike other parts of Nigeria, 90% of the Lagos State population has access to electricity and the city consumes 45% of the energy of the country (UN, 2012). The city is naturally surrounded by water but in spite of this there is acute and worsening water supply and inadequate sewerage disposal with much the city's human waste disposed of by the drainage of rainwater through open

ditches that releases onto the tidal flats (UN, 2012). There are 17,552,942 people in Lagos with 9,115,041 males and 8,437,901 females all in the 20 local government councils of the state (Lagos State Government, 2011). As at 2006, the population of Shomolu Local government area was one million, with a population projection of 1.3 million in 2012 (Lagos State Government, 2011).

This study was located in the Shomolu local government in Lagos state. Located in the south-western part of Nigeria, Lagos use to be the capital of Nigeria before the capital was moved to Abuja in 1992 (Lagos State Government, 2014). Lagos State is considered the economic nerve center of Nigeria due to the large concentration of industries, major seaports, financial institutions and tourist sites (Lagos State Government, 2014). Geographically, Lagos is the smallest out of the 36 states in Nigeria, with an area mass of 3,577.28 km², which is further reduced by creeks, rivers, lagoons, and swamps, but it is the most populated with a population of over 21 million (Lagos State Government, 2011). As would be expected in most urban areas, Lagos State is highly congested and over crowded with poor roads, limited amenities, and access to health care (Aluko, 2010). Although the current government is working hard to provide amenities there are limited resources to go around and it is also interesting to note that Lagos State also has areas that could be referred to as elite area with low-density population and occupied by elites, foreign businesses, and high-income group (Expatararrival, 2015).

There are 20 local government councils and 37 local council development areas. The study will focus on Shomolu local government council, an area that could be

described as low-to-middle income residential area which has one of the highest levels of literacy in those who are age 15 to 49 years (Lagos State Government, 2011). In a recent study by the Lagos state government in 2011, 87% of the participants were found to be literate in English and 75% are also literate in other languages (Lagos State Government, 2011).

Maternal Health in Nigeria

Maternal health is the overall health of a woman during pregnancy, during childbirth, and during the postpartum period (WHO, 2014). When a woman is pregnant, there should be specialized care for the safety of the mother and the child. Even in the historical society of Africa, before education or civilization, traditional healers were responsible for ensuring safe delivery of pregnant women and providing obstetric care and divination (Adetunji, 1992). At the time of birth, the female members of the household would assist the pregnant woman with the birth and if there were complications the traditional healers would be call upon to assist (Adetunji, 1992). With the advent of Christianity there was a shift to mission houses for healthcare because Christian converts did not want to be seen with herbalists or traditional healers in order not to compromise their faith (Harrison, 2009). This is an important development because church organizations became pioneers of modern health care services in Africa in the colonial era (Adetunji, 1992).

The Church Missionary Society of Nigeria partnered with the colonial government to raise midwifery standard to the British standard by meeting the healthcare needs of the people and improving their ways of live (Harrison, 2009). Although there

was no record of mortality or fatality, it could be assumed that there must have been a high percentage of maternal mortality in the pre-colonial era and this was why the church introduced the concept of maternal care. The aim of obstetrics care was to reduce maternal mortality and this was done by providing antenatal care, identifying danger signs that could lead to adverse pregnancy outcomes, and facilitating early intervention of such maternal complications (Adetunji, 1992).

The influence of churches in this era provided a way of looking at the future of obstetric care. The introduction of Christ Apostolic Church (CAC) pregnancy care in 1930 led to the creation of school of midwifery and midwives were trained in England by the Church Missionary Society of Nigeria (Adetunji, 1992). By 1949 there were 51 maternity homes to handle 6500 deliveries in a year and the ratio of maternal mortality was 46 per 100,000 births (Harrison, 2009). Within CAC, it was mandatory for women to register their pregnancy early and attend weekly meetings. The mandatory weekly meeting was used for teaching the pregnant women, praying for them, and praying for their unborn babies (Adetunji, 1992). Topics covered in these meetings included sexual education such as safe sex during pregnancy and when to stop, pregnant women's state of mind and when to be concerned, and work habits including posture, physical exercise, weight lifting, health, and hygiene (Adetunji, 1992). Large-scale community health education was combined with the establishment of maternity homes operated by trained midwives with thorough supervision and established measures to ensure efficiency and boost staff morale (Harrison, 2009).

Antenatal Care

Antenatal visits have been found to lower the chance of maternal deaths (Taguchi et al., 2004). Antenatal or antenatal care visits are the visits women make to the health care practitioners during pregnancy and these visits are important because pregnant women have the opportunity to learn more about pregnancy, what to expect during labor, and how to take care of their newborn (Jennings, Yebadokpo, Affo, & Agbogbe, 2010). Antenatal visits also provide an opportunity for screening, routine examination, treatment, counseling, and access to information to help pregnant women have a successful pregnancy and prepare them for what to expect in the next months (Jennings et al., 2010). Access to this information and services during pregnancy is effective for improving maternal health. The need for antenatal care is further justified by the number of deaths that occur among women who are not registered for delivery (Ekott, Ovwigho, & Ehiegiegba, 2012). Antenatal care visits present an avenue for the women to be screened for disease treatment and prevention. Also, attending antenatal care program provides the opportunity for pregnant women to be aware of pregnancy complication and to seek help early when needed (Ekott et al., 2012).

The timing of when a pregnant woman goes in for the first antenatal visit is important to diagnose any abnormalities and to ensure appropriate and early intervention and treatment (WHO, 2002). According to the WHO (2002), the first antenatal visit should occur before or during the twelfth week in order to get accurate medical and obstetric history that would allow for adequate follow up and identification of supports needed for successful pregnancy. With 920 deaths per 100,000 live births, sub Saharan African is noted as the region with the highest level of maternal mortality (Alvarez et al.

2009; McTavish et al. 2010). This statistic is not too different from UNICEF's claim that Nigeria loses about 145 women of childbearing age to pregnancies every day (UNICEF, n.d., para 2). Many reasons have been suggested for this high number of maternal deaths and they include direct causes like hypertension, bleeding/hemorrhage, obstructive labor and hypertensive disorder (Alvarez et al. 2009). According to Harrison (1997), fundamental issues of poverty, illiteracy, unbooked emergencies (pregnant women who did not register for antenatal services but who were rushed to the hospital as a result of pregnancy complications), and governmental economic policies were the major causes of maternal mortality 15 years ago. Much has changed in 18 years but the statistics on maternal mortality in Nigeria are becoming worse and baffling to researchers (Mojekwu & Ibekwe, 2012).

Role of Religion and Religious Beliefs on Pregnancy Health

Religion and religious beliefs have been shown to impact how health services are used and perceptions of the efficacy of modern services (Gazali et al., 2012). Gazali et al. (2012) found that women tend to remain in the house and rely on their Muslim religious leaders' ritualistic reading of the Quran to protect the pregnant woman and the unborn child instead of going to health facility. This author revealed religious and traditional beliefs still influence maternal mortality in Nigeria and it is important to address this to evaluate if religious practices of a woman still impact their utilization of antenatal clinics and their attendance to the message received. The importance of formal education in these instances cannot be over emphasized because education creates awareness that will create knowledge. The ability to read and understand antenatal

message may have a protective effect on acceptance or rejection of traditional practices that could affect maternal mortality.

Researchers found that uneducated women may not be able to obtain the help of professional health services because of lack of awareness of availability of such services or as a result of fear or alienation they feel with modern health care facility while women who are educated have better understanding of health system process and are less disposed to accept traditional practices (Gazali et al., 2012). Since religious beliefs and taboos can impact a woman's choice of health and treatment during pregnancy (Gazali et al., 2012), they can also affect early detection of warning signs of pregnancy complications and response to such signs or warnings since antenatal visits help to detect and treat adverse pregnancy related outcomes (Adekanle & Isawumi, 2008).

Religious and traditional beliefs are factors affecting maternal mortality in Sub-Saharan Africa and it is important to address these to maintain maternal health. Chiwuzie and Okolocha (2001) noted that bleeding during pregnancy was considered normal and many taboos associate with pregnancy include not eating eggs, snails, or sweet foods like milk to prevent pregnancy complications. Religion and religious beliefs have been shown to influence the use of health services and perceptions of the efficacy of modern services (Gazali et al., 2012). These authors illustrated how reliance on traditional taboos and religion can impact a pregnant woman's decision to seek medical help during pregnancy and the type of treatment they receive.

Social Economical Status and Antenatal Services Utilization

Eighteen percent of females in urban areas and 7% in rural areas have completed secondary school level education compared to 22% of males in urban areas and 11% in rural areas that completed secondary school education (NPC & ICF Macro, 2009). This can lead to gaps in socioeconomic status as more education is correlated to more income. As a result of poverty, many women may not be able to afford antenatal care during pregnancy or medical care for their baby after the child is born. Babalola and Fatusi (2009) found there is low use of medical facilities by women with low literacy level in Nigeria. This association between poverty and literacy was also supported by McTavish, Moore, Harper, and Lynch (2010) who reported that in countries with lower literacy levels, women in poor households were less likely to use maternal care.

Ogunlesi (2004) found that women from higher social economic backgrounds are more likely to value and use antenatal care and delivery services during pregnancies. These women would most likely be able to take prompt and cost effective health decisions when compared to women from lower social economic background. Furthermore, when women are employed they tend to have higher economic status, which leads to better usage of antenatal services (Kabir et al., 2005).

Pregnant women are expected to visit medical facilities to have medical personnel check the growth of the growing baby and their overall health. Unfortunately, some women do not do this and it is evidenced in the findings that most deaths happen within 24 hours of admission as a result of delay in going to health facility (Bukar et al., 2014). A recent report on the progress of MDG 5 concluded that “proven health-care intervention can prevent or manage these complications, including antenatal care in

pregnancy, skilled care during childbirth and care and support in the weeks after childbirth” (UN, 2015, p. 39).

Nigeria, unlike developed countries, does not track statistics relating to maternal mortality and most of the data available are based on hospital research conducted by other researchers (Adegoke, Lawoyin, Ogundeji, & Thomson, 2007). Because most births are not recorded or take place in a medical center there are no accurate statistics on number of pregnancy and childbirth related deaths (Adegoke et al., 2007).

Maternal Age and Pregnancy Outcomes

According to the World Bank Report (2014), women constitute 49% of the Nigerian population and 23% of these women were teenage mothers between 15-19 years of age. It is important to consider the maternal age of women and how this could impact maternal mortality because of the implication for maternal maturity and biological readiness. Age and parity are considered major biological determinants of rate of maternal mortality in some parts of the world.

In Sweden, the optimum child bearing age is considered between 20 and 29 years and risk of maternal death for women younger than 20 years and older than 29 years are two to six times higher (Högberg & Wall, 1986). Researchers in Pakistan found women under 19 or over 39 years of age are at a greater risk of maternal death (Midhet, Becker, & Berendes, 1998). Having a child early in life, during the teenage years, could limit a young girl’s opportunity for better education or ability to get a good job, but delaying motherhood to later years could lead to pregnancy complications as well (World Bank, 2014). Jacobson, Ladfors, and Milson (2004) found that the risks of miscarriage,

gestational diabetes, and preeclampsia increased in women between 40 to 45 years. Age would then be an important variable to consider as having an impact on education, standard of living, pregnancy complications, and pregnancy outcomes.

Status of Women, Literacy, and Pregnancy Outcomes

Status of women in Nigeria. In the traditional Nigerian society, women were important in the economic sphere because of the roles they play in virtually all areas of farming activities such as land clearing for farming, produce processing and marketing (Anugwom, 2009). Women are often the ones who keep the household while holding down a job or trade, and they sometimes may not have the time to take care of themselves or may not consider it a priority. However, with education, a pregnant woman would be sensitized to the importance of caring for herself during pregnancy so she could have the time and energy to care for her family. Thus, educating women could be viewed as an investment not just for the family but also for the nation (Anugwom, 2009).

Generally, a healthy pregnancy outcome is a result of the care a mother receives during and immediately after antenatal visits. Most significant is the care received during the antenatal period because during the antenatal care visit, a new or seasoned mother would get information about pregnancy care and how to care for themselves and their children. Babalola and Fatusi (2009) found that most Nigerian women have a lower usage of maternal health facilities and a lower usage of skilled assistance during delivery than those from other African countries. Low usage of maternal facilities during pregnancy could be connected to the education level of these women. These authors found a statistically significant positive association between education and use of maternal

services (Babalola & Fatusi, 2009). Education leads to information seeking behavior which could lead to higher level of health awareness and better knowledge of available health services and resources (Babalola & Fatusi, 2009). A low educational level leads to a low literacy level which is associated with less optimal health outcomes and information seeking behavior (Shieh, Mays, McDaniel, & Yu, 2009).

Literacy. When women are educated and literate they are more likely to use antenatal care services during pregnancy, visit health facilities more often during pregnancy, and most likely deliver at a health facility (Iyaniwura & Yusuf, 2009). As a result of antenatal care and health facility usage there would be access to information that these women could use and this could help in reducing maternal mortality and also improve health in general. Women's educational level attainment has been linked to their comprehension of health message and understanding of medical instruction (LeVine, LeVine, Rowe, & Schnell-Anzola, 2004) and also to birth and death rates (LeVine et al., 2004). Ferguson (2008) reported that individuals without a high school education are more likely to have lower literacy than those with a high school education. Deficiency in literacy affects health seeking behavior and information seeking abilities (Shieh et al., 2009). This is because there are many information sources currently and the ability to seek and use information is dependent on a woman's education level. In examining the relationship between comprehension of health information and literacy skills among young mothers in Zambia, Stuebing (1997) found that school-acquired literacy skills, and especially oral "decontextualized" language skill, are indeed a missing link in the relationship between maternal schooling adult comprehensions of health information.

Although conducted in 1997, the results are still relevant today because of the findings of the relationship between maternal schooling and ability to comprehend and act upon new information outside the home.

Okereke et al. (2013) found a significant association between education, knowledge of maternal danger signs, and knowledge of antenatal visits. They confirmed the importance of education to understanding maternal danger signs because there was significance in having some form of education and being aware of safe motherhood practices. However, this study was carried out in rural settings and findings may not be generalized to urban setting like Shomolu. Also, antenatal visits in this study did not include the kind of messages women receive and how these messages help to shape the women's antenatal behaviors.

It is generally said in Africa that “if you educate a man you educate an individual, but if you educate a woman you educate a family (nation)” (Suen, 2013, p. 66). This is also true of maternal education. When mothers are able to read, they are able to comprehend written health information and even auditory health messages used in developing countries (Levine et al., 2004). Understanding of these messages is important to adopting healthy behavior that has been found to lead to children survival which may also translate into maternal survival (Levine et al., 2004). Although Levine et al. (2004) showed an association between a mother's literacy skills and the survival of the child, there is a need to confirm in Nigeria if there is such an association between a mother's education level, maternal health literacy, and pregnancy outcomes. This study provided investigation of these associations.

Understanding basic information about one's health may include written directions or reading materials and the ability to process this information may be critical to making life and death decisions (LeVine et al., 2004). Mojekwu and Ibekwe (2012) found there is a need to improve maternal education since this is one of the factors responsible for high maternal mortality in the past in Nigeria. Maternal education could lead to empowerment of women in making decisions about issues that concern them and the infants they are carrying.

Decision-making skills are needed to navigate pregnancy, childbirth, and child rearing and individuals with limited education may find it difficult to carry out such functions without encountering difficulties (Ferguson, 2008; Shieh & Halstead, 2009). When given materials containing information on how to implement their care, it becomes difficult for people with low education to understand and carryout the instructions in their care plan (Ferguson, 2008). Nikiéma, Beninguisse, and Haggerty (2009) researched the extent to which women in 19 countries in sub-Saharan Africa remembered receiving information about complications in pregnancy during their antenatal visit and if it impacted the likelihood of delivering their babies in health institutions or at home. They found that pregnant women were not routinely provided with information about pregnancy complications during their antenatal care visits or the information was not provided in a way that the women remembered the information. It is important to look at the information being given to pregnant women to see if education level is one of the reasons for not remembering this information and if not remembering antenatal

information has implications for unmet needs and what the impact is on maternal outcomes.

Antenatal care visits should be used to inform and educate pregnant women about what to do and what to expect during pregnancy, care for the newborn, and necessary postnatal care. Anya, Hydera, and Jaiteh (2008) found that, in spite of repeated visits to the clinics, pregnant women in their study did not benefit from effective information, education, or communication since most women reported spending few minutes with the care providers and could not recall being informed about important subjects as nutrition and diet, family planning, care of the baby, place of birth, or what to do in case of complication.

Rothman et al. (2004) determined that it is difficult for women with low literacy to read directions, to follow medical recommendations, and they have poorer knowledge which can lead to worse clinical outcomes. In a study in Sudan, it was observed that inadequate antenatal care and maternal education were predictors of maternal mortality (Ali & Adam, 2011); this leads to the question if this can also be true in Nigeria. There is a need to investigate the provision and use of antenatal care services, the education level of the women who use this service and socio demographic characteristics of the women who use the service in relation to maternal deaths.

Previous researchers who have studied maternal health care have found associations between maternal health care and literacy level (McTavish, Moore, Harper, & Lynch, 2010). The concept of maternal education as it affects women's health and specifically women's maternal health has been issue of discussion for researchers in the

developed world. According to the WHO's definition of health literacy, as reported in Renkert and Nutbeam (2001),

Health literacy represents the cognitive and social skills that determine the motivation and ability of individuals to gain access to, understand, and use the information in ways that promote and maintain good health. Health literacy means more than being able to read pamphlets and successfully make appointments....
(p. 381)

Thus, health literacy enables individuals to process and understand health messages in order to make better health choices. This ability to read and process health messages is said to improve a woman's reproductive behavior, which would lead to an improvement in their children's health and survival (Levine et al., 2012). Literacy skills, which includes the ability to speak and understand spoken language, read, write, and understand written language, and ability to understand the use of numbers is very important in understanding health related behaviors in different community (Ciampia et al., 2012). The United States Department of Health and Human Services Health noted that nine out of ten American adults find it difficult to understand information about their health (U.S. Department of Health and Human Services, 2014) though 99% of Americans are said to be somewhat literate (Central Intelligence Agency[CIA] Factbook, 2014). It would be interesting to find out what percentage of Nigerians can understand information about their health though 68% of the population age 15 and over can read and write (CIA Factbook, 2014). Also, the Shomolu local government is one of the areas with high number of educated women in Lagos State (Lagos state government, 2014) I sought to

find out if the women's literacy level correlates with their health literacy level, and how this impacts health mortality.

Summary and Conclusions

While there have been studies on importance of antenatal visits (Adekanle & Isawumi, 2008; Anya et al., 2008; Jennings, Yebadokpo, Affo, & Agbogbe, 2010; Okereke et al., 2013; Taguchi et al., 2004), there has not been a study focusing mainly on the impact of maternal characteristics, maternal health literacy, and antenatal visits on pregnancy outcomes in Nigeria. It is important to know what women learn during antenatal visits and if their characteristics and health literacy levels in anyway affect their understanding of antenatal services and utilization of information received. The next chapter focuses on methodology, data collection, and data analysis plans. The purpose of this cross-sectional quantitative study was to examine the high rate of maternal mortality and adverse pregnancy related outcomes by studying the predictive relationship between maternal health literacy level, the number of antenatal visits, timing of the first antenatal care visit, development of medical conditions during pregnancy and pregnancy outcomes (birth status of child, which are healthy or unhealthy baby) in Lagos. Chapter 3 focused on the research design and methodology, population under study, sample size, sample selection process, description of the instrument used for data collection, and the process of data collection and methods used in analyzing the data.

Chapter 3: Research Method

Introduction

In this chapter, I will discuss the research design, methodology, and rationale for this study; the population under study; sample size; method and procedure for data collection; the instruments used for data collection; and how the data were analyzed. The purpose of this cross-sectional quantitative study was to examine the high rate of maternal mortality and adverse pregnancy related outcomes by studying the predictive relationship between maternal health literacy level, the number of antenatal visits, timing of the first antenatal care visit, development of medical conditions during pregnancy and pregnancy outcomes (the birth status of the child, which is either a healthy or unhealthy baby) in Lagos, Nigeria.

Poor maternal health outcomes, especially the high incidence of maternal mortality rate in Nigeria, create an unacceptable major public health problem. It has been established that an approximately 287,000 women died giving birth worldwide and 99% of these deaths are from developing nations (Say et al., 2014). While some factors are medical factors, there are nonmedical and avoidable factors that could help in reducing maternal mortality. Factors such as delay in seeking medical care, delay in recognizing an obstetric problem, following medical advice, and non-utilization of antenatal care services (Ozumba & Nwogu-Ikojo, 2007) can all be attributed to insufficient education and the characteristics of the pregnant women. In this study, I examined the predictive relationship between maternal health literacy level, antenatal care, development of medical conditions during pregnancy, and pregnancy outcomes among women that are 18

years and older who had been pregnant before, but were not pregnant at the time of the study, in Lagos State, Nigeria.

To achieve this, I used a survey to gather information about the number of antenatal visits, maternal health literacy level, timing of the first antenatal care visit, development of medical conditions during pregnancy, and the outcome of the pregnancy. Also, information on maternal characteristics of these women that included their age, religion, number of pregnancies, number of children, education level, household income, and employment status were collected in order to examine the predictive relationships between these factors and pregnancy outcomes. The theoretical application of SCT and the HBM were utilized to explain how pregnant women make decisions relating to their pregnancy and the impact of the environment on their decision-making powers.

The research question that guided the study was: What is the predictive relationship between maternal health literacy levels, the number of antenatal visits, timing of the first antenatal care visit, development of medical conditions during pregnancy and pregnancy outcomes (the birth status of the child, which is either a healthy or unhealthy baby) in Lagos, Nigeria? The H_0 developed to answer this question was: There is no statistically significant predictive relationship between maternal health literacy level, the number of antenatal visits, timing of the first antenatal care visit, development of medical conditions during pregnancy, and pregnancy outcomes (the birth status of the child, which is either a healthy or unhealthy baby) in Lagos, Nigeria ($H_0: r = 0$).

I used descriptive statistics and logistic regression to analyze the data. As noted by Mertler and Vannatta (2013), the appropriate measure of the degree of relationship between two or more variables is correlation and/or regression analysis. Bivariate statistics were used to examine the correlation between the variables. According to Bhattacharjee (2012), the most common type of bivariate statistics used is bivariate correlation, which is expressed as a number between -1 and +1. The strength of the correlation was measured by how close the number is to -1 or +1. A positive correlation implies that an increase in the independent variables by one unit would result in an increase in the dependent variable, while a negative correlation implies an inverse relationship, an increase in the independent variable would result in a decrease in the dependent variable (Bhattacharjee ,2012). The null hypothesis would be rejected if the correlations between the dependent and the independent variables are statistically significant, the null hypothesis would be rejected if the p values were equal or less than 0.05 ($p \leq 0.05$).

Research Design and Rationale

Quantitative, qualitative, and mixed methods are the three research designs common in social sciences studies. The quantitative method is used to test a theory or hypothesis and to operationalize variables derived from theory and a research question that a researcher is attempting to solve (Creswell, 2009). The quantitative research method applies survey design to observe and measure opinion, attitudes, and the behavioral patterns of a population sample and then generalize the findings back to the whole population so that inferences can be made about the characteristics, attitudes, or

behaviors of the population (Creswell, 2009). The type of survey designs common in social sciences include self-administered surveys or questionnaires, interviews, structured interviews, and structured observations (Adanri, 2016). Compared to other methods, survey designs are cheaper and faster to collect, but they do not do a good of a job of studying or understanding complex social phenomenon (Adanri, 2016).

. The strategy of inquiries that are common among qualitative studies include narrative, phenomenology, ethnography, case study, and grounded theory. The qualitative research method requires “learning the meanings that the participants hold about the problem or issue, not the meaning that the researcher bring to the research or writer express in literature” (Creswell, 2009, p. 175). While qualitative research method provides opportunity to study complex social phenomenon, it is prone to researcher’s bias and subjectivity.

The research method I selected for this study was a quantitative research approach. I chose a quantitative research method based on its alignment with the research question and purpose of the study. There are four types of quantitative research designs: experimental research design, quasi-experimental research design, cross-sectional research design, and longitudinal research design (Creswell, 2009). I used a cross-sectional research design in this study because it allowed for the observation of patterns or relationships between two or more variables.

This study was a cross-sectional quantitative study of women who had been pregnant before but were not pregnant at the time of the study. Survey instruments were administered to women 18 years and older who had been pregnant or had given birth in

Shomolu local government area in Lagos, Nigeria. The independent variables examined in this study were maternal health literacy, frequency of antenatal visits, number of antenatal visits, timing of the start of antenatal care, and problems developed during pregnancy. The dependent variable was pregnancy outcomes and they were measured by the birth status of the child, which was either a healthy or unhealthy baby. The level of education and socio-economic characteristics of the women were assessed through the survey. The education level of the women was assessed by asking them what grade they completed and their socio-economic status was assessed by asking questions about their annual income. Because of the nature of the design, I collected data face-to-face, and I spent considerable time and resources on this project. The variables used in the study were also analyzed using the Statistical Package for Social Sciences (SPSS), Version 21.

Variables

Independent variables. The independent variables were maternal health literacy, frequency of antenatal visits, number of antenatal visits, timing of the start of antenatal care, and problems developed during pregnancy. I assessed health literacy level by asking questions from Dr. Chew's Literacy Screening Questionnaire (Chew et al., 2004), and antenatal care usage was measured by Kotelchuck's APNCU Index (Koroukian & Rimm, 2002). This was measured as adequate plus, adequate, intermediate, or inadequate maternal care visits based on the month antenatal care began and the number of antenatal visits.

Dependent variables. The dependent variable was pregnancy outcomes, which was measured by the birth status of the child, either a healthy or unhealthy baby.

Covariates. The covariates I used in the study included socio-economic status of family, number of previous pregnancies, religion, age, number of children, education level, household income, and employment status.

Methodology

Population to Sample

According to Frankfort-Nachmias and Nachmias (2008), the population of a study refers to the complete set of relevant units of analysis, while a population sample refers to a subset of the population that is used to generalize back to the population. The target population for this study was Nigerian women that had been pregnant before but were not pregnant at the time of the survey. The sample population was drawn from women 18 years and over who had been pregnant before but were not pregnant at the time of the study. Although women between the ages of 15 to 49 are considered to be in their reproductive years (WHO, 2006), women 18 years and older were allowed to participate due to their ability to consent to be in the study without parental permission. I used the Shomolu local government area of Lagos State as the study area because it best represented the various characteristics that constitute the independent variables in this study. The Shomolu local government is a high-density residential area and is one of the local government areas with the highest level of literacy in the population (Lagos State government, 2011). The state government in 2011 showed that 87% of the participants in a survey they conducted were literate in English and 75% were also literate in other languages (Lagos State Government, 2011). Therefore, participants for this study needed to be able to speak and read English.

Sampling and Sampling Procedures

There are five strategies that can be used to select a representative sample from a population (Creswell, 2010). The strategies include simple random sampling, systematic sampling, stratified sampling, cluster sampling, and stage sampling (Creswell, 2010). In a simple random sampling, each member of a population has an equal chance of being selected (Creswell, 2010). Systematic sampling, although similar to random sampling, uses a sampling frame from which participants are selected at regular intervals (Creswell, 2010). Stratified sampling is similar to systematic sampling; the only difference is that one or more characteristics of the sample frame can be altered at the same time ensure that the same percentage of participants are selected from the population (Adanri, 2016).

I used a combination of systematic sampling and purposive sampling methods in this study. Purposive sampling is a form of nonprobability sampling that allows researchers to make decisions on who would be included in a study based on knowledge of the study issue or capability or willingness to participate in the research (Jupp, 2008). I purposively chose neighborhoods in the local government area because it was not possible to have the address of all the women that had been pregnant in the local government area or the streets they resided on. I sampled women who were available on the streets and met the inclusion criteria. Systematic sampling was introduced in order to ensure that the sample was a fair representation of the population studied. The sample frame consisted of women who were 18 years and over, not pregnant at the time of the study but who had been pregnant at least once, able to read and comprehend the English language, and who resided in the Shomolu local government area of Lagos State, Nigeria.

The participants were systematically selected by alternating the side of the road from which participants were selected and limiting the number of survey per each street block to five.

I conducted the study in the Shomolu local government area where there are two government health centers and 35 private hospitals (Lagos State Government, 2011). Sampling units can be challenging in Nigeria because of the problems of incomplete frames, clusters of elements, and foreign elements (Frankfort-Nachmias & Nachmias, 2008). It is likely that some women do not use the medical services when they are pregnant or when they have the babies because of a lack of education or access to medical services. If they do not have complications, these women may end up not going to a hospital at all. For these reasons, women who had been pregnant before were surveyed by me going door-to-door to various residential areas in the Shomolu local government area of Lagos State using a purposive convenience sampling method to select the streets and houses.

Sample Size

Sample size estimation and statistical power analyses are important because it would not be ethically acceptable to conduct a study by recruiting thousands of participants when sufficient data could be obtained with hundreds of participants instead and research ethics committees often ask for justification of the study based on sample size estimation and statistical power (Prajapati, Dunne, & Armstrong, 2010). According to Bartlett, Kotrlik, and Higgins (2001), sample size is one of the four inter-related features that can influence the detection of significant differences, relationships or

interactions in a research study. It is considered as one of the important features of a survey research design (Bartlett et al., 2001). There are three steps involved in determining the sample size required for a research study.

The first step is to determine the alpha which is the for Type 1 error. The higher the alpha level the more likely for researcher to reject a true null hypothesis (type I error) and the lower the alpha level the more likely the researcher will accept a false null hypothesis, which will be a Type II error (Tomczak, Tomczak, Kleka, & Lew, 2014). In most social science and behavioral studies, alpha is often set at 0.05. The second step is to determine the effect size which is the limit for Type II errors and based on literature review in the social science and behavioral studies is to set effect size as either small, medium or large but the convention is to set it at 0.20 (Fritz, Morris, & Richler, 2011). The third step in determining sample size is to determine the power. A commonly recommended power is 0.80 according to Fritz et al. (2011). The sample size can then be manually calculated or a computer software like G*Power can then be used to calculate the sample size.

I used the G* Power calculator v. 3.1.9.2 to calculate the sample size taking into consideration the purpose of the study, the research question, and the hypothesis to be tested. The family of test selected for the study was t-test. Statistical test selected was correlation: point biserial model. Type of power analysis was a priori: compute required sample size given alpha, power and effect size. Type of tail(s) was two tails. The effect size was set at .20 which is a medium effect size; alpha was set at 0.05 and power was set

at .80 which is typical in social science studies (Frits et al., 2011). The estimated sample size computed by G*Power was 191. The sample size calculation is shown in Table 1.

Table 1

Sample Size Calculation: t tests

<i>t tests - Correlation: Point biserial model</i>		
Analysis:	A priori: Compute required sample size	
Input:	Tail(s)	= Two
	Effect size $ \rho $	= 0.20
	α err prob	= 0.05
	Power (1- β err prob)	= 0.80
Output:	Noncentrality parameter δ	= 2.8210518
	Critical t	= 1.9725951
	Df	= 189
	Total sample size	= 191
	Actual power	= 0.8014269

Procedures for Recruitment, Participation, and Data Collection

The data collection relied on the survey instrument developed by Chew et al. (2004) with permission to use granted by Dr. Chew. Permission to use the instrument was sought and granted by Dr. Chew. The survey instrument can be found in Appendix A and the permission letter in Appendix B. I did not modify the instrument and it was approved by the research committee. Walden University's approval number for this study was IRB# 06-20-16-0290994. The approved instrument was used to collect social and demographic data, level of education and antenatal visits during pregnancy. The data provided reliable and practical information concerning the well-being and functional health of a community or an individual from a patient or individual's point of view (Quality Metric, 2013, para. 1).

Surveys are usually cost effective in collecting information from a large number of individuals who are most likely representative of the target audience (Cengage Research Methods Workshops, 2005). Surveys can be useful when a researcher wants to collect data from the general public that cannot be directly observed and the data would be collected through the use of questionnaires. There was no controlled setting and this made the setting less artificial. Survey data can be collected through the mail where the survey is sent to participants by mail, filled out by participants, and mailed back to researcher; face to face survey where participants are met in person by an interviewer, the interviewer administers the survey and records the responses to survey questions; and telephone survey where participants are contacted over the telephone by an interviewer, the interviewer administers the survey and records the responses to survey questions (Kansas State University, n.d.). Internet research methods usually allows researcher to have access to rich data, especially for those working in sensitive areas because of anonymity (Hine, 2011).

However, because the population this research was focused on may not have access to the Internet, the use of Internet survey would likely not yield many responses. In addition, in Nigeria the house addresses and mailing system is not as effective as we have in developed countries (personal experience) so the use of mail survey has been determined to not be an effective manner of surveying potential participants. Therefore, a face-to-face self-administered or interviewer-administered survey was used in this study because it ensured access to participants and assist in the completion of the surveys so the needed sample size could be more easily attained. Although this method could reduce

nonresponse bias, it did not provide anonymity and responders may not have truthfully answer sensitive questions (Cengage Research Methods Workshops, 2005). In order to counteract this, I did not collect the names of participants and informed the participants that their responses would remain confidential.

Procedures for Recruitment

Once approval was granted by Walden University Institutional Review Board (IRB), I proceeded to collect the data from participants residing in the study area. Since there is no bank of information about women and their pregnancies, I purposively chose neighborhoods and streets in the study area in order to access women who may be eligible to participate in the study. I sampled women I approached in public and/or live on the street who met the inclusion criteria of 18 years and older, have been pregnant in the past, could speak /read English, and not currently pregnant. This sampling method was used due to the need to be able to approach women who may be eligible for participation.

Because of the nature of this study, face-to-face interaction was used and the self-administered surveys were distributed to the participants in their homes and on the streets. If requested, I dropped off the survey and picked up the completed survey at a later date and time that the participant and I found to be convenient. If there were no women that fit the criteria (18 years and older, can speak/read English, and have been pregnant before, not currently pregnant) at a particular house, I moved to the next house on the street until the number of participants on the street have been satisfied. Each participant was told the reason for the study and were asked to read the participant

informed consent. The participants were given the options to participate or not to participate in the study. It is implied that by completing the survey or responding to questions in the survey, the participants gave their consent. Completed surveys were returned in sealed envelope that was provided and included in the survey packet to ensure confidentiality and anonymity of the participants. As a token of appreciation, I included a N100 phone card (an equivalent of \$1.00) in the survey packet and this was for the participants to keep whether they completed the survey or not. The survey packet consisted of the survey instrument, a return envelope, and a N100 phone card. Confidentiality of the completed instrument and participants was ensured by not disclosing the result or participants and by ensuring I am the only one who have access to the raw data. The data were entered straight into SPSS file and processed by me for analysis.

Ethical Concerns

I followed the standard practices and ethical compliance checklist of the APA Manual, Sixth Edition, the Walden University IRB and protecting the confidentiality of the research participants. I also emphasized to the participation in the study was voluntary and that there will be no retribution for refusal to participate. The participants were assured of the confidentiality of the study; the survey did not identify the participants by name or by code. Although I was present when many of the surveys were completed by the participants, I offered no assistance nor did I influence the participants in their response to the survey. The survey was free of personal bias. I collected the

completed surveys in person and personally processed the data; no other person or persons had access to the data and only aggregate results were used in the reporting.

Instrumentation and Operationalization of Constructs

Instruments

Health Literacy Screening Questions (Chew, Bradley, & Boyko, 2004).

To measure the health literacy level of the participants in this study, the Health Literacy Screening Questions developed by Chew et al. (2004) was used. Chew et al. (2004) developed the health literacy screening questions to assess people's ability to comprehend information or to perform tasks usually encountered in health care setting. This instrument consists of 16 questions that use a 5-point Likert scale. Out of the sixteen questions asked, three questions were found to be effective in detecting inadequate health literacy. In the following questions "How often do you have someone help you read hospital materials?" "How confident are you filling out medical forms by yourself?" and "How often do you have problems learning about your medical condition because of difficulty understanding written information?" the area under the receiver operating characteristic curve are 0.87, 0.80, and 0.76, respectively. Other researchers have used these three questions in comparison to Short Test of Functional Health Literacy in Adult (S-TOFHLA) to assess literacy skills. Schwurtz et al. (2013) used these items and the area under receiver operating characteristic curve (AUROC) for all the questions was 0.90 (95% CI, 0.85-0.95). Wallace et al. (2006), in order to evaluate the three screening questions by Chew et al. (2004), compared the questions to the Rapid Estimate of Adult Literacy in Medicine (REALM) and also found that the questions were effective at

identifying individuals with marginal or limited health literacy skills. Ohl et al. (2010) also used the screening questions to identify people with low health literacy and accuracy of provider perception in two HIV primary care clinics. For this study, all 16 questions from the Health Literacy screening tool were used in assessing health literacy in the study population. Permission to use the instrument was sought and granted by Dr. Chew. The survey instrument can be found in Appendix A and the permission letter in Appendix B.

Operationalization of Variables

Based on American Congress of Obstetricians and Gynecologists (ACOG) recommendations, antenatal care was analyzed in terms of frequency, which would be coded as 1, 2–3, or 4 visits or more, timing of the visit, whether antenatal care was initiated in the first, second, or third trimester of pregnancy. To understand if women who were pregnant received antenatal care, it is important to know how many of these women really registered for antenatal care. This was assessed by a dichotomous variable: 0-did not receive antenatal care; 1- received antenatal care. According to the United Nations Population Fund (UNFPA; n.d. a), there should be at least four antenatal visits early in the pregnancy to educate women, identify and manage either current or potential pregnancy risks, and develop a birth plan on how to reach a medical care in case of emergency. UNFPA (n.d. b) also recognized this visit could be the pregnant woman's first visit, therefore some health educational activities on sexual and reproductive health, family planning, birth spacing, and care of the newborn should be incorporated into these visits (UNFPA, n.d. a). In assessing antenatal messages received, the women in this study were asked whether or not they received information on these topics during their

visits. Maternal education level was measured by the number of years of formal education received by the mother. For this study, education level was divided into six levels as follows: 1- No education; 2-Elementary education (1-6th grade); 3. Junior Secondary School (6-9th grade); 4- Secondary School (Complete 12th grade); 5- Post-secondary (some College); and 6- College degree and above. Table 2 consists of the operationalization of the study variables.

Table 2

Operationalization of Study Variables

Variable name	Variable Source	Variable Type	Value Labels	Level of Measurement
Pregnancy Outcome	RQ, SQ26	Dependent	0- Unhealthy baby 1- Healthy baby	Nominal
Health Literacy	RQ Survey Q11	Independent	1-Always 2-Often 3-Sometimes 4-Occasionally 5-Never	Ordinal
	RQ Survey Q12	Independent	1-Always 2-Often 3-Sometimes 4-Occasionally 5-Never	Ordinal
	RQ Survey Q13	Independent	1-Always 2-Often 3-Sometimes 4-Occasionally 5-Never	Ordinal
Number of Antenatal Care Visits	RQ, Survey Q22	Independent	0-3 visits 4-6 visits 7-9 visits	Categorical
	RQ, Survey Q20	Independent	0-3 visits 4-6 visits 7-9 visits	Categorical
Timing of Antennal Care	Survey Q25	Independent	0=0-3 months	

Medical Problem developed during pregnancy	Independent	1=4–6 months 2=later than 6 months	Categorical
		0-Gestational diabetes 1-Depression 2-Heart problem 3-High blood pressure 4-Bleeding 5-Other health issues	Categorical

Covariates that were included in this study were: maternal age, employment status, income, and marital status; descriptive statistics would be used for these maternal characteristics.

Table 3

Descriptive Variables

Variable name	Variable Source	Variable Type	Value Labels	Level of Measurement
Last time pregnant?	Survey Q 17	Descriptive	0= 1–11 months ago 1=12–23 months ago 2= 24–35 months ago 3=36 + Months ago	Interval
Received antenatal care?	Survey Q 18	Descriptive	0- No 1- Yes	Dichotomous
Likely reasons for not getting antenatal care	Survey Q 19	Descriptive	0- I didn't know I was pregnant 1- I didn't know where to go	Categorical

			<p>2- I didn't have enough money to pay for my visits</p> <p>3- I didn't want anybody to know I was pregnant</p> <p>4- I've given birth before and I didn't feel I needed antenatal care</p> <p>5- I had no way of getting to a medical center</p> <p>6- It is against my religion</p> <p>7- Other reasons?</p>	
Information received	Survey Q23	Descriptive	<p>1- Health educational materials on sexual and reproductive health</p> <p>2- Family planning and birth spacing information</p> <p>3- Care of the newborn</p> <p>4- What to expect during pregnancy</p> <p>5- No information</p>	Categorical
Frequency of antenatal visit	Survey Q 21	Descriptive	<p>0- Weekly</p> <p>1- Every two weeks</p> <p>2- Once per month</p> <p>3- Every few months</p> <p>4- Only when there was a</p>	Ratio

How many Visits	Survey Q22	Descriptive	problem 1- 1 Visit 2- 2 Visits 3- 3 Visits 4- 4 Visits 5- 5 Visits 6- 6+Visits	Ratio
Marital status	Survey Q28	Demographic	0- Dating 1- Married 2-Separated 3-Divorce 4- Widowed	Nominal
Number of children	Survey Q34	Demographic	1–15	Ratio
Number of pregnancy?	Survey Q33	Demographic	1–15	Ordinal
Employment status	Survey Q30	Demographic	0-No employment outside the home 1-Part employment 2- Full time employment outside the home	Nominal
Religion	Survey Q33	Demographic	1- Christianity 2- Islamic 3- Traditional 4- No religion	Nominal
Age	Survey Q27	Descriptive	1-15–20 years 2-21–25 years 3-26–30 years 4-31–35 years 5-36–40 years 6-40–50 years	Interval
Education Level	Survey Q29	Descriptive	1- No formal education 2- Primary school	Nominal

			3- Junior Secondary School 4- Secondary School certificate 5- Ordinary diploma or college of education certificate i.e. OND, NCE 6- College degree or above	
Household Income	Survey Q34	Descriptive	1- Less than N25,000 2- N26,000– N50,000 3- N51,000– N75,000 4- More than N75,000	Interval

(table continues)

Data Quality and Potential Bias by Mode of Survey Administration

According to Bowling (2005), data quality can be measured by response rate and the accuracy of the responses, absence of bias, and the completeness of information obtained from respondents. Bowling (2005) noted that a low response rate could affect the reliability of the survey and result in study bias which could weaken the external validity. Some of the factors that could affect data quality include impersonality, cognitive burden, and the order of the questionnaire items and the way the participants respond to the questions (Bowling, 2005). Aside from answering generic questions which the participants might have had, I did not provide any assistance or attempt to

influence the decision of the participants. The participants did not appear to experience or suffer any embarrassment which could affect their response to any of the questions. Although some methods of survey create cognitive burden on the participants, face-to-face or drop off and pick are less burdensome. The participants voluntarily completed the survey; they were motivated to be part of the solution to a national problem as a result the legitimacy of the study was established. The participants were in control of the questionnaire; I did not offer any help other than answer questions that are generic to the survey. Therefore, I am confident that my personal bias or data collection method do not affect the quality of the data.

Data Analysis Plan

The data analysis included screening the data for errors and missing data. As errors could result from missing values or incorrect coding, one of the ways this study guarded against this was by replacing missing values. I manually replaced missing data based on the mean or median value from frequency. The plan also included testing the data for parametric test assumptions. Descriptive statistics was conducted to describe the sample and population demographics used in the study, this include frequency, mean, median, standard deviation (measures of central tendency), and measure of variability. SPSS version 21 was used to analyze data. A variety of statistical methods were used to test the hypotheses based on the characteristics of the dependent and independent variables. Descriptive statistics were used to explore frequency distributions and percentages for nominal and ordinal level. Output tables were created to reflect the number of participants, percentages, cumulative frequencies, percentages for maternal

characteristics. Descriptive analyses were used for Questions 18-20 in order to determine the percentage of the participants who received antenatal care and if they encountered any problems receiving antenatal care. Question 22 helped to identify the kind of health conditions women developed during their last pregnancy and question seven was assessed to determine the kind of information the women received during their antenatal care.

Binary logistic regression was used to assess the predictive relationship between maternal literacy level and maternal pregnancy outcomes. A multivariate analysis was performed to test if there is correlation between the dependent and the independent variables. Regression was used to estimate the influence of maternal characteristics on the odds of pregnancy outcomes. The relationship between maternal health literacy levels was computed, using SPSS 21, to determine if there was a correlation to pregnancy outcomes. The dependent variable was dichotomized into 0 and 1 where 0 meant unhealthy baby and 1 denoted healthy baby. The null hypothesis was rejected if the p value was less than or equal to .05 ($P \leq .05$). Pregnancy outcomes were measured by birth status of child, which were healthy or unhealthy baby.

Research Question: What is the predictive relationship between maternal health literacy levels, the number of antenatal visits, timing of the first antenatal care visit, development of medical conditions during pregnancy and pregnancy outcomes (birth status of child, which are healthy or unhealthy baby) in Lagos, Nigeria?

H_0 : There was no statistically significant predictive relationship between maternal health literacy level, the number of antenatal visits, timing of the first antenatal care visit, development of medical conditions during pregnancy and pregnancy outcomes (birth status of child, which are healthy or unhealthy baby) in Lagos, Nigeria.

H_A : There was a statistically significant predictive relationship between maternal health literacy level, the number of antenatal visits, timing of the first antenatal care visit, development of medical conditions during pregnancy and pregnancy outcomes (birth status of child, which are healthy or unhealthy baby) in Lagos, Nigeria.

Threats to Validity

In any research study, there are certain factors that can affect the reliability and validity of a study. Threats to internal validity include selection, history, maturation, mortality, testing, regression, and compensatory demoralization (Creswell, 2009). According to Creswell (2010), selecting participants with certain characteristics which enables them to have certain outcomes will affect the outcome of the research. Also, history, which is events that occur during the research that can affect the outcome of the research, can also threaten the validity if some unanticipated events occur that affect the outcome of the research (Creswell, 2010). As a result of normal development, participants may mature during the research and this maturation may affect how they respond overtime (Creswell, 2010). Experimental mortality occurs when participants drop out of the research and this has the potential of affecting the study since the result of those who dropped out would not be known (Creswell, 2010). Creswell (2010) also

noted that it is possible for participants to become sensitized to the measurement instruments during pretest and their post-test response result may be due to their exposure to the outcome measurement earlier. Statistical regression occurs when participants are selected as a result of their extremes scores (Creswell, 2010). Compensatory demoralization occurs when one group receives the treatment and the other group does not; this could be demoralizing and could lead to resentment as well (Creswell, 2010).

The threats to validity anticipated in this study are incorrect recollection, response bias, and measurement bias. Since I was asking participants to think back to their experience, it is possible that some participants may not recollect the information clearly and give false information. The study included only women who have been pregnant before and who can speak/read English and or understand spoken English in order to assess their literacy level; women who do not speak or understand English are excluded from the survey.

Response bias was another type of bias anticipated in this study. Participants may be providing answers they think I was looking for and may not answer truthfully or they could be guessing on the answers. Measurement bias was also anticipated. This is because participants were asked to read and respond to certain questions in the literacy instrument. In order not to appear illiterate, the respondent might have made up the answers. This study randomly recruited participants from Shomolu local government of Lagos state. Since this study was specifically aimed at women in Lagos state the study may not be generalized to other parts of Nigeria (Frankfort-Nachmias & Nachmias, 2008), though data may be compared to look for similarities and areas needing

improvement. To guide against response bias, I explained to the participants that the outcome would not affect them directly but the information could help other women in their pregnancy.

Ethical Procedures

The study approval was sought from Walden University IRB to ensure compliance with the Institution's ethical guidelines. The study ensured that individuals within the protected class were excluded from the study this include anyone under the age of 18 and any woman that was pregnant at the time of the survey. The study also ensured confidentiality of the participants by not identifying them by name or coding system. The participants were informed that by voluntarily complete the survey or respond to the survey questions, they have given their informed consent therefore the participants were not required to sign any document. Participants were offered a one hundred Naira (N100.00) phone card which is an equivalent of one dollars (\$1.00) as a token of my appreciation for the time taken to complete the survey. Since the survey was administered face to face (paper and pencil) it was important to ensure that no individual name was used on any documents in order to maintain confidentiality. Informed consent was shared with the participant and completion of the survey constituted granting informed consent.

I was aware that participants cannot be forced to participate, so there was a need to let the individuals know that their participation was entirely voluntary and that their refusal would not in any way have a negative impact on them. They could refuse to participate without explanation and participants were free to withdraw from the study at

any point in time (Crosby, DiClemente, & Salazar, 2006). Also, since the participants were likely to be from different educational backgrounds, it was my responsibility to ensure that oral and written directions were communicated in such a way that the participants could understand (Crosby et al., 2006). Participants were adults (18 years and older) and not pregnant so they were not classified as a protected group.

The data collected for this study were used solely for this research and the identity of the participants was not released to any organization. To that extent, I entered survey data collected into a password protected laptop and the original questionnaire collected was kept in a locked safe in my home. The completed questionnaires will be shredded five years after the study has been completed. I was the only one to have access to the data collected. The study was conducted for academic purposes therefore no conflict of interest was declared. The time and resources that were used for this research study were at my expense in order to fulfill academic requirements.

Summary

In this cross-sectional research study, I examined the relationship between pregnancy outcomes (dependent variable) and maternal health literacy, frequency of antenatal visits, number of antenatal visit, timing of the start of antenatal care and problems developed during pregnancy (independent variables). The dependent variables were measured by birth status of child (healthy or unhealthy baby). An existing instrument that was slightly modified and approved by the researcher's dissertation committee was used for the data collection. The survey participants were systematically purposively selected. Any woman that was under the age of 18 or pregnant at the time of

the survey was excluded from the survey. Women that do not speak or comprehend English language were also excluded from the survey. I used drop-and-pick as well as face-to-face interview methods to administer the survey. In chapter 3, I described the choice of research design and method that guide the study. The choice of research design was based on research question and research purpose. Quantitative research design lends itself to questions that explore the relationship between two or more variables and allows for the generalization of the research findings to the population that was being studied. In chapter 3 I also provided information on the how the questionnaire was administered and the plan for the data analysis. In chapter 4 I described how I processed and analyzed the and I also included the method of analysis and findings from the study.

Chapter 4: Results

Introduction

The purpose of this cross-sectional research study was to determine if there is a relationship between maternal health literacy, frequency of antenatal visits, number of antenatal visit, timing of the start of antenatal care, and problems developed during pregnancy (independent variables) and pregnancy outcomes (dependent variable) in Lagos, Nigeria. I measured pregnancy outcomes by the birth status of the child (which was either a healthy or unhealthy baby). A review of the literature did not reveal any previous researchers who had examined the relationship between maternal characteristics and use of antenatal care on maternal pregnancy outcomes or any study carried out in Nigeria that examined the relationship between maternal literacy level and pregnancy outcomes using a health literacy instrument. Therefore, the results of this study could be used to fill the identified research gap of the relationship between health literacy (measured with a validated tool), maternal characteristics, utilization of antenatal care, and potential pregnancy outcomes in Nigeria.

The following research question and hypotheses were formulated to guide this study:

Research Question: What is the predictive relationship between maternal health literacy levels, the number of antenatal visits, timing of the first antenatal care visit, development of medical conditions during pregnancy, and pregnancy outcomes (the birth status of the child, which is either a healthy or unhealthy baby) in Lagos, Nigeria?

H₀: There is no statistically significant predictive relationship between maternal health literacy level, the number of antenatal visits, timing of the first antenatal care visit, development of medical conditions during pregnancy, and pregnancy outcomes (the birth status of the child, which was either a healthy or unhealthy baby) in Lagos, Nigeria.

H_A: There is a statistically significant predictive relationship between maternal health literacy level, the number of antenatal visits, timing of the first antenatal care visit, development of medical conditions during pregnancy, and pregnancy outcomes (the birth status of the child, which was either a healthy or unhealthy baby) in Lagos, Nigeria.

In this chapter, I will review the methods for data collection, present the descriptive statistics of the dependent and independent variables, as well as the study covariates. I will also discuss the issues I identified, the inferential statistics analysis and hypothesis testing for the research question, the results of the statistical analyses, and provide a summary of the answers to the research questions.

Data Collection

Following the approval of my research proposal by the Walden University IRB, I initiated data collection on June 24, 2016 in Bariga, Shomolu local government area in Lagos State, Nigeria and ended data collection on July 15, 2016. I used a combination of traditional face-to-face data collection as well as drop-off and pickup methods to administer the questionnaire. The questionnaires were administered to 150 participants. Since a purposive convenience sampling method was used, I was able to go into homes

and shops as well as survey who I encountered on the street who met the recruitment criteria. Women under the age of 18 years old and women that were pregnant at the time of the survey were excluded from the study. When the women were busy, they asked me to provide them the questionnaire and pick it up later in the evening or the following morning. I made sure to explain the reason for the study and read the consent form to the women before I left. I was able to go to different neighborhoods in the local government area and speak with different groups of women. There were no requirements that the participants sign an informed consent form as they were advised that by completing the survey or responding to the survey questions they implied informed consent. The participants were assured of the confidentiality and anonymity of the study, and I was careful in the way the questions were asked in the face-to-face survey to ensure that the participants were not influenced in their responses.

As I noted in Chapter 3, the sample size calculated necessary to meet the power, effect, and alpha sizes for this study was 191, but because of time constraints and other logistic reasons, I only administered 150 surveys and collected 130 completed surveys. Therefore, a post hoc power analysis involving estimating the effect size based on the obtained study data was conducted. This analysis took into account the sample size, alpha level, two-tailed nature of the statistical test, and .20 effect size to derive the power (Volker, 2006). The effect size was 0.2 and power was 0.64. The result of the post hoc analysis is displayed in Table 4. This calculation shows 64% power to detect a statistically significant association between an outcome variable and predictor variable using regression techniques. The return rate was 86.7%, which is greater than the

between 32% and 50% return rate in most behavioral science research (Adanri, 2016; Baruch & Holtom, 2008; Cycyota & Harrison, 2006).

Table 4

Sample Size Calculation: t tests

<i>t tests - Correlation: Point biserial model</i>	
Analysis:	Post hoc: Compute achieved power
Input:	Tail(s) = Two
	Effect size $ \rho $ = 0.20
	α err prob = 0.05
	Power (1- β err prob) = 0.80
Output:	Noncentrality parameter δ = 2.3273733
	Critical t = 1.9786708
	Df = 128
	Total sample size = 130
	Actual power = 0.64

Data Preparation and Screening

Missing data. According to Bhattacharjee (2012), it is inevitable to have missing data in any empirical data set because participants may not answer some questions for any reason and a researcher needs to detect and correct this before data analysis.

Therefore, before I started my data analysis, I screened the data for accuracy to ensure my data were imputed correctly, to determine what to do with missing data, to look for outliers, and to test if assumptions of normality were violated. The data showed that missing values existed, but there was no pattern to the organization of missing values. Almost all (99.10%) of the values were completed data, while 0.9% of the data had incomplete values. I chose to replace the missing values using the mean value of the variables instead of removing the cases from my analysis. Mertler and Vannatta (2013) suggested calculating the mean of the missing value and replacing the missing values before starting the analysis. I ran descriptive statistics in SPSS to get the mean value in

each of the cases and manually inputted the missing values. According to Mertler and Vannata, the mean value is the best estimate of missing data when there is no other information available. Using the mean value does not change the overall mean of the data or affect the variance because the number of missing values in the data set were few (Mertler & Vannatta,2013).

However, not all missing data required values to be assigned. I excluded two of the questions with follow-up questions from the missing value analysis because the questions were expected to have missing values as they were not applicable to everyone. One of the questions was “Did you develop any health problems during your pregnancy?” and another asked “Did you get any antenatal care during your pregnancy?” If the participants did not have any issues during their pregnancy, the follow-up questions about the problems were not applicable.

Grouping of variables and values. The first 16 items on the instrument I used in this study consisted of Likert-type items developed by Chew et al. (2004) to measure health literacy. The remaining 18 items or questions in the instrument were developed to capture data necessary to answer the research question. Likert-type items are single questions that use some of the aspects of the Likert response alternatives, while a Likert-scale consists of a summation of multiple Likert-type items into a single composite score to create a new variable during the data analysis process (Boone & Boone, 2012). I used an ordinal level scale as the scale of measurements in this study. I tested the predictor variables for normality, linearity, and homoscedasticity assumptions, and the result showed that the data were not normally distributed. Frequency analyses were performed

to check for skewness and kurtosis. According to Mertler and Vannatta (2013) and Field (2009), skewness and kurtosis values should be between -1 and +1. The closer to zero the skewness and kurtosis, the more the data are said to be normally distributed (Mertler & Vannatta, 2013). In this study, the skewness values ranged from .04 and 1.529, while the values of the kurtosis ranged between -.038 and 3.873. The skewness and kurtosis in the data are far from zero which indicates the data were not normally distributed. Therefore, I used nonparametric tests to analyze the data.

Results

In this section, I will focus on discussing the results of the statistical analyses, and it be divided by the type of analyses I conducted. Descriptive statistics were used to analyze the demographics of study participants in this study. I will describe the demographic variables and correlational analysis. I will also discuss the binomial regression analysis I conducted.

Demographic Variables

This study included 130 participants. I used SPSS, Version 21.0 to generate demographic percentages, frequencies, means, standard deviation, and kurtosis. Table 5 summarizes the descriptive analysis and characteristics of the study participants.

Table 5

Survey Participants' Demographics (N = 130)

Variables	Frequency	Percentage
Marital Status		
Single	11	8.5
Ongoing dating relationship with father	16	12.3
Married	93	71.5
Separated	5	3.8

Divorced	4	3.1
Widowed	1	0.8
Education Level		
No formal education	12	9.2
Primary/elementary school	6	4.6
Junior secondary school	6	4.6
Secondary school certificate	27	20.8
Ordinary diploma or college of education certificate	30	23.1
College degree/advanced degree	49	37.7
Religion		
No religion	1	0.8
Christianity	94	72.3
Islam	31	23.8
Traditional	4	3.1
Employment Status		
No employment outside home	37	28.5
Part time employment outside of home	38	29.2
Full time employment outside of home	55	42.3
Household Income		
Less than N25,000	42	32.3
N26,000–N50,000	42	32.3
N51,000–N75,000	18	13.8
More than N75,000	28	21.5
Developed Health Problems		
No	102	78.5
Yes	28	21.5
Type of Health Problem Developed		
Gestational diabetes	5	3.8
Depression	5	3.8
Heart problem	3	2.3
High blood pressure	12	9.2
Bleeding	6	4.6
Information Received		
Health education material on sexual/reproductive health	14	10.8
Family planning and birth spacing	11	8.5
Care of newborn	21	16.2
What to expect during pregnancy	28	21.5
More than one choice	44	21.5
No information	12	9.2

Outcome of Pregnancy		
Healthy baby	109	83.8
Unhealthy baby	21	16.2

(table continues)

Overall, respondents were between age 18 and 42 years and the mean age was 30 years. 71.5% of respondents were married, 8.5% were single. Almost half of the respondents (42%) were employed outside the home and 29.2% of respondents had part time employment. A majority of respondents (72.3%) were Christians, 23.8% were Muslims and in terms of education, 37.7% of respondents had a college degree or above, 23.1% had a diploma or college of education certificate, 20.8% had a secondary school certificate. The household income for the participants ranged from less than N25,000 to more than N75,000. Close to a quarter of the participants said they developed some sort of medical problems during their last pregnancy ($n = 28$) and majority of the participants received antenatal information during their last pregnancy, and only 9.2% of the participants stated they did not receive any information. Only 10% of the participants did not receive antenatal care and 40% of these participants who did not receive antenatal care said they did not know they were pregnant.

Descriptive Statistics for Covariates and Pregnancy Outcomes

I analyzed the associations between pregnancy outcomes with the covariates of marital status, employment status, education level, income level, religion, and number of pregnancies using cross tabulation. As displayed in Table 6, out of the 109 healthy baby outcomes, participants who were married reported the most positive outcomes ($n = 85$).

Table 6

Marital Status and Pregnancy Outcomes

<i>Marital Status</i>	<i>Healthy Baby</i>	<i>Unhealthy baby</i>	<i>Total</i>
Single (Never married)	5 (3.8%)	6 (4.6%)	11 (8.5%)
On-going Dating Relationship with Father of the Child	15 (11.5%)	1 (.8%)	16 (12.3%)
Married	85 (65%)	8 (6.15)	93 (71.5%)
Separated	1 (.8%)	4 (3.1)	5 (3.8)
Divorced	2 (1.53)	2 (1.53)	4 (3.1)
Total	109 (83.85)	21 (16.15)	130 (100%)

Income also seemed to have positive effect on pregnancy outcomes. About three fourths of the participants who are somewhat employed reported positive birth outcomes as can be seen in Table 7.

Table 7

Employment Status and Pregnancy Outcomes

<i>Employment Status</i>	<i>Healthy Baby</i>	<i>Unhealthy baby</i>	<i>Total</i>
No Employment	29 (22.3%)	8 (6.15)	37 (28.46%)
Part-Time Employment	34 (26.15%)	4 (3.1)	38 (29.23)
Full-Time Employment	46 (35.38%)	9 (6.92%)	55 (42.31%)
Total	109 (83.85)	21 (16.15)	130 (100%)

Level of education and birth outcomes shows an interesting dynamic. While it would be expected that higher education would serve as a protective factor against negative birth outcomes, the result did not indicate that. Participants with little or no education reported fewer negative birth outcomes compared to participants with higher education. Table 8 shows that almost half of the participants with senior secondary

school education reported unhealthy birth outcomes, while participants with elementary education did not report any unhealthy birth outcomes.

Table 8

Level of Education and Pregnancy Outcomes

<i>Level of Education</i>	<i>Healthy Baby</i>	<i>Unhealthy baby</i>	<i>Total</i>
No Formal Education	11 (8.5%)	1 (.8%)	12 (9.2%)
Primary School	6 (4.61%)	0	6 (4.61%)
Junior Secondary School	4 (3.1)	2 (1.53)	6 (4.61%)
Secondary School Certificate	19 (14.61%)	8 (6.15)	27 (20.76)
Ordinary Diploma (OND) or National Certificate of Education (NCE)	26 (20%)	4 (3.1)	30 (23.07%)
College Degree or Above	43 (33.07%)	6 (4.61%)	49 (37.69)
Total	109 (83.85)	21 (16.15)	130 (100%)

As would be expected, participants with more income had better pregnancy outcomes.

Participants earning between N25,000–N50,000 reported more negative birth outcomes when compared to participants earning between N51,000 and over N75,000. This is reported in table 9.

Table 9

Household Income and Pregnancy Outcomes

<i>Household Income</i>	<i>Healthy Baby</i>	<i>Unhealthy baby</i>	<i>Total</i>
Less than N25,000	35 (26.92%)	7 (5.38%)	42 (32.30%)
N26,000–N50,000	33 (25.38%)	9 (6.92%)	42 (32.30%)
N51,000–N75,000	17 (13.07%)	1 (.8%)	18 (13.84%)
More than N75,000	24 (18.46%)	4 (3.1%)	28 (21.53%)

Total	109 (83.85)	21 (16.15)	130 (100%)
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Table 10 shows that participants for this study were mainly Christians, and out of 94 Christians, 81 reported positive birth outcomes. Out of the 31 Muslim participants, 25 reported positive birth outcomes. Religion does not seem to be related to pregnancy outcomes.

Table 10

Religion and Pregnancy Outcomes

<i>Religion</i>	<i>Healthy Baby</i>	<i>Unhealthy baby</i>	<i>Total</i>
No Religion	0	1 (.8%)	1 (.8%)
Christianity	81 (62.31%)	13 (10%)	94 (72.31%)
Islamic	25 (19.23%)	6 (4.61%)	31 (23.84%)
Traditional	3 (2.31%)	1 (.8%)	4 (3.1%)
Total	109 (83.85)	21 (16.15)	130 (100%)

In table 11, participants who have had more than one pregnancy reported fewer unhealthy babies when compared to participants who reported one pregnancy.

Table 11

Number of Pregnancy and Pregnancy Outcomes

<i>No. of Pregnancy</i>	<i>Healthy Baby</i>	<i>Unhealthy baby</i>	<i>Total</i>
1	25 (19.23%)	7 (5.38%)	32 (24.61%)
2	18 (13.84%)	3 (2.31%)	21 (16.15%)
3	39 (30%)	3 (2.31%)	45 (34.61%)
4	24 (18.46%)	4 (3.1%)	28 (21.53%)
5	14 (10.77%)	4 (3.1%)	18 (13.84%)
6	4 (3.1%)	1 (.8%)	5 (3.85%)
7	4 (3.1%)	0	4 (3.1%)
Total	109 (83.85)	21 (16.15)	130 (100%)

As noted in table 12, only 11 respondents (9.2%) reported having more than four children and out of this number, only one (.8%) reported an unhealthy baby as their pregnancy outcome.

Table 12

Number of Children and Pregnancy Outcomes

<i>No. of Children</i>	<i>Healthy Baby</i>	<i>Unhealthy baby</i>	<i>Total</i>
1	26 (20%)	7 (5.38%)	33 (25.38%)
2	23 (17.69%)	4 (3.1%)	27 (20.72%)
3	35 (26.92%)	6 (4.61%)	41 (31.53%)
4	14 (10.77%)	3 (2.31%)	17 (13.07%)
5	8 (6.15%)	1 (0.8%)	9 (6.92%)
6	1 (.8%)	0	1 (.8%)
7	2 (1.53)	0	2 (1.53)
Total	109 (83.85)	21 (16.15)	130 (100%)

Correlational Analyses

Using a bivariate correlational analysis, the relationship between maternal health literacy, number of antenatal visits, timing of first antenatal care visit, problems during pregnancy, and pregnancy outcomes were examined to determine if any of the variables were too highly correlated to leave in the regression analyses due to multicollinearity.

The analysis showed no multicollinearity in the variables so all the variables were included in the analysis. To assess the intervariable relationship, correlation analysis was used to examine the relationship between the dependent and independent variables. Table 13 shows the results of the analysis. The convention in behavioral studies such as this is to interpret correlation value of .10 to .29 as small correlation; .30 to .49 as medium correlation and .50 to 1.0 as large correlation (Green & Salkind, 2011).

Table 13

Correlation Coefficient for Dependent and Independent Variables

	Develop- ment of health problems	Health Literacy	Frequency of Visit	Number of antenatal Visit	Timing of first antenatal visit	Pregnancy outcomes
Development of health problems	1.000					
Health Literacy	.005	1.000				
Frequency of Visit	-.016	-.032	1.000			
Number of antenatal Visit	.107	.224*	-.380**	1.000		
Timing of first antenatal visit	.050	.035	.081	-.106	1.000	
Pregnancy outcomes	-.177*	.097	-.204*	.145	-.111	1.000

Note. *Correlations are statistically significant at the .05 level (2-tailed)

**Correlations are statistically significant at the .01 level (2-tailed)

Also, the result from this study shows small to medium correlations among the variables. The result shows that there was a medium correlation between the level of education and number of antenatal visits, $r = 0.27$, $p = .002$ (2-tailed); education also correlated with development of medical condition, $r = 0.18$; timing of first antenatal care visit, $r = -0.23$; employment status, $r = 0.48$ and household income, $r = 0.64$ (all with $p < 0.05$). There was statistically significant relationship between pregnancy outcomes and frequency of antenatal care visit ($r = -0.219$, $p < 0.005$). There is a medium correlation

and statistically significant relationship in number of antenatal visits and the frequency of the visit, $r = 0.38$, $p = .000$; there is also a small correlation but statistically significant relationship between number of antenatal visits made and health literacy ($r = .20$, $p < .05$). This indicates that women with better health literacy skills make more antenatal visits. This could be because of awareness of the need to have medical checkup or knowledge of the importance of medical examination during pregnancy. There is also a small correlation between pregnancy outcomes and development of medical problems during pregnancy but a statistically relationship, $r = -.18$, $p = .04$. This could be because when pregnant women go for antenatal visit their medical conditions are noted and monitored. This will enable the women utilizing health serviced have better pregnancy outcomes if they any develop medical problems. Using bivariate correlation coefficient, maternal health literacy, number of antenatal visit, and timing of the start of antenatal care are not statistically significant. This implies that there may be other actors affecting pregnancy outcome beyond health literacy, antenatal care, and timing of the start of care

Binomial Logistic Regression

I used logistic regression to assess how well the independent variables predicted the dependent variable. The variables used in the analysis were pregnancy outcome (dependent variable), as measured by whether a mother delivered either a healthy or unhealthy baby. The independent variables were maternal health literacy, frequency of antenatal visits, number of antenatal visit, timing of the start of antenatal care and problems developed during pregnancy. To start the analysis, I collapsed cells and recoded

the variables but there was no multicollinearity that would negatively impact the analysis so all the variables were included.

Using a stepwise logistic regression approach, all independent and dependent variables were entered into the equation one at a time. Frequency of visits was entered first because it has the highest correlation. This was followed by problem develop during pregnancy, number of visits, timing of the first visits and health literacy. During this process, the best regression equation decreased the variables accordingly to improve the logistic regression model. There were five steps created and there were no big differences in the results from the steps. At the first step, when frequency of visit was entered, the model explained 84% of the results; when development of medical problems was entered in the second block, 85% of the model was correctly presented; when antenatal visit was entered in block 3 85% of the results was predicted; at block 4 when timing of visit was removed, 85% was correctly classified and by the fifth block when health literacy was entered, 85% of the cases were correctly classified. The five models completed for the research question did not show any significant difference. Table 14 shows how the models were created.

Table 14

Models for Binary Regression

Blocks	Variables included
1	Frequency of visit
1, 2	Frequency of visit, Develop problem
1,2,3	Frequency of visit, Develop problem, Number of antenatal visit
1,2,3,4	Frequency of visit, Develop problem, Number of antenatal visit, Timing of visit
1,2,3,4,5	Frequency of visit, Develop problem, Number of antenatal visit, Timing of visit, Health Literacy

The results presented in Table 15 shows that the omnibus goodness-of-fit test for the regression model was statistically significant and reliable in distinguishing or differentiating pregnancy outcome which is whether a healthy or unhealthy baby is delivered ($\chi^2 = 13.23; p = .040$).

Table 15

Omnibus Test of Model Coefficient

	Chi-square	df	Sig.
Step	2.699	2	.259
Model	2.699	2	.259
Block	13.229	6	0.040

The classification table as can be seen in Table 16 shows that 18 cases are classified as having unhealthy baby and 108 cases are classified as having healthy baby, implying that the model correctly classified about 85.4% of the cases.

Table 16

Classification Table for Pregnancy Outcome

	Predicted		Percentage Correct
	Pregnancy Outcome (Healthy Baby)		
Observed Pregnancy Outcome	No	Yes	
No	3	18	14.3
Yes	1	108	99.1
Overall percentage			85.4

The Cox and Snell *R* Square and Nagelkerke *R* square values, in Table 17, were used to explain variation in the dependent variable. Based on the outcomes, the amount of variance in the dependent variable accounted for by the model is about 17%.

Table 17

Model Summary

Step	-2 Log Likelihood	Cox & Snell R Square	Nagelkerke R Square
1	101.747 ^a	.097	.165

A correlation analysis between the covariates and independent variables shows that education level is correlated to timing of the start of antenatal care, health literacy,

household income, number of antenatal care visits, employment status and marital status ($p < .05$). While it is not strange that education correlates with employment status, number of antenatal visits and number of children, medical problems developed during pregnancy is only correlated with pregnancy outcomes. The number of antenatal care visits is highly correlated with frequency of visits ($p < .01$), employment ($p = .05$), education ($p = .01$).

According to Szumilas (2010), an odds ratio is used to measure the relationship that exists between an exposure and an outcome. This means that given a particular exposure an outcome will occur compared to the odds that the outcome occurs without the exposure. In other words, odds are “the ratio of probability that an event will occur divided by the possibility that the event will not occur” (Mertler & Vannatta, 2013, p. 298). The regression coefficients are presented in Table 18. The Wald statistics shows only problems developed during pregnancy is related to pregnancy outcomes ($p = .047$) at statistically significant levels and there is no statistical significance among the rest of the variables. The odds ratio for problem developed showed that for every increase of 1 in the pregnancy problem developed that there is a 0.316 less chance for a healthy baby. Since the value $\text{Exp}(\beta)$ is less than 1 this indicates a negative odds or change, Thus, an increase in pregnancy problems developed during pregnancy will lead to decrease possibility of healthy pregnancy.

From the correlations model in Table 18, problems developed during pregnancy add significantly to the prediction of the pregnancy outcome or whether the mother has a healthy or unhealthy baby ($p < .05$). Frequency of visits is also related at a statistically

significant level to pregnancy outcome and this makes sense because the more visit a pregnant woman makes to a health facility the more likely health personnel would be able to detect any medical issues. The number of antenatal visits, health literacy, and timing of the first antenatal care visit did not add significantly to the prediction of pregnancy outcome. The odds ratio (Exp(B) indicates how the independent variables change the likelihood of the pregnancy outcomes, that is whether a healthy or unhealthy baby will be delivered. The findings presented in Table 18 reveal high odds for the effects of the different categories of problems developed during pregnancy. Although timing of antenatal visit is not statistically significant, it is important to note that the odds ratios for the categories for this variable shows that the women who attended antenatal visit at least once in a month are three times likely to affect their pregnancy outcome.

Table 18

Regression Coefficients for Maternal Health Literacy, Frequency of Antenatal Visits, Number of Antenatal Visit, Timing of the Start of Antenatal Care and Problems Developed During Pregnancy.

	β	S.E.	Wald	df	Sig.	Exp(β)	95% C.I. for EXP(β)	
							Lower	Upper
Frequency of antenatal Visit			6.947	3	.074			
Frequency of antenatal Visit (1)	.613	1.212	.256	1	.613	1.846	.171	19.871
Frequency antenatal Visit (2)	-.882	1.240	.506	1	.477	.414	.036	4.704
Frequency antenatal Visit (3)	-1.517	1.548	.960	1	.327	.219	.011	4.563
Pregnancy problem developed	-1.151	.580	3.944		.047	.316	.102	.985
Number of Antenatal Visit			2.448	2	.294			
Number of Antenatal Visit (1)	-.903	.779	1.343	1	.247	.406	.088	1.867
Number of Antenatal Visit (2)	.825	1.015	.662	1	.416	2.283	.313	16.674
Timing of first antenatal visit			2.830	2	.243			
Timing of first antenatal visit (1)	1.140	.776	2.158	1	.142	3.126	.683	14.305
Timing of first antenatal visit (2)	1.293	.795	2.646	1	.104	3.645	.767	17.320
Health Literacy	.408	.397	1.060		.303	1.504	.691	3.272
Constant	-.101	1.858	.003	1	.956	.904		

Note. Variable(s) entered on Step 1: Health Literacy, Pregnancy Problems, Frequency of antenatal visit, number of Antenatal Visits, Timing of first visit

Results in Relationship to Null Hypothesis

The research question and hypotheses that guided this study were: What is the predictive relationship between maternal health literacy level, the number of antenatal visits, timing of the first antenatal care visit, development of medical conditions during pregnancy and pregnancy outcomes (birth status of child, which are healthy and unhealthy baby) in Lagos, Nigeria? The H_0 was: There was no statistically significant predictive relationship between maternal health literacy level, the number of antenatal visits, timing of the first antenatal care visit, development of medical conditions during pregnancy and pregnancy outcomes (birth status of child, which are healthy and unhealthy baby) in Lagos, Nigeria. The H_0 was rejected if p -values were $p \leq 0.05$.

Based on my research question I used binary logistic regression to determine the odds of having healthy or unhealthy baby as a pregnancy outcome. To begin I checked to be sure the assumptions of the logistic regression were met, so the result would analysis would be valid. According to Mertler and Vannatta (2013) the dependent variable needs to be binary or binomial. Pregnancy outcome was categorized as binomial variable and I coded healthy pregnancy as 1 and unhealthy pregnancy as 0. Also, there should be no multicollinearity. According to Mertler and Vannatta, this can lead to understanding which independent variable contributes to the explained variance. A preliminary multiple linear regression was conducted to evaluate multicollinearity in the variables. As can be seen in table 18, multicollinearity was not violated because tolerance statistics for all the five independent variables were greater than 0.1. Also, the Chi Square test of association shows there is no multicollinearity. There are no outliers and the test of goodness of fit to

assess the fit of the model to the data (Mertler & Vannatta, 2013) shows the model is a good fit. This was confirmed by the Hosmer-Lemeshow not being statistically significant ($p = 0.641$). A logistic regression model was used to assess the importance of each independent variable and to predict which variables had the strongest relationship with each other. Of the predictor variables, only problems developed during pregnancy was found to be statistically significant ($p = .05$). Overall only one variable was a statistically significant predictor of relationship between the independent and dependent variables (Chi square = 13.23, $p < 0.05$ with $df = 6$) 13.23 therefore, the result is not conclusive.

Summary

The purpose of this study was to examine the relationship between maternal health literacy, antenatal care visits, development of medical conditions during pregnancy (independent variables), and pregnancy outcomes (dependent variable) for women in the city of Lagos, Nigeria. The population studied is diverse and evenly distributed. In this study, I examined if there is a statistically significant relationship between the dependent and the independent variables or the extent to which the independent variables (i.e., maternal health literacy, antenatal care visits, and development of medical conditions during pregnancy) predict the dependent variable (i.e., pregnancy outcomes) in Lagos, Nigeria based on social cognitive theory and the health belief model. In chapter 4 I reported the data collection procedure, return rate, data screening and treatment of missing data and data analysis methods. Findings from the study show that there is statistically significant relationship between pregnancy outcomes and antenatal care visits.

Next, the findings from further analysis that included the regression of independent variable maternal health literacy, antenatal care visits, frequency of antenatal care, and timing of antenatal care, and development of medical problems during pregnancy on the dependent variable pregnancy outcome showed that only one variable was a statistically significant predictor of relationship between the independent and dependent variables. The results show that only development of medical problems during pregnancy play significant role in women pregnancy outcomes. However, the findings should be interpreted with caution because the participants might have responded in a manner beyond my control. The data did not meet the parametric tests which limit the extent to which it can be generalized to the larger population but the findings from the study can be used to develop educational materials and to develop programs and services that will better improve women's pregnancy outcomes. In chapter 5 I discussed the research findings, limitation of the study, recommendations, implications, and conclusion.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of the study was to determine if there is a relationship between maternal health literacy, antenatal care visits, and development of medical conditions during pregnancy (independent variables) and pregnancy outcomes (dependent variable) in Lagos, Nigeria. In the study, I identified antenatal care utilization measured by the timing of first antenatal care visit. I also assessed the relationship of the independent variables on pregnancy outcomes measured by the birth status of the child, which was either a healthy and unhealthy baby. In this chapter, I will discuss the results of the study and the public health implications of the findings and provide my conclusions and recommendations for further research. A binary correlation was conducted to assess the relationship between the dependent and independent variables. Results showed that the variable problems developed during pregnancy were significantly correlated with pregnancy outcomes.

Interpretation of Findings

Overall, the findings of this study indicated that problems developed during pregnancy are significantly correlated to pregnancy outcome. I performed a binary logistic regression to find the predictable relationship between maternal health literacy level, the number of antenatal visits, the timing of the first antenatal care visit, development of medical conditions during pregnancy, and pregnancy outcomes (which was measured by having either a healthy baby or unhealthy baby). The binary logistic regression results showed statistical significance for medical problems developed during

pregnancy. The model explained 20% (Nagelkerke R^2) of the variance in pregnancy outcome and correctly classified about 87% of the cases. The sensitivity test for those who had a healthy baby was 96% and those who did not have healthy baby as 38%. About 21% of the participants reported they had or developed medical problems during their pregnancy. Medical complications may exist before pregnancy or worsen with pregnancy if they are not treated (WHO, 2016). Some of the complications mentioned by the participants were bleeding, high blood pressure, malaria, anemia, and other complications. This is generally consistent with WHO's (2016) report that major health complications account for 75% of maternal deaths. Unlike the WHO (2016) reports, in this study I did not look at women who died from these complications but tried to see if medical problems predict birth outcomes. Medical conditions during pregnancy highlight the need for antenatal care to ensure healthy pregnancy. This is important for coordinated care among health care providers to effectively manage the health of the pregnant women and ensure high likelihood of successful outcomes (Iezzoni, Yu, Wint, Smeltzer, & Ecker, 2014).

In this study, I did not find a statistically significant predictive relationship between maternal health literacy level and pregnancy outcomes in the study population. Past researchers have identified an association between a mother's literacy skills and the survival of the child (Levine et al., 2004). Shieh, Mays, McDaniel, and Yu (2009) reported that low health literacy affects the women's pregnancy knowledge which will affect the health of the baby. Rothman et al. (2004) also showed it was difficult for women with low literacy to read directions and to follow medical recommendations,

which leads to them having poorer knowledge that can contribute to worse clinical outcomes. However, these researchers' results could not be vindicated in this study because no association was found.

As a result, I looked at the education level of the women participants to see how their education level could impact their birth outcomes. Past studies have found level of education an important factor in birth outcomes (Idris et al., 2007; Ifenne et al., 1997; Ikeako et al., 2006). A study by Auger, Luo, Platt, and Daniel (2008) in Canada found an association between not having a high school diploma and low birth weight. However, the result from this study shows an interesting dynamic. While it would be expected that higher education would serve as a protective factor against negative birth outcomes, participants in this study with little or no education reported fewer negative birth outcomes compared to participants with higher education. This finding is different from other studies that suggest an association between education level and pregnancy outcome (Kohan, Ghasemi, & Dodangeh, 2007).

Skilled obstetric assistance during delivery and adequate antenatal care are important to reducing maternal mortality and morbidity (Iyaniwura & Yusuf, 2009), since pregnant women will receive information that will help them in making the right decisions concerning their pregnancy, receive treatment for existing medical conditions, and also receive screening for risk factors. The results from this study showed that a majority of the pregnant women in this study received adequate antenatal care but receiving adequate antenatal care may not be enough because a majority of the fatal complications may occur during or shortly after delivery (Iyaniwura & Yusuf, 2009).

Most of the women started antenatal care after the first trimester and this could be due to a lot of reasons that were not explored in this study. Therefore, there may be a need to look at other socio-cultural factors which may act as barriers to starting antenatal care early which could lead to successful pregnancy outcomes.

The results from this study are in accord with the HBM. The correlation in education, income, health literacy level, and timing of first antenatal visit are products of the environments. The socio-cultural factors which are associated with low antenatal care utilization can be viewed as modifying factors and perceived barriers to health seeking behavior for the women in the study. Furthermore, results from this study indicate the need for prevention focused programs that specifically target and encourage women to seek medical care as soon as they discover they are pregnant. This may help to promote healthy practices in these women. Self-efficacy can be used to help these women to set short term goals from one visit to another.

Limitations of the Study

Potential limitations associated with this study included the use of self-reported data, which can introduce recall bias (Creswell, 2007). In this study, I used a face-to-face, self-administered survey because of the ability of ensuring feedback and completion of the questions and assisting participants who may have questions (Creswell, 2007). Although this method may reduce nonresponse bias it did not provide anonymity and participants might not have truthfully answered sensitive questions (Creswell, 2007). To guard against this, Pannucci and Wilkins (2010) suggested the use of only validated scale. The scale I used was already validated and I also dropped off questionnaire for

participants who were busy or did not want to complete the survey with me there. These were picked up in a sealed envelope and this could have reduced non-response bias. Also, Frankfort-Nachmias and Nachmias (2008) suggested researchers ensure that the questions asked are not threatening by asking participants to rate how uneasy they felt other people would feel about the questions or rate the degree of difficulty in answering the questions. Although not all bias in the study could be controlled but the awareness of the presence of bias allowed thorough scrutiny of the results (Sica, 2006).

Another limitation for this study was lack of data from women who have died giving birth. Although this would have provided rich information about what they went through, data cannot be collected from a dead person and collecting data from the family of a dead pregnant woman will bring unpleasant memories and the information provided may be only hearsay. Furthermore, the study was limited to women over 18 years because women 17 years and under are considered minors who will need adult consent to participate. Pregnant women under age 18 may have different reactions to the questions in this study and their experience or lack of experience with antenatal care could have provided robust data.

Block (2002) noted there are intrinsic limitations with the self-reporting research method and analysis that relies on empirical measures alone; this is because cognitive and situational factors could affect the validity of the self-administered questionnaires. According to Gliem and Gliem (2003), the use of single item question in a construct is not a reliable way to generate conclusion. The dependent variable in this study was a

single item construct and this could constitute a limitation to the study and present an opportunity for future studies and the development of stronger instruments to support future study.

Recommendations

As a result of dearth of literature showing evidence of use of a standardized instrument to measure health literacy and also to find predictable relationships between health literacy, maternal health characteristics, and pregnancy outcomes, I conducted this study to add to the body of literature. The SCT of interaction between the environment, behavior, and what the pregnant women participants acquired through their education and information received during antenatal visit could empower women to make informed decisions about their health during pregnancy and beyond. Exposure to antenatal care and information provided during these visits could also help pregnant women in their decision making.

One of the seven MDGs, the reduction of maternal mortality by 75% by the year 2015 (Say et al., 2014), was not achieved (Oye-Adeniran et al., 2014), but women in this study were aware of the importance of antenatal visits. Seventy percent of women attended six or more antenatal visits; more than the four visits or more as proposed by WHO (2002). Although there were more than six visits for more than half of the women surveyed, only 47% of these women started antenatal care before the end of the first trimester (3 months). It is important to encourage early start of antenatal visits. This will allow early detection of likely medical problems and will reduce pregnancy complications that can lead to death or debilitation. Future studies should consider what

makes women wait longer to start antenatal care and how media campaigns could work to remedy this. The women who did not receive antenatal care at all were either not aware they were pregnant or did not want others to know they were pregnant. The women participants in this study were not pregnant at the time of the study but a comparison with women who are pregnant at the time of the study may give better insight. Also, future studies using the health literacy tool should try to consolidate the questions. Some of the participants reported the questions as repetitive or not very clear.

Health practitioners should be proactive in educating pregnant women, during each visit, on the importance of self-care and the early start of antenatal care. The participants in the study volunteered unsolicited information about the kind of care they received and their expectations for their care. A mixed methods approach of qualitative and quantitative research methods would be able to gather more information than this quantitative study and would help to bring out other reasons of lack of attendance or late attendance of antenatal care and what can be done to get women to use health facilities before, during, or after pregnancy.

Implications

Reducing maternal mortality is an important goal for public health professionals globally. The results from this study showed an interplay of different variables and underscore the challenges health professionals in a developing country, like Nigeria, might have in reducing maternal pregnancy and promoting better pregnancy outcomes. Data from the study showed Nigerian women have a high level of education; to improve maternal literacy, antenatal education should be introduced in high school and students

should be encouraged to take health-related courses emphasizing this subject area even if they are not majoring in health sciences. Community health promotion and awareness should emphasize early antenatal care to safeguard the health of the mother and child. Although this was not an area of focus in this study, information the women receive during their routine antenatal visits should address the importance of healthy living for a successful pregnancy outcome. This combination of practices is essential for a successful pregnancy outcomes and preventive health education could be useful for behavioral change and promoting antenatal care among future pregnant women.

Conclusions

Of the five predictor variables, problems developed during pregnancy was statistically significant. An increase in problems developed during pregnancy most likely will increase the chance of having negative pregnancy outcomes. It has been established in the literature that having antenatal care and care throughout the pregnancy increases the chance of having a successful pregnancy and healthy child. There is still much to be done to encourage early antenatal usage. The practice of registering late for antenatal care and having to go for biweekly visits, as a result of a late start, needs to be discouraged. Uniformity of care for pregnant women in both private and public health facilities needs to be encouraged to allow women who use government hospitals to have confidence in the care they are receiving. The long term positive social change implication of this study is that educational efforts and healthcare outreach could be focused on those women that normally would not pursue antenatal health care on their own.

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Appendix A: Survey Instrument

Qualifying Question:

1. Are you currently pregnant? 0=no; 1=yes—If no, continue with survey.

Survey:**Please answer each of the following items based on your experience:**

1. How often are appointment slips written in a way that is easy to read and understand?
(1) Always (2) Often (3) Sometimes (4) Occasionally (5) Never
2. How often are medical forms written in a way that is easy to read and understand?
(1) Always (2) Often (3) Sometimes (4) Occasionally (5) Never
3. How often are medication labels written in a way that is easy to read and understand?
(1) Always (2) Often (3) Sometimes (4) Occasionally (5) Never
4. How often are patient educational materials written in a way that is easy to read and understand? *(1) Always (2) Often (3) Sometimes (4) Occasionally (5) Never*
5. How often are hospital or clinic signs difficult to understand?
(1) Always (2) Often (3) Sometimes (4) Occasionally (5) Never
6. How often are appointment slips difficult to understand?
(1) Always (2) Often (3) Sometimes (4) Occasionally (5) Never
7. How often are medical forms difficult to understand and fill out?
(1) Always (2) Often (3) Sometimes (4) Occasionally (5) Never
8. How often are directions on medication bottles difficult to understand?
(1) Always (2) Often (3) Sometimes (4) Occasionally (5) Never
9. How often do you have difficulty understand written information your health care provider (like a doctor, nurse, nurse practitioner) gives you?
(1) Always (2) Often (3) Sometimes (4) Occasionally (5) Never
10. How often do you have problems getting to your clinic appointments at the right time because of difficulty understanding written instructions? *(1) Always (2) Often (3) Sometimes (4) Occasionally (5) Never*
11. How often do you have problems completing medical forms because of difficulty understanding the instructions? *(1) Always (2) Often (3) Sometimes (4) Occasionally (5) Never*
12. How often do you have problems learning about your medical condition because of difficulty understanding written information? *(1) Always (2) Often (3) Sometimes (4) Occasionally (5) Never*

How often are you unsure of how to take your medication(s) correctly because of problems understanding written instructions on the bottle label? (1) *Always* (2) *Often* (3) *Sometimes* (4) *Occasionally* (5) *Never*

13. How confident are you filling out medical forms by yourself?
(1) *Extremely* (2) *Quite a bit* (3) *Somewhat* (4) *A little bit* (5) *Not at all*
14. How confident are you filling out medical forms by yourself?
(1) *Extremely* (2) *Quite a bit* (3) *Somewhat* (4) *A little bit* (5) *Not at all*
15. How confident do you feel you are able to follow the instructions on the label of a medication bottle? (1) *Extremely* (2) *Quite a bit* (3) *Somewhat* (4) *A little bit* (5) *Not at all*
16. How often do you have someone (like a family member, friend, hospital/clinic worker, or caregiver) help you read hospital materials? (1) *Always* (2) *Often* (3) *Sometimes* (4) *Occasionally* (5) *Never*

For the following survey items please answer the question(s) thinking only about your last pregnancy.

17. When was the last time you were pregnant?

0=1–11 months ago
1=12–23 months ago
2=24–35 months ago
3=36 months or more

18. Did you get any antenatal care during your pregnancy? (Antenatal care is the care that a pregnant woman receives from organized health care services).

0=no
1=yes
2=not sure

If the answer to #18 (Did you get any antenatal care during your pregnancy?) is no, display the following items (What was the main reason you get any antenatal care during your pregnancy):

19. What was the main reason you get any antenatal care during your pregnancy?

0=I didn't know I was pregnant
1=I didn't know where to go for this type of care
2=I didn't have enough money to pay for the care
3=I didn't want anybody to know I was pregnant
4=I didn't believe I needed this type of care as I had been pregnant before
5=I had no way of getting to a medical center for this type of care
6=This type of care is against my religion

7=Other. (allow open ended response)

If the answer to #18 (Did you get any antenatal care during your pregnancy?) is yes, display the following items (#20, #21, #22, #23):

20. How far along in your pregnancy were you when you started antenatal care visit?

0=3 months or less

1=4 to 6 months

2=later than 6 months

21. How often did you go for antenatal visit?

0=Weekly

1=Every 2 weeks

2=Once per months

3=Every few months

4=Only when there were problems or I had questions

22. Approximately, how many antenatal visits did you make in total during your last pregnancy? (1, 2, 3, 4, 5, 6, 7, 8, 9+=more than 9)

23. What information did you receive during your antenatal visits? (check all that apply)

0=Health educational materials on sexual and reproductive health

1=Family planning and birth spacing information

2=Care of the newborn

3=What to expect during pregnancy

4=No information

Display the following question (Did you develop any health problems during your pregnancy?) to all participants who have been pregnant (those who did and did not get antenatal care)

24. Did you develop any health problems during your pregnancy? 0=no; 1=yes

If the answer to the previous item (Did you develop any health problems during your pregnancy?) is yes, display the following item:

25. Which of the following were health problems you developed during your pregnancy? (check all that apply)

0=Gestational diabetes

1=Depression

2=Heart problem

3=High blood pressure

4=Bleeding

5=Other health issues

26. **Display the following questions (26-34) to all participants who have been pregnant (those who did and did not get antenatal care)** When your child was born the child...

0=was a healthy baby

1=was premature

2=had a lower than normal birthweight

3=was stillborn

4=had another health issue

27. How old were you when you became pregnant with this child? (Give actual age)

28. What was your marital status when you became pregnant with this child?

0=Single

1=Ongoing dating relationship with father of child

1=Married

2=Separated

3=Divorced

4=Widowed

29. What was your highest level of education attained when you became pregnant with this child?

0=No formal education

1= Primary school

2=Junior Secondary School

3=Secondary School certificate

4=Ordinary diploma or college of education certificate i.e. OND, NCE

5=College degree or above

30. What was your employment status when you became pregnant with this child?

0=No employment outside of home

1=Part time employment outside of home

2=Full time employment outside of home

31. What was your religion when you became pregnant with this child?

0=No religion

1=Christianity

2=Islam

3=Traditional

32. What was your household income when you became pregnant with this child?

0=Less than N25,000

1=N26,000– N50,000

2=N51,000–N75,000

3=More than N75,000

33. How many times have you been pregnant? (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15)

How many children do you have (including the child of your last pregnancy, if alive)? (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15)

Appendix B: Permission to Use Instrument

E-mail Permission from Dr. Lisa Chew to use the questions on her survey

On Friday, September 25, 2015 10:25 AM, Lisa Chew <[XXXXXXXXXX](#)> wrote:

Yes, feel free to use the survey.

The above email may contain patient identifiable or confidential information. Because email is not secure, please be aware of associated risks of email transmission. If you are a patient, communicating to a UW Medicine Provider via email implies your agreement to email communication; see <http://www.uwmedicine.org/Global/Compliance/EmailRisk.htm>

The information is intended for the individual named above. If you are not the intended recipient, any disclosure, copying, distribution or use of the contents of this information is prohibited. Please notify the sender by reply email, and then destroy all copies of the message and any attachments. See our Notice of Privacy Practices at www.uwmedicine.org.

From: olubunmi adanri [XXXXXXXXXX]

Sent: Friday, September 25, 2015 8:24 AM

To: [XXXXXXXXXX](#)

Subject: Permission to use instrument

My name is Bunmi Adanri and I'm a doctoral student at Walden University. My dissertation is on "The Association Between Poor Maternal Health Outcomes, Maternal Characteristics, Antenatal Care Services Usage and Health Literacy in Lagos, Nigeria". I'm writing to request for permission to use 16 Health Literacy Screening Questions you used in your study, "Brief Questions to Identify Patients with Inadequate Health Literacy", as a health literacy assessment tool for my research. To the best of my knowledge, this would be the first to Use Existing Instrument

Appendix C: Certificate of Completion of NIH Training



Appendix D: Permission Letter from Lagos State Government to Use the Map of Lagos

State

