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KNOWLEDGE OF OVULATORY CYCLE AND CURRENT FERTILITY AMONG WOMEN IN GHANA

BY

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ACCEPTANCE

Accepted by the College of Humanities, University of Ghana, Legon in partial fulfillment of the requirements for the Degree of M.A. (Population Studies).

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DECLARATION

I, CHARLES ALLOR JUAYIRE, hereby declare that, except for references to other people's work which have been duly acknowledged, this is the result of my own research and it has neither in part nor in whole been presented for another degree. I, however, accept responsibility for any errors found in this work

Signed ……

Charles Allor Juayire (Student)

Date ……

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DEDICATION

This work is dedicated to the entire Juayire family. Especially to my wonderful parents;

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ABSTRACT

Most studies on knowledge of ovulatory cycle have predominantly established it to have an influence on the effective use of contraception. However studies on knowledge of ovulatory cycle and fertility remains an unexplored area in literature. Filling this gap may prove vital, especially at a time when efforts towards controlling fertility already in place appear to be ineffective. According to the 2014 GDHS, Ghana has experienced a slight increase in TFR from 4.0 in 2008 to 4.2 in 2014. The main aim of the study was to investigate if there exists a relationship between knowledge of ovulatory cycle and current fertility in Ghana.

Using the 2014 GDHS dataset and a study sample of 8201 respondents, the univariate analysis results showed that majority of respondents had inaccurate knowledge of ovulation, did not use any method of contraception, were aged 35+ and resided in the urban areas. The bivariate analyses showed that knowledge of ovulatory cycle and current fertility were not significantly related. It was also made evident, from the bivariate analyses that women living with a partner were more likely than married women to have births in the last five years. The Poisson regression model results maintained that knowledge of ovulatory cycle and current fertility were not statistically significant in both regression models. Contraceptive use, age, marital status, ethnicity, level of education and religion were found to be significantly related to current fertility.

Among the various recommendations informed by findings from this study, crucial ones include the need for strategies to improve contraceptive use and increase age at first marriage.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

According to the UNFPA (2015), the world's population reached its first billion in 1804, after several millenniums, and then in just about 200 years, it grew sevenfold. Variations in the number of children born to women across the world have been the main drive behind the rise in the world's population, resulting in the upswing of people on earth (UNFPA, 2015). The global population is currently about 7.3 billion people and has been projected to reach 9.8 billion in 2050 (PRB, 2015). Out of the world's population of 7.3 billion, sixteen percent (16%) makes up Africa's current population of about 1.2 billion, with the highest proportion of the population in Asia occupying sixty percent (60%). However, projections show that Africa is expected to contribute more than half of the expected growth in the world's population between 2015 and 2050 (UN, 2015). The world has been projected to add about 2.3 billion people to its current population. Africa alone has been projected to contribute more than half of this increase by 2050 by adding 1.3 billion people (UN, 2015).

It is asserted that developing countries account for 97 per cent of the world's population due to their high birth rates. These high birth rates in developing countries can be explained by factors including, no and low levels of education, gender inequality, high child mortality rates, child labour, and ineffective use and awareness of modern contraception (Eswaran, 2004). Among developed countries, however, the annual number of births barely exceeds deaths, because of low birth rates and an increasing aging

population (Haub, 2012). This situation in developed countries can be attributed to factors including high levels of economic development, very low child mortality rates, an appreciable level of gender equality, a substantial number of women participating in the labour force, and an effective use of contraception (Kohler, Billari, and Ortega, 2006). Fertility levels in sub-Saharan Africa stand at 5.1 children per woman, which is more than double the replacement level of 2.1, adding to this, there has been significant decline in mortality, which is due to improvements in pharmaceuticals and medical technologies and this has led to rapid growth in our population size (UN, 2011). Africa's population is estimated to double from about 1.2 billion to about 2.3 billion in 2050, on the assumption that Africa's fertility will decline from 5.1 to about 3.0 by 2050 (Haub, 2012).

In the past few decades, there has been significant fertility decline in some sub-Saharan African countries while some other countries in this same region continue to either stall or have more children. Rwandans, for instance, from 2005 to 2010 have declined their fertility by 25 percent, whereas, countries like Niger, Benin, and Burkina Faso keep stalling at very high fertility levels (Madsen, 2013).

The 2014 Ghana Demographic and Health Survey (GDHS) report states that Ghana's total fertility rate (TFR) has stalled at around 4.2 births per woman even in the wake of the moderate increases in the contraceptive prevalence rate. According to Agyei-Mensah (2006), for fertility to decline there should be stability in the infant mortality rate, fertility desires, and an increase in the use of modern contraceptives. He suggests intensive mass education to increase awareness on the usage and practice of modern contraception. Although Ghana has increased efforts in this direction, as well as improved healthcare services over the years, the effects of these strides have not yielded the expected results

(that is, decline in fertility) (GSS, GHS and Macro International, 2015). This situation compels the need to query the strategies in place, to identify omissions, or make some modifications so as to rectify the problem. One way to do this is to consider extensively exploring all possible variables with potential to reduce fertility. One of such variables, with very scanty literature on is knowledge of ovulatory cycle. Nyarko (2015), in his article on the prevalence and correlates of contraceptive use among female adolescents in Ghana, found that knowledge of ovulatory cycle influenced the effective use of contraception, hence may potentially lead to a decline in fertility.

Ovulation in simple terms refers to a time period in the menstrual cycle when a matured egg (ovum) journeys through the fallopian tube, waiting to be fertilized by a sperm (Mtawale et al., 1997). Ovulation is a crucial part of the female menstruation cycle (Crosta, 2015). The menstrual cycle begins with monthly changes in the uterus (womb), when the lining of the womb ruptures, and blood mixed with mucus is expelled out of the body through the vagina, in a process termed menstruation. After which the walls of the uterus thickens in reaction to hormones secreted from the hypothalamus, aimed at preparing the uterus for possible pregnancy (Camron, 2002). The ovary then starts the process of developing a matured egg to be released down the fallopian tube in a process called ovulation (Mtawale et al, 1997). Studies from Dunson et al. (1999) and Dunson et al. (2001) show that the highest probability for conception occurs one (1) or two (2) days to ovulation rather than the actual day of ovulation whereas other studies including Wilcox, Weinberg, and Baird (1995) hold that the woman in the process of ovulation, is most fertile on the day of ovulation.

It is important for a woman to know her ovulatory cycle, since the length and duration of the cycle process might not be the same for any two women. The probability of conception during ovulation ranges from 0.10 when intercourse occurs five days before ovulation to 0.33 when it occurs on the actual day of ovulation (Wilcox, Weinberg, Baird, 1995). Knowledge of the cycle (and the practice of that knowledge) is important for two main reasons. First, it reduces the chances of unwanted pregnancies and second it aids in improving a woman's reproductive health (American Academy of Pediatrics, 2006). A woman who has an accurate knowledge of her ovulatory cycle is more likely to effectively use modern contraception, especially the rhythm method, to avoid unintended pregnancies (Laguna, Po, and Perez, 2000). From this, the purpose of this research is to explore the relationship between knowledge of ovulatory cycle and current fertility among women in Ghana.

1.2 Statement of the Problem

Ghana's total fertility rate (TFR) has slightly increased to 4.2 births per woman in 2014, from 4.0 births per woman in 2008 (GSS et al., 2015). The TFR refers to the number of children a woman would have by the end of her childbearing years, under the prevailing age specific conditions. This means that on the average the Ghanaian woman will have four children, by the end of her reproductive years. Ghana's TFR is higher than the world's average of 2.5 (PRB, 2014). From 1988 to 2008, Ghana has seen a steady decline in its fertility, so this slight increase as reported in the 2014 GDHS, signals the potential for further increase, if efforts toward fertility decline are not doubled to stabilize and subsequently reduce fertility.

Rapid population growth comes with its economic, social, and environmental challenges which slow the pace of achieving human and economic development (UN, 2015). Rapid population growth leads to hunger, poverty and low standards of living, when the population outgrows the available resources in the society (Bongaarts, and Casterline, 2013). Consequently, this may lead the government to disproportionately spend more on the welfare of the population to the neglect of equally important sectors of the economy, leading to the decline of government's per capita expenditure on other social needs just to maintain a minimum standard of living (Boadu, 1994). Out of the 48 predominantly poor countries with very high population growth in the world, 33 of these countries, that is, almost 70% are in sub-Saharan Africa. The Ghanaian society as seen in most African nations is pro-natalist. Among the characteristics of such countries includes "low income, high economic vulnerability, and poor human development indicators such as low life expectancy at birth, very low per capita income, and low levels of education" (Haub, 2012).

According to the WHO (2015), 225 million women in developing countries want to delay conception and yet do not use any method of contraception. This indicates the magnitude at which women have an unmet need for contraception. Findings from the 2014 GDHS suggest that Ghana has seen an increase somewhat in the contraceptive prevalence rate (CPR), both in any method and modern methods of contraception, although modern methods are predominantly used compared to traditional methods of contraception. CPR is defined by the WHO as the number of women either married or in union who are currently using contraception or whose partners use contraception among women aged 15 to 49 years. In spite of this, some women report a variety of reasons for their discontinued

use of modern methods of contraception; among these are the cost of contraception, health reasons and husbands' disapproval on the use of contraception, (GSS et al., 2015). Marginal increases are seen in Ghana's CPR from 2008 to 2014 from 20 to 27%. Though Ghana's CPR has increased to 27%, it is still below the global average of 63.4% (MDG Report, 2015; The World Bank, 2016). The increase in CPR has clearly not brought with it the corresponding decline in fertility as expected. Instead of an anticipated decline in Ghana's TFR there has been an increase of 0.2 in 2014.

Some women resort to induced abortion as a form of birth control, especially in a pro-natalist country like Ghana where many young women are pressured to get married and have children immediately after they are married (Kannae, 1993). However, for various, legal, economic and social related reasons, these women decide to use unsafe methods to terminate unintended pregnancies. Some women get frustrated with the lengthy bureaucratic proceedings as allowed by Ghana's law on abortion before they are allowed to have safe abortions at registered and approved hospitals. Ghana's law on abortion does not allow abortion for economic or social reasons, which are among the core reasons young women opt for abortion, and since the nation does not permit abortion for such reasons they may choose unapproved methods of abortions at unapproved places. Also, the shame and stigma associated with premarital pregnancies and induced abortion may lead women to use of unsafe methods. Also, ignorance about the cycle may lead women to use unhealthy procedures to address events during the menstrual cycle, as well as the inappropriate use of contraception (Anjum et al., 2010). When these unsafe methods are chosen, they render these women vulnerable to morbidity and mortality which adds to the

causes of maternal morbidity and mortality in the country and diverts the inadequate income allowed for the health sector.

This topic is again important to study as knowledge of the ovulatory cycle has been found to contribute to women's increased and effective use of contraception (Nyarko, 2015). Unfortunately, women tend to have no or incorrect knowledge about their ovulatory cycle. According to the 2014 GDHS report, more than half of women sampled for the survey (62%) have no or inaccurate knowledge of the ovulatory cycle (GSS et al., 2015). Kothari (2010) found that very few women are aware of their ovulatory cycle before menarche. This suggests that most women are more likely to be ignorant about when they are most fertile so as to avoid unintended pregnancies since unintended pregnancies in Ghana contributes about 17 percent of our current TFR of 4.2 (GSS et al, 2015).

1.3 Research Questions

Due to the aforementioned problems, this study seeks to answer the following questions:

1. What is the relationship between women's level of knowledge of the ovulatory cycle, their contraceptive use, and their current fertility in Ghana?

2. How are women's different socio-demographic, -economic, and -cultural characteristics associated with their current fertility?

1.4 Rationale of the Study

Eswi, Helal and Elarousy (2012) state that the onset of a woman's menstrual cycle is an indication of her reproductive maturity. In this breath, any uninformed decisions, such as choosing to have intercourse in the middle of the cycle with no intention of becoming

pregnant, could result in unintended pregnancies. One way to prevent incidence of unwanted pregnancy is to provide accurate information to the young woman about the importance of knowing the menstrual cycle in order to prevent unwanted pregnancies. Such information will go a long way to aid the young woman to make informed decisions about when to engage in intercourse and when not to, depending on her goals on her timing of childbearing. Unfortunately, among women aged 15-49 interviewed during the 2014 GDHS, only 36% had accurate knowledge of the ovulatory cycle, and among users of the rhythm method only 54% identified their most fertile period as being halfway between two menstrual cycles, hence the importance of this study.

Knowledge of ovulatory cycle has been found to be consistent with increased and effective use of contraception (Nyarko, 2015; Prior, 2008). Mtawali, et al. (1997) adds that a woman with accurate information about her menstrual cycle can avoid intercourse during fertile periods to prevent pregnancies or may choose to get pregnant by having intercourse during her fertile period. Knowledge of ovulatory cycle may therefore have an indirect influence on fertility by having a direct impact on contraceptive use. Maximizing the use of this traditional method of contraception could contribute to curbing unintended pregnancies for those not using a modern method for various reasons. For instance, in the eighteenth century, British men from the urban elite or higher mostly used contraception because they could afford it, while men in the lower classes practiced coitus interruptus (withdrawal method) instead, even though it demanded much self-control in order to achieve the desired effect. Coitus interruptus was used to prevent matters related to illegitimate children that may surface as a result of engaging in extramarital affairs.

Literature on the relationship between knowledge of ovulatory cycle and fertility is generally an underdeveloped area. Reviewed literature so far that focuses on related topics, do so in order to contribute towards reproductive health advances, for instance, Ayoola et al (2016), examined the extent of knowledge that women possess when it comes to their anatomy, hormones, ovulation and other associated reproductive concerns in South America. Eligible respondents had to be eighteen and above and not pregnant. Sinai, Jennings, and Are´ valo (1999) focused on identifying the fertile time during the menstrual cycle. They also published a second article, Are´ valo, Jennings, and Sinai, (2002), which aimed at providing a fixed formula for identifying the fertile period during the window. The last study worth mentioning examined how ovulation affects the behaviour of women. In it, Durante et al. (2008) tried to explain why ovulating women tended to have heightened sensations to enhance their appearance and wear sexier clothing. The studies mentioned above, in addition to many other reviewed literature, do not examine the association of knowledge of ovulatory cycle on fertility.

A study, therefore, on knowledge of ovulatory cycle and current fertility among women in Ghana is timely, since it seeks to shed light on the relationship between, knowledge of ovulatory cycle and fertility among women in Ghana. It fills a gap in the literature on Ghanaian women's knowledge of the ovulatory cycle and use of traditional methods to influence their fertility. Findings from this study should provide the necessary information to contribute to the literature on fertility in Ghana.

1.5 Objectives

The general objective is to examine the relationships between knowledge of ovulatory cycle, contraceptive use and women's current fertility in Ghana.

Specific objectives of the study are:

1. To determine the difference in current fertility levels among women with accurate knowledge of their ovulatory cycle and women with no or inaccurate knowledge.
2. To examine the differentials in current fertility levels by women using contraception.
3. To describe the relationship between women's socio-demographic, -economic, and -cultural characteristics and their current fertility.

1.6 Organization of the Study

This study consists of seven chapters. The content of each chapter is as follows:

Chapter One began the dissertation with an Introduction of the study. This consisted of background information about the study, the problem statement, research questions for the study, the rationale of the study and objectives. Chapter Two contains the literature review, where works written by other scholars in relation to the knowledge of ovulatory cycle and/or fertility are reviewed and examined. It also contains the conceptual framework and the hypotheses to be tested. Chapter Three outlines the methodology employed for the study, indicating the source of data, the study area under consideration as well as how variables are categorized for the purpose of the study, methods of data analyses and data limitations.

Chapter Four titled 'background characteristics of respondents', focuses on displaying descriptive statistics such as frequency tables and charts to examine and describe the distribution of the respondents by their background characteristics. The independent and

the dependent variables are also described in this chapter. Chapter Five examines bivariate relationships between the independent variable, knowledge of ovulatory cycle, the intermediate variable, contraceptive use, and the dependent variable, births in the last five years, as well as the relationship between each control variable and the dependent variable.

Chapter Six consists of two models showing results from Poisson regression analyses to identify if there exists any association between knowledge of ovulatory cycle and births in the last five years (first model), the second model will examine the net effect of all independent variables (main independent and the control variables) on the dependent variable (birth in the last five years). This chapter will also discuss findings from the models. Chapter Seven provides a summary of the major study findings, conclusions drawn from the results and their policy suggestions for action.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter is focused on reviewing relevant literature to provide some support for examining the influence of a woman's knowledge of the ovulatory cycle on the number of children she has had in the five years preceding the survey. It will also discuss some socio-demographic characteristics and how they influence the level of knowledge a woman has about the ovulatory cycle, and then also assess the literature on some determinants of fertility.

2.2 The Menstrual and Ovulatory Cycles

The literature on knowledge of ovulatory cycle and current fertility among women in Ghana is scanty, as indicated earlier; however, sufficient literature on the knowledge of the menstrual cycle does exist (Koyama et al, 2009). The menstrual cycle cannot be discussed without a mention of the ovulation process. The onset of menstruation is a signal of reproductive maturity (Eswi, Helal and Elarousy, 2012). It lasts for the first 3 to 5 days, right after which the walls of the uterus thicken in reaction to the presence of the follicle stimulating hormone (FSH) and the luteinizing hormone (LH) (Camron, 2003). These hormones are secreted by the pituitary gland in response to hormones secreted by the hypothalamus with the aim of preparing the uterus for possible pregnancy. Ovulation has been defined by Mtawali, et al. (1997) as a monthly occurrence in the life of a woman in their reproductive years in preparation for possible pregnancy. According to Stanford, White, and Hatasaka (2002), ovulation occurs when a matured egg from the ovary is

released into the fallopian tube to begin its journey down the tube, making it available in the process, for fertilization by a male sperm.

The menstrual cycle starts from the day of the first menstrual bleeding to the day before the next menstrual bleeding. The menstrual cycle has three phases the menstrual bleeding phase, the estrogen phase and the progesterone phase (Mtawali, et al 1997). The middle phase of a woman's menstrual cycle, also called the estrogen phase presents a chance for conception. Women are most fertile during this period due to the process of ovulation.

Attitudes about the menstrual cycle, developed at the start of a woman's menstrual cycle are believed to persist throughout the woman's life. Studies suggest that the lack of access to information on the menstrual cycle leads to negative personality perceptions such as guilt, shame, and inferiority complex, simply because young women lack knowledge about their own pending and recurring bodily events (Eswi, Helal and Elarousy 2012; Busari, 2012; Kothari, 2010). Women with prior knowledge of their menstrual cycle before their first experience have been noticed to have more positive attitudes towards the event (Eswi, Helal and Elarousy 2012; Busari, 2012). The negative perceptions may lead to faulty menstrual related practices leading to negative health implications, including extremely painful menstrual cramps (Adinma & Adinma, 2008). Another problem found to be associated with incorrect or lack of information about the menstrual cycle is high levels of gynecological morbidity such as infrequent and irregular menstrual periods with more than thirty-five (35) day intervals (Busari, 2012).

2.3 Knowledge of the Ovulatory Cycle

Knowledge of the ovulatory cycle is the accurate awareness of a woman's fertile period during the menstrual cycle (Mtawale et al, 1997). At present, the ovulatory cycle and by

extension the menstrual cycle remains prohibited and sometimes perceived in superstitious light in India as well as some cultures on the African continent (Bhudhagaonkar & Mahadeo, 2014). For instance, according to Oppong (2015), some ethnic groups, like the Akans in Ghana, have in their traditional villages, houses that are reserved for use by menstruating women so as to keep them from coming into contact with other people until night fall. Also among religious groups, like the Hindus, the menstruating woman is considered unclean, therefore admonished to remain isolated from everybody else during the menstruation period. In other settings she is not allowed to approach holy grounds, touch holy books and other holy objects. These beliefs coupled with perceptions that knowledge of the ovulatory cycle and its sexual related matters are privileged to only matured women, obstruct access to knowledge of ovulatory cycle to younger women. Such discussions are believed to subsequently lead to discussions on sexual related matters, for which the young woman is not considered matured enough to know. This may result in the continuous ignorance of the significance of ovulation as well as the hygienic practices necessary to maintain positive health, before, during and after the ovulatory cycle (Bhudhagaonkar & Mahadeo, 2014).

In Ghana, however, certain ethnic groups (such as the Ga-Dangme, Hausa, and Dagomba) used to strictly observe puberty rites, but these rites appear to have died out (Ahwenekoko, 2008). These rites were publicly performed to officially celebrate and introduce the young woman into womanhood. According to Munthali & Zulu (2007) issues discussed during these rites include but are not limited to how best the young woman can become a responsible woman in the society, by being obedient, respectful to elders, and how to appropriately carry herself in public, not forgetting the need to avoid

sex before marriage, teenage pregnancy and illegal abortions. These rites serve as legitimate platforms for counselling the young woman, as it serves as a reliable source of knowledge from which informed choices are made, and must therefore be reinstated (Ahwenekoko, 2008).

Apart from indicating a woman's fertile window, ovulation is considered by Prior (2008), as a predictor of a woman's entire health status. She states that regular ovulation prevents cardiovascular diseases, osteoporosis, and breast cancer in women especially in their premenopausal years. The process of ovulation also serves as an indicator of poor health when it does not occur during the expected time and an indicator of good health when the process regularizes (Prior, 2008). For ovulation to regularize in a woman there must be good eating habits and balanced emotional and social health (Prior, 2008).

Very few women are aware of their ovulatory cycle before menarche (Kothari, 2010; Garg, Sharma, and Sahay, 2001). Sociocultural prohibitions as well as the lack of available and accurate information about ovulation and sex has prevented most women from having access to the right information and this has led to a lack of awareness of their fertile periods, and the underestimation of possibilities of getting pregnant during their ovulation period (Lampic et al, 2006). This is because pregnancy usually occurs when intercourse occurs in the five day interval including the day of ovulation (Dunson et al, 2001).

Most women who accurately identify their fertile window are more likely to experience higher conception rates, however, accurate information about ovulation received earlier before intentions to be pregnant are more likely to delay conception and reduce unnecessary cost and interventions for many couples (Stanford, White and Hatasaka,

2002). Women with accurate knowledge of their fertile window during their menstrual cycle, have the ability to effectively use contraceptive methods and reduce the incidence of unintended pregnancies and repeated abortion (Shashina et al, 2013).

There are many methods for estimating the day of ovulation, although many of these methods are not widely available for use. These methods range from physiological indicators such as basal body temperatures, vaginal discharge and calendar calculations, to technological advancements such as the use of serial ovarian ultrasound, the urine Luteinizing Hormone (LH) Kit, the ovarian monitor, the clearplan easy fertility monitor, and the ovaCUE fertility monitor (Stanford, White and Hatasaka, 2002). In sub-Saharan Africa, where many of these methods for detecting ovulation correctly rarely exist, most women don't know their most fertile period, hence cannot effectively use the rhythm method of contraception to prevent unintended pregnancies (Stanford, White and Hatasaka, 2002).

2.4 Sources of Knowledge of Ovulatory Cycle

The main sources of information about ovulation are mothers and peers, followed by the mass media (Eswi, Helal and Elarousy 2012). Stanford, White and Hatasaka (2002) add that only physicians who counsel women for the purpose of conception are in the best position to advise them regarding their most fertile period. According to the literature, the accuracy of ovulatory cycle knowledge possessed by mothers is not certain (Crichton et al., 2012; Izugbara et al., 2011; Roudi-Fahini and Feki, 2011). Conservative mothers have been found to deliberately avoid discussing matters relating to the menstrual cycle with their daughters for fear that the topic will lead to discussions about sexual related matters, while liberal mothers, on the other hand, openly discuss issues that relate to the

menstrual cycle with their daughters (Zalberg, 2009). Friends are regarded by other studies as the most important source of information for adolescents on sexual reproductive matters (Roudi, Fahini and Feki, 2011). Kirby (2002) found otherwise as he recognized schools instead as being a more important source for building knowledge on sexual reproduction and fertility related matters. The community was also deemed vital in determining the knowledge of sexual reproduction and fertility related matters. Finally, the internet had an indispensable role in building knowledge by displaying both appropriate and inappropriate information to anyone who had access (Strasburger, 2012).

2.5 Factors Associated with Knowledge of Ovulatory Cycle

People with higher income status and Catholics have been found to possess more knowledge on average about the ovulation cycle than those with lower socioeconomic status and other denominations, respectively, as a result of their emphasis on the rhythm method (Potter, Sagi, & Westoff, 1962). Legally married women as well as educated women are more likely to have accurate knowledge of their ovulation cycle, for they have been found to more likely prefer natural methods of contraception (Laguna, Po, and Perez, 2000). The rhythm method is a natural procedure used to avoid conception by regulating times for intercourse, specifically during ovulation (Potter, Sagi & Westoff, 1962). Applying this method effectively requires nothing less than an accurate knowledge of the ovulatory cycle (Jeyaseelan and Rao, 1993).

2.6 Age, Education and Knowledge of Ovulatory Cycle

According to research carried out in Uganda to examine the determinants of knowledge of the right fertile period in a woman's ovulatory cycle among women and men, a person with secondary or higher levels of education was more likely than one with no education

to have accurate knowledge of the right fertile period. This suggests a positive correlation between level of education and knowledge of ovulatory cycle (Skirbekk and Samir, 2012). Age was another variable found by the study to have positive relationship with knowledge of ovulatory cycle. Individuals at later ages of their reproductive lives possessed more accurate knowledge of their ovulatory cycle than individuals at the early stages (Skirbekk and Samir, 2012).

2.7 Knowledge about the Ovulatory Cycle, Contraceptive use and Fertility

Potter, Sagi & Westoff (1962) in a seminal study about knowledge of the ovulatory cycle, coital frequency and their effects on conception and contraception, found that almost half of the respondents with accurate information about the ovulatory cycle reported to have avoided intercourse at certain times of the cycle to avoid pregnancies. However, less than 20% of the respondents reported to have had intercourse at specific times during the cycle to improve upon their chance of conception. The latter category of respondents with accurate knowledge of their ovulation cycle had been found to experience shorter conception delays.

2.8 Fertility

The universal desire to control fertility amongst nations, both developed and developing, validates fertility as an important component of population change (Jara, et al., 2013; Weeks, 2008). The change in fertility and its related socio-economic and cultural implications account for the current commitments in formulating policies in nations around the world to either increase or decrease fertility. Developed countries such as the America and Canada have instituted measures to keep fertility on the low, some of these measures are the introduction and effective implementation of family planning methods,

and legalization of abortion (Weeks, 2008). Other developed countries like Germany and Russia have the desire to increase the number of births in their country, because their mortality exceeds their fertility level (Weeks, 2008). As a result of boosting the number of births, these countries grant educational scholarships to international students who are young and intelligent to study in these countries, they also give incentives to couples with two or more children (Jara, et al., 2013). According to the United Nations (2013), commitments to control the rate of fertility in countries worldwide is justified because of the impact population size has in determining the living standards of the population. Most studies on fertility focus on factors that influence fertility, also known as determinants of fertility (Nabar, et al., 2013; Jara, et al., 2013; Skirbekk and Samir, 2012). Determinants of fertility can be categorized into two groups, the socio-demographic characteristics: age, place of residence, level of education, religion, amongst others and the proximate or intermediate factors: contraceptive use and effectiveness, induced abortion, proportion of married couples, amongst others (Weeks, 2008). The former group (socio-demographic factors) affects fertility by influencing the latter category (Bongaarts, 1982).

Socio-demographic and economic characteristics of women were found to have a significant relationship with her fertility (Nabar, et al. 2013; Jara, et al. 2013; Skirbekk and Samir, 2012). According Aduah-Kabah (2014) in his work titled "Marriage type and children ever born among women in Ghana", found that, there were significant relationships between socio-demographic characteristics (age, religion, place of residence, region of residence, wealth index and education) and children ever born.

Studies have found that a greater proportion of respondents who have knowledge of their ovulatory cycle use contraceptives than respondents without knowledge of ovulation

(Nyarko, 2015; Potter, Sagi & Westoff, 1962). Accurate knowledge of one's ovulatory cycle is vital for using the rhythm method of contraception, for those who wish to forego the use of modern contraception. An effective use of contraception is essential as it imbues in a woman the ability to control number of births by postponing and spacing her births. By so doing, she minimizes the risk of having unintended pregnancies and unsafe abortions, therefore maximizing her chances of survival. Berger et al. (2012), in contrast, found that the use of contraception was not linked to accurate knowledge of a woman's ovulatory cycle. They added that women who use traditional methods of birth control possess equally less accurate knowledge of their ovulatory cycle than those who have never used this method.

2.9 Summary of reviewed literature

In summary, various studies highlighting the influence of having knowledge of the ovulatory cycle on the number of children a woman will have were reviewed earlier in the chapter. Observations on the association between knowledge of the ovulatory cycle and effective contraceptive use have been inconclusive. Berger et al.'s (2002) article on what young adults know (and don't know) about women's fertility patterns and its implications for reducing unintended pregnancies, states that there exists no relationship between knowledge of the ovulatory cycle and effective contraceptive use, whereas Nyarko's (2015) current study on the prevalence and correlates of contraceptive use among female adolescents in Ghana found an association. Either way, knowledge of ovulatory cycle or lack of it ensures an influence on the number of children a woman will have, whether or not they use modern contraception. The use of modern contraception as a tool for effective population control has been extensively written on by both African

and foreign scholars. Use of modern contraception, although moderate, has been effective in reducing fertility rates among women in Ghana for years, but in recent times, fertility levels in Ghana have stalled even in the midst of increased investments and support for these family planning programs in recent years.

2.10 Conceptual Framework

2.10.1 Knowledge of Ovulatory Cycle

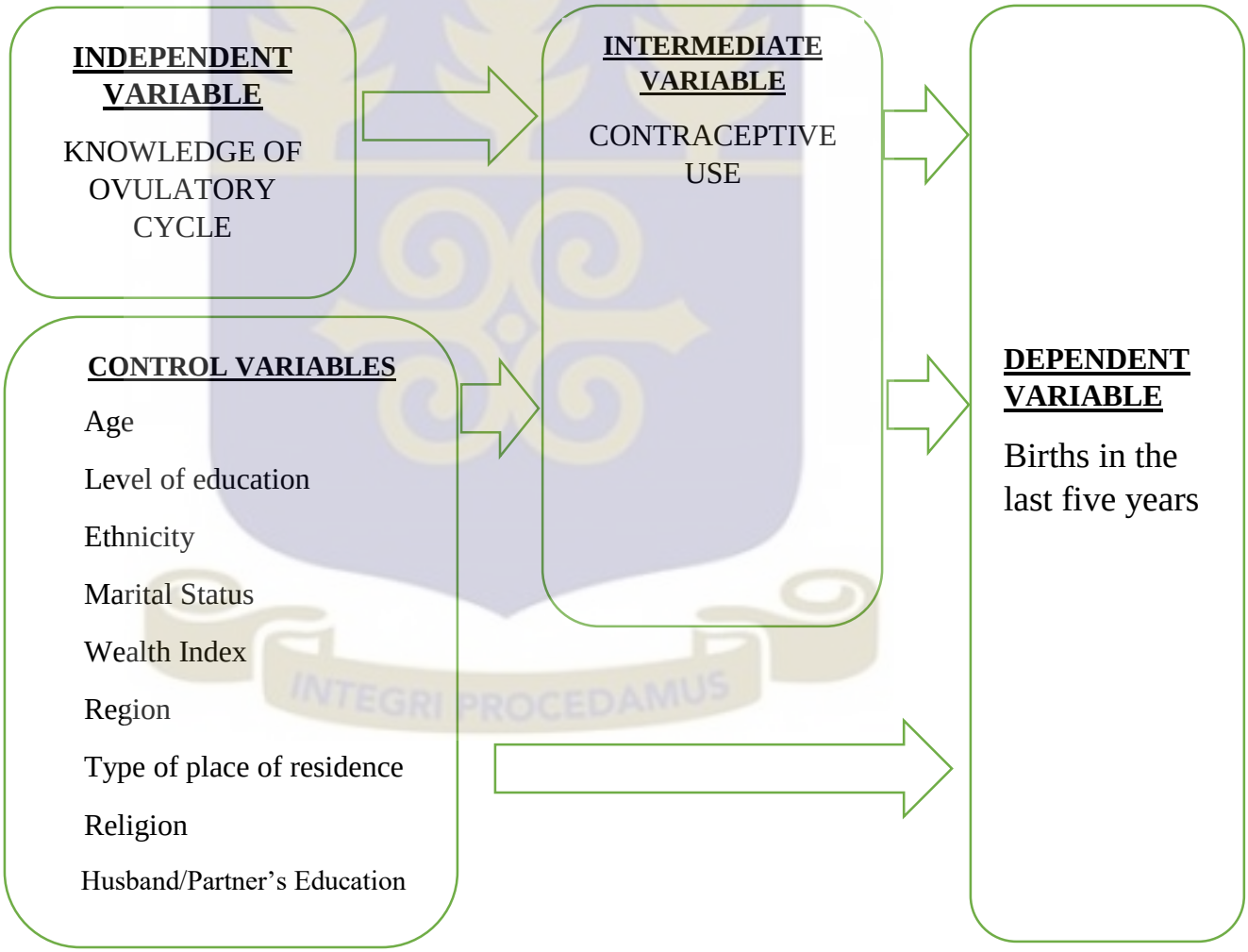
The literature has established the existence of a relationship between knowledge of ovulatory cycle and contraceptive use (Berger, Manlove, Wildsmith, Peterson, & Guzman, 2012; Nyarko, 2015), suggesting that women's knowledge of the ovulatory cycle affects the effectiveness with which they use modern contraception. Thus, those with accurate knowledge are expected to be able to use modern contraception effectively in contrast to those with no or inaccurate knowledge. The effective use of contraception enhances the health of both mother and child as well as reduces cost on healthcare. According to the WHO (2015), the use of contraception is necessary for slowing unsustainable population growth. Women with accurate knowledge of their ovulatory cycle are more likely than women with no or inaccurate knowledge to use modern contraception to avoid unwanted pregnancies. This is because women with accurate knowledge of their ovulation are well informed on the times during their menstrual period when they are most likely to be fertile (Laguna, Po, and Perez, 2000).

2.10.2 Contraceptive Use

Fertility is influenced by proximate determinants such as induced abortion, lactational infecundability, prevalence of permanent sterility, proportion of married women, and contraceptive use and effectiveness (Bongaarts, 2010). Prime amongst these proximate

determinants is contraceptive use, which has been found to have a significant relationship with a woman's fertility (Bogaart, 2010). The effective use of contraception is associated with reduction in fertility (Weeks, 2008). This implies that in areas where contraception is widespread fertility declines, whereas areas with insufficient contraceptive supply are more likely to have increased number of births (Robey et al, 1992).

Figure 2.1 A Conceptual Framework on Knowledge of Ovulatory Cycle and Current Fertility



Source: Adapted from Bongaarts, (2015), Author's construct (2016).

2.10.3 Age

Higher age at first marriage reduces fertility (Oyefara, 2012). Women generally become fertile after puberty, as the beginning of ovulation marks the commencement of a young girl's reproductive years. A woman is born with all the eggs she will ever release in her lifetime contained in her ovaries. The quantity of these eggs reduces as the woman advances in age, resulting in decreased reproductive potential at latter ages. As a result of this older women are expected to have fewer births in the last five years, compared to women in their prime ages i.e. 25-34 years. A woman's reproductive potential is generally at its peak during her twenties (20's) and this gradually declines in her thirties (30's) particularly after age thirty-fives (35) and by age forty (40) a woman's chances of getting pregnant drops to less than 5% per cycle (ASRM, 2012).

2.10.4 Wealth Index

Fertility is generally higher in poorer families. The association between income and fertility has been found to be an inverse one in many countries. However, studies suggest that depending on the source of income, fertility can continue to increase or decline. In situations where the income source is from land, many children will be an asset to the family so as to attend to the family business from time to time, so in such events fertility will increase. However, in situations where income stems from the rising value of the woman's time, having many children will overburden the family with responsibilities it has no spare time for, thus, the price of raising children will increase leading to fertility decline in those types of families (Schultz, 2005).

2.10.5 Education

The literature has most often asserted that the relationship between education and fertility is negative, that is, the more an individual, especially a woman advances in education the less likely she would prefer a large family. This is because after attaining a higher level of education, she might have spent a significant number of her reproductive years schooling, leaving her with a reduced reproductive age interval to give birth. Educated women have also been found to marry men who share their reproductive preference (Basu, 1999). Basu (2002) states that "education depresses fertility" as it promotes and encourages self-reliance among women, giving them the courage to take charge of their lives and resources (Basu, 2002). Education empowers women to better communicate and negotiate with their partners about issues relating to their reproductive health.

2.10.6 Religion

The differences in religious doctrines are believed to account for the fertility variation among different religious groups. Catholics and Baptists, to mention a few, are against the use of modern contraception and any other artificial method of reducing fertility. This is due to their peculiar doctrines, and teachings, such as, the following quotes from the Bible from Psalm, 127:3-5,"Behold, children are a heritage from the Lord, the fruit of the womb a reward. Like arrows in the hand of a warrior are the children of one's youth. Blessed is the man who fills his quiver with them! He shall not be put to shame when he speaks with his enemies in the gate". Per teachings of this kind, any attempt to control the number of children one has may be considered immoral and a violation of God's design for mankind (Coale, 1986; Chamie, 1981).

2.10.7 Marital Status

There exists an association between marital status and fertility. This association is evident in the fact that married women and women in union tend to have more children than their unmarried counterparts (GSS, 2013). However between married women and cohabiting women, married women tend to have more children than women who are cohabiting because of the closeness, security and stability marriage guarantees to women (Zhang and Song, 2007).

2.10.8 Ethnicity

There exists diverse normative ways of doing things in different cultural environments, and diverse ethnic groups are enveloped in these different cultural environment. These groups exhibit differences in their beliefs, practices and customs. One way of accounting for the differences in childbearing practices is the extant ethnic variation in the country. According to Boadu, (2002), ethnic groups prevalent in the northern part of Ghana are expected to have more children than ethnic groups that are prevalent in the south. According to Aduah-Kabah (2014), the Gruma ethnic group has the highest number of children while the Ewe ethnic group had the least number of children ever born. One reason suggested was that they have had less exposure to Western culture. This means that an ethnic group's level of social interaction with the West can influence the impact that their norms have on the reproductive behavior of its adherents.

2.10.9 Place of Residence

Place of residence has also been mentioned as having an influence on a woman's fertility. Rural dwellers, as a result of unfair distribution of resources, remain disadvantaged in

national development plans in comparison to urban dwellers. Urban dwellers have also been found to have less number of children in comparison to rural dwellers (Boupha et al., 2005). Rural dwellers face inadequate and not easily accessible health facilities, which lead to the prevalence of child mortality, than their urban counterparts. In response to this high child mortality, and some socio-economic reasons, couples in rural settlements are motivated to have more children to serve as the necessary response and insurance against the high mortality they experience (Boadu, 2002).

2.10.10 Region of Residence

Agyei-Mensah and Owoo (2015) found that although Ghana has experienced significant decline in fertility from 1998 to 2008, which is from 6.4 to 4.0, this decline in fertility was not uniform across all ten regions in Ghana. GSS (2010) in their regional analytic report cited variations in fertility among the various regions in Ghana. In this report, the Northern region experienced the highest level of fertility at 6.01, while the lowest regional fertility level of 3.51 was reported in the Greater Accra region.

2.10.11 Husband's Education

According to Yang (1993), in a study about the differential effects of husbands' and wives' statuses on marital fertility, found that, the correlation between husband's education and fertility were statistically significant. An educated husband is more likely to comprehend the need to have fewer children, trading quantity for quality, than his counterpart with no education. With fewer children, they are able to invest much more resources into their wards, giving them the best quality of education and health care possible, securing for them a conducive environment to realize their full potential.

For the purpose of this study the relationship between the control, intermediate and dependent variables will not be discussed, as such discussions has the potential of clouding the main focus of the study, which is the relationship between the independent, intermediate and dependent variables.

2.11 Hypotheses

1. Women with accurate knowledge of their ovulatory cycle are less likely to have more children in the last five years than women with no knowledge of the ovulatory cycle.
2. Women with inaccurate knowledge of their ovulatory cycle are more likely to have more children in the last five years than women with no knowledge of their ovulatory cycle.
3. Women who use modern contraception methods will have fewer children in the last five years than those not using a method of contraception.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

Kitchin and Tate (2000) define methodology as a set of coherent rules and steps used to investigate a problem. This chapter is focused on the methodology employed in this study and consists of a description of the study area, source of data, data collection techniques, measurement of variables, and techniques to be employed for data analysis, as well as the data limitations of the study.

3.2 Study Area

Ghana is a lower middle income country located on the west coast of Africa, and bordered by Burkina Faso to the north, Togo to the east, Cote D'Ivoire to the west and the Gulf of Guinea to the south. The country has ten (10) administrative regions with the capital city located in the smallest region, Greater Accra. The nation's Gross Domestic Product (GDP) was growing at 4% per annum in 2014, compared to 7% in 2013 (GSS, 2015). This suggests that Ghana's economic potential appear to be declining, especially when the population is showing no impressive signs of declining considering the increase in TFR by 0.2 births per woman. The country experienced an average growth rate of 2.5% between 2000 and 2010, and has seen an increase in population density from 29 persons per square kilometer (persons/km2) in 1960 to 103 persons/km^2 in 2010. Ghana's sex ratio experienced a reduction from 102.2 in 1960 to 95.2 males per 100 females in 2010, implying a smaller proportion of men to women. Life expectancy at birth increased from 38 years to 60 years, over the last five decades among males and from 43 years to 63 years among females (GSS 1979, 1985, 2002, and 2013).

3.3 Data

Secondary data from the women's questionnaire of the Ghana Demographic and Health Survey (2014) was used for this study. The Ghana Demographic and Health Survey is a nationwide survey covering all ten regions of Ghana. This is the sixth in the series of demographic and health surveys conducted in Ghana. The sampling frame used for the study is a modified version of the sample used for the Population and Housing Census in 2010 (GSS, 2013). This frame excludes nomadic and institutional populations. A sample consisting of 427 clusters throughout the country were drawn, and a sample of 30 households was scientifically selected from each of the clusters, resulting in a total sample of 12,831 households. Data from this survey is representative since the survey used a probabilistic multistage cluster sampling technique. The purpose of the survey is to make available current and reliable information on fertility, family planning, infant and child mortality, maternal and child health, and nutrition. Information related to fertility and the demographic, socio-economic, and socio-cultural characteristics of women were used for the study.

3.4 Sample Size

The total number of women in their reproductive ages (15-49 years) selected for the study were 9396, however, not all women in this group had had sexual intercourse. Women who reported they had never had sex were not at risk of conceiving, and they numbered up to 1227. Thus, after filtering the number of women in their reproductive ages to exclude those who had not had sex, and weighting the data by the weighting variable (women's individual sample weight) my final sample size was reduced to 8201 women, and this includes those who are either married or not.

3.5 Measurement of Variables

Dependent Variable

The dependent variable for the study was births in the last five years. This variable provides a more current measure of fertility than children ever born. Births in the last five years measures the number of children born to a woman within the five years prior to the survey (2010 to 2014). This variable was extracted from birth information collected from respondents in their reproductive years (ages 15-49) during the survey. During the survey, detailed birth information was collected, such as the child's name, month and year of birth, as well as the sex and survival status of each birth. From this collected and collated information, births in the last five years were extracted and created. Births to respondents in the last five years range from 0 to 5 births. For the purpose of the study, this range will be maintained as a discrete measure.

Independent and Intermediate Variables

The independent variable for this study was knowledge of the ovulation cycle. Knowledge of the ovulatory cycle was determined by these questions; "from one menstrual period to the next, are there certain days when a woman is more likely to become pregnant?" as well as "when during her menstrual cycle can a woman get pregnant, is it just before her period begins, during her period, right after her period has ended, or halfway between two periods?". From the responses obtained, respondents who answered "YES" to the first question and "halfway between two periods" for the second question, were considered by the 2014 GDHS as having accurate knowledge of their ovulatory cycle, however, if the first question was incorrectly answered by the respondent by way of choosing "NO" or "DON'T KNOW" for the first question, it

demonstrated the respondent's inaccurate or lack of knowledge about the ovulatory cycle, respectively. In addition, women who reported "YES" to knowing when a woman is most fertile but chose any other answer apart from "halfway between two periods" were also classified under their respective inaccurate views. Ovulation can be difficult to predict even among those with regular menstrual cycles, however, for most women it occurs around the midpoint of their cycle, although the exact time varies from one cycle to cycle (Stanford, White & Hatasaka, 2002). A study by Wilcox, Dunson and Baird (2000) used urinary metabolites of oestrogen and progesterone to estimate the timing of ovulation in 696 menstrual cycles from 221 women who were planning to be pregnant. Results indicated that 30% of the women had their fertile window within days 10 to 17 of their menstrual cycle while most of them had theirs earlier than day 10 and others later than day 17. Using a dataset from the World Health Organization study of the ovulation method, Arévalo, Sinai, Jennings (1999), found that days 8 – 19 were the most fertile days in the menstrual cycle. However, for the purpose of this study the variable 'knowledge of ovulatory cycle' was categorized into inaccurate knowledge, accurate knowledge and don't know (or no knowledge).

The intermediary variable used in the study was a woman's current use of a contraceptive method. The question asked, "Are you or your partner currently doing something or using any method to delay or avoid getting pregnant?" respondents who choose "NO" were grouped into the "no method" category, whereas respondents who choose "YES" were further asked "which method are you using?" here they are instructed to indicate by choosing the method or methods they are currently using. The different methods women reported using were female sterilization, male sterilization, IUD, injectables, implants,

pill, condom, female condom, emergency contraception, standard days method, lactational amenorrhea method (LAM), rhythm method, withdrawal, other modern method, and other traditional method. These methods were then categorized into no method, traditional method, folkloric method and modern method of contraception (GDHS, 2014). According to the United Nations Department of Economic and Social Affairs, Population Division (2015), contraceptive methods are classified into modern and traditional for analytical convenience. Hence, for this study, contraceptive use will be categorized into no method, traditional method (rhythm method, withdrawal and other traditional method), which is a blend of both folkloric and traditional methods, and then modern methods (female sterilization, male sterilization, IUD, injectables, implants, pill, condom, female condom, emergency contraception, standard days method, lactational amenorrhea method (LAM) and other modern methods).

Control Variables

The control variables in the study were socio-demographic, -economic and -cultural characteristics of respondents and these include her age, region of residence, highest educational level attained, ethnicity, marital status, religion, wealth index, type of place of residence and husband's highest educational level attained.

Age was originally categorized into five year age groups, that is, 15-19, 20-29 through to 45-49 years. However, for the purpose of the study age was re-categorized into women who were less than 25 years, which is made up of women 15-24, those 25-34 years, and women 35+, constituting women in the age group 35-49. Age can be categorized for the female population by fertility at three levels depending on the purpose of the study. These levels are the first level detail, which presents ages in single ages, the second level detail,

where ages are presented in five year age groups and the lowest level detail where ages are presented in a ten year range under the age 45+ (UN, 2004; UN, 1982).

Religion was grouped and measured as Catholic, Protestants, Pentecostals/Charismatics, Other Christians, Islam, Traditionalist, and No Religion. The measure Protestant, constitutes Anglicans, Methodists and Presbyterians.

Region of residence was categorized into the ten regions in Ghana: Greater Accra, Western, Eastern, Central, Volta, Ashanti, Brong Ahafo, Northern, Upper East and Upper West Regions.

The woman's and her husband's/partner's highest educational attainment levels were measured as no education, primary, secondary, and higher. However, the husband's/partner's educational attainment had additional categories. Women who did not know their husband's educational levels could answer "don't know". Also, there was 1903 respondents categorized as missing system in the variable, this missing system was constituted by women to whom the question of husband/partner education did not apply. Therefore the 1903 missing women was transformed into women with no husband/partner category, no partner. So the variable was in the end categorized into, no education, primary, secondary, higher, don't know and no partner.

Ethnicity was measured in terms of Ga-Dangme, Akan, Ewes, Mole-Dagbani, Gruma, and Others. Marital status was categorized according to never married, married, living with partner, and formerly married groups. Women who were widowed, divorced or no longer in union were categorized under formerly married. Finally, type of place of

residence was grouped into rural and urban settings, while the wealth index was regrouped into poor, middle and rich wealth categories.

3.6 Methods of Analysis

Methods of analyses to be used in the study include univariate analyses, cross tabulation and ANOVA tables for the bivariate analyses, and Poisson regression models for the multivariate analyses. The Statistical Package for Social Sciences (SPSS) was used to analyze the data.

Univariate analyses constituting a mix bag of tables and graphs were employed to show the proportions of respondents under each variable in the study. This analysis is descriptive in nature showing proportions of respondents in terms of number and percentages.

Bivariate analyses in the form of analysis of variance (ANOVA), were employed to find out the level of significance in the relationship between the following variables; the independent and dependent variable, the intermediate variable and the dependent variable, and then finally the relationship between each control variable and the dependent variable. ANOVA tables were used to analyze the relationship between the categorical variables and the discrete dependent variable (births in the last five years). In addition, a cross tabulation was used to assess the relationship between two categorical variables in the study, that is, the relationship between knowledge of ovulatory cycle and contraceptive use.

For the final analysis, Poisson regression models were employed. The Poisson model is appropriate for count variables, and the dependent variable (birth in the last five years)

for the study is in counts. A defining characteristic of this model is that, the conditional mean and variance should be similar to each other, this is known as the property of equidispersion. The conditional mean and variance for the variable birth in the last five years were similar, meeting the property of equidispersion assumption. Below is an illustration of Poisson regression model equation;

$$\Pr(y \mid \mu) = \frac{\exp(-\mu)\mu^{y}}{y!}$$

Where "y" indicates the probability of the dependent variable (birth in the last five years), and the "μ" represents the indicators in the model.

The Poisson regression model, was used to examine the net effect of the independent variables (indicators) on the dependent variable. There were two models, the first containing the main independent, intermediate, and dependent variables. The second model consisted of the independent, intermediate and controls as indicators against the dependent variable.

3.7 Data Limitations

This study is not without its limitations. First, the GDHS data is cross-sectional, and thus makes tracking respondent's behavior through time difficult. In this instance, the items in the women's questionnaire did not allow for further exploration into knowing when exactly woman with accurate knowledge learned about the method, it would have helped us understand better its link to their fertility. At the moment, we are to assume that knowledge of the cycle is a past occurrence which has ultimately affected women's fertility behaviour until now. However, it may be possible that the women may have

gained knowledge about the ovulatory cycle after they had finished childbearing. To subvert this limitation, the woman's fertility has been limited to their births in the five years preceding the survey instead of taking into account their children ever born. This provides a way of ascribing their fertility closer to their current knowledge of ovulatory cycle. In addition, I argue that this study is not seeking to predict or establish causality but rather to solely identify associations between knowledge of ovulatory cycle and their current fertility in Ghana.

Second, it would have been preferable to have a variable in the dataset that measured the woman's source of knowledge of ovulation. However, in order to ascertain knowledge of ovulatory cycle, questions in the women's questionnaire only sought to establish the accuracy or inaccuracy of their knowledge; hence, there were no items in the questionnaire measuring the source of ovulation knowledge attained by the respondent. As a result of this, women who were asked to indicate the specific time during their menstrual cycle when they were more likely to be pregnant and took a wild guess, which happened to be the correct answer, would be counted among those who actually had accurate knowledge of their ovulatory cycle. Again, respondents who knew the correct answer, but due to circumstances such as shyness or misunderstanding of the question chose the wrong answer will be counted among those who did not have accurate knowledge of their ovulatory cycle, and these will affect the outcome of the study's analysis. In the situation where sources of accurate ovulatory cycle knowledge are known. The respondent's indicated source of knowledge can be used to authenticate the accuracy of her knowledge of the ovulatory cycle. Hence, this would mitigate the effect of overestimation and underestimation of respondents who have accurate knowledge of

their ovulatory cycle, after analysis. In addition, knowing the source of her knowledge could lead the study to recommend relevant strategies that will equip these sources with accurate information and knowledge on how, where and when to relay their knowledge to upcoming women. Although the lack of the source of knowledge variable would help improve the study, it does not necessarily take away from the main aim of the study which was to examine the association between knowledge of ovulation and current fertility.

Finally, the GDHS is saddled with the inevitable errors associated with misreporting of information inherent in the survey data collection process. Despite this, since the survey is highly respected and conducted by reputable organizations that have collected these data for decades, I believe that the best and most robust information was obtained from respondents.

CHAPTER FOUR

BACKGROUND CHARACTERISTICS OF RESPONDENTS

4.1 Introduction

The socio-demographic, -economic and -cultural characteristics of the individual as presented in the conceptual framework does impact women's current fertility. This chapter will focus on presenting descriptive statistics of all independent and dependent variables in the conceptual framework, namely knowledge of ovulatory cycle, contraceptive use, and the socio-demographic, -economic and -cultural characteristics identified. These variables were analyzed using frequency and percentage distribution tables, with some displayed using the appropriate graphs.

4.2 Current Fertility

The table below (Table 4.1) shows that a higher proportion (about 50%) of respondents did not have any child in the last five, while only one respondent had five children in the last five years, and about 2% of them had three children in the last five years.

Table 4.1 Percentage Distribution of Current Fertility.

Birth in the Last five years	Number	Valid Percent
0 No births	4061	49.5
1	2767	33.7
2	1208	14.7
3	150	1.8
4	14	.2
5	1	.0
Total	8201	100.0

Source: Computed from 2014 GDHS dataset.

4.3 Knowledge of Ovulatory Cycle

A woman with knowledge of ovulatory cycle can use this knowledge to encourage pregnancy by increasing the frequency of intercourse during her most fertile period (Association of Reproductive Health Professionals, 2014). There is higher risk of getting pregnant, when couples have sex on fertile days without contraception. The knowledge of ovulatory cycle can be used to also discourage pregnancy (Association of Reproductive Health Professional, 2014). Here, intercourse is avoided during most fertile days or barrier methods of birth control are used to prevent pregnancies. Table 4.2 displays statistics on knowledge of ovulatory cycle among women in Ghana. It shows that the majority of these women, precisely 53.7% had inaccurate knowledge of the ovulatory cycle, and about 38% of women in their reproductive age had accurate knowledge of ovulatory cycle as being in the middle of the period, whereas about 8% of these women didn't have knowledge about the ovulatory cycle.

Table 4.2 Percentage Distribution of Women by Knowledge of Ovulatory Cycle

Knowledge of ovulatory cycle	Number	Valid Percent
Inaccurate Knowledge	4404	53.7
Don't Know	650	7.9
Accurate Knowledge	3147	38.4
Total	8201	100.0

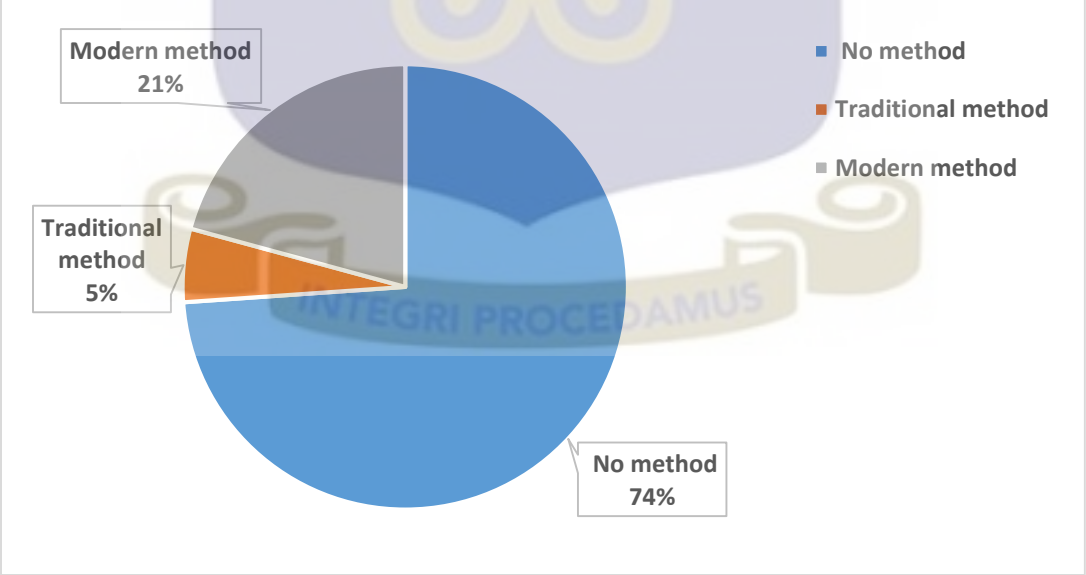
Source: Computed from 2014 GDHS dataset.

4.4 Contraceptive Use

Fertility regulation and pregnancy prevention is among the most important health care issues of the twenty-first century (WHO, 2004). One way of achieving this is through the

proliferative use of contraception among the masses. The use of contraception is presently widespread throughout the world (UN, 2003). The prevalence of contraception worldwide has not yielded the required result of reducing fertility accordingly in developing countries (UN, 2003). The use of contraception has become necessary because of the sudden surge in the size of the population as well as the reproductive needs of married couples to control the timing and number of birth they beget (Darroch and Singh, 2013). Researchers continue to nonetheless invest efforts into contraception to make them more safe, effective and less expensive. In Figure 4.1 below, is displayed the percentage of women interviewed in the 2014 GDHS who either used some method of contraception or not. According to the figure, seventy-four percent (74%) of women in Ghana used none of the contraceptive methods. However twenty-one percent (21%) used a modern method, while five percent (5%) used a traditional method.

Figure 4.1 Percentage Distribution of Women by Contraceptive Use

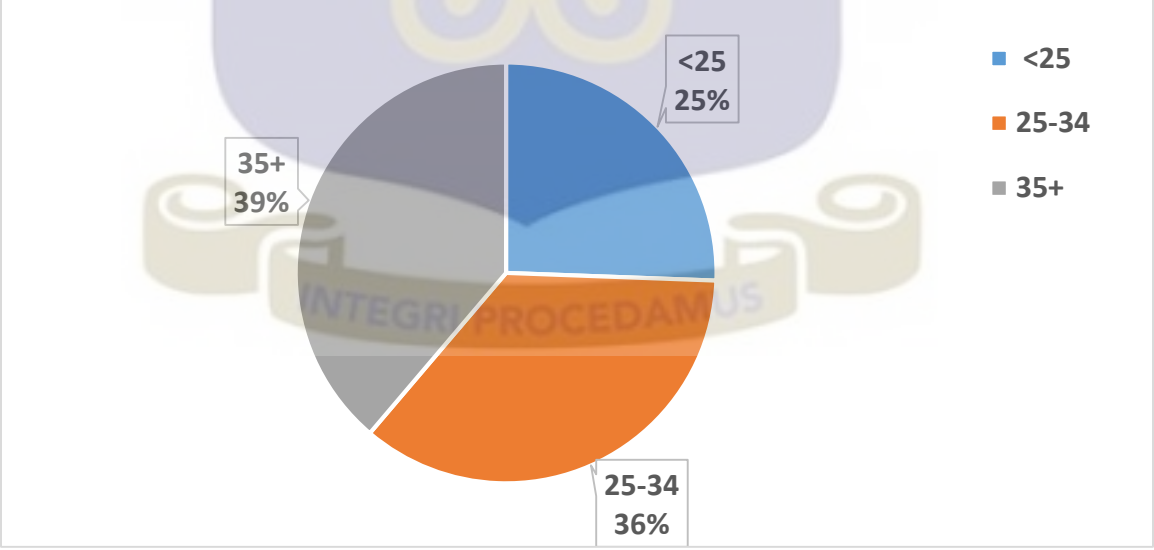


SOURCE: Computed from GDHS 2014

4.5 Age

Fertility changes with age. The onset of ovulation (menarche) marks the beginning of the female's fertility (American Society for Reproductive Medicine, 2012). The average age of women giving birth globally has increased from 27.0 to 29.3 years over the last 20 years, due to change in social trends worldwide (Liu and Chase, 2012). Increased age at first birth is associated with low fertility since ovarian function declines as age increases especially towards menopause (Liu and Chase, 2012). Women in their reproductive age begin to experience decline in birth during their mid-thirties and cease to have children 10 years before menopause. Figure 4.2 displayed below, shows the various categorization of women by age who participated in the survey. It shows that 39% of women, making the majority were 35 years and older, whereas the least represented women at 25% were women between the ages of <25.

Figure 4.2 Percentage Distribution of Women by Age Groups



SOURCE: Computed from GDHS 2014

4.6 Education

Education is a key determinant of fertility. Most developed countries attribute their decline in fertility to the mass education of women (Monstad, Propper and Salvanes, 2008). Women who achieve higher levels of education get empowered. As a result of years spent in education, these women bring forth few children by the end of their reproductive ages (Fitzgerald, 2011). Increased education for women leads to low completed fertility (Skirbekk, Kohler and Prskawetz, 2004). Increased education for women leads them to postpone their age at first birth from the 20's to ages 35 to 40 (Ameyaw, 2012; Monstad, Propper and Salvanes, 2008).Conversely, a woman's fertility status can be an indicator of the woman's educational status, since women who have early births generally have the tendency of foregoing their education (UN, 2013). According to GSS (2013), women with no education have a higher TFR (5.87 births per woman) in contrast to women with tertiary levels of education who had a TFR at 2.3 births per woman. Table 4.3 shows that close to eighty percent of women, specifically, seventy-nine percent (79%) have had at least some form of education, whereas twenty-one percent (21%) of them have never been to school. However, considering all levels of education, according to the table, fifty-five percent (55%) of women have completed their secondary level of education, while six percent (6%) of them have attained higher levels of education.

Table 4.3 Percentage Distribution of Women by Level Of Education

Level of Education	Number	Valid Percent
No education	1746	21.3
Primary	1451	17.7
Secondary	4484	54.7
Higher	519	6.3
Total	8201	100.0

SOURCE: Computed from GDHS 2014

4.7 Religion

Women's religiosity and denominational affiliation influences their fertility (Heineck, 2005). In a study by Hayford and Morgan (2008) on religiosity and fertility in the United States and the role of fertility intentions, women who considered religion very important in their lives had more children that those who reported religion as somewhat not important. In France, practicing Catholic women had been found to have more children than women in other denominations (Baudin, 2015). In Spain, conservative Protestants and Muslims had the highest number of children (Adsera, 2004). Other studies have found that Muslims had more children than Christians (Johnson-Hanks, 2006), while others state the opposite as true (Heaton, 2011). Still, additional studies found no fertility differences between the two religions (Kollehlon, 1994). These differences in fertility due to religion are attributed to differences in religious values and norms (McQuillan, 2004). Table 4.4 shows the religious affiliation of the sample, it indicates that forty-one percent (41%) of respondents belonged to the Pentecostal/Charismatic religion and the least represented religion is the Traditionalist/Spiritualist faction at two (2%), while three percent (3%) of them had no religion.

Table 4.4 Percentage Distribution of Women by Religion

Religion	Number	Valid Percent
Catholic	819	10.0
Protestant	1152	14.0
Pentecostal/Charismatic	3388	41.3
Other Christians	1246	15.2
Islam	1185	14.4
Traditional/Spiritualist	172	2.1
No Religion	240	2.9
Total	8201	100.0

SOURCE: Computed from GDHS 2014

4.8 Wealth Index

Studies have found an inverse association between income and fertility (Frejka &Westoff, 2006; Schultz, 2005). Sufficient evidence of this association exists in most countries, most of the time (Jones, Schoonbroodt &Tertilt, 2008). Generally, fertility is higher among poorer families, since individuals with higher average fertility tend to have a lower average income. Schultz, (2005) however, differentiates between two sources of income and their varied effect on fertility. He advances that income from immediate parents have the tendency of resulting in smaller family size preference, while income sourced from investments in stock of physical capital and other natural resources are more likely to result in the preference of large families. Table 4.5 shows that most of the women who were sampled for the study were rich, and they add up to about forty-five percent (45.2%) of the sample, while thirty-four percent (33.5%) were poor and about twenty-one percent (21.3%) of them were in the middle category.

Table 4.5 Percentage Distribution of Women by Wealth Index

Wealth Index	Number	Valid Percent
Poor	2744	33.5
Middle	1747	21.3
Rich	3710	45.2
Total	8201	100.0

SOURCE: Computed from GDHS 2014

4.9 Ethnicity

According to Addai and Trovato (1999), an ethnic group's level of fertility is dependent on the extent to which its members have been assimilated into the society's socio-economic and political structure. People who have fully assimilated into the society's way of life and structures mirror the approved life of the dominant group, in terms of their normative way of living, especially their fertility preference (Addai and Trovato, 1999). The average family size of an ethnic group can also be influenced by the level of adaptation to social and economic deprivations, where greater deprivation leads to staunch adherence to the normative way of life, since victims feel powerless to adapt other life patterns than what they are used to (Addai and Trovato, 1999). In Ghana, Northerners have been found to have higher fertility levels than Southerners (GSS, 2013). Table 4.6 shows that majority (51%) of the respondent are Akans and the least represented ethnic group at six percent (6%) is the Gurma ethnic group.

Table 4.6 Percentage Distribution of Women by Ethnicity

Ethnicity	Number	Valid Percent
Akan	4141	50.5
Ga/Dangme	638	7.8
Ewe	1129	13.8
Mole-Dagbani	1186	14.5
Gurma	451	5.5
Other	655	8.0
Total	8201	100.0

SOURCE: Computed from GDHS 2014

4.10 Region

The decline in fertility in all ten regions of Ghana has not been homogenous (Agyei-Mensah and Owoo, 2015). All other regions with the exception of the Greater Accra in 2003 and Upper West in 1998 experienced reductions in fertility between 1988 and 2003 (NPC, 2004). Between the 2000 and 2010 censuses there had been an average decrease in fertility of nearly 16.0% at the regional level. With the highest observed decline in the Ashanti Region at 32.6% and lowest in Brong Ahafo at 0.01% (GSS, 2013). The level of child mortality varied across the regions, since some regions have access to improved healthcare while others did not. Women in the Northern region experienced higher levels of child mortality than women in any other region in Ghana. Hence, they are expected to have the most number of children to serve as guarantee against child mortality (GSS, 2013). Table 4.7 indicates that majority of the respondents who participated in the survey were in the Greater Accra region and the Ashanti region representing twenty percent (20%) and nineteen percent (19%) respectively, while two percent (2%) of the respondents were situated in the Upper West region.

Table 4.7 Percentage Distribution of Women by Region of Residence

Region	Number	Valid Percent
Western	927	11.3
Central	842	10.3
Greater Accra	1641	20.0
Volta	645	7.9
Eastern	781	9.5
Ashanti	1530	18.7
Brong Ahafo	694	8.5
Northern	669	8.2
Upper East	296	3.6
Upper West	176	2.1
Total	8201	100.0

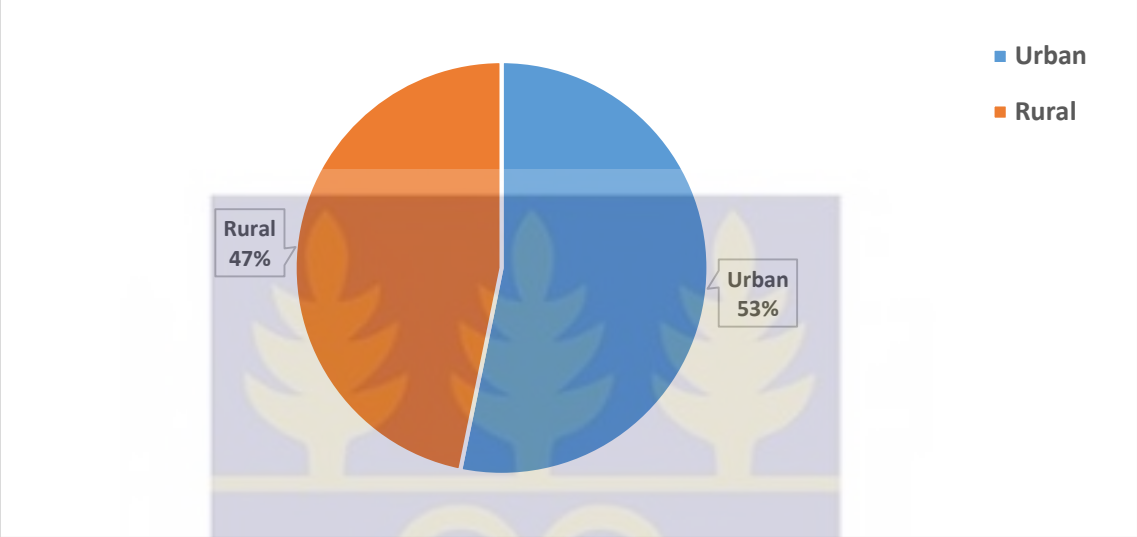
SOURCE: Computed from GDHS 2014

4.11 Place of Residence

According to GSS (2013), fertility levels in rural areas were higher than fertility levels in urban areas. One way of explaining this difference in fertility is that, rural dwellers mostly lack access to basic social amenities and services such as portable drinking water, schools and hospitals, when compared to those in urban dwellers. These varied levels of deprivation between the rural and urban areas gives meaning to the varied impact of child mortality in these two areas. Infant and under-five mortality, as expected, has been found to be higher in rural than in urban areas. This situation compels more births as a guarantee against the prevalence of child mortality in rural areas than in urban areas. In Ghana, the TFR in rural areas is 5.69 births per woman which is higher than the TFR in urban areas of 4.32 births per woman (GSS, 2013). Figure 4.3 presents a pie chart displaying the distribution of women in terms of their place of residence. It shows that

more than half (53%) of respondents were in the urban areas whereas forty-seven percent (47%) of them were in the rural areas.

Figure 4.3 Percentage Distribution of Women by Type of Place of Residence



SOURCE: Computed from GDHS 2014

4.12 Marital Status

A woman's marital status is associated with her level of fertility, since marriage is considered an important setting for childbearing (Wineberg, 1990). According to the GSS, (2013), women who have never married have the lowest TFR of 1.64 births per woman, followed by women who had ever been married with TFR of 3.43 births per woman. Next in line were women informally living together with a TFR of 4.0 births per woman, and the last category with the highest TFR of 4.89 births per woman was married women. Table 4.8 shows that the majority (48%) of respondents were currently married whereas twenty-three percent (23%) of them had never married and twelve percent (12%) of them were formerly married.

Table 4.8 Percentage Distribution of Women by Marital Status

Marital Status	Number	Valid Percent
Never In union	1903	23.2
Married	3967	48.4
Living with partner	1352	16.5
Formerly married	979	11.9
Total	8201	100.0

SOURCE: Computed from GDHS 2014

4.13 Husband's/Partner's Education

A husband's education may exert more influence on wife's fertility intentions than does her own education (DeRose & Ezeh, 2005). Husbands with or without education exert influence over wife's attitude. It is argued that in the midst of a woman's reproductive autonomy, her stated intentions are dependent on her spouse's intention (DeRose & Ezeh, 2005). In Ghana, for instance, men normatively control reproductive decisions (Adomako Ampofo, 2000). The characteristics of Ghanaian husbands have been found to affect their wife's decision to use contraception, however, husbands' attitude toward contraception were generally independent of their wife's (Ezeh, 1993). DeRose & Ezeh, (2005), also found that men with only primary education were less inclined to intend to stop childbearing, while men with secondary and higher educational levels were more likely to intend to stop childbearing. Table 4.9 indicates that seventy-seven percent (77%) of respondents had husbands or partners while twenty-three (23%) of them had none. Forty-four percent (44%) of respondents had husbands or partners who had completed secondary school while two percent (2%) of them did not know their husbands' or partners' educational level. Fifteen percent (15%) of respondents had husbands or partners who had no education.

Table 4.9 Percentage Distribution of Women by Husband's/Partner's Educational Level

Husband's Education	Frequency	Valid Percent
No Education	1236	15.1
Primary	544	6.6
Secondary	3620	44.1
Higher	749	9.1
Don't Know	149	1.8
No Partner	1903	23.2
Total	8201	100.0

SOURCE: Computed from GDHS 2014

CHAPTER FIVE

SOCIO-ECONOMIC AND DEMOGRAPHIC CHARACTERISTICS OF WOMEN AND CURRENT FERTILITY IN GHANA

5.1 Introduction

This chapter seeks to examine the relationships between knowledge of ovulatory cycle and births in the last five years, as well as knowledge of ovulatory cycle and contraceptive use, and the association between contraceptive use and birth in the last five years. In addition, relationships that exist among each control variable and the dependent variable will also be assessed by running bivariate analyses. These tasks will be achieved using ANOVA and cross tabulations.

5.2 Knowledge of ovulatory cycle and Current Fertility

Knowledge of ovulatory cycle and fertility had only been assumed to be related for the purpose of this study, for reasons stated above in the limitation section. Table 5.1a shows that, women with no or inaccurate knowledge of ovulatory cycle had the highest mean number of birth in the last five years. While women with accurate knowledge of the ovulatory cycle had the lowest mean number of birth in the last five years. Table 5.1b illustrates statistics on these two variables, according to the table the relationship between knowledge of ovulatory cycle and current fertility is not significant (.820). One reason for this, is that, a woman's knowledge of her ovulatory cycle, does not directly influence her fertility. For there to be an influence, knowledge of ovulatory cycle must function through other intermediate variables such as contraceptive use to affect fertility.

Table 5.1a Table Comparing Mean Number of Birth in the Last Five Years

Knowledge of ovulatory cycle	Mean	N	Std. Deviation
Inaccurate Knowledge	.70	4404	.794
Accurate Knowledge	.69	3147	.808
Don't Know	.70	650	.795
Total	.69	8201	.799

Source: Computed from 2014 GDHS dataset

Table 5.1b ANOVA Table of Knowledge of Ovulatory Cycle and Birth in the Last Five Years

KOC and Fertility	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.254	2	.127	.199	.820
Within Groups	5239.687	8197	.639		
Total	5239.941	8199			

Source: Computed from 2014 GDHS dataset

5.3 Knowledge of Ovulatory Cycle and Contraceptive Use

Knowledge of ovulation has been found to significantly influence the use of contraception (Nyarko, 2015; Potter, Sagi and Westoff, 1962). Women with accurate knowledge of their ovulatory cycle, effectively use the rhythm method of contraception, since knowledge of ovulatory cycle aids them to avoid pregnancy by avoiding intercourse during their fertile period. Knowledge of ovulatory cycle also facilitates conception when women engage in intercourse during their fertile periods. Table 5.2, shows that the relationship between knowledge of ovulatory cycle and contraceptive use is very significant at a p value of less than 0.0001. This finding confirms studies done by Nyarko (2015)

and Shashina et al, (2013), as these studies found significant relationships between knowledge of ovulatory cycle and the use of contraception. This goes to support the

notion that knowledge of ovulatory cycle better influences fertility through the use of contraception. Findings from the table below show that majority of women with inaccurate knowledge of their ovulatory cycle do not use any method of contraception, while only 5% of them used traditional methods. Twenty percent of women with accurate knowledge of their ovulatory cycle used modern method, while only 7% of them indicating the minority of women with accurate knowledge, used the traditional method. This finding confirms studies from Jeyaseelan and Rao, (1993), who found that knowledge of ovulatory cycle influenced the use of traditional methods. According to the table, women with knowledge (accurate or inaccurate) and those with no knowledge of their ovulatory cycle, in general, have higher proportions of women using no method, and the lowest proportion using traditional method relative to modern method. This suggests that no matter the level of knowledge of ovulatory cycle possessed by women in Ghana, they are more placed to use modern methods than traditional methods.

Table 5.2 Cross Tabulation of Knowledge of Ovulatory Cycle and Contraceptive Use

Knowledge of ovulatory cycle	Contraceptive Use			
	No method	Traditional Method	Modern Method	Total
Inaccurate Knowledge	3240	209	956	4405
	73.6%	4.7%	21.7%	100.0%
Don't Know	512	16	122	650
	78.8%	2.5%	18.8%	100.0%
Accurate Knowledge	2309	211	627	3147
	73.4%	6.7%	19.9%	100.0%
Total	6061	436	1705	8202
	73.9%	5.3%	20.8%	100.0%
x^2 = 30.541[a]		df =4		**P-value= .0001**

Source: Computed from 2014 GDHS dataset

5.4 Contraceptive Use and Current Fertility

One way for a nation to achieve desired fertility goals is to make access to effective and affordable contraception easy (Yesudian, 2007). Interventions to prevent pregnancies and realize lesser number of children have been associated with the proliferation of contraception (Mtruri, and Hinde, 2011). Table 5.3b establishes that there exists a very significant relationship between a woman's contraceptive use and their current fertility, at a p-value < 0.001. Table 5.3a shows the mean number of births as distributed by a woman's contraceptive use. It shows that women using a modern method of contraception have the highest mean number of children of .83 in the last five years, as compared to women using a traditional method of contraception, since they have the least mean number of children of .53 in the last five years. The influence of contraception on a woman's fertility has been established in the literature by many scholars. This finding is

consistent with studies from Adhikari (2000) and Palamuleni, (2013) who found contraceptive use and fertility to be significantly related.

Table 5.3a Comparing Mean Number of Births in the Last Five years

Contraceptive Use	Mean	N	Std. Deviation
No method	.67	6060	.804
Traditional Method	.53	436	.692
Modern Method	.83	1704	.792
Total	.69	8201	.799

Source: Computed from 2014 GDHS dataset

Table 5.3b ANOVA Table of Contraceptive Use and Birth in the Last Five Years

Contraception use and Fertility	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	49.097	2	24.549	38.765	**.000**
Within Groups	5190.844	8197	.633		
Total	5239.941	8199			

Source: Computed from 2014 GDHS dataset

5.5 Age and Current Fertility

According to the Southern California Centre for Reproductive Medicine (2016), age is an important factor affecting a woman's chance of conceiving. Women in their twenties are known to have better chances of conceiving than those above age thirty-five. A plausible explanation to this is that, women above thirty-five have less frequent and less potent ovaries available for conception. Table 5.4b shows that there is a significant relationship between a woman's age and her current fertility at a p value < 0.0001. Table 5.4a indicates that, women aged 25 to 34 years had the highest mean number of children in the last five years of .97, while women aged 35+ had the least mean number of children in the last five years of .53. This suggests that a woman's fertility potential is dependent on

her age. This finding is consistent with studies by Oyefara, (2012) and ASRM (2012), who found that a woman's fertility potential peaks during her 20's and declines after age 35.

Table 5.4a Comparing Mean Number of Birth in the Last Five Years

Age	Mean	N	Std. Deviation
<25	.56	2098	.743
25-34	.97	2922	.839
35+	.53	3181	.726
Total	.69	8201	.799

Source: Computed from 2014 GDHS dataset

Table 5.4b ANOVA Table of Age and Birth in the Last Five Years

Age and Fertility	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	349.012	2	174.506	292.465	**.000**
Within Groups	4890.929	8197	.597		
Total	5239.941	8199			

Source: Computed from 2014 GDHS dataset

5.6 Education and Current Fertility

Boupha et al. (2005) states that the relationship between women's level of education and number of children they give birth to are inversely related. Hence, women with higher levels of education are less likely to have many children compared to women with lower educational levels. Blesdoe et al. (1990) adds that a woman's fertility reduces as her education increases. Table 5.5b shows that a woman's level of education and their current fertility are highly significantly related at a p-value < 0.0001. This is consistent with studies such as Adhikari, (2010), where the relationship between education and fertility was found to be highly significant. One reason for this significant relationship is the

established and crucial role that education plays in fertility, such as delaying the age at which women get married, and enhancing their capacity to understand the essence and use of family planning methods to control their fertility. Table 5.5a shows that women with no education had higher mean number of births in the last five years of .89, whereas women with higher education had the least mean number of births in the last five years of .49. This suggests an inverse relationship between education and fertility, where the higher the woman's education the lower her fertility.

Table 5.5a Comparing Means of Birth in the Last Five Years

Educational level	Mean	N	Std. Deviation
No education	.89	1746	.841
Primary	.79	1451	.837
Secondary	.61	4484	.759
Higher	.49	519	.725
Total	.69	8201	.799

Source: Computed from 2014 GDHS dataset

Table 5.5b ANOVA Table of Education and Current Fertility

Education and Fertility	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	135.512	3	45.171	72.529	**.000**
Within Groups	5104.430	8196	.623		
Total	5239.941	8199			

Source: Computed from 2014 GDHS dataset

5.7 Wealth Index and Current Fertility

Income has been found to also influence the number of children a woman will have (Weerasinghe and Parr, 2002). Women with lower income levels were found to be more likely to have many children than women with higher income levels (Lovenheim and Mumford, 2011). Table 5.6b shows that a woman's wealth index has a very significant

relationship with the number of children born to her. Findings from the table had been consistent with many studies among these are Schultz, (2005), Palamuleni, (2013), and Uddin, Bhuyan and Islam (2011). These studies found that the wealth status of a woman, influences her fertility. Table 5.6a shows that women who are poor had the highest mean number of birth in the last five years of .90, whereas women who are rich had the least mean number of births in the last five years of .57.

Table 5.6a Comparing Mean Number of Birth in the Last Five Years

Wealth Index	Mean	N	Std. Deviation
Poor	.90	2744	.839
Middle	.64	1747	.772
Rich	.57	3710	.751
Total	.69	8201	.799

Source: Computed from 2014 GDHS dataset

Table 5.6b ANOVA Table of Wealth Index and Birth in Last Five Years

Wealth and Fertility	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	173.742	2	86.871	140.555	**.000**
Within Groups	5066.199	8197	.618		
Total	5239.941	8199			

Source: Computed from 2014 GDHS dataset

5.8 Religion and Current Fertility

Religion has also been found to affect the number of children a woman will have (Bumi, 2014). Religious teachings have had and still has a tremendous effect on the behaviors of their members, to the extent that the various forms of these teachings either promote or reduce the number of children a woman will have (Ahonsi, 1991). The Catholic and Islamic religions, for instance, hold and teach against the use of contraception and abortion practices. Hence, members of the aforementioned religions are more likely to

have many children as compared to members of other denominations. Table 5.7b shows that a woman's religion has a very significant association with the number of children she has. This was significant at a p-value < 0.0001. This suggests that a woman's religion influences her willingness to have more or less children. This finding is consistent with studies from Bumi, (2014) and Ahonsi (1991). Table 5.7a shows that women who are traditionalists had the highest mean number of birth of 1.07 in the last five years, while Protestants had the lowest mean number of children of .60 in the last five years.

Table 5.7a Comparing the Mean Number of Birth in the Last Five Years

Religion	Mean	N	Std. Deviation
Catholic	.66	819	.759
Protestant	.60	1152	.790
Pentecost/Charismatic	.66	3388	.777
Other Christian	.66	1246	.823
Islam	.82	1185	.809
Traditional/Spiritualist	1.07	172	.836
No Religion	1.00	240	.886
Total	.69	8201	.799

Source: Computed from 2014 GDHS dataset

Table 5.7b ANOVA Table of Religion and Birth in the Last Five Years

Religion and Fertility	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	80.012	6	13.335	21.174	**.000**
Within Groups	5159.930	8193	.630		
Total	5239.941	8199			

Source: Computed from 2014 GDHS dataset

5.9 Ethnicity and Current Fertility

Iyer and Weeks (2009) found a woman's ethnicity and her fertility are related. This is evident in Kenya where social interaction, in terms of values and norms, has been found

to immensely influence the number of children a woman would have (Iyer and Weeks, 2009). Table 5.8b shows that at a p value of < 0.0001, the relationship between women's ethnicity and fertility are highly significant. This finding is consistent with findings from Iyer and Weeks (2009), who found that ethnicity and fertility are consistent. Table 5.8a shows that Gruma had the highest mean number of birth of 1.04 in the last five years, while Ga/Dangme's had the lowest mean number of birth of .55 in the last five years.

Table 5.8a Comparing Mean Number Birth to the Last Five Years

Ethnicity	Mean	N	Std. Deviation
Akan	.65	4141	.794
Ga/Dangme	.55	638	.745
Ewe	.65	1129	.786
Mole Dagbani	.83	1186	.793
Gurma	1.04	451	.833
Other	.69	655	.801
Total	.69	8201	.799

Source: Computed 2014 GDHS dataset

Table 5.8b ANOVA Table of Ethnicity and Current Fertility

Ethnicity and Fertility	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	98.090	5	19.618	31.263	**.000**
Within Groups	5141.851	8194	.628		
Total	5239.941	8199			

Source: Computed from 2014 GDHS dataset

5.10 Type of Place of Residence and Current Fertility

A woman's place of residence affects the number of children she would have (Kolnegah, 1997; Bumi, 2014). Women residing in urban areas are more likely to have less number of births in the last five years, as a result of the high cost of living they experience and the ease with which they access effective and affordable modern contraceptive, as compared to those in rural areas (Kolnegah, 1997; Bumi, 2014). According to the Ghana Statistical

Service (2013), the average woman in the rural areas has more children than one in the urban areas, represented by a TFR of 5.7 and 4.3 respectively. Table 5.9b shows that a woman's place of residence, whether rural or urban, has a very significant relationship with the number of children she has. This relationship is significant at a p-value < 0.0001. According table 5.9a, women in the rural areas have higher mean number of birth of .82 birth in the last five years, than women in the urban areas, who have a mean number of birth of .59 in the last five years prior to the survey. This is consistent with findings from Hakim (1994), Bumi (2014), and Kolnegah (1997) who found that rural women have more births than women in the urban areas.

Table 5.9a Comparing Mean Number of Birth in the Last Five Years

Type of place of residence	Mean	N	Std. Deviation
Urban	.59	4364	.763
Rural	.82	3837	.822
Total	.69	8201	.799

Source: Computed from 2014 GDHS dataset

Table 5.9b ANOVA Table of Type of Place of residence and Birth in the Last Five Years

Place of Residence	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	107.453	1	107.453	171.632	**.000**
Within Groups	5132.488	8198	.626		
Total	5239.941	8199			

Source: Computed from 2014 GDHS dataset

5.11 Marital Status and Current Fertility

To explain factors that account for fertility differences between married and cohabiting couples, Zhang (2007) found that married couples are more likely to have many children than couples cohabiting. He attributes this to the behavioral differences between the two groups of couples (Zhang, 2007). Another reason for this difference is that marriage offers a sense of stability to couples than cohabiting does. Table 5.10b shows that a woman's marital status has a highly significant relationship with birth in the last five years, at a p-value < 0.0001. Table 5.10a, shows that women living with partner had the highest mean number of births of .94 in the last five years, while married women had a mean number of birth of .91 in the last five years. However, the least mean number of birth women had in the last five years of .23, were from women who were never in union. These findings contradict those from Zhang (2007), who found that married women were more likely than unmarried women to have high fertility.

Table 5.10a Comparing Means of Birth in the Last Five years

Marital Status	Mean	N	Std. Deviation
Never in Union	.23	1903	.474
Married	.91	3967	.825
Living with Partner	.94	1352	.838
Formerly Married	.39	979	.637
Total	.69	8201	.799

Source: Computed from 2014 GDHS dataset

Table 5.10b ANOVA Table for Marital Status and Current Fertility

Marital Status	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	770.675	3	256.892	471.103	.000
Within Groups	4469.266	8196	.545		
Total	5239.941	8199			

Source: Computed from 2014 GDHS dataset

5.12 Region and Current Fertility

The fertility of women in Ghana has been found to be influenced by the region in which they reside, as women in the ten administrative regions were found to differ by the number children each one has. Women in the Northern region of Ghana, on average, were found to have the highest number of children at a TFR of 6.8, whereas the region with the least number of children is the Greater Accra region with a TFR of 3.9 (GSS, 2013). Table 5.11b shows that there exists a highly significant relationship between a woman's region of residence and her fertility, at a p-value < 0.0001. Table 5.11a shows that women in the Northern region of Ghana had the highest mean number of birth of 1.06 in the last five years, while women in the Greater Accra region had the least mean number of birth of .54 in the last five years. This findings are consistent with those of GSS (2013), where it was found that women in the Greater Accra had the least number of children while those in the Northern region had the most number of children.

Table 5. 11a Comparing Means of Birth in the Last Five Years

Region	Mean	N	Std. Deviation
Western	.62	927	.769
Central	.74	842	.796
Greater Accra	.54	1641	.730
Volta	.68	645	.813
Eastern	.68	781	.799
Ashanti	.70	1530	.845
Brong Ahafo	.72	694	.757
Northern	1.06	669	.833
Upper East	.77	296	.726
Upper West	.87	176	.791
Total	.69	8201	.799

Source: Computed from 2014 GDHS dataset

Table 5.11b ANOVA Table for Region and Current Fertility

Region and Fertility	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	144.882	9	16.098	25.877	.000
Within Groups	5095.059	8190	.622		
Total	5239.941	8199			

Source: Computed from 2014 GDHS dataset

5.13 Husband's/Partner's Education and Current fertility

The relationship between a husband's education and fertility is an inverse one, since husbands with higher education are less likely to have many children compared to husbands with lower levels of education. This is due to his previous intentions being more likely to have been influenced by more secular norms, where smaller family size is preferred (Miah, 1993). Table 5.12b shows that there is a highly significant relationship, at a p-value <.0001 between a woman's husband or partner's education and her fertility. This finding of statistical significance is consistent with Yang (1993), who also found the relation to be highly significant. According to table 5.12a, women with husband/partner's with primary education had the highest mean number of birth of 1.02 in the last five years, while women with no partner had the least mean number of birth of .23 in the last five years. The findings is consistent with a study by Miah (1993) which found that the higher the husband's education, the fewer the number of births.

Table 5.12a Comparing Means of Births in the Last Five Years

Husband/partner's Education	Mean	N	Std. Deviation
No Education	.94	1236	.832
Primary	1.02	544	.828
Secondary	.81	3620	.821
Higher	.69	749	.804
Don't Know	.53	149	.640
No Partner	.23	1903	.474
Total	.69	8201	.799

Source: Computed from the 2014 GDHS dataset

Table 5.12b ANOVA Table of Husband/Partner's Education and Birth in the Last Five Years

H/P Education and Fertility	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	600.289	5	120.058	212.032	.000
Within Groups	4639.652	8194	.566		
Total	5239.941	8199			

Source: Computed from 2014 GDHS datset

To summarize the findings, knowledge of ovulatory cycle and birth in the last five years were not statistically significant. However women with accurate knowledge of their ovulatory cycle, had the lowest mean number of birth in the last five years, compared to women with no or inaccurate knowledge of their ovulatory cycle. The bivariate analyses also shows that each of the respondent's background characteristics were statistically significant to their birth in the last five years at P-value <.0001. Few of the unusual findings in the study, include discoveries that women who used modern method of contraception had the highest mean number birth in the last five years than women who

used no method of contraception. Women with husbands/partners, with only primary education had the highest mean number of births in the last five years compared to husbands/partners with no education.

CHAPTER SIX

POISSON REGRESSION MODELS FOR KNOWLEDGE OF OVULATORY CYCLE AND CURRENT FERTILITY

6.1 Introduction

This chapter examines the net effect of the independent variable on the dependent variable, holding intermediate, and control variables constant. It presents two Poisson model results. The first model comprises of the main independent, the intermediate and the dependent variables. The second model includes the independent variable, intermediate, controls and the dependent variable. One category from each variable in the model was set as a reference category (RC). In interpreting the model, the odds ratio (EXP (B)) will be used, where a value greater than one (1) indicates that as the predictor increases the odds of the outcome occurring also increases. If the value is less than one, the odds of the outcome occurring is decreased. Results from these models would also be discussed in this chapter. Table 6.1 presents the first model and 6.2 the second.

6.2 Knowledge of Ovulatory Cycle and Current Fertility among Women in Ghana

The goodness-of-fit value for the first model (Table 6.1), indicates a value/df of 0.92, this indicates that the model fits the data well, since it is greater than .05. Also under the omnibus test, is the model likelihood ratio chi-square indicating that the model is statistically significant (P<.0001).

In the first model, knowledge of ovulatory cycle was not significant, however, contraceptive use was. According to the Table 6.1, under the variable "contraceptive use," and with "no method" set as reference category, women using modern methods of contraception were 0.24 times more likely than women using no method to have had

births in the last five years. Women using traditional methods were .022 times less likely than women using no method to have had birth in the last five years. Under knowledge of ovulatory cycle, women with accurate were .02 times more likely than women with no knowledge of their ovulatory cycle to have had birth in the last five years, also women with inaccurate knowledge of their ovulatory cycle were .02 times more likely than women with no knowledge to have had birth in the last five years, using women with no knowledge as reference category.

Table 6.1 Poisson Regression Results of Knowledge of Ovulatory Cycle, Contraceptive Use and Births in the Last Five Years

Indicators	Exp (B) C I	P-value
Knowledge of Ovulatory cycle		
Inaccurate Knowledge	1.02 [0.92, 1.13]	.7020
Accurate Knowledge	1.02 [0.92, 1.13]	.7320
Don't Know **(RC)**	1.00	
Contraceptive Use		
Modern Method	1.24 [1.17, 1.32]	.0001
Traditional Method	0.78 [0.69, 0.89]	.0001
No method	1.00	
Pearson chi-square (value/df)	0.92	
Omnibus test (x^2,df and P-value)	72.43, 4 (<.0001)	

SOURCE: Computed from 2014 GDHS dataset

RC : Reference Category

Table 6.2 Poisson Regression Results of Knowledge of Ovulatory Cycle, Contraceptive Use, Background Characteristics and Births in the Last Five Years

Indicators	EXP (B) [95% C I]	P- value
Knowledge of Ovulatory cycle		
Inaccurate Knowledge	1.01 [0.91, 1.11]	.8940
Accurate Knowledge	1.01 [0.91, 1.12]	.8740
Don't Know **(RC)**	1.00	
Contraceptive Use		
Modern Method	1.15 [1.08, 1.22]	.0001
Traditional Method	0.99 [0.87, 1.14]	.9370
No Method **(RC)**	1.00	
Age of Woman		
<25	1.90 [1.75, 2.07]	.0001
25-34	2.06 [1.94, 2.19]	.0001
35+ **(RC)**	1.00	
Marital Status		
Never Married	0.56 [0.44, 0.73]	.0001
Married	2.10 [1.89, 2.34]	.0001
Living with Partner	1.95 [1.74, 2.19]	.0001
Formerly Married **(RC)**	1.00	
Wealth Index		
Poor	1.23 [1.14, 1.34]	.0001
Middle **(RC)**	1.00	
Rich	0.89 [0.82, 0.97]	.0060
Husband/Partner's Education		
No Education	1.19 [0.95, 1.50]	.1350
Primary	1.25 [0.99, 1.58]	.0610
Secondary	1.25 [1.00, 1.56]	.0460
Higher	1.16 [0.92, 1.48]	.2150
Don't Know	1.04 [0.90, 1.20]	.0740
No Partner **(RC)**	1.00	
Ethnicity		
Akan	1.11 [0.99, 1.24]	.0740
Ga/Dangme	1.07 [0.92, 1.25]	.3900
Ewe	1.10 [0.96, 1.25]	.1920
Mole-Dagbani	1.04 [0.92, 1.17]	.5230
Gurma	1.04 [0.90, 1.20]	.6230
Others **(RC)**	1.00	
Type of Place of Residence		
Urban	0.98 [0.92, 1.06]	.6370
Rural **(RC)**	1.00	

Level of Education			
No Education **(RC)**	1.00		
Primary	1.03	[0.95, 1.12]	.4840
Secondary	0.95	[0.87, 1.03]	.2130
Higher	0.83	[0.71, 0.98]	.0260
Religion			
Catholic	0.73	[0.63, 0.85]	.0001
Protestant	0.81	[0.70, 0.93]	.0040
Pentecost/Charismatic	0.79	[0.69, 0.90]	.0010
Other Christians	0.79	[0.69, 0.91]	.0010
Islam	0.83	[0.71, 0.96]	.0120
Traditionalist/Spiritual	0.95	[0.78, 1.15]	.5690
No Religion **(RC)**	1.00		
Region			
Western	1.63	[0.95, 2.79]	.0750
Central	1.81	[1.06, 3.09]	.0310
Greater Accra	1.60	[0.93, 2.74]	.0890
Volta	1.58	[0.92, 2.72]	.0980
Eastern	1.67	[0.98, 2.86]	.0620
Ashanti	1.94	[1.14, 3.31]	.0150
Brong Ahafo	1.73	[1.02, 2.96]	.0440
Northern	1.91	[1.12, 3.26]	.0170
Upper East	1.61	[0.93, 2.80]	.0890
Upper West **(RC)**	1.00		
Pearson chi-square x^2 (value/df)	0.78		
Omnibus Test (x^2, df and P-value)	2257.72, 39 (<.0001)		

Source: Computed from 2014 GDHS dataset

RC = Reference Category

In the second Poisson model (Table 6.2), the value/df for the Pearson chi-square is greater than .05, which indicates that the model fits the data well. There is also the omnibus test for the second model, which compares the model to the constant and it shows that the model is statistically significant, since it is less than .05 (P<.0001).

Knowledge of ovulatory cycle and traditional method of contraception were not significant in the second model, type of place residence, ethnicity, and husband's education were also not significantly associated with birth in last five years. However,

contraceptive use, age, marital status, level of education, region, wealth index and religion were statistically significantly related to fertility.

In Table 6.2, knowledge of ovulatory cycle and birth in last five years had no significant relationship. This addresses the first research question, about what the relationship between the knowledge of ovulatory cycle and fertility, that is, there is no significant relationship. This finding rejects the first and second hypotheses of the study, since women with accurate knowledge of ovulatory cycle were expected to be less likely than those with no knowledge to have birth the last five years. A possible reason for this is that women with knowledge of their ovulatory cycle use it to facilitate births rather than control it.

Under contraceptive use, using women who did not use any method as a reference, women using modern methods of contraception were .15 times more likely than women using no method to have had births in the last five years, whereas women using traditional methods of contraception were 0.02 times less likely to have had birth in the last five years, compared to women using no method; however, the relationship between traditional methods and births in last five years were not statistically significant.

Findings on contraceptive use rejects the third and final hypothesis of the study, which state that women using modern method of contraception will have fewer birth in the last five years than women who do not use any method. Since it has been found that women using modern method are more likely to have birth in the last five years compared to women using no method. The findings also addresses the main objective of the study i.e. to examine the relationship between knowledge of ovulatory cycle, contraceptive use and current fertility in Ghana. It also addresses the first and second specific objective, in

addressing the first, it shows that there was no difference in fertility among women with knowledge of their ovulatory cycle, since women with accurate knowledge and, those with inaccurate knowledge of their ovulatory cycle had the same odds of .01 at predicting likelihood of birth in the last five years. However, women with no knowledge had fewer birth in the last five years compared to women with knowledge of their ovulatory cycle. In addressing the second, the findings show that, women using modern methods are more likely than women using traditional method to have had births in the last five years.

The findings on contraceptive use also contradicts studies from Yosef, (2012), and Mtruri, and Hinde, (2011), who found that, women using modern contraceptives were more likely to have fewer births than those not using any method. This could perhaps have come about, because women resorted to using contraception after giving birth to the number of children they desired in the 5 years preceding the survey.

Women aged 25 to 34 were 1.06 times more likely than women aged 35+ to have had births in the last five years. An explanation to this find would be that, women within the ages of 25 to 34 linger relatively at the peak of their fertility, with potent ovaries for easy conception, in contrast to women aged 35+. This finding is consistent with findings from the American Society for Reproductive Medicine (2016) and the Southern California Centre for Reproductive Medicine (2016), who state that women in the early stages of their reproductive years are very fertile, however this fertility begins to decline when they are 35+.

Under the variable "marital status" all categories were highly significant with birth in the last five years. Married women, holding other indicators constant, and setting those formerly married as reference, are 1.10 times more likely than women formerly married

to have had births in the last five years. Women living with a partner were also .05 times more likely than women formerly married to have had births in the last five years. Women who have never married were 0.56 times less likely than women formerly married to have had births in the last five years. Marriage has been recognized in literature as a legitimate institution for childbearing, with this in mind, it is therefore not odd that findings from this study show that, married women are more likely to have births than unmarried women. This finding confirms those from Zhang, (2007), who also found married woman with higher fertility than unmarried women.

With the middle wealth index as the reference category, women with a poor wealth index were 0.23 times more likely than women with a middle wealth index to have had births in the last five year. Women with rich wealth index are 0.11 times less likely than women with middle wealth index to have had births in the last five years. Women considered poor are expected to be predisposed to have children for economic reasons than women who are rich or economically stable. Hence, women considered poor are more likely than the rich to have more children. Findings from this current study are consistent with findings from Gwatkin et al, (2000), and Ainsworth (1989), who found economic status and fertility to be negatively related.

Women with higher education are 0.17 times less likely than those with no education to have had a birth in the last five years. However women with primary education were .03 times more likely than those with no education to have had birth in the last five years, though the relationship is not significant. The influence of education on fertility had been studied by many scholars all over the world. One striking finding amongst these studies has been that, women who spend more time in school, are more likely to have less

children, because they are more likely to have spent most of their reproductive years educating themselves, and therefore have fewer reproductive years remaining. Women with no education have been found on the other hand, to most likely be married early and begin child bearing immediately, making them more likely to have more children. Findings from this study are consistent with many studies including Eyasu (2015), Adhikari (2010), Boupha et al, (2005), and Blesdoe et al, (1990).

In the regression model, all categories of religion except for traditionalists/spiritualist were statistically significant in predicting births in the last five years. Considering women with no religion as the reference category, women belonging to other denominations including traditionalist/spiritualist were less likely to have had birth in the last five years.

In terms of regions in Ghana and birth in last five years, holding all other indicators constant, the Central, Ashanti, and Northern regions were statistically significantly related to births in the last five years. Setting the Upper West region as the reference category, women in the Northern region were 0.91 times more likely than women in the Upper West region to have had a birth in the five years preceding the survey. Women in the Central and Ashanti regions were 0.81 and 0.94 times more likely to have had a birth in the last five years respectively, than women in the upper west region, as reference. The first finding is consistent with findings from the regional summary report of the 2010 Population and Housing Census, which found women in the Northern region to have the highest number of children, and therefore an increased probability of having births in the last five years.

The variable "Husband/partners education" had only the secondary education category statistically significantly associated with births in the last five years. With women with no

partner as reference category, women with husband/partner's with secondary education were .25 times more likely than women with no partner to have had a birth in the last five years. Women with husbands with no education are .19 times more likely than those with no husbands to have had births in the last five years. An explanation to this may be the fact that, a husband's ethnicity and religion, influence his general way of living. Therefore, no matter the level of education a husband attains, his faith and/or culture may influence his decision to have more births.

Although none of the categories under ethnicity were statistically significantly related with birth in the last five years, the odds ratios show that Akan women were 1.11 times as likely as women grouped into the 'Other' category to have had birth in the last five years. On the other hand, Mole-Dagbani women were .04 times more likely than women in the 'Other' category to have had a birth in the last five years. With women in the other category still as reference category, Gurma women were also .04 times more likely than women in the other category to have had birth in the last five years. In terms of place of residence, this was found not to be significant. However, with rural set as the reference category, urban women were 0.02 times less likely than rural women to have had a birth in the last five years.

The preceding paragraphs addresses the third research question as well as the third specific research objective, as it explains and describe how each of the socio-demographic, economic, and cultural characteristics of a woman relates to her current fertility, her births in the five years preceding the survey.

In summary, both models according to the Pearson chi-squares fit the data well, and were significant at a p-value <.0001. Knowledge of ovulatory cycle and birth in the last five

years were not significantly related. Also, women using modern method of contraception were found to have more births than women using no method of contraception. Other contrary findings, with respect to the respondent's background characteristics that were significant with birth in the last five years, were observed in variables such as ethnicity, and husband/partner's education.

CHAPTER SEVEN

SUMMARY, CONCLUSION AND RECOMMENDATIONS

7.1 Summary

The study set out to investigate any association between knowledge of ovulatory cycle and current fertility among women in Ghana by addressing two research questions: what is the relationship between knowledge of ovulatory cycle and current fertility in Ghana? And, how are a woman's socio-demographic, economic and cultural characteristics associated with her current fertility? The main objective of the study was to examine the relationship between knowledge of ovulatory cycle, contraceptive use and current fertility in Ghana.

Data used for the study was the 2014 GDHS dataset. The sample size for the study was 8201. It was constituted by women who were in their reproductive years (15-49) and had ever had sex. Both married and unmarried were included in the sample. Univariate analysis of data began with presenting simple proportion and percentages of each variable in the study Bivariate analyses in the form of comparing means, ANOVA and a crosstabulation were employed to examine the relationships between the variables. At the multivariate level, Poisson regression model was used for the analysis, to examine the net effect of knowledge of ovulatory cycle, contraceptive use and the socio-demographic, economic and cultural characteristics on births in the last five years.

Findings from the study at the univariate level show that about half (49.5%) of respondents had no births in the last five years. More than half of the respondents (53.7%) had inaccurate knowledge of their ovulatory cycle. 74% of the respondents do not use any method of contraception, majority (39%) of respondents were aged 35 and

over, while 45.2% of them were in the rich wealth index and more than half (53%) of the respondents interviewed for the survey resided in urban areas.

Findings from the bivariate analysis indicated that all variables except knowledge of ovulatory cycle had a statistically significant relationship with birth in the last five years. However, knowledge of ovulatory cycle was statistically significant with contraceptive use at a p-value <.0001. Again, women using modern methods of contraception were more likely to have a birth in the last five years than women not using any method of contraception. Women living with a partner had the highest mean number of births in the last five years than married women, and women whose husbands had secondary education were more likely to have had births in the last five years than women whose husband/partner had no education.

Finding from the two Poisson regression models showed that contraceptive use, age, marital status, level of education, region, wealth index and religion were significantly related to births in the last five years. Knowledge of the ovulatory cycle remained not significant in its association to birth in the last five years, even after including control variables in the model.

7.2 Conclusion

In investigating the relationship between knowledge of ovulatory cycle and current fertility, findings show that the relationship was not significant. Therefore, the results did not support the first two hypotheses of the study.

Also, contraceptive use has been established by literature as one of the efficient and effective ways to control fertility; however, this study found that women using modern

methods of contraception were more likely than women who do not use any method to have birth in the last five years. In addition, knowledge of ovulatory cycle and contraceptive use were significantly related at the bivariate level.

In addition, it has been the norm in literature that ethnic groups mostly found in the north compared to those in the south, were more likely to have more births as supported in the bivariate analysis. However in the multivariate analysis the Akans were found to be more likely than Mole-Dagbanis, and Gurmas, to have had births in the last five years. Region of residence, however, showed that women in the Northern region had significantly more births.

To conclude, although the main independent variable, knowledge of ovulatory cycle was not significant, other characteristics of women were related to their current fertility. This suggests that a woman's knowledge of ovulatory cycle has no influence on their current fertility, instead, other variables such as the respondent's use of contraception, may influence the desired effect on her current fertility.

7.3 Recommendations

Recommendations from this study stem from findings from the multivariate analyses. From these analyses, variables including contraceptive use, age, level of education, and wealth index had significant relationships with births in last five years.

On contraceptive use, the study found that women who used modern contraceptives were more likely to have birth in the last five years than women who used no method; Thus, implying that although Ghana has realized a marginal increase in her CPR, contraceptives are not used to control fertility, but instead space birth, as suggested by Lockwood

(1995). To effectively control fertility through the use of contraceptives, I recommend massive sensitization programs with messages directly focused on the relevance of having fewer number of children and the ease with which contraceptives can be used not only to space births but to achieve fertility desires, depending on the person's fertility intentions. This should be done in order to significantly improve upon the reproductive health of respondents so as to effectively contribute towards improving upon the pace at which Ghana is developing.

This study found that women aged 25-34 were more likely to have births in the last five years than the older women. It also found that level of education was significantly associated with births in the last five years, where women with higher education were less likely to give birth in the last five years than those with no education. Having these in mind, I recommend reinforced government interventions to make education affordable from primary school through to the university to all, especially for young girls from poor homes. Scholarship opportunities that would specifically target young girls should be made available and accessible, so as to keep them longer in school, at the same time increasing their age for their first marriage, since education has been identified as an effective program that increases the mean age at first marriage as result of postponing marriage (Derebssa, 2002).

Poor women were more likely than women within the rich wealth index to have births in the last five years preceding the survey. Since most poor women are likely to be unable to purchase any method of contraception and more likely to be uneducated, this may result in their predisposal to being likely handicapped to using and understanding the importance of contraception in controlling fertility. Educational programs already in

place should significantly increase their staff so as to efficiently increase their target group, while adopting more effective communication strategies in order to adequately inform and sustain the interest of the poor in the use of contraceptives.

Finally, additional studies should look into using longitudinal methods or cross sectional data that provide adequate information, in order to assess timing of knowledge as well as sources of knowledge and fertility. In-depth studies into these areas can better help understand the link between knowledge of ovulatory cycle and fertility.

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