

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND
TECHNOLOGY**



**Important Determinants of Sexual and Reproductive Health of
Female Adolescent and Youth in Ghana**

By

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Declaration

I hereby declare that this submission is my own work towards the award of the M. Phil degree and that, to the best of my knowledge, it contains no material previously published by another person nor material which had been accepted for the award of any other degree of the university, except where due acknowledgment had been made in the text.

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Dedication

This thesis is dedicated to Almighty Allah for everything he has done for me. Also to my Mom Halimah Opoku Ampomah, to my late father Mr. Opoku Saidu Yaw, Brothers and Sisters; Opoku, Issah, Firdaus, and Zahra. These and many other persons have been and continue to be a blessing to my life. God Bless you all richly... AMEEN

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Abstract

This study documents key indicators of sexual and reproductive health among female adolescent and youth age between 15-24 in Ghana and examine factors affecting them. This study aimed at the following objectives: examine the association between various socio-economic characteristics and key indicators of female adolescent childbearing. The application of logistic regression on the use of contraception on Ghana Demographic and Health Survey (GDHS), 2008 data was used for the analysis. Multiple logistic regression was the main statistical tool employed through this study. In our findings, women's educational level had a strong influence on the odds of adolescent childbirth. The adjusted odds of beginning child bearing before age 20 are roughly 54 percent lower among women who have primary education compared with women with secondary education. This study also shows low rates of ever use contraceptives among female adolescent and youth in Ghana with the key indicator of sexual and reproductive health of female adolescent and youth vary substantially among adolescent according to their background characteristics. The main determinants that influence adolescent and youth to ever use contraceptives were discovered to be educational level, ethnic group, recent sexual activity and wealth index which were found to be significant by the wald test statistics indicate significant. Significant determinant such as adolescent and youth level of education, recent sexual activity and wealth index should be considered as determinant that contribute to early childbearing in Ghana.

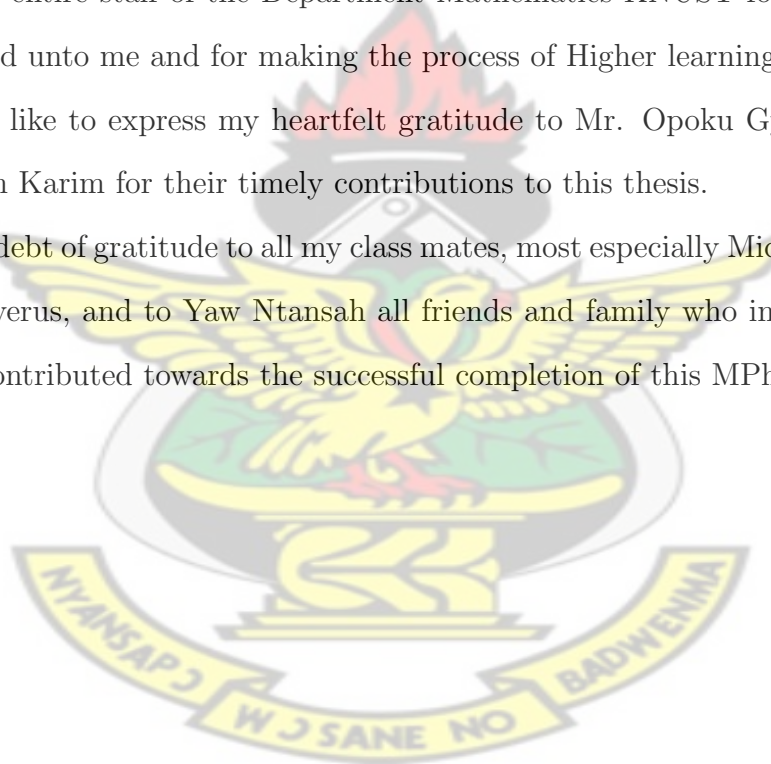
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Chapter 1

Introduction

1.1 Background

World Health Organisation (WHO) defines adolescent as a period of transition from childhood to adulthood. It is a period of most rapid intellectual growth and adolescents often feel that they know more than their parents and other adults. Ghana adopts the World Health Organisation WHO (1948) definitions for health, children and youth, where health is defined as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. From birth to the age of eighteen years, an individual is considered a child while the youth are individuals aged between 15 to 24 years and those aged 10 to 24 years are referred to as young people. Traditionally, sexual activities are expected to be within wedlock in Ghana. Most of these norms have been eroded due to lack of traditional sanctions that formerly inhibited pre-marital sexual activities. As the gap between the generations is strengthened by cultural globalisation, young people are increasingly left to learn about sexual issues from their peers or from the mass media. These have culminated into a significant percentage of Ghanaian youths being sexually active. This trend of increased sexually active behaviour of adolescents is confirmed by the Ghana Demographic and Health Survey GDHS (2003): nine percent of women and 4.0% of men are reported to have had sexual intercourse by age 15. However, by age eighteen, 48.0% of women and 25.0% of men have had sexual intercourse. These figures imply that some proportion of first sexual experience occur in pre-marital relationships. Important sexual health needs of young people in Ghana are preventing HIV and other STIs, unwanted pregnancy or unplanned pregnancy. In 2002, the estimated HIV/AIDS

prevalence rate among the fifteen year olds to the twenty four year olds in Ghana was 3.4% and the median prevalence rate for the adult population increased from 2.3% in 2000 to 3.4% in 2002.

HIV prevalence figures from the GDHS (2003) were lower: Some 0.3% of the fifteen to nineteen year olds, 1.2% of twenty to twenty four year olds tested positive for HIV, and the overall prevalence rate among fifteen to forty nine year olds was 2.2%. Some STIs such as gonorrhoea, syphilis; herpes, genital warts and Chlamydia are important health concerns in Ghana. Adolescents are at higher risk of exposure to STIs than adults because of their immature reproductive systems, misconceptions and lack of knowledge about STIs.

1.1.1 Common Adolescent Sexual Practice

Sexual practices are sexual expressions that are experienced regularly or repeatedly. Some sexual practices that the adolescent practices include hugging, kissing, masturbating, manually stimulating sexual partners, vaginal and anal penetration with objects, oral genital stimulation. Others include getting sexual excitement from looking at or reading a pornographic material, having telephone or cyber sex, wearing sexy clothes,(Omotoso, 2007).

1.1.2 Status of Adolescent and Youth Sexual and Reproductive Health

Sexuality

Sexuality is experienced and expressed in thoughts, fantasies, desires, beliefs, attitudes, values, behavioural traits, practices, roles and relationships. While sexuality can include all of these dimensions, not all of them are always experienced or expressed. Sexuality is influenced by the interaction of biological, psychological, social, economic, political, cultural, legal, historical, religious and spiritual factor

by (WHO, 2006)

Sexual Right

There is a growing consensus that sexual health cannot be achieved and maintained without respect for, and protection of, certain human rights. Sexual rights protect all people's rights to fulfil and express their sexuality and enjoy sexual health, with due regard for the rights of others and within a framework of protection against discrimination (WHO, 2010).

1.1.3 Age at First Sex and First Birth

HIV transmission in Ghana occurs primarily through sexual intercourse between an HIV-positive person and an HIV-negative person, age at first intercourse marks the beginning of the period in which most young adults are exposed to the risk of contracting HIV or other sexually transmitted diseases. One of the contributing factors that influence fertility level in the measurement of a population is the age at first birth. Women who get married at an early stage are usually prone to the risk of pregnancy for a longer period, especially when the use of contraceptive is little or absent. Thus, early childbearing, generally, leads to a larger family size than later onset of childbearing. A rise in the median age at first birth is typically a sign of transition from high to low fertility by (GDHS, 2003).

GDHS (2008) also reported that, urban teenagers differ from their rural counterparts; 11 percent of adolescents in urban areas have begun childbearing, compared with 16 percent of those in rural areas. It is also clear that childbearing decreases substantially as education increases; 31 percent of adolescents with no education have begun childbearing, compared with just 1 percent of teenagers with secondary or higher education. By wealth status, adolescent childbearing decreases from 21 percent in the second wealth quintile to 4 percent in the highest wealth quintile. This finding suggests that poverty is an important consideration

in understanding adolescent childbearing in Ghana (Nabila and Fayorsey, 1996).

1.1.4 Contraceptive Usage

According to Company (2005), contraception is the intentional prevention of conception or impregnation through the use of various devices, agents, drugs, sexual practices, or surgical procedures. It can also be defined as any practice that serves to prevent conception during sexual activity. Female adolescent and youth who are having sexual intercourse and do not want a pregnancy need to know about and usage of contraceptives.

According to Esabella (2012) contraceptive methods use is part of a family planning package. A large and empirically verified demand for contraceptive methods to space or limit childbearing exists worldwide. Also according to GDHS (2008), usage of contraceptive varies with number of living children, urban-rural residence, region, education, and wealth. Women in urban areas are more likely to use contraceptive methods (27 percent) than their rural counterparts (21 percent). Women with at least some secondary education are more than twice as likely to use contraception as women with no education (30 and 14 percent, respectively). Use of any method and use of any modern method increase with level of education. Use of contraception is also positively related to wealth status, increasing from 14 percent among currently married women in the lowest wealth quintile to 31 percent in the highest wealth quintile.

1.2 Statement of the Problem

Ghana's socio-economic and health indicators remain among the lowest in Sub-Saharan Africa according to (GDHS, 2008). Despite the growing body of knowledge about adolescent and youth reproductive sexual behaviour, teenage pregnancy has become a major challenge for developing countries as reported by

(Khatiwada et al., 2013) and Ghana will not be an exception. Several studies have focused on addressing problems of adolescent age at first birth and ever use contraceptives using logistic regression. Katharine (2012) applied logistic regression on sexual and reproductive health data and their results showed that age at first birth was positively associated with age at first sex, education and economic opportunities. Research work by (da Conceicao Chagas de Almeida and M.L.Aquino, 2009) showed that women are more likely to have had an early pregnancy experience if their mother had a child before age 20. Other researchers also applied logistic regression on whether respondents have ever used contraceptives. Manning et al. (2000) used logistic regression to test model predicting usage of contraceptives. Notwithstanding the research work of these researchers, not much extensive work has been done in the application of multiple logistic regression on the effects of certain sexual behaviour on adolescents and youth ever use contraceptives. Also limited attention has been focused in the areas of application of logistic regression on risky sexual behaviour of adolescent and youth that leads to teenage pregnancy. Hence this study seeks to predict the determinant of sexual and reproductive health among female adolescent and youth in Ghana. To achieve this, we set out the objectives below.

1.3 Objective of the study

The main objective of this study is to use multiple logistic regression model to highlight some important determinants of sexual and reproductive health among female adolescents and youth in Ghana.

1.3.1 Specific objectives

1. To use multiple logistic regression model to determine the significant effect of factors associated with adolescent age at first birth in Ghana.
2. To use multiple logistic regression model to determine the risk of using

contraceptives among female adolescent and youth in Ghana.

1.4 Research Questions

The researcher seeks to answer the following questions;

1. What are factors influencing adolescent age at delivery of first child?
2. What are sexual needs of adolescents and youths?
3. What are factors influencing adolescent and youth ever use of contraceptives?
4. What are the determinant of sexual and reproductive health of female adolescent and youth?

1.5 Methodology

The data employed in this study were women questionnaire from the (GDHS) conducted in 2008.

In these surveys, the data were collected in personal interviews with a national representative. The GDHS 2008 questionnaire covers topics related to sexual health, sexual behaviour, STIs, among others. This aims to address the gap in reliable data and scientific knowledge on a female adolescent and youth sexual and reproductive health.

The repeated surveys, which were conducted five years apart, allow for analysis of determinant at the national level as well as for sub-groups by age, including adolescents and youth aged 15-19 and 20-24.

All the ten regions in Ghana were considered. In this study, the analysis is limited to female adolescent and youth aged 15-19 and 20-24. Cross tabulations are used to calculate the prevalence of health indicators for the entire adolescent and youth population, stratified by key background characteristics, namely place

of residence (urban, rural), regions in Ghana and educational attainment (no education, primary, some secondary, school leaving certification and above).

In all tables and figures, the percentages and sample sizes are weighted, using standard GDHS sample weights, to correct for the unequal probability of selection in the sample. Two sexual and reproductive health indicators were selected for further exploratory: adolescent age at first birth and ever used contraceptives.

Logistic regression analysis was implored identify determinants of each indicator. A logic link was used to model each outcome. Results are presented in the form of odds ratios. The statistical software to be used is SAS version 9.1. The complex sample design of the GDHS was taken into account by using SAS. All tests were carried out based on a 5 percent level of significance.

1.6 Significance of the Study

This study helps to identify socio-demographic and socio-cultural issues that are barriers to sexual and reproductive health by female adolescent and youth.

The research helped to generate ideas for reducing female adolescent and youth negative perceptions and attitudes towards use of contraceptives. The recommendations made by this study may play a role towards improving effective sexual and reproductive health issues of female adolescent and youth use, and thereby contribute towards reaching the millennium development goals by decreasing adolescent pregnancy and child motility.

1.7 Outline of the Thesis

Chapter one deals with the introduction. It includes the background of the study, statement of the problem, objective of the study, the study's research questions, data collection and the outline of study. The method used in the study is logistic regression. Chapter 2 reviews related literature based on the objectives of the study and preferred models to be used in achieving these objectives. Other

comparative results of similar studies are also discussed in this chapter. Chapter 3 describe the theory of history model to be used, formulations and methods of solution. Chapter 4 is dedicated to data collection, analysis and results. Chapter 5 concludes the entire study by stating specific recommendations to stakeholders based on the major findings made in the study.

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Chapter 2

Literature Review

This chapter discusses various literatures available on the sexual health of adolescents. It basically reviews summaries of these literatures with respect to relevant studies on the sexual and reproductive health of female adolescents and youth. Sexual health comprises sexual development and reproductive health, as well as such characteristics as the ability to develop and maintain meaningful interpersonal relationships, appreciate one's own body, interact with both genders in respectful and appropriate ways, and express affection, love and intimacy in ways consistent with one's own values (Quinn and Ejlaak, 2008)

The World Health Organisation (WHO) defines sexual health as “a state of physical, emotional, mental and social well-being in relation to sexuality; it is not merely the absence of disease, dysfunction or infirmity.” Sexual health requires a positive and respectful approach to sexuality and sexual relationships as well as the possibility of having pleasurable and safe sexual experiences, free of coercion, discrimination and violence. For sexual health to be attained and maintained, the sexual right of all persons must be respected, protected and fulfilled (WHO, 2006).

This concern of World Health Organisation clearly underlines the importance of the sexual life of each person and the related rights that ensure the fulfilment of such a life. Evidently, sexual health, an aspect of a healthy body, cannot be overlooked, especially because it cuts across an individual's physical, mental and social well-being (Beijing, 1996).

Reproductive health, therefore, implies that people are able to have a responsible, satisfying and safer sex life and that they have the capability to reproduce

and the freedom to decide if, when and how often to do so, as defined by International Conference on Population and Development Programme of Action and United Nations Fourth World Conference On Women, which is also called Beijing Declaration of 1995 (Beijing, 1996).

In 2010, WHO released the Social determinants of sexual and reproductive health: Informing future research and programme implementation report, which examined the complex way in which the social determinants of sexual and reproductive health exacerbate global health inequities (WHO, 2010).

WHO (2010) insists that a focus on people's lifestyle and behaviour is inadequate in alleviating long-term sexual and reproductive health inequities if such interventions fail to also work towards redressing the social conditions that drive poor health outcomes.

An individual's right to a safe and pleasurable sex life with the partner of their choice, to control their body and make informed decision about their sexual and reproductive health free from violence; discrimination and social prejudice are the cornerstones to optimal sexual and reproductive health. All members of the community, regardless of their age, ethnicity, religion, educational level, wealth index, sexuality, ability or marital status, have the right to the highest standard of sexual and reproductive health. This report is informed by the following definitions.

2.1 Sexuality

Sexuality is one of the key determinants which affect sexual health in most countries (UNFPA, 2003), (Munthali et al., 2004) and (Jimmy-Gama, 2009). The definitions of sexuality vary from one professional field to another. The contemporary belief views sexuality as a fixed essence that resides within the individual (D'Emilio and Freedman, 1988). Goettsch (1989) defines sexuality as "the individual capacity to respond to physical experiences which are capable of producing body-centred genital excitation that only subsequently becomes associated

with cognitive constructs (either anticipatory for new experiences or reflective of past experiences), independent of ongoing physical experiences.” According to Wikipedia (2014) , human sexuality is the capacity to have erotic experiences and responses. A person’s sexual orientation may influence their sexual interest and attraction for another person. Sexuality can have biological, emotional/physical or spiritual aspects.

2.2 Sexual Behaviour

Over the time, there have been various views on the sexual behaviour of human kind. Wikipedia (2014) defines adolescent sexuality as sexual feelings, behavior and development in adolescents and it is a stage of human sexuality. Sexuality is often a vital aspect of teenagers’ lives. The sexual behavior of adolescents is, in most cases, influenced by ethnicity, their orientation and issues of their religion, education and many more.

2.2.1 Sexual Orientation

Sexual behaviour is strongly influenced by a person’s sexual orientation. Sexual orientation refers to your degree of emotional and physical attraction to members of the opposite sex, same sex, or both sexes. Heterosexual people are attracted to the members of the opposite sex. Homosexual people are attracted to people of the same sex and those who are bisexual are attracted to both men and women by (Dibyendu, 2013).

2.2.2 Religion

Most world religions have sought to address the moral issues that arise from people’s sexuality in society and in human interactions. Each major religion has developed moral codes covering issues of sexuality, morality, ethics etcetera. These moral codes seek to regulate the situations which can give rise to sexual

interest and to influence people's sexual activities and practices by (Nundwe, 2012).

2.2.3 Education

An analysis by Chio and Mishra (2009) on primary and secondary sexual abstinence found that youths attending school initiate sex later, with male and female youths in school who have never married being four to five times more likely to abstain from sex than those out of school. However, there were differentials by gender: females in secondary school were more likely to abstain than their male counterparts of the same educational attainment.

The Religious Institute believes that religious communities have a unique role in providing sexuality education. According to Sexuality Information and Education Council of the United States SIECUS (2013), sex education is the study of the characteristics of beings a male or a female. Such characteristics make up the person's sexuality.

Sexuality is an important aspect of the life of a human being and almost all people, including children, want to know about it. Sex education includes all the educational measures which, regardless of the particular method used, may centre on sex.

2.3 Reproductive Health

Again, reproductive health is one of the determinants of the sexual and reproductive health of female adolescents and youths. Reproduction is the process of having babies, as defined by (Macmillan, 2006). Reproductive health, therefore, implies that people are able to have a responsible, satisfying and safe sex life and that they have the capability to reproduce and the freedom to decide if, when and how often to do so by (ICPD).

2.3.1 Reproductive Rights

Reproductive rights is the basic right of all couples and individuals to decide freely and responsibly the number, spacing and timing of their children and to have the information and means to do so and the right to attain the highest standard of sexual and reproductive health by (ICPD). They also includes the right of all to make decisions concerning reproduction free of discrimination, coercion and violence by World Health Organisation. The 1995 Fourth World Conference on Women in Beijing, in its non-binding Declaration and Platform for Action, supported the Cairo Programme's definition of reproductive health but established a broader context of reproductive rights.

The human rights of women include their right to have control over and decide freely and responsibly on matters related to their sexuality, including sexual and reproductive health, free of coercion, discrimination and violence. Equal relationships between women and men in matters of sexual relations and reproduction, including full respect for the integrity of the person, require mutual respect, consent and shared responsibility for sexual behavior and its consequences.

The Beijing Platform demarcated twelve interrelated critical areas of the human rights of women that require advocacy. The Platform framed women's reproductive rights as "indivisible, universal and inalienable human rights."

2.4 Sexual Health

Sexual health is a state of physical, emotional, mental and social wellbeing in relation to sexuality; it is not merely the absence of disease, dysfunction or infirmity. Sexual health requires a positive and respectful approach to sexuality and sexual relationships, as well as the possibility of having pleasurable and safe sexual experiences, free of coercion, discrimination and violence. For sexual health to be attained and maintained, sexual rights of all persons must be respected, protected and fulfilled (Beijing, 1996).

Sexual health and reproductive health are often segregated in policy and practice. This report has integrated sexual and reproductive health, based on the rationale that sexual and reproductive health are inherently interconnected, as sexual health is vital for, and therefore part of reproductive health by (O'Rourke., 2008). In recent years there has been an increasing recognition that a rights-based approach is crucial in ensuring communities achieve optimal sexual and reproductive health.

Sexual and reproductive health is among the “most sensitive and controversial issues in international human rights law, but also among the most important” (Hunt and Bueno de Mesquita, 2010). This is because the underlying drivers of poor sexual and reproductive health are multifaceted and often deeply entrenched. For instance, the lower social status of girls and women in many countries, including Australia, is a key contributor to their sexual and reproductive ill health and represents a violation of their right to health and freedom from violence and discrimination as reported by (Hunt and Bueno de Mesquita, 2010).

2.4.1 Health Promotion

Health promotion is the process of enabling people to increase control over the determinants of health and thereby improve their health (WHO, 1986). Health promotion is defined in this report as a conceptual framework and approach that is informed by a holistic understanding of health. Health promotion: not only embraces actions directed at strengthening the skills and capabilities of individuals, but also action directed towards changing social, environmental and economic conditions so as to alleviate their impact on public and individual health.

The objective of sexual health promotion is therefore to enable and facilitate individuals, communities and population groups to enhance control over the determinants of health and thus increase people's capacity to achieve optimal sexual and reproductive health over their life course WHO (2012c).

2.5 Factors Associated With Adolescent Age at First Child's Delivery

Although fertility begins about the time of menarche, adolescents are not fully mature physically or mentally. Babies born to adolescents are more likely to be born preterm or at low birth weight and are more likely to die in the neonatal period.

Many adolescent girls who become pregnant have to leave school, often with long-term adverse consequences for themselves, their families, and their communities WHO (2012b). Globally, about 16 million girls aged 15-19 give birth every year, and these births occur predominantly in developing countries by WHO (2012a). Early pregnancy is indicated by a number of measures such as age at first pregnancy, how often teens have been pregnant, and the total number of births the teens have had. WHO (2001) reported that a substantial minority of sexually active unmarried young women experience pregnancy, which is typically both unplanned and unwanted.

The age at which childbearing begins has important demographic consequences for society, as a whole, as well as for the health and welfare of mother and child. One of the factors that determine the level of fertility in a population is “age at first birth” (GDHS, 2008). Some of the factors of “age at first birth” are discussed as follow.

2.5.1 Age at First Sexual Intercourse

The age at which adolescents get exposed to sexual activities has declined significantly over the past 12 years, according to the National Survey of Family Growth. In 2002, 46 percent of never-married boys aged 15 to 19 had had sexual intercourse, down from 60 percent in 1988. The percentage of girls in the age group who have had sexual intercourse fell from 51 to 46 percent. Despite the

decline, 54 percent of boys and 58 percent of girls have had sex by age 18.

Nahar and Min (2008) indicated that, in most sub-Saharan African countries, young women start having sex earlier than young men. The case is similar with Ghana Demographic Health Survey (2008) that early sexual intercourse is greater among women than men. When young women attain higher education, the chance of beginning sexual intercourse at an early age is low. For example, whereas 11% of young women aged 15-19 and 20-24 who do not have any education had sex by age 15, 14 % of young women with basic education had sex by age 15; only 2 % of young women with secondary or higher education had sex by age 15.

The proportion of young women initiating sex by age 15 and 18 is lowest among young women in the highest wealth quintile. The relationship between early initiation of sex and level of education or wealth quintile seen among young women is less apparent among young men.

Christine E. Kaestle and Ford (2004) also mentions in their study that sexual intercourse is frequently initiated during adolescence. Early initiation of sexual intercourse has been connected to increased risk of sexually transmitted infections (STIs). This indicates that the risk of the young ones contracting an STI depends on the age they become sexually active.

2.5.2 Educational level

Education is defined by (UNESCO, 2000) as the key to the new global economy, from primary school up to life-long learning. It is central to development, social progress and human freedom. The past 50 years have seen immense transformations in the educational and the reproductive expectations of young people in the developing world: educational levels are going up everywhere (UNESCO statistics).

Education and early fertility are known to be negatively correlated. On the one hand, early fertility often leads to termination of schooling because of time incompatibility, others look of disapproval, law discriminating against pregnant

students. On the other hand, education can affect women's early fertility decisions through access to knowledge, information and new ideas. It enhances overall efficiency, market opportunities and social status.

It also changes attitudes and behaviour, bringing about openness to new ideas and experiences, an increasing independence from traditional authority, and a questioning of passivity as reported by Celine (2009).

2.5.3 Adult Behaviour Influenced

Katharine (2012) reported that adults are trained to reach out to adolescents and youths either in the community or within an institution with information and/or services. They can be parents, guardians, teachers or service providers. Some organisations interviewed (6 out of 45) are using this approach to reach youths with sexual and reproductive health information and service.

2.5.4 Religion

From Wikipedia (2014), religion refers to a search for the sacred within a traditional context such as a formal religious institution. Religion is a prominent force in all societies, as it is estimated that more than five billion people follow one of the world's religions. In many societies, religious people and institutions promote human rights. However, some use religion to justify violations of human rights or to oppose certain rights, including sexual and reproductive health reported by Advocates for Youth, (Alford et al., 2009). This, therefore, implies that religion can have effect on the age at which adolescents and youths have their first child.

2.5.5 Heard about STDs

Rates of sexually transmitted diseases (STDs) and unintended pregnancies are especially high among minority adolescents by (Bluestein and Starling, 1994).

2.5.6 Contraceptive

Adolescents and youths who use contraceptives during their first sexual experience are less likely to experience a pregnancy as compared to those who do not use any contraceptive. Twenty-seven percent of teenage girls and 12 percent of teenage boys who used a contraceptive at first sex have been involved in a pregnancy.

For Adolescents and youths who did not use any contraceptive at first sex, 43 percent of girls and 18 percent of boys have been involved in a pregnancy (Suelentrop and Flanigan, 2006).

2.5.7 Wealth index

The costs of some methods may be too high for some female adolescents and youths, especially if they are not covered by provincial drug plans. Chronic poverty and its determinants (malnutrition, bad housing conditions, intense workload of women and girls) impact on all aspects of sexual health and on reproductive health in particular.

2.6 Application of Logistic Regression on Adolescent Age at First Birth

Katherine et al (2009) uses logistic regression to show that age at first birth was positively associated with age at first sex, education and economic opportunities: Having had first sex before age 15 was associated with an increased risk of having an earlier first birth (1.7-2.4), whereas having first had sex at age 16 or later was associated with a decreased risk (0.2-0.7).

According to Almeida and Aquino (2009), 30% of women reported getting pregnant before age 20, of these groups, 34% of women reported that their mothers

had first given birth at the same age. Women are more likely to have had an early pregnancy experience if their mother had a child before age 20 (odds ratios, 2.0).

Daughters' level of education appears to be an important factor in the repetition of adolescent fertility across generations. Ghazaleh and Speizer (2010) also use logistic regression to show that Nicaraguan adolescents became significantly less likely to have had their first live birth over the study period. Factors like urban residence, education level and socioeconomic status were important predictors of adolescents' sexual and reproductive outcomes.

2.7 Factors Associated With Ever Use Contraceptive of Female Adolescent and Youth

2.7.1 Definition of Contraception

According to New Dictionary (2005), contraception is the intentional prevention of conception or impregnation through the use of various devices, agents, drugs, sexual practices, or surgical procedures. It can also be defined as any practice that serves to prevent conception during sexual activity. Female adolescents and youths who have sexual intercourse and do not want to be pregnant need to know about and use of a contraceptive.

According to Esabella (2012) contraceptive methods use is part of a family planning package. A large and empirically verified demand for contraceptive methods to space or limit childbearing exists worldwide.

Moreover, the need for contraceptive use is generally high in societies where poverty, illiteracy, and gender inequality are high. In such societies, unintended and repeated pregnancies make it difficult for women to participate in economic development and self-development (Mackenzie et al). Das et al. (2001) mentioned in their study that the educational level of female adolescents and youths

emerges as the strongest predictor of those who have ever used any contraceptive methods. Also, Almualm (2007) reported that parity, age, marital status, religion, husband's education, husband's occupation, monthly family income and woman's occupation were found to be associated with those who have ever used any contraceptive methods.

The principal predisposing and enabling factors affecting female adolescents and youths who have ever used any contraceptive methods were socio-economic status, knowledge and education of the mother. The likelihood of those who have ever used any contraceptive methods is higher for those with higher parity and the literate (Gizaw and N, 2011).

Seventy-five percent of sexually active unmarried women have used a method of contraception at some time. Sexually active unmarried female adolescents and youths tend to use temporary methods of contraception rather than long-term or permanent methods. Forty-four percent of these women have ever used a male condom, compared with 19 percent of married female respondents (GDHS, 2008).

2.7.2 Age of Respondent

Use of contraceptive methods among female adolescents and youths in stable marital relations may be influenced by a number of factors which include but not limited to socio-demographic variables such as age, education level and occupation. Age can be associated with those who have ever used any contraceptive methods.

Different age groups have different knowledge of contraception and contraception needs. For example, women in mid-twenties who are in stable relationships are likely not to ever use any contraceptive methods because it a period to bear children. However, women with advanced age above forty five are likely to use contraceptives as reported by (Esabella, 2012).

2.7.3 Knowledge of Contraception

Levels of knowledge of the contraceptive methods as well as communication between spouses regarding family planning issues were significantly associated with those who have ever used any contraceptives (Kessy and Rwabudongo, 2006). Khan and H (2000) mention in their study that the majority of respondents reported knowing of a contraceptive method (76%), only 28% were currently using one, and fewer than half (47%) reported ever having used one.

2.8 Application of Logistic Regression on Ever Used Contraceptives

We now turn our attention to some application to logistic regression models. These models are appropriate when the response takes one of only two possible values representing success and failure, or used of contraceptive and never used contraceptives.

Manning et al. (2000) used logistic regression to test models predicting whether a contraceptive was used. The logistic regression estimates predicting contraceptive use at first sexual intercourse shows that adolescents who had just met their partner or who were just friends had significantly reduced odds of practicing contraception at first intercourse, compared with the odds for those who were going steady with their first partner.

Adolescents who had just met their first sexual partner had 65% lower odds of using contraceptives than did girls who were going steady with their first sexual partner. Religiosity while growing up and place of residence did not influence contraceptive use at first intercourse.

Tawiah (1997) also applied logistic regression model to show that respondents' approval of family planning emerged as the most important predictor of current contraceptive use, followed by discussion of family planning with partner

and level of education. Again, a study found that family planning clinics had a greater effect on contraceptive use among the rural poor than among better educated urban women DaVanzo et al. (1989).

The wealth of the household may also be important because of its correlation with education and since wealth may have effects on desired family size and contraceptive use effectiveness Hamill et al. (1990)

Khan and H (2000) reported that, the predictor variables for the female respondents were age, education, ethnicity, family planning approval, and media exposure, communication with their spouse and his approval of family planning, and the social support of others. Women who agreed strongly with the statement that the practice of family planning breeds conflict in the home were 37% less likely than those who disagreed to use family planning. In addition, those who support female education and discourage early marriage were three times as likely to practice contraception as those who do not. Those who think that practicing contraception provides health benefits are likely to use a method, as are those who perceive that family planning will help them to improve their standard of living.

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Adolescents who had just met their first sexual partner had 65% lower odds of using contraceptives than did girls who were going steady with their first sexual partner. Religiosity while growing up and place of residence did not influence contraceptive use at first intercourse.

According to Nicole and Roger (2012), the factors significantly associated with the odds of ever used contraception were the number of intimate reasons given

for having sex and the warmth and availability of parents among young women.

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Chapter 3

Methodology

This chapter describes the theory of models to be used, formulations and methods of analyzing the available data to satisfy the objectives of the study. Among the aspects that will come under discussion include the methodologies used in modeling, the software specifications, and the features that are incorporated in the model. The main methods that are used in analyzing this study are binary logistic regression analysis and other statistical.

3.1 Data Source and Type

This study essentially seeks to model the sexual and reproduction health of female adolescent and youth to be used to highlight some important determinants of sexual and reproductive health among female adolescent. We drew our analytic sample from women questionnaire aged 15-24 (GDHS),2008.

3.2 Likelihood-Ratio Statistics

Likelihood function is the probability of the data, viewed as a function of the parameter once the data are observed. In statistics, a likelihood ratio test is a statistical test used to compare the fit of two models. The test is based on the likelihood ratio, which expresses how many times more likely the data are under one model than the other.

For example, the likelihood that an adolescent will give birth before age 20 would be expected in an adolescent with educational level compared to the likelihood that the same result would occur in an adolescent without educational level. The likelihood-ratio test determines the parameter values that maximize the likelihood

function (a) under the assumption that H_0 is true, (b) under the more general condition that H_0 may or may not be true. The test statistics uses the ratio of the maximized likelihoods through

$$-2\log \left(\frac{\text{maximum likelihood when the parameters satisfy } H_0}{\text{maximum likelihood when the parameters are unrestricted}} \right)$$

The test statistics value is nonnegative. When H_0 is false, the ratio of maximized likelihood tends to be far below 1, for which the logarithm is negative; then -2 times the log ratio tends to be a large positive number, more so as the sample size increases. The likelihood ratio statistics simplifies to (3.1) in a two-way cross tabulation.

$$G^2 = 2 \sum n_{ij} \log \left(\frac{n_{ij}}{\mu_{ij}} \right) \quad (3.1)$$

This statistics is called the likelihood-ratio chi squared statistics. G^2 takes its minimum value of 0 when all $n_{ij} = \mu_{ij}$, and larger values provide stronger evidence against H_0 .

3.3 Cochran-Mental-Haenszel Test

Cochran-Mental-Haenszel Test which is also known as the Mental-Haenszel test is use for repeated test for independent. There are three nominal variables; if the two variables are independent of each other, and the third variable identified the repeats.

The Cochran-Mental-Haenszel test is a method to compare the probability of an event among independent groups in stratified samples. The stratification factor can be study center, gender, age group, educational level. This underlying sub-population can be confounding factors that affect the associations between risk factors and the outcome variables.

The null hypothesis is the two nominal variables that are tested within each repetition are independent of each other; having one value of one variable does

not mean that it is more likely that you will have one value of the second variable.

Technically, the null hypothesis of the Cochran-Mental-Haenszel test is that the odds ratios within each repetition are equal to 1. The odds ratio is equal to 1 when the proportions are the same, and the odds ratio is different from 1 when the proportions are different from each other. with K categories for Z , where Z is a control variable for a $2 \times 2 \times K$ contingency table. The Cochran-Mental-Haenszel (CMH) test statistics summarizes the information from the K partial tables using

$$CHM = \frac{[\sum_k (n_{11k} - \mu_{11k})]^2}{\sum_k var(n_{11k})} \quad (3.2)$$

where n_{11k} in the cell in row 1 and column 1 of the partial table k . In partial table, the row totals (n_{1+k}, n_{2+k}) and the column totals are (n_{+1k}, n_{+2k}) . Given these totals, under H_0

$$\mu_{11k} = E(n_{11k}) = \frac{n_{1+k}n_{+1k}}{n_{++k}} \quad (3.3)$$

$$Var(n_{11k}) = \frac{n_{1+k}n_{2+k}n_{+1k}n_{+2k}}{n_{++k}^2(n_{++k} - 1)} \quad (3.4)$$

3.4 Chi-Square Test

The chi-square test χ^2 distribution is used to test when the following holds:

- The observed frequencies differ significantly from expected frequencies when more than two outcomes are possible.
- The sample distribution is binomial, normal or other. In other words the chi-square test assumes that the expected value for each cell is five or higher.
- The two variables should be independent to each other.

The χ^2 statistics which is calculated from the sample data is given by

$\chi^2 = \sum_r \sum_c \frac{(f_0 - f_e)^2}{f_e}$, where f_0 the frequencies of the observed whiles are f_e is the expected frequencies. f_e is then given by $\frac{\sum_r f_0 \sum_c f_0}{f_0}$ where $\sum_r f_0$ and $\sum_c f_0$ indicate sum over rows and column respectively of the observed cells and n represent the overall sample sizes which should be five or higher.

The chi-square distribution is concentrated over nonnegative values. It has mean equal to its degrees of freedom df , and its standard deviation equals $\sqrt{2df}$. As df increase, the distribution concentrates around larger values and is more spread out. The distribution is skewed to the right, but it becomes more bell-shaped (normal) as df increase. The df value equals the difference between the number of parameters in the alternative hypothesis and in the null hypothesis.

3.5 Logistic Regression Model

3.5.1 The Proposed Model

Linear models are particularly useful in the modeling of most quantitative data. However, when there is evidence that the condition for linear models are not satisfied, recent advances in statistical theory; provide another alternative, called generalized linear models (GLM).

Situations that make the use of linear model unsuitable, but which may require the use of generalized linear models by (Dobson, 1990) and (Chatfield, 1988) include when the response variable is not normally distributed; when the response variable is categorical rather than continuous; and when the relationship between the response and the explanatory variable is not simple linear form. One aspect of the GLM, which is of interest in this model, is the Multiple logistic regression model. The Multiple Logistic regression models the relationship between a binary or ordinal response variable and one or more explanatory variables.

There are three main types of logistic regression. These are the binary logistic

regression, in which the response variable is binary without order; the ordinal logistic, in which the response variable has three or more categorical or levels with natural order; and the multinomial logistic regression, in which the response variable is nominal without natural ordering. In all these cases, the explanatory variables may be quantitative or qualitative.

Due to the nature of the data, discussion of the model in the following sub section focuses on binary logistic regression, although it would be realized that most part of it is apply to other forms of logistic regression that have been mention earlier. Logistic regression is a way of analyzing a problem in which the outcome is determined by one or more explanatory variables. The logistic regression model is a generalized linear model with two components namely random and systematic.

The random component is the response variable which is binary variable, $Y_i = 1$ or 0 (ever use contraceptives or never use contraceptive). The systematic component is a linear predictor $\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots \beta_n X_n$ where the predictor variables are $X = (x_1, x_2, \dots, x_n)$. In this case we are interested in the probability that $Y_i = 1$. We assume that Y_i has a binomial distribution; $Y_i \sim B(n_i, \pi_i)$ with a binomial denominator n_i and probability π_i . The outcome variable in this case analysis is ever used contraceptive. Therefore the fitted logistic regression model takes the form;

$$\text{logit}(\pi(x_i)) = \log\left[\frac{\pi(x_i)}{1 - \pi(x_i)}\right] = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots \beta_n x_n \quad (3.5)$$

3.6 Model Building

There are different types of model selection criteria; but we are interested in the following model selection criteria, FORWARD for forward selection, BACKWARD for backward elimination, and Automatic model selection approaches.

Forward selection, which involves starting with no variables in the model, testing the addition of each variable using a chosen model comparison criterion, adding the variable (if any) that improves the model the most, and repeating this process

until none improves the model.

Backward elimination, which involves starting with all candidate variables, testing the deletion of each variable using a chosen model comparison criterion, deleting the variable (if any) that improves the model the most by being deleted, and repeating this process until no further improvement is possible.

For automatic model selection procedure, where there is a large number of potential explanatory variables, and no underlying theory on which to base the model selection.

This is a variation on forward selection. At each stage in the process, after a new variable is added, a test is made to check if some variables can be deleted without appreciably increasing the residual sum of squares (RSS). The procedure terminates when the measure is (locally) maximized, or when the available improvement falls below some critical value.

Automatic model selection approaches and criteria can be informative, provided that we use the results cautiously and continue to think about the scientific meaning and plausibility of the models under consideration.

3.7 Model Selection and Test for Adequacy

Several model selection procedures exist, no one of which is “best”. Cautions that apply to ordinary regression modeling of normal data hold for any generalized linear model. For instance, a model with several predictors has the potential for multicollinearity, strong correlations among predictors, making it seem that no one variable is important when all the other are in the model. A variable may seem to have little effect simply because it “overlaps” considerably with other predictors in the model. Confidence intervals are used to indicate the reliability of an estimate. How likely the interval is to contain the parameter determined by the confidence level.

3.8 Method of Estimation

Supposed that X_1, X_2, \dots, X_n are independent and identically distributed (*iid*) random variables with common probability density function, $f(x; \theta)$, $\theta \in \Omega$. The basis of our inferential procedure is the likelihood function given by,

$L(\theta, x) = \prod_{i=1}^n f(x_i; \theta)$, $\theta \in \Omega$ where $X = (X_1, X_2, \dots, X_n)^T$, and the likelihood function which is a function of θ is simply denoted by $L(\theta)$. The maximum likelihood estimator ($\hat{\theta}$) of the parameter θ is obtained by maximizing $L(\theta)$. Usually, for mathematical convenience, we rather work with $\ell(\theta) = \log L(\theta)$, which interestingly gives us no loss of information in using $\ell(\theta)$ because the log is a one-to-one function. Thus

$$\ell(\theta) = \log L(\theta) = \sum_{i=1}^n \log f(x_i; \theta), \theta \in \Omega \quad (3.6)$$

for example, given the iid random sample, X_1, X_2, \dots, X_n from the logistic density

3.8.1 Estimation of Parameter

The response variable, ever used contraceptive is a dichotomous, distributed binomially for each linear combination of the explanatory variables. The maximum likelihood equation is derived from the probability distribution of the dependent variable. Since each y_i represents a binomial count in the i th population, the joint probability density function of Y is:

$$f(y|\beta) = \prod_{i=1}^N \frac{n_i!}{y_i!(n_i - y_i)!} \pi_i^{y_i} (1 - \pi_i)^{n_i - y_i} \quad (3.7)$$

For each population, there are $\binom{n_i}{y_i}$ different ways to arrange y_i successes (ever used contraceptive) from among n_i trials. Since the probability of a success for any one of the n_i trials is π_i , the probability of y_i successes is $\pi_i^{y_i}$. Likewise,

the probability of $n_i - y_i$ failures (never used contraceptive) is $(1 - \pi_i)^{n_i - y_i}$. The likelihood function has the same form as the probability density function, except that the parameters of the function are reversed: the likelihood function expresses the values of β in terms of known, fixed values for y . Thus,

$$L(\beta|y) = \prod_{i=1}^N \left(\frac{n_i!}{y_i!(n_i - y_i)!} \pi_i^{y_i} (1 - \pi_i)^{n_i - y_i} \right) \quad (3.8)$$

The maximum likelihood estimates are the values for β that maximize the likelihood function. The factorial terms will be considered constants and will be ignored since it does not contain any of the π .

$$\prod_{i=1}^N \left(\frac{\pi_i}{1 - \pi_i} \right)^{y_i} (1 - \pi_i)^{n_i}.$$

The Logit equation is given by

$$\log\left(\frac{\pi_i}{1 - \pi_i}\right) = \alpha + \sum_{k=1}^k \beta_k x_{ik} \quad (3.9)$$

By taking the natural logarithms on both sides

$$\frac{\pi_i}{1 - \pi_i} = \exp\left(\alpha + \sum_{k=1}^k \beta_k x_{ik}\right) \quad (3.10)$$

which after solving for π_i becomes

$$\pi_i = \frac{\exp(\alpha + \sum_{k=1}^k \beta_k x_{ik})}{1 + \exp(\alpha + \sum_{k=1}^k \beta_k x_{ik})} \quad (3.11)$$

The quantity α is the intercept parameter, x_{ik} are the k explanatory variables and β_k are the regression parameters. Substituting equation (3.10) into equation (3.11) gives equation (3.12)

$$\prod_{i=1}^N \left(\exp(\alpha + \sum_{k=1}^k \beta_k x_{ik}) \right)^{y_i} \left(1 - \frac{\exp(\alpha + \sum_{k=1}^k \beta_k x_{ik})}{1 + \exp(\alpha + \sum_{k=1}^k \beta_k x_{ik})} \right)^{n_i} = \prod_{i=1}^N \left(\exp(y_i(\alpha + \sum_{k=1}^k \beta_k x_{ik})) \right) \quad (3.12)$$

Taking the log of equation (3.12) is given below

$$\ell(\beta) = \sum_{i=1}^N \left((y_i(\alpha + \sum_{k=1}^k \beta_k x_{ik})) - n_i \log(1 + \exp(\alpha + \sum_{k=1}^k \beta_k x_{ik})) \right) \quad (3.13)$$

Note that $\frac{\partial}{\partial \beta_k} \left(\alpha + \sum_{k=1}^k \beta_k x_{ik} \right) = X_{ik}$

$$\begin{aligned} \frac{\partial \ell(\beta)}{\partial \beta_k} &= \sum_{i=1}^N y_i x_{ik} - n_i \frac{1}{1 + (\alpha + \sum_{k=1}^k \beta_k x_{ik})} \frac{\partial}{\partial \beta_k} \left(1 + \alpha + \sum_{k=1}^k \beta_k x_{ik} \right) \\ &= \sum_{i=1}^N y_i x_{ik} - n_i \frac{1}{1 + (\alpha + \sum_{k=1}^k \beta_k x_{ik})} \alpha + \sum_{k=1}^k \beta_k x_{ik} \frac{\partial}{\partial \beta_k} \left(\alpha + \sum_{k=1}^k \beta_k x_{ik} \right) \\ &= \sum_{i=1}^N y_i x_{ik} - n_i \frac{1}{1 + (\alpha + \sum_{k=1}^k \beta_k x_{ik})} (\alpha + \sum_{k=1}^k \beta_k x_{ik}) \\ &= \sum_{i=1}^N y_i x_{ik} - n_i \pi_i x_{ik} \end{aligned} \quad (3.14)$$

The maximum likelihood estimates for β can be found by setting each of the $K + 1$ equations in equation (3.14) equal to zero and solving for each β_k . In SAS, the Fisher Scoring algorithm is used to find the parameter β_k since equation (3.14) is in closed form.

3.9 Goodness of Fit (Hosmer -Lemeshow)

Testing goodness of fit (GOF) is an important step in evaluating a statistical model. It is also called a goodness of fit statistic, because it measures how well the observed distribution of data fits with the distribution that is expected if the variables are independent. That is goodness-of-fit tests help you decide whether your model is correctly specified. They produce a p-value if it's low (say, below .05), you reject the model. If it's high, then your model passes the test.

The Hosmer-Lemeshow goodness-of-fit statistic is obtained by calculating the Pearson chi-square statistic from the $2 \times g$ table of observed and expected fre-

quencies, where g is the number of groups. The statistic is written

$$\chi^2_{HL} = \sum_{i=1}^g \left(\frac{(O_i - N_i \pi_i)^2}{N_i \pi_i (1 - \pi_i)} \right) \quad (3.15)$$

where N_i is the total frequency of subjects in the i_{th} group, O_i is the total frequency of event outcomes in the i_{th} group, and π_i is the average estimated predicted probability of an event outcome for the i_{th} group. The Hosmer-Lemeshow statistic is then compared to a chi- distribution with $(g - n)$ degrees of freedom, where the value of n can be specified in the model statement. The default is $n = 2$. Large values of χ^2_{HL} (and small p-values) indicate a lack of fit of the model.

3.10 Odds and Odds Ratio

Odds are the probability of an even happening divided by the probability of an event not happening. An odds ratio is the odds of the event in one group, for example, adolescent who gave birth before age 20, divided by the odds in another group adolescent who did not gave birth before age 20. Odds are simply a different expression of the probability. Odds are the probability of an event happening divided by the probability of an event not happening. Thus, the odds of an event would be $[\text{probability} / (1-\text{probability})]$. Since this is a ratio, the values range from zero to infinity. Assume that, with a current issue of teenage pregnancy, teenagers who got pregnant before completing basic education were 80% probability of teenage pregnancy is (0.80).

The odds of teenage pregnancy before completing basic education would be $[0.80 / (1-0.80)] = (0.80/0.20) = 4.0$. The probability of teenage pregnancy before completing basic education is (0.80), while the odds of teenage pregnancy before completing basic education is 4.0, a twice fold difference. The odds ratio compares likelihood of an event between two groups. We study the binary outcome in two groups, and introduce the odds ratio and logit analogue. We will use a

contraceptive used data as summarized in the Table 3.1

Table 3.1: Contraceptive Use

Desires(i)	Using(y_i)	Not Using ($n_i - y_i$)	Total(n_i)
Yes	308	154	462
No	142	709	851
Total	450	863	1313

The odds ratio compares the relative odds of contraceptive used in each group. For respondent who said yes, the odds were exactly two to one against not using $[(154/308) = 0.5]$. For those respondent who said no, the odds were almost five to one in favor of not using $[(709/142) = 4.993]$. The odd ratio is $[(4.993/0.5) = 9.986]$ which means that there are about ten folds greater odds of contraceptive used for respondent who responded “no” than those respondent who responded “yes”. The logistic Regression model

$$\text{logit}(\pi(x_i)) = \log \left(\frac{\pi(x_i)}{1 - \pi(x_i)} \right) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n \quad (3.16)$$

This gives us a model for odds, where the odds increase multiplicatively with X . A unit change in X leads to an increase or decrease in the odds of $\exp\beta$. So the odds ratio for a unit increase in X equals

$$\frac{\frac{\pi(x+1)}{1 - \pi(x+1)}}{\frac{\pi}{1 - \pi}} = e^\beta \quad (3.17)$$

when $\beta = 0$, $e^0 = 1$ then the odds do not change with X . The logarithm of the odds changes linearly with X .

Chapter 4

Analysis

4.1 Results and Discussion

This chapter discusses the analysis (GDHS, 2008) for our study on the determinant of sexual and reproductive health among female adolescent and youth in Ghana. The chapter is categorised in to two section, namely, the preliminary analysis section and the defined analysis section.

4.2 Preliminary Analysis

The preliminary analysis discusses the demographic characteristics recorded in GDHS, 2008 data as well as some basic information about sexual and reproductive health among female adolescent and youth in Ghana. The demographic characteristics and some of the basic information variables used in this section are age of Respondent, De facto region of residence, Educational level, Highest year of education, Type of contraceptive, Fertility preference, Current Contraceptive, Sources of Contraceptives, Religion, Ethnicity, Contraceptive Knowledge, wealth Index, Any STDs, Marital Status and Haerd about other STDs and others.

The descriptive analysis present continuous variables only and some categorical analysis will follow, which is used to describe some key features of GDHS,2008 data in this research study.

4.2.1 Results

Table 4.1: summary statistics for continuous variables

Variable	Number	Mean	Std Dev	Minimum	Maximum
Age of Respondent	1894	19.206	2.810	15	24
Highest Yr of Education	1646	3.467	1.802	0.00	9

Table 4.1 present the mean, standard deviation, minimum and maximum of age of respondent and highest year of education of all female adolescent and youth age 15-24 years. In 2008, 1894 of female adolescent and youth age between 15 and 24 were presented in the table. The average age is 19.206 with standard deviation of 2.810 and for that of highest year of education, the sample sizes is 1646 with minimum and maximum highest year of education being 0.00 and 9 respectively. Its mean is 3.467 with standard deviation 1.802.

In the descriptive exercise, the categorical analysis against age at first birth are illustrated below.

Table 4.2: Cross-tabulation of age at first birth and marital status.

Variable	Age at first birth >20 years(0),%	Age at first birth <20 years(1),%	Total n(%)
Marital status			
currently married	68(12.45)	347(63.55)	415(76.01)
formerly married	4(0.73)	29(5.31)	33(6.04)
never married	9(1.65)	89(16.3)	98(17.95)
Total	81(14.84)	465(85.16)	546(100)

The Table 4.2 shows that, 347(63.55%) female adolescent and youth gave birth for the first time at ages below 20 and are currently married whiles 89(16.3%) aged below 20 had never married. The number of adolescent and youth recorded as formally married were 29 (5.31%) by age at first birth.

Table 4.3: Cross-tabulation of age at first birth and Educational Level

Variables	Age at first birth >20 yrs(%)	Age at first birth <20 yrs(%)	Total(%)
Educational Level			
Higher	2(2.5)	1(0.22)	3(2.72)
no education	21(3.85)	127(23.3)	148(27.16)
Primary	12(2.2)	146(26.79)	158(28.99)
Secondary	45(8.26)	191(35.05)	236(43.3)
Total	80(14.68)	465(85.32)	545(100)

From Table 4.3, female adolescent and youth with secondary level of education do have the highest frequency, that is 191(35.05%) followed by primary with 146 (26.79%), no education recorded 127 (23.3%) of the respondents. However, higher educational level recorded the least, 1(0.22%) by adolescent and youth aged below 20 to have given birth for the first time.

Table 4.4: Cross-tabulation of age at first birth and Contraception Knowledge

Variable	Age at first birth >20 years(0),%	Age at first birth <20 years(1),%	Total (%)
Contraception Knowledge			
knows modern method	77(14.1)	445(81.5)	522(95.6)
knows no method	4(0.73)	19(3.48)	23(4.21)
knows only traditional method	0(0)	1(0.18)	1(0.18)
Total	81(14.84)	465(85.16)	546(100)

Interestingly from Table 4.4, almost all, 445(81.5%) of female adolescent and youth knows modern methods to have a first child at age below 20 years, whiles combination of knows no method and knows only traditional method is 20(3.66%).

Table 4.5 presents the factors associated with female adolescent and youth age at first birth. However, only the variables making significant contribution to the prediction of adolescent and youth age at first birth were selected. But the variables which were not making significant contributions were discarded.

Table 4.5: Factors associated with age at first birth

VARIABLES	Likelihood Ratio(P-Value)	Cochran-Mantel-Haenszel(P-Value)
Ethnicity	11.1588(0.1929)	3.8654(0.0493)
Any STDs	5.9015(0.0523)	3.8874(0.0486)
whether pregnant	1.4932(0.2217)	1.3559(0.2443)
current marital status for the respondent	9.4670(0.0918)	1.5504(0.2131)
resent sexual activity	14.8612(0.0006)	9.3783(0.0022)
age at first sexual intercourse	129.3657(0.0001)	9.3783(0.0001)

Table 4.5 display factors associated with age at first birth. From the output, you can see that Cochran-Mantel-Haenszel of ethnicity has the value of 3.8654 with p value = 0.0493, which is significant at 5% which shows that there is an association between ethnicity and age at first birth. Age at first sexual intercourse has a Cochran-Mantel-Haenszel value of 9.3783 with p-value =0.0001, which is strongly significant. Age at first sexual intercourse is highly associated.

The descriptive analysis on some of the categorical variables against ever use contraceptives are illustrated below.

Table 4.6: Cross-tabulation of Ever Use Contraceptive and Educational level

Variables	Never Used of Contraceptive(%)	Ever Used Contraceptive(%)	Total(%)
Educational Level			
Higher	15(0.79)	29(1.53)	44(2.33)
No education	195(10.31)	51(2.7)	246(13)
Primary	264(13.95)	136(7.19)	400(21.14)
Secondary	751(39.69)	451(23.84)	1202(63.53)
Total	1225(64.75)	667(35.25)	1892(100)

From the Table 4.6 female adolescents and youth with secondary level of education recorded the highest percentage of 35.25 among respondents who have ever used contraceptives followed by primary, no education, and higher with 21.14%, 13% and 2.33% respectively. Interestingly, adolescents and youth with higher level of education recorded the least percentage among respondent who have ever used contraceptives.

Table 4.7: Cross-tabulation of Ever Use Contraceptive and Heard about other STDs

Variables	Never Used Contraceptive(%)	Ever Used Contraceptive(%)	Total(%)
Heard about other STDs			
No	584(31.06)	200(10.64)	784(41.7)
Yes	628(33.4)	468(24.89)	1096(58.3)
Total	1212(64.47)	668(35.53)	1880(100)

Table 4.7 shows that, there exist a correlative relationship between adolescents and youth who have heard about other STDs and their preparedness to use contraceptives as respondents who had heard about STDs were the same group that recorded the highest percentages 24.89%. Also adolescent and youth who had not heard about other STDs recorded 10.64%.

Table 4.8: Cross-tabulation of Ever Use Contraceptive and Contraception Knowledge

Variables	Never Use Contra- ceptive(%)	Ever Use Contracep- tive(%)	Total(%)
knows modern method	1137(60.03)	669(35.32)	1806(95.35)
knows no method	85(4.49)	0(0)	85(4.49)
knows only traditional method	3(0.16)	0(0)	3(0.16)
Total	1225(64.68)	669(35.32)	1894(100)

Table 4.8 present the percentage and the frequency of all adolescent and youth age 15-24 who had ever use contraceptive by contraceptive knowledge. For female adolescent and youth age 15-24, ever use contraceptive takes place almost exclusively within contraceptive knowledge. In 2008, respondent who do not know any method recorded 0% among respondent who have ever use a contraceptive. The table shows that respondents who know modern methods recorded highest percentage of 35.32% by adolescent and youth to have ever use contraceptive.

Table 4.9 depicts the factors associated with female adolescent and youth who have ever use contraceptives. However, only the variables making significant contribution to the prediction of adolescent and youth ever use contraceptives were selected. But the variables which were not making significant contributions were discarded.

Table 4.9: Factors associated with ever use contraceptives

Variables	Likelihood Ratio(p-value)	Cochran-Mantel-Haenszel(p-value)
Wealth Index	76.3071(0.0001)	4.9329(0.0264)
Ethnicity	78.5157(0.0001)	28.9549(0.0001)
Heard About Other Stds	60.1876(0.0001)	58.9322(0.0001)
Educational Level	44.7747(0.0001)	4.6290(0.0314)
Defacto Type Of Place Of Residence	10.2376(0.0014)	10.2467(0.0014)
Resent Sexual Activity	884.5096(0.0001)	2.2489(0.1337)
Age At First Sexual Intercourse	33.7686(0.0001)	11.7481(0.0006)

This Table 4.9 indicates the result for ever use contraceptive against background characteristics. From the output, the Cochran-Mantel-Haenszel (CMH) value of ethnicity is 28.9549 with p value of 0.0001, the strongly significant association between ever use contraceptive and ethnicity. You can see from the table 4.9 that, CMH value for women who have heard about other STDs, respondent age at first sexual intercourse, and defacto type of place of residence are 58.9322, 11.7481 and 10.2467 with p value of 0.0001, 0.0006 and 0.0014 respectively indicate that there is association between female adolescent and youth who have ever use a contraceptive and the variables mention above.

4.3 Logistic Regression For Sexual and Reproduction Health for Female Adolescent and Youth in Ghana

Some of the recorded variables in the data are defined as follows. Educational Level is categorized into primary=1, secondary=2, higher =3 and no education=4. Resent sexual activity is defined as active in last 4 weeks=1, not active in last 4 weeks - not postpartum abstinence=2 not active in last 4 weeks-postpartum abstinence=3 and never had intercourse=4. Wealth Index is recorded as richer=1, richest=2, middle=3, poorer=4 and poorest=4. Age at First Birth is recorded as age less than 20=1 and 20 and above =2. Ever Use Contraceptive is categorized as used modern method, used only traditional method=1 whiles never used=1.

Table 4.10: Model selection criteria for adolescent age at first birth

Analysis of Effects Eligible for Entry					
EFFECT	step1 p-value	step2 p-value	step3 p-value	step4 p-value	step5 p-value
Any STD	0.0376	0.0974	0.17	0.0907	0.0907
Defacto Type Of Place Of residence	0.0761	0.9136	0.8617	0.9904	0.9904
Type of Contraceptives	0.2407	0.2976	0.2595	0.2055	0.2055
Current Contraceptive	0.0748	0.1107	0.077	0.0738	0.0738
Source of Contraceptives	0.5519	0.6122	0.4289	0.4361	0.4361
Educational Level	0.0024	0.0198	0.0192	(***)	
Religion	0.0821	0.2084	0.1876	0.1683	0.1683
Ethnicity	0.2215	0.2089	0.2846	0.2315	0.2315
Contraception Knowledge	0.702	0.8768	0.8745	0.8188	0.8188
Recent sexual activity	0.0135	0.0041	(***)		
Fertility prevalence	0.6483	0.6239	0.7033	0.6221	0.6221
Wealth Index	0.0012	(***)			

Note: the (***) shows that, that particular effects or variable has been selected into the model.

The method used for selection is the stepwise selection method which includes all the variables in the model, as shown in the table above and deletes any variable that does not produce large chi-squares and correspondingly small p-values. At step 1, wealth index has the smallest p-value (0.0012), therefore wealth index has been included in the model. Again at step 2, the effect or the variable to be included in the model is recent sexual activity with p-value of 0.0041 being the lowest p-value among the rest of the variables. At step 3, educational level was included in the model, since its p-value was the lowest among the rest of the p-values. At step 4, no (additional) effects met the 0.05 significant levels for entry into the model. Which implies that, variables selected based on the 0.05 significant level for entry for adolescent age at first birth are educational level, recent sexual activity and wealth index.

Analysis of effect Table 4.11 is from the main effect model. In fact, for the main effects models where presumably each explanatory variable chosen has some potential basis for its inclusion (Stokes et al., 2003), that is, the Chi-square test statistics and the associate p-value shown in the table indicate that each of the three variables in the model significantly improve the model fit. Analysis of effect for age at first birth is shown in table 4.11 below.

Table 4.11: Analysis of Effect for Age at First birth

Analysis of Effects age at first birth			
Effect	DF	Wald Chi-Square	Pr >Chi Square
Educational Level	3	9.6332	0.0220
recent sexual activity	2	10.9412	0.0042
Wealth Index	4	14.0748	0.0071

From the Table 4.11, the variable, wealth index is clearly significant with Chi-square value of 14.07. The Table 4.11 also indicate that all variables chosen met designated 0.05 level of significant. The main explanatory variable chosen are educational level, recent sexual activity and wealth index which will be included in the model.

The output 4.12 contains the odds ratio estimates and their confident limits for age at first birth, which are the 0.05 wald confident limits.

Table 4.12: Logistic regression results for age at first birth, adjusted odds ratio, Ghana DHS 2008

Odds Ratio Estimates		
Effect	Point Estimate	95% Wald Conf. Limits
EDUCATIONAL LEVEL		
secondaryÂ®	1	
higher	2.803	0.213 - 36.883
no education	0.771	0.441 - 1.349
primary	0.459**	0.275 - 0.766
RECENT SEXUAL ACTIVITY		
active in last 4 weeksÂ®	1	
not active in last 4 weeks - not postpartum abstinence	0.87	0.508 - 1.491
not active in last 4 weeks - postpartum abstinence	1.881**	1.192 - 2.966
WEALTH INDEX		
poorerÂ®	1	
middle	0.832	0.456 - 1.517
poorest	0.692	0.378 - 1.267
richer	0.844	0.471 - 1.513
richest	2.948**	1.395 - 6.229

Note: *p<0.1; **p<0.05; ***p<0.001; regression model excludes five female adolescent and youth with missing observation and

1 "¹" identifies the reference categories

In this particular Table 4.12, the number of observations read is 546 but 536 were used in the analysis whiles 10 observations were deleted due to missing values for the response or the explanatory variables. This illustrates factors associated

with age at first birth (defined as the specific age at which adolescent and youth had their first birth from 15-24) with four background characteristics which were included in this analysis.

Female adolescent and youth who were not active in last 4 weeks-not postpartum abstinence as a category of recent sexual activity are 13% less likely to give birth at a specific age than female adolescent and youth who are active in last 4 weeks in recent sexual activity.

Female adolescent and youth in the “richest” category of the “wealth index” are 2.948 times as likely to give birth below the ages of 20 compared to those in the “poorer index” category. Also, female adolescent and youth in middle and poorest wealth index categories were 0.8321 and 0.692 times as likely, respectively to give birth below age 20 compared to those in the poorer index category.

Table 4.13: Model selection criteria for ever use contraceptives

Effects	step1 χ^2	step2 χ^2	step3 χ^2	step4 χ^2	step5 χ^2
Any STD	<.0001 (32.47)	0.3097(2.340)	0.6545(0.850)	0.4333(1.672)	0.5584(1.170)
DTPR	0.0014(10.170)	<.0001(30.160)	0.0011(10.650)	0.0085(6.930)	0.4837(0.490)
H.STD	<.0001(60.46)	<.0001(45.71)	0.0001(14.590)	0.0006(11.90)	0.0045(8.0700)
EL	<.0001(43.040)	<.0001(106.100)	(***)		
Religion	<.0001(49.290)	<.0001(62.620)	0.0014(27.040)	0.042(917.46)	0.0589(16.400)
Ethnicity	<.0001(75.010)	<.0001(101.790)	<.0001(48.830)	(***)	
CK	<.0001(50.340)	<.0001(51.010)	<.0001(23.110)	<.0001(20.450)	0.0001(17.690)
RSA	<.0001(675.300)	(***)			
FP	<.0001(33.440)	0.010(9.210)	0.0027(11.840)	0.0019(12.490)	0.0114(8.950)
WI	<.0001(73.080)	<.0001(89.030)	<.0001(32.310)	<.0001(26.680)	(***)

Note: the (***) shows that, that particular effects or variable have been selected into the model.

As stated in earlier, stepwise selection method is used for the selection of effect in the model. For main effects models where each explanatory variable chosen should have large chi-squares and correspondingly small p-values for the variable to be included in the model.

From the Table 4.13, at steps 1, recent sexual activity has the smallest p-value (0.0001) and large chi-square of (675.3) which account for its inclusion in the mode. At step 2, educational level was included in the model since it has a p-value of 0.0001 and the corresponding chi-square value (106.10) which is the smallest and the highest respectively in step 2. The same procedures were used for step 3 and step 4 resulting in ethnicity and wealth index respectively to be

included in the model. Parameter estimates are all significant at the 0.05 level, as judged by the accompanying Wald statistics. At step 5, no (additional) effects met the 0.5 significant levels for entry into the model. variables that satisfy the 0.05 significant level for entry in the model were selected. These variables are educational level, ethnicity, recent sexual activity and worth index.

Analysis of effects for ever use contraceptive present the Chi-square test statistics and the associate p-value, which indicate that each of the four variables in the model significantly improve the model fit. Analysis of effect for ever use contraceptives is shown in the table 4.14 below.

Table 4.14: Analysis of effects

Analysis of Effects for Ever Use Contraceptive			
Effect	DF	Wald Chi-Square	Pr >Chi Square
Educational Level	3	106.10	0.0001
recent sexual activity	2	675.3	0.0001
Ethnicity	8	48.83	0.0001
Wealth Index	4	26.68	0.0001

From the Table 4.14, the variable, educational level is clearly significant with Chi-square value of 106.10. The Table4.14 also indicate that all variables chosen met designated 0.05 level of significant. The main explanatory variable chosen are educational level, recent sexual activity ,ethnicity and wealth index which will be included in the model.

The output 4.15 shows the odds ratio estimates and their confident limits for adolescent and youth ever use of contraceptive, which are the 0.05 wald confident limits.

Table 4.15: Factors associated with ever use contraceptives

Effect	Point Estimate	95% Wald Conf. Limits
EDUCATIONAL LEVEL		
secondary ¹	1	
higher	0.307**	0.107 - 0.879
no education	2.865***	1.861 - 4.409
primary	1.351*	0.974 - 1.874
ETHNICITY		
akan ¹	1	
ewe	0.63**	0.414 - 0.957
ga/dangme	0.483**	0.273 - 0.854
gruma	2.956**	1.407 - 6.209
Grussi	2.43**	1.351 - 4.37
guan	1.046	0.407 - 2.686
mande	>999.999	<0.001 - >999.999
mole-dagbani	1.022	0.7 - 1.492
other	0.709	0.36 - 1.397
RECENT SEXUAL ACTIVITY		
active in last 4 weeks	1	
never had intercourse	966.683***	235.732 - >999.999
not active in last 4 weeks - not postpartum abstinence	1.46**	1.092 - 1.952
not active in last 4 weeks - postpartum abstinence	2.145***	1.451 - 3.171
WEALTH INDEX		
poorer ¹	1	
middle	0.847	0.567 - 1.268
poorest	2.273***	1.491 - 3.465
Richer	0.811	0.55 - 1.196
richest	0.999	0.64 - 1.558

Note: *p<0.1; **p<0.05; ***p<0.001; and 1 “¹” identifies the reference categories

In Table 4.15, the number of observations read is 1894 but 1865 were used while 29 observations were deleted due to missing values for the response or the explanatory variables. The table presents the factors associated with female adolescent and youth who have ever used a contraceptive between the age (15-24). In this model, female adolescent and youth who have ever used a contraceptive are compared with female adolescent and youth who have never use a contraceptive. Educational level, recent sexual activity, wealth index, ethnicity and the age of a respondent are associated with greater likelihood for the female adolescent and youth to ever use contraceptive.

Female adolescent and youth with higher level of education are far less likely to ever use a contraceptive than adolescent and youth with secondary level of education.

Adolescent and youth whose recent sexual activities show not active in the last 4 weeks-postpartum abstinence were 1.46 times as likely to use contraceptives compared to those who were active in last 4 weeks. Also, adolescent and youth whose recent sexual activities show not active in the last 4 weeks-not postpartum abstinence were 2.145 times as likely to use contraceptives compared to those who were active in last 4 weeks.

Female adolescent and youth who belong to the Gruma, Grussi, and Mande ethnic groupings were 2.588, 2.32 and >999.999, respectively times as likely as their friends from the Akans tribe to ever use contraceptives. Whiles Ewe, Ga/Dangme, Mole-Dagbon, and others were 0.63, 0.483, 1.022 and 0.709 respectively were less likely to ever use contraceptive compared to the Akans respondents.

Female adolescent and youth in the poorest and the richest categories of the wealth index were 2.273 and 0.999 times as likely to have ever used contraceptive compared to the poorer respondents, whiles female adolescent and youth in middle and richer were 15.3% and 18.9% less likely to have use contraceptive compared to their poorer respondents.

4.4 Discussion

This thesis analysed the determinant of sexual and reproductive behaviour among female adolescent and youth age between 15 -24 in Ghana, drawing on the data from Ghana Demographic and Health Survey conducted in 2008, with some determinant showing encouraging improvements. At the same time, the finding makes it clear that major challenges remain in increasing overall levels of health services utilisation and reducing risky behaviour among female adolescent and youth. In addressing these challenges at the national level, it is important to decrease the huge gap that reflects the differences in education, wealth, residence and other personal characteristics. As the thesis results indicate, the proportion of female adolescent and youth who have first child before the age 20 increases with respect to the odds of educational level. Thus, among female adolescent,

age at first birth takes place almost universally with educational level.

The results also shows that, women who are “not active in last 4 weeks- not postpartum abstinence” as a category of recent sexual activity are 13 Women in the richest category of the wealth index are likely to give birth before 20 years than those who are poorer. It also indicates that , adolescent in the middle, and poorest wealth index category are 16.79% and 30.8% times as likely, respectively to give birth below 20 years as compared to those in the poorer index category. Young women who are most likely to give birth before age 20 are the richest, followed by those who have primary level of education, and those who are not active in last 4 week- postpartum abstinence.

The study shows low rate of contraceptive use among female adolescent and youth in Ghana. Young women who are most likely to use contraception are those with no educational level as compared to those with secondary level of education. Women with higher level of education are far less likely to ever use contraceptive than adolescent and youth with secondary level of education. The result of the survey indicates that, the higher the education, the less likely people are to use contraceptives. Young women belonging to a particular ethnic group are more likely to use contraception than those in other ethnic groups. Female adolescent and youth belonging to ethnic group like Gruma, Grussi, and Mande are more likely to use contraceptives as compared to those in Akan ethnic groups. While groups like Ewe, Ga/Adangme, Mole-Dagbani are less likely to ever use a contraceptive compared to the Akans.

Respondents who are in the poorest and richest categories of the wealth index are more likely to ever use contraceptives as compared to female respondents who are in the poorer bracket. The results of the survey also indicate that, female adolescent and youth in the middle and richer category of the wealth index are less likely to have used contraceptive as compared to young women who are poorer. As indicated in the results, female adolescent and youth who are most likely to ever use contraceptives are those have no education, those who are poorest, those

who belong to Gruma, and Grussi ethnic groups, and those who are not active in last 4 weeks-postpartum abstinence.

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Chapter 5

Conclusion and Recommendation

Improving our understanding of sexual and reproductive health is critical for the development of strategies that will improve the health and well-being of female adolescent and youth and their families. Such strategies could address a range of needs in areas that include information, education and finance. The preceding chapters have reviewed a large number of studies that, in one way or another, shed light on the sexual and reproductive behaviour among female adolescent and youth in Ghana. However, much more work needs to be done. The goal of this thesis was relatively limited to briefly using multiple logistic regression to find the key determinant of sexual and reproductive health among female adolescent and youth and also to use multiple logistic regression to determine factors associated with adolescent age at first birth and adolescent ever use contraceptives and it is impossible for this survey to cover the full range of socio-cultural contexts and scenarios that influence the sexual and reproductive health behaviour of female adolescent and youth.

In conclusion, significant determinants such as adolescent and youth level of education, recent sexual activity, and their wealth index account for early childbearing. The survey result shows that female adolescent and youth who are “richest” category of the wealth index are more likely to give birth below the ages of 20 than those who are poorer.

Moreover, determinants such as women educational level, ethnic group, recent sexual activity and their wealth index are the significant determinants that have an effect on adolescent and youth to ever use contraceptives. Surprisingly, we find out that, female adolescents and youth with higher level of education are far less

likely to ever use a contraceptive than adolescent and youth with secondary level of education. Female adolescents and youth who are in the “richer” category of the wealth index are 18.9% less likely to have used contraceptives compared to the poorer respondents.

The finding of this research suggests the following implications for policy formulation and design of programmes to improve the sexual and reproductive health among female adolescent and youth in Ghana.

- Given that teenage pregnancies constitute a particular problem among adolescent with financial problems and uneducated adolescent, more efforts are needed to increase access to education and services to those out of school.
- Since the wealth index and educational status of adolescents and youth influence many sexual and reproductive health indicators, the collaborative efforts of both the health and education sectors, including provision of comprehensive sexual and reproductive health education, are needed to improve health outcomes in the future. There is also the need for government to bring more work for the youth to solve their financial problems.

Without a doubt, programs that seek to address the reproductive and sexual health of female adolescents and youth have faced many challenges and roadblocks. Reproductive health and family planning programmes for young people have remained limited in scope and young people are among the least prioritised in health and development efforts. If we are to reverse these persistent trends of low rates of contraceptive use and high rates of pregnancy among female adolescents and youth, and other health concerns such as STIs, young women must be provided with the knowledge that the use of contraceptives control pregnancy and infectious diseases (STIs). Health systems, parents and the community must be strengthened and made more responsive to the needs of female adolescent and youth. These changes will inevitably lead more young people to use family planning measures and delay their first pregnancy.

REFERENCES

- Alford, S., Bridges, E., Gonzalez, T., Davis, L., and Hauser, D. (2009). *Sex Education and Other Programs that Work to Prevent Teen Pregnancy, HIV and Sexually Transmitted Infections*. Advocates for Youth , Washington, DC.
- Almeida, M. C. C. A. C. and Aquino, E. M. L. (2009). The role of education level in the intergenerational pattern of adolescent pregnancy in brazil. *International Perspectives on Sexual and Reproductive Health*, 35(3):139–146.
- Almualm, Y. (2007). Knowledge, attitude and practice of husbands towards modern family planning in mukalla yemen. Technical report, University Sains Malaysia.
- Beijing, W. (1996). Fourth world conference on women beijing. Technical report, United Nations New York.
- Bluestein, D. and Starling, M. E. (1994). Helping pregnant teenagers. *PM-CID:PMC1022525*, 161(2):140–143.
- Celine, F. (2009). Age at first child does education delay fertility timing? the case of kenya. Technical report, The World Bank South Asia Region Human Development Division.
- Chatfield, C. (1988). *Problem Solving: A Statistician's Guide*. London: Chapman and Hall.
- Chio and Mishra (2009). Analysis of kdhs trends. Technical report, FHI 360/PROGRESS and the Ministry of Health, Kenya.
- Christine E. Kaestle, Carolyn T. Halpern, W. C. M. and Ford, C. A. (2004). Young age at first sexual intercourse and sexually transmitted infections in adolescents and young adults. *American Journal of Epidemiology*, 161:8.

- Company, H. M. (2005). New dictionary of cultural literacy, third edition. *The American Heritage*.
- da Conceicao Chagas de Almeida, M. and M.L.Aquino, E. (2009). The role of education level in the intergenerational pattern of adolescent pregnancy in brazil. 35(3):139–146.
- Das, N., VK, M., and PK, S. (2001). Does community access affect the use of health and family welfare services in rural india? Technical report, National Family Health Survey.
- DaVanzo, J., TB, A., and R, O. (1989). Determinants of contraceptive method choice in peninsular malaysia, in: *Choosing a contraceptive: Method choice in asia and the united states*.
- D’Emilio, J. and Freedman, E. B. (1988). *Intimate Matters: A History of Sexuality in America*. University of Chicago Press.
- Dibyendu, G. (2013). An exploratory study of harassment on male homosexuals in metropolitan kolkata, india. *International Research Journal of Social Sciences*, 2(3):25–30.
- Dobson, A. (1990). *An Introduction to Generalized Linear Models*. Chapman and Hall.
- Esabella, J. M. (2012). use of contraceptives methods among women in stable marital relations attending health facilities in kahama district, shinyanga region, tanzania. *Muhimbili University of Health and Allied Sciences*.
- GDHS (2003). Ghana demographic health and survey. Technical report, Ghana Statistical Service, Ghana Health Service.
- GDHS (2008). Ghana demographic and health survey. Technical report, Ghana Statistical Service, Ghana Health Service.

- Ghazaleh, S. and Speizer, I. S. (2010). Adolescent sexual behavior and reproductive outcomes in central america: Trends over the past two decades. *Int Perspect Sex Reprod Health*, 36(1):26–35.
- Gizaw, A. and N, R. (2011). Family planning service utilization in mojo town, ethiopia: a population based study. *Journal of Geography and Regional Planning*, 4:6.
- Goettsch, S. (1989). Clarifying concepts: Conceptualizing sexuality. *Journal of Sex Research*, 26:249–255.
- Hamill, D., AO, T., and S, T. (1990). Determinants of contraceptive switching behavior in rural sri lanka. *Demography*: 559-578., 27:4.
- Hunt, P. and Bueno de Mesquita, J. (2010). The rights to sexual and reproductive health. Technical report, University of Essex: Essex.
- (ICPD) (1994). Reproductive rights and reproductive health. In *United Nations Population Information Network (POPIN) Gopher of the Population Division, Department for Economic and Social Information and Policy Analysis*.
- Jimmy-Gama, D. B. (2009). *An assessment of the capacity of facility- based youth friendly reproductive health Services to promote sexual and reproductive health among unmarried adolescents:.* PhD thesis, Queen Margaret University.
- Katharine, D. M. (2012). Planned parenthood federation of america.
- Kessy, T. and Rwabudongo, N. (2006). Utilization of modern family planning methods among women of reproductive age in a rural setting: the case of shinyanga rural district, tanzania. *East African Journal of Public Health*.
- Khan, M. H. R. and H, J. E. (2000). Family planning perspectives. 32:3.
- Khatiwada, N., Silwal, P. R., Bhadra, D. R., and Tamang, T. M. (2013). Sexual and the reproductive health of adolescents and youth in nepal: Trends and determinants: Further analysis of the 2011 nepal demographic and health survey.

- Technical report, Population Division, Ministry of Health and population and GIZ/GFA Consulting Group, GmbH and Jhpiego, Nepal and United Nation Population Fund.
- Macmillan (2006). *Macmillan English Dictionary for Advanced Learners (International Student Edition)*. Macmillan Education.
- Manning, D. W., Longmore, M. A., and Giordano, P. C. (2000). The relationship context of contraceptive use at first intercourse. *Family Planning Perspectives*, 32:3.
- Munthali, A. C., Chimbiri, A., and Zulu, E. (2004). Adolescent sexual and reproductive health in malawi: A synthesis of research evidence. Technical report.
- Nabila, J. S. and Fayorsey, C. (1996). Adolescent fertility and reproductive behaviour in ghana. *University of Ghana*.
- Nahar, Q. and Min, H. (2008). Trends and determinants of adolescent childbearing in bangladesh. Technical report, USAID.
- Nicole, S. and Roger, I. (2012). Perspectives on sexual and reproductive health. 34(4):191–197.
- Nundwe, C. S. (2012). Barriers to communication between parents and adolescents concerning sexual and reproductive health issues: a case study of kinondoni municipality, tanzania. Master's thesis, Muhimbili University of Health and Allied Sciences.
- OMOTOSO, O. (2007). Adolescents transition: The challenges and the way out (african perspective).
- O'Rourke., K. (2008). Time for a national sexual and reproductive health strategy for australia. Technical report, Public Health Association of Australia: Canberra.

- Quinn, K. and Ejlaq, J. (2008). Women's sexual and reproductive health: A literature review. *Women's Health Victoria*.
- SIECUS (2013). Jump up "sexual information and education council of the united states (siecus)".
- Stokes, M. E., Davis, C. S., and Koch, G. G. (2003). *Categorical Data Analysis Using The SAS system, Second Edition*. SAS Institute Inc., SAS Campus Drive, Cary, North Carolina 27513 and John Wiley & Sons, Inc. ISBN 0-471-22424-3.
- Suellentrop, K. and Flanigan, C. (2006). Pregnancy among sexually experienced teens. In *Washington, DC: The National Campaign to Prevent Teen and Unplanned Pregnancy*.
- TAWIAH, E. O. (1997). Factors affecting contraceptive use in ghana.
- UNESCO (2000). Adolescence: Reproductive health. Technical report, New York UNESCO.
- UNFPA (2003). Sexual and reproductive health.
- WHO (1948). Who definition of health. 2:100.
- WHO (1986). Social determinants of sexual and reproductive health.
- WHO (2006). Sexual and reproductive health.
- WHO (2010). Social determinants of sexual and reproductive health. Technical report, World Health Organization.
- WHO (2012a). Adolescent pregnancy. fact sheet n'364,may. <http://www.who.int/mediacentre/factsheets/fs364/en/index.html>. Technical report, World Health Organization.
- WHO (2012b). Family planning. fact sheet n'351, july. <http://www.who.int/mediacentre/factsheetsfs351/en/>. Technical report, World Health Organization.

WHO (2012c). Social determinants of sexual and reproductive health. Technical report.

Wikipedia (2014). Adolescent sexuality. Technical report, Wikimedia Foundation, Inc.

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Appendix A

5.1 Definition of Indicators of Sexual and Reproductive Health in Adolescents and Youth

The variables and indicators used in this report are defined according to MEASURE DHS standard definitions.

1. Age of Respondent: Current age in completed years is calculated from the century month code of the date of birth of the respondent. In a few cases the age in the data file will be different from that reported by the respondent when the respondent's birthday was in the month of interview, but she had not yet had her birthday. If the respondent correctly reported her age at her last birthday (and not her age at her next birthday) then the calculated age was rounded up from the reported age, to avoid inconsistencies between the age and the century month code for the birth.
2. De facto region of residence: Region in which the respondent was interviewed.
3. De facto type of place of residence: Type of place of residence where the respondent was interviewed as either urban or rural. Type of place of residence is classified into, capital, large city, small city, town and countryside as reported by the respondent.
4. Highest education level attended: This is a standardized variable providing level of education in the following categories: No education, Primary, Secondary, and Higher.
5. Highest year of education: This gives the years of education completed at the level given by the all respondent except those answering "No education".

6. Literacy: Literacy of the respondent is categorized into no card with required language, cannot read at all and able to read whole sentence.
7. Contraceptive use: Contraceptive use and intention shows current users of modern methods, current users of traditional methods, non-users who intend to use in the future and non-users not intending to use a method.
8. Type of contraceptive: Type of contraceptive method categorizes the current contraceptive method as either a modern method, a traditional method, or a folkloric method.
9. Ever use contraceptive: Whether the respondent has ever used the contraceptive method.
10. Current marital status of the respondent: This is categorized as either never married, widowed, not living together, married, living together and divorced.
11. Whether the respondent is currently, formerly or never married (or lived with a partner): Currently married includes married women and women living with a partner, and formerly married includes widowed, divorced, separated women and women who have lived with a partner but are not now living with a partner.
12. Age at first sexual intercourse: Respondents who had ever had sex were asked of their age at their first sexual intercourse. For these cases, the age at first sex is taken from the age at first union.
13. Fertility preference: This variable is created from a series of questions in the Model "A" questionnaire. Firstly, a question relating to the respondent's desire for a future birth is asked. If the respondent is sterilized then a separate series of questions are asked leading to four categories.
14. Sexually transmitted diseases: Whether the respondent has ever heard of any sexually transmitted diseases (STDs).

15. Age of the respondent at first birth: The respond were asked the age of first birth and the date of birth of the respondent first child.

5.2 Appendix B

Table 5.1: Cross-tabulation of Ever Use Contraceptive and Wealth Index

Variables	Never used Contraceptive (%)	Ever Use Contraceptive (%)	Total (%)
Wealth Index			
Middle	202(10.67)	157(8.29)	359(18.95)
Poorer	214(11.3)	140(7.39)	354(18.69)
Poorest	314(16.58)	71(3.75)	385(20.33)
Richer	244(12.88)	178(9.4)	422(22.28)
Richest	251(13.25)	123(6.49)	374(19.75)
Total	1225(64.68)	669(35.32)	1894(100)

Table 5.2: Cross-tabulation of Ever Use Contraceptive and Ethnicity

Variables	Never Use Contraceptive (%)	Ever Use Contraceptive (%)	Total (%)
Ethnicity			
Akan	482(25.46)	324(17.12)	806(42.58)
Ewe	137(7.24)	102(5.39)	239(12.63)
ga/dangme	66(3.49)	63(3.33)	129(6.81)
Gruma	81(4.28)	13(0.69)	94(4.97)
Grussi	75(3.96)	21(1.11)	96(5.07)
Guan	36(1.9)	12(0.63)	48(2.54)
Mande	9(0.48)	0(0)	9(0.48)
mole-dagbani	289(15.27)	104(5.49)	393(20.76)
Other	49(2.59)	30(1.58)	79(4.17)
Total	1224(64.66)	669(35.34)	1893(100)

Table 5.3: Cross-tabulation of Ever Use Contraceptive and Defacto Type Of Place Of Residence

Variables	Never used Contra- ceptive (%)	Ever used Contra- ceptive (%)	Total (%)
Defacto Type Of Place Of Residence			
Rural	700(36.96)	331(17.48)	1031(54.44)
Urban	525(27.72)	338(17.85)	863(45.56)
Total	1225(64.68)	669(35.32)	1894(100)

5.3 Abbreviation and Acronyms

AIDS	Acquired Immune Deficiency Syndrome
GDHS	Ghana Demographic and Health Survey
STI	Sexually Transmitted Infection
WHO	World Health Organization
SIECUS	Sexuality Information and Education Council of the United State
ICPD	International Conference on Population and Development
FWCW	Fourth World Conference on Women
USAID	United States Agency for International Development
UNESCO	United Nations Educational, Scientific and Cultural Organization.
DTPR	Defacto Type of Place of Residence
S.STD	Heard about other STDs
E.L	Educational Level
C.K	Contraceptive Knowledge
FP	Fertility Prevalence
RSA	Recent Sexual Activity
WI	Wealth Index