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The Factors Influencing the Sexual Practices
Of Adolescents in Three African Nations

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The Factors Influencing the Sexual Practices Of Adolescents in Three African Nations

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Presently, 3,280,000 youth in sub-Saharan Africa between the ages of 15-24 are living with HIV (UNAIDS, 2008a). Ghana, Malawi, and Uganda are three sub-Saharan African nations that have started examining the sexual practices of adolescents via population-based studies. These three nations are similar in that each falls into the last quartile on the Human Development Index (HDI) signifying the lowest levels of human development in the world.

The study explores how knowledge and persuasion dimensions influence choices in condom use or sexual abstinence among adolescents from Ghana, Malawi, and Uganda. Further, the study examines whether differences exist in adoption of condoms between nations. In testing the three hypotheses of this study on adoption of condom use and sexual abstinence by adolescents, binary logistic regression and analysis of covariance were utilized. Scale development and instrument reliability were examined through Cronbach alphas and item deletion. The first binary logistic regression model demonstrated that when controlling for background variables, family planning, condom knowledge and efficacy, and media intervention on family planning and HIV prevention increased the likelihood of condom use. In the second binary logistic regression model, family planning, AIDS knowledge, and pressure from family to remain sexually abstinent were statistically significant in the odds on

sexual abstinence when controlling for background variables. The testing of the third hypothesis showed that Uganda had a higher mean for condom utilization compared to Ghana and Malawi but only the mean difference between Uganda and Ghana was statistically significant.

Implications for macro, mezzo, and micro-level social work practice are discussed. Additional attention was given to macro-level social work practice due to international social development modeling which is most appropriately practiced at the macro-level involving both social policy and community practice. There are four main areas of social policy that the findings from this study can influence: AIDS, family, education, and labor. Implications for community practice in addressing HIV prevention and intervention among adolescents involve community development and community organizing. Implications for social work groupwork were explored as much community organization involves mezzo-level social work practice through the use of small groups.

This dissertation by Dorlisa J. Minnick fulfills the dissertation requirement for the doctoral degree in social work as approved by Frederick L. Ahearn, D.S.W., as Director, and Sr. Ann Patrick Conrad, Ph.D., and Karlynn BrintzenhofeSzoc, Ph.D. as Readers.

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CHAPTER I: INTRODUCTION

The Human Immunodeficiency Virus (HIV) is a retrovirus that is transmitted through body fluids that can lead to Acquired Immune Deficiency Syndrome (AIDS). When the AIDS was first recognized in the early 1980's the disease was seen as a death sentence. And while there is still no cure for HIV disease and AIDS is still life threatening, the number of deaths from AIDS has fallen dramatically with the invention of pharmaceutical treatment. But even with a reduction in deaths caused by AIDS, HIV disease is costly to society in terms of the burden placed on individuals, families, schools, social service organizations, communities and nations. Therefore, HIV prevention remains the core focus in ameliorating the AIDS phenomena.

PROBLEM STATEMENT

In 2000, world leaders adopted the Millennium Development Goals (MDG). The target date for the eight identified goals is 2015. One of the eight Millennium Development Goals is to reverse the spread of HIV/AIDS (United Nations, 2008). Presently, 22 million individuals in sub-Saharan Africa live with HIV/AIDS, that is two-thirds of the world's total HIV/AIDS population (UNAIDS, 2008b). Of this number, 3,280,000 youth in sub-Saharan Africa between the ages of 15-24 are living with HIV (UNAIDS, 2008a). In order to reverse the spread of HIV/AIDS, addressing the needs of youth is essential.

Recently, attention in Africa has turned to addressing HIV prevention among the young. Family planning and HIV education has been primarily targeted to youth through schools and media. There have been a number of qualitative and quantitative studies examining perceptions of adolescents on HIV risk and ways to reduce risk (Bohmer&

Kirumira, 2000; Kiapi-Iwa & Hart, 2004; Kinsman, Nyanzi, & Pool, 2000; Mirembe & Davies, 2001; Nyanzi, Pool, & Kinsman, 2001); however, all of these studies have been conducted on small samples, usually limited to a specific geographic community.

Ghana, Malawi, and Uganda are three sub-Saharan African nations that have started examining the sexual practices of adolescents via population-based studies. The current HIV/AIDS situations in these three African nations are different. According to the Joint United Nations Programme on HIV/AIDS and the World Health Organization (UNAIDS/WHO) Working Group on Global HIV/AIDS and Sexually Transmitted Infections (STI) Surveillance (2008a, b & c), between 2001 and 2007 Ghana and Malawi have seen an increase in number of children living with HIV, whereas, during the same time period, Uganda has seen a decrease. Gender is an important factor in the HIV/AIDS epidemic in Africa in that females are at greater risk for infection. The prevalence rate in Ghana during 2007 for 15-24 year old boys and girls, respectively, was 0.4% and 1.3%; in Malawi, the rate was 2.4% versus 8.4%; and, in Uganda, the rate was 1.3% and 3.9% (UNAIDS/WHO, 2008 a, b, & c). Yet, in spite of differences in the AIDS pandemic in each country, these three nations share similarity in that each falls into the last quartile on the Human Development Index (HDI) signifying the lowest levels of human development in the world. Life expectancy, education, and standard of living are the three dimensions comprising the HDI developed by the United Nations Development Programme (UNDP) and is a standard international measurement on human development. For example, the life expectancy in these three nations are: 60 years in Ghana; 48 years in Malawi; and, 51 years in Uganda (World Bank, 2008a, b & c). In 2008, the ranking of each of these nations based on their calculated

HDI out of 177 nations providing data are Ghana (135th), Uganda (154th), and Malawi (164th).

Ghana

Ghana is a country in West Africa located just north of the Equator bordering the Gulf of Guinea to the south, Burkina Faso to the north, Côte d'Ivoire to the West and Togo to the East. The country is a combined size of Illinois and Indiana and has 23 million inhabitants. In 1957, Ghana was the first African nation to win its independence from British colonization and today operates as a democratic government. The majority of Ghanaians are Christian (69%) with Muslims comprising about 16%, and traditional and indigenous beliefs accounting for 9% of the population. English is the official language of Ghana with over 50 ethnic languages and dialects (U.S. Dept. of State, 2008a).

Primary and junior secondary school education is mandatory. Senior secondary education is optional. Compulsory education is tuition free and entrance into one of five public universities is by examination. As of 2006, the adult literacy rate was 63% (UNAIDS/WHO Working Group on Global HIV/AIDS and STI, 2009a).

The Gross Domestic Product (GDP) for Ghana was \$15.25 billion in 2007 (World Bank, 2008a). Agriculture accounts for approximately one-third of the GDP and accounts for about 55% of employment opportunities. Another 25% of GDP results from their industrial base of manufacturing, industry, construction and electricity (U.S. Dept. of State, 2008a). There does not appear to be consistency in Ghana's efforts toward reaching the MDG's. For example, the U.S. State Department's website reports Ghana will achieve halving extreme poverty (MDG 1) by 2008, yet the MDG Monitor (2010) reports that insufficient information

exist to determine Ghana's ability to eradicate extreme poverty and hunger by 2015. Over 1 billion dollars in official aid was given to Ghana in 2007 (World Bank, 2008).

Malawi

The nation of Malawi declared its independence from British rule in 1964. It is a multi-party democracy today and located in the southeastern portion of the continent. With over 13 million persons living within its borders, Malawi is the size of Pennsylvania with a lake the size of Vermont. The shape of the country is long and narrow with a subtropical climate. Mozambique wraps around the southern portion of Malawi to the east and west with Zambia bordering the north western part of the nation and Tanzania to its east. It is a landlocked nation.

There is no compulsory education in Malawi (U.S. Dept. of State, 2008b) resulting in a 55% completion rate of primary school (World Bank, 2008b). In terms of education, World Bank (2008b) reports that there is equal ratio of girls to boys in primary and secondary education. Moreover, the MDG Monitor (2010b) reports that it is possible for Malawi to achieve universal primary education and promote gender equality if some changes are made. However, it also notes that Malawi is off target in meeting the MDG of improving maternal health and eradicating extreme poverty and hunger by 2015.

Malawi received 669 million dollars in official development assistance (World Bank, 2008b). Much of the assistance is for income generating programs as well as to promote humanitarian efforts. For a decade from the mid-1980's to the mid-1990's, Malawi took in over one million refugees from Mozambique. Then, in 1996 as the Mozambican refugee crisis came to an end, Malawi took in refugees from Rwanda and the Congo. The nation

generated a GDP of \$3.55 billion. Agriculture comprises 34% of its GDP with industry contributing an additional 20% (World Bank, 2008b). Tobacco, sugar, cotton, and tea are items cultivated and exported.

Uganda

About the size of the state of Oregon, Uganda is located in the eastern part of the African continent, and like Malawi is a landlocked nation. With the Equator running through the southern part of the nation, Uganda is located to the west of Kenya and the east of the Democratic Republic of Congo. Sudan borders the north with Rwanda and Tanzania defining Uganda's southern borders. Tanzania is a large nation, so even though Malawi and Uganda both share borders with Tanzania, the two nations are approximately 600 miles apart.

Winning its independence from Britain in 1962, the government today in Uganda operates as a republic and holds elections every five years. Yet, the Lord's Resistance Army (LRA), a group that seeks to overthrow the government, operates in the northern part of the country and has internally displaced millions of Ugandans. In recent years, the Ugandan government has taken a more aggressive stance to stop the LRA. Attempts at brokering peace agreements between the government and LRA are on-going (U.S. Dept. of State, 2008c).

Uganda exports almost all of its agriculture crops. Coffee accounts for about 19% of all exports with fishing following a close second at 16%. While most employment is related to agriculture, there has been an increased effort to expand production of construction. The 2007 GDP of Uganda was \$11.2 billion and the official development assistance received in 2006 was approximately 1 ½ billion dollars (World Bank, 2008).

With a population of nearly 31 million, Uganda boasts a rate of 89% for primary school enrollment. The literacy rate is 70% (World Bank, 2008c), and the MDG Monitor (2010) reports that Uganda is very likely to achieve the Millennium Development Goals of universal primary education, promoting gender equality, and eradicating extreme poverty and hunger. Despite the encouraging standing on these MDG's, Uganda is rated as being off track in improving maternal health and reducing child mortality.

SIGNIFICANCE TO SOCIAL WORK

Social justice is the central tenant of social work that makes it stand out from other human service professions. The promotion of social justice is the promotion of social change. In the international context of social work, the Universal Declaration of Human Rights is the umbrella under which social workers advocate for social change. The Universal Declaration of Human Rights was passed by the United Nations on December, 10, 1948. One of the most relevant articles pertaining to the social phenomena of HIV disease is the right to an adequate standard of living:

Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control. (United Nations, 1948)

While children are considered to be included under the Declaration of Human Rights, children also have their own human rights document titled, the Convention on the Rights of the Child. This document was created to recognize that children are particularly vulnerable

and need special attention. Survival and development is one of the core principles of the document and sets standards in health care and social services for children (UNICEF, 1989). All nations, but Somalia and the United States of America at the moment, have ratified the Convention on the Rights of the Child. Therefore, the human rights and child's rights approaches to addressing HIV prevention in adolescents in Ghana, Malawi, and Uganda are applicable. For example, in addition to reversing the spread of HIV/AIDS by 2015, universal primary education, improving maternal health, and decreasing child mortality rates are three additional Millennium Development Goals that benefit children.

A human rights based approach to HIV/AIDS aligns with social work practice. According to the definition of social work by the International Federation of Social Workers (IFSW), social work is grounded in the values of dignity and respect, social inclusion, and empowerment. In short, these values are consistent with a strength-based approach to social work, and these same values are also grounded in a rights-based approach to practice. Social work enhances the well-being of the client system through problem solving and empowerment (IFSW, 2010). As such, it is appropriate that social work be one of the professions addressing HIV/AIDS in the youth population. Therefore, adolescents infected and affected by HIV disease are seen as stakeholders in the AIDS pandemic and can be engaged in the problem-solving process which can be empowering for youth who are most often marginalized in society. In order to do so, it is imperative that social workers seek understanding into adolescent AIDS knowledge and behaviors they adopt to stay safe from HIV infection.

RESEARCH QUESTIONS AND HYPOTHESES

Social work is a profession focused on increasing social functioning and protecting vulnerable populations. The social work profession empowers vulnerable populations by increasing protective factors to buffer the client system from environmental risks so that the individual can make decisions that concern one's own life. In order to build protective factors against HIV exposure, social workers must ask two questions: 1) How are adolescent sexual practices (abstinence vs. sexual activity) influenced by knowledge and communication channels (media and interpersonal communication networks)? 2) To what extent do interpersonal communication networks, through the persuasion of family and peers, influence adolescent sexual practices? Interpersonal communication networks and media are powerful influences in the lives and behaviors of adolescents. Thus, these questions are important to social work in its efforts to reduce the transmission of HIV among youth through the development and implementation of population appropriate interventions; thereby, supporting the Millennium Development Goal on HIV/AIDS.

The purpose of the study was to examine how knowledge on family planning, AIDS, condom procedures and efficacy, and communication channels of media and interpersonal communication networks (family and friends) influence choices in sexual activity among adolescents from Ghana, Malawi, and Uganda. Additionally, the study examines how the characteristics of adolescents may influence their decision-making process. Finally, the study questioned whether differences exist between the nations of Ghana, Malawi, and Uganda in adoption of condoms. The three hypotheses for this investigation were:

- **H₁:** Controlling for background variables, reporting greater levels of knowledge in family planning, AIDS, condom efficacy and more media exposure to family planning and AIDS messages, and greater communication with family and non-family members about sex-related matters, the greater the odds for adolescents in having ‘ever used’ condoms;
- **H₂:** Controlling for background variables, greater levels of knowledge in family planning, AIDS, and more media exposure to family planning and AIDS messages, and more persuasion from family to not engage in sex, the greater the odds for adolescents to engage in sexual abstinence;
- **H₃:** Controlling for background variables except nation in which survey was taken, Uganda will report more condom utilization than Ghana and Malawi.

OVERVIEW OF CHAPTERS

The current chapter has provided an overview of the investigation. In particular, it has provided a context in which the study took place. Therefore, the AIDS pandemic in Africa was identified and particular emphasis on its impact on youth was given. The contextual background of Ghana, Malawi, and Uganda were explored so that the reader gains basic understanding of each nation. Then, the human rights framework is explored within the practice of social work in understanding the significance of the AIDS pandemic and social work’s response to it. From the significance of the investigation on social work, the chapter moves into outlining the research question and its three accompanying hypotheses. The chapter concludes by providing an overview of each chapter in this study.

The second chapter, then, outlines relevant literature to condom use and sexual abstinence as two methods to safer sex practices among African adolescents in reducing HIV/AIDS. To begin, the theoretical framework of diffusion of innovations is introduced. Diffusion of innovations, a theory examining the process of innovation adoption, is important to guiding the choice of variables for this research study. The two innovations under study are condom use and sexual abstinence among adolescents in Ghana, Malawi, and Uganda because these two methods are known to reduce HIV/AIDS infection rates. After describing the theoretical framework and its relevancy to the research study, the predictor variables and the criterion variable (condom use) are discussed thoroughly. Then, the chapter concludes with a review of the literature of the predictor variables by the second criterion variable, sexual abstinence. All literature related to the criterion variables are of populations exclusively from Africa. In other words, all literature reviewed pertains to HIV/AIDS in Africa.

Following the literature review, the third chapter describes the research methodology utilized in the investigation. The study population of youth from Ghana, Malawi, and Uganda along with the recruitment and selection of adolescents are discussed. Protection of human subjects and rationale for exemption status are provided. Risk to human subjects was minimized through the use of secondary data that has been stripped of all potentially identifying information. Conceptualization and operationalization of criterion, predictor, and control variables are thoroughly described. The two criterion variables are condom use and sexual abstinence with the main predictors being constructs to measure knowledge and implementation dimensions of the diffusion of innovations theory explored in the literature

review. Additionally, background variables that are identified as important variables to control for during data analysis are discussed. The plan for data analysis describes the statistical techniques utilized to test the identified hypotheses. Descriptive and inferential statistical procedures utilized to examine the hypotheses are outlined. The next chapter, Data Analysis, picks up where chapter three ends.

Chapter four, the data analysis chapter, reports the statistical analysis of data, specifically, the following findings are included: 1) demographic characteristics of the sample; 2) zero-order correlations; 3) reliability of additive scales; 4) binary logistic regression on condom use in testing H_1 , 5) binary logistic regression on sexual abstinence in testing H_2 , and 6) analysis of covariance (ANCOVA) on condom use by Ghana, Malawi, and Uganda in testing H_3 . Binary logistic regression and ANCOVA were utilized in testing multivariate hypotheses.

After the data analysis chapter, the investigation concludes with a summary chapter (Chapter 5) in which interpretation of the data and its implications for social work policy and practice are discussed. The interpretations of the findings are explored in terms of whether the three hypotheses were supported. Then, implications for macro, mezzo, and micro-level social work practice are discussed. More attention is given to macro-level social work practice due to international social development modeling which is most appropriately practiced at the macro-level involving both social policy and community practice. Four main areas of social policy are identified. The chapter then moves to discuss implications for community practice in addressing HIV prevention and intervention among adolescents, specifically, community development and community organizing. Of course, much

community organization involves mezzo-level social work practice through groupwork.

Thus, implications for groupwork in social work are explored. Before concluding the chapter, the author explores the strengths and limitations of the investigation.

CHAPTER II: LITERATURE REVIEW

This chapter outlines literature relevant to condom use and sexual abstinence as two methods to safer sex practices among African adolescents in reducing HIV/AIDS. To begin, the theoretical framework of diffusion of innovations is introduced. Diffusion of innovations, a theory examining the process of innovation adoption, is important to guiding the choice of variables for this research study. The two innovations under study are condom use and sexual abstinence among adolescents in Ghana, Malawi, and Uganda because these are two methods known to reduce HIV/AIDS infection rates. After describing the theoretical framework and its relevancy to the research study, the predictor or independent variables and the criterion variable (condom use) are discussed thoroughly. Then, the chapter concludes with a review of the literature of the predictor variables by the second criterion variable, sexual abstinence. All literature related to the criterion variables are of populations exclusively from Africa.

Theoretical Framework

Diffusion of innovations theory was developed in the 1940's by rural sociologists studying the adoption of hybrid corn seed by farmers (Ryan & Gross, 1943). Ryan and Gross were interested in discovering sociological factors contributing to farmers adoption of new technology, hybrid corn seed, which was cheaper and increased crop productivity. Yet, farmers were reluctant to convert to planting hybrid corn seed because it differed significantly from their current practice of cultivating their own seed from year to year to purchasing seed every year from a vendor (Rogers, 2004). Then, in 1957, Everett Rogers popularized the theory through his doctoral dissertation on adoption of agricultural

technologies in Iowa. Thus, he took the seminal work of Ryan and Gross (1943) and continued to build the diffusion of innovation theoretical model. Since that time, *Diffusion of Innovations* has been revised five times (1962, 1971, 1983, 1995, & 2003) and its theory applied to a wide variety of fields of study. As of 2002, over 5000 research studies had been completed utilizing the diffusion of innovations framework (Rogers, 2004) in fields from hybrid corn seed to oral rehydration therapy to artificial contraceptive use to cellular telephones to human immunodeficiency virus (HIV) prevention techniques (Rogers, 2003).

In a historical review of diffusion of innovations theory on its 40th anniversary, Rogers (2004) describes application of diffusion of innovations in dissertations from nursing, marketing, management, communications, public health, social policy, etc. (2004). In his words, Rogers (2004) claims that “It seems today, scholarly research on the Diffusion of Innovations knows almost no boundaries” (p. 18). In short, diffusion of innovations appears to be generalizable with its many research studies across disciplines and across cultures. Moreover, diffusion of innovations is an appropriate theoretical framework for the current innovations under study, the sexual practices of sexual abstinence and condom use among adolescents in reducing risk for HIV infection.

Rogers (2003) defines diffusion as “the process in which an innovation is communicated through certain channels over time among the members of a social system” (p. 5). Diffusion of innovations is a multifaceted theory with four main focal points: 1) innovation, 2) communication channels, 3) time, and 4) social system. Innovation can be described as a product or practice adopted for use. Communication channels are the methods

used to spread information (i.e. radio, television, radio, print media, etc.) pertaining to the innovation to individuals. Time is the component that is most open to criticism due to the fact that, by virtue of the definition, time is deemed a process, yet most often, research on diffusion theory utilizes cross-sectional research designs meaning that datum are collected at one point in time. Moreover, it requires that respondents recall the point in time when an innovation was adopted. Individuals may or may not recall behavior correctly. Thus, most research designs testing diffusion of innovations theory contain threat to internal validity of history (Stanley & Campbell, 1964). Social systems are boundaries or social structures that facilitate or thwart the diffusion process.

Innovation.

There are two important aspects to the innovation concept. First, adoption of the innovation is most frequently discussed in terms of early adopters versus late adopters. Ryan and Gross (1943) found the rate of innovation adoption results in an 'S curve' in which the innovation is slow to get off of the ground but when it reaches a critical mass of 10-20%, a fast incline (rate of adoption) results until stabilization occurs or a slowing of innovation adoption. The steepness of the curve depends on the quickness of adoption.

Additionally, the second important point to consider is the perceived attributes of innovations. The perceived attributes of innovations are critical to adoption of an innovation and explain the difference in adoption rates among various innovations (Rogers, 2003). Relative advantage, compatibility, complexity, trialability, and observability are the five characteristics accounting for differences in rates of innovation adoption. In innovation

adoption, relative advantage occurs when the new idea, product, or practice is perceived to be better than the one already existing. Compatibility refers to the similarity between the innovation and the values and societal norms embraced by potential adopters. The perceived complexity of a new innovation is the third factor influencing adoption. Adopters tend to experiment with an innovation on a limited basis before committing to permanent innovation adoption and prefer innovations that permit this type of consumer behavior. This concept is referred to as trialability. The final factor important to adoption of an innovation is observability, which refers to the visibility of an innovation. These five factors are important to higher rates of innovation adoption (Rogers, 2003).

Communication channels.

In reviewing the chief components of the diffusion of innovations definition, communication channels are important to consider. Communication channels are the means for passing along information. Mass media channels provide the opportunity for information to be spread to many individuals quickly and efficiently and refer to television, newspapers, radio, and so forth. Mass communication channels are most influential in creating awareness-knowledge, whereas, interpersonal channels are more effective in persuading individuals to adopt an innovation (Rogers, 2003). Thus, the different kinds of communication channels play an important role in the diffusion of innovations process. Interpersonal communication is the most important factor within this component as the general masses rely on subjective evaluation of the innovation from individuals similar to themselves versus scientific evidence (Rogers, 2003).

Thus, the concept of homophily is an integral component to examining interpersonal communication's role in innovation adoption. Homophily refers to the degree of similarity between two individuals. On the other hand, heterophily indicates differences between two individuals. Despite the fact that homophily is an important indicator to an individual adopting an innovation, the change agent, often labeled the opinion leader, must be different from the individual in terms of understanding and embracing the innovation. Otherwise, diffusion cannot happen as exchange of new information does not occur. Therefore, the two individuals should be similar on all other variables except in innovation competency. The receiver and messenger need to be homophilous signifying higher degrees of similarity between the interactions of the two individuals because transfer of ideas occurs more readily among similarly situated individuals (Rogers, 2003).

To understand the complexity of heterophily and homophily in interpersonal relationships within diffusion theory, specifically among communication channels, one must understand that interpersonal relationships are a social process in which modeling and imitation occur in shaping relationships and behavior. Thus, components of Bandura's theory on social learning are relevant to diffusion of innovations, which leads to the claim that near peers are influential in the decision-making process of whether to adopt an innovation (Rogers, 2003).

Specifically, near peers is an important communication channel in the diffusion process while opinion leaders are important to the context of the social system. Opinion leaders possess sufficient social status to buffer the potential status loss if a new innovation is

not received well, yet their behavior is also most likely to be replicated by others, and thus the adoption of the innovation. For example, prior to Margaret Sanger's visit to India in 1950, India opposed population control policies for its country. Yet with the visit of this change agent, India opened its doors to promoting fertility control policies, whereby, supporting Western neo-Malthusian policies in an effort to control its population (Murphy, 2004). The term neo-Malthusian refers to the contemporary relevance of the relationship between population growth and sustainable resources (Simon, 2006).

Time.

Time is the third critical building block in the theoretical framework of diffusion of innovations and it contains three dimensions: 1) innovation-decision process; 2) innovativeness of individual; and 3) rate of adoption. Similar to the social systems component, time is open to critique because most often it requires research subjects to recall past experiences, and therefore, time is subjected to criticism as the passage of time is a threat to internal validity (Stanley & Campbell, 1969).

The innovation-decision process is conceptualized as the time it takes to move from knowledge on the innovation to arriving at a conclusion on whether to adopt the innovation. In social work terms, the process can be described as moving from thinking to practice or from theory to practice. Rogers (2003) conceptualizes the time-ordered sequence process as 1) knowledge, 2) persuasion, 3) decision, 4) implementation, and 5) confirmation. Elements of this process are being tested in the current study.

The process of knowledge attainment occurs when an individual discovers that an innovation exists and an understanding of how the innovation functions. Knowledge can effectively be gained through mass media channels. Persuasion is the stage in which the unit of analysis forms a favorable or unfavorable opinion toward the innovation. During the persuasion stage, interpersonal communication networks become particularly important and remain so throughout the decision stage. Individuals seek subjective input from peers and close interpersonal networks in determining whether the innovation is right for their own particular situation. Therefore, mass media campaigns are not useful during these stages due to the fact that information conveyed via mass media tends to be generalized. The implementation stage is characterized by individuals participating in activities associated with either accepting or rejecting the innovation. Thus, the chief difference between the persuasion and decision stage is the movement from 'thinking about' to 'engaging with' the innovation. Putting the innovation to use occurs in the implementation phase of the innovation-decision process. Finally, the confirmation stage requires behavior reinforcement to continue or discontinue use of the innovation.

Social system.

The social system in which the innovation is introduced is a powerful force in whether the innovation is adopted. The social system provides the context or backdrop through which all decision-making occurs. Social systems are comprised of any number of units of analysis (individuals, families, groups, organizations, communities, etc.) situated within an environment and maintained by boundaries. Innovations are diffused by change

agents within a social system is a function of the system's boundaries. Boundaries are created by social norms and values generating a structure within which the social system operates. Social structures and boundaries of a social system are difficult to measure, and therefore, most research utilizing diffusion of innovations framework does so at the individual unit of analysis. Thus characteristics of individuals and the impact of the individual on innovation adoption are measured.

Yet in social systems in which collectivism is valued over individualism, analyzing the individual unit is often critiqued. Additional questions arise, too, like how does the role of sexism impact the individual unit of analysis. Yet, a number of studies on collectivist-structured communities demonstrate applicability of diffusion of innovations because, while individualistically focused, the theory incorporates collective concepts through influence on social learning (Rogers, 2003). Moreover, Rogers (2000) discusses diffusions of innovations being applicable across cultures whether the orientation is one of individualism or collectivism.

Applicability.

Diffusion of innovations has been a framework utilized with both micro and macro applications. For example, Berry Stokes and Stokes (Sabatier, 1999) examined lottery adoption by states. The unit of analysis was at the state level and it was found that states bordering states with lotteries already in place were more likely to adopt lottery in their own state. In examining population control policies by nations, many developing countries

rebuked population control policies because the leadership was coming from the West versus countries similar to those considering adoption (Murphy, 2004). In diffusion of innovations terms, heterophily was too great for these countries to replicate policy promotion of the West. Thus, these countries found ways to delay or reject policy adoption that did not offend the West who provided international donor monies while not ostracizing their own culture. Much of the family planning policies promoted by the West were not culturally sensitive (Luke & Watkins, 2002).

Diffusion of innovations also has application to organizational level analysis. Greenhalgh, Robert, MacFarlane, Bate, and Kyriakidou (2004) conducted a systematic review of the diffusion of innovations literature on sustaining innovations in health service delivery and organization. Additionally, the Institute of Medicine on Substance Abuse and Healthcare found that it takes 20 years to integrate science into practice at an organization level (Brekke, Ell, & Palinkas, 2007). In social work literature, diffusion of innovations theory has been utilized in evaluating practice at the program level (Ager, 2005; Herie & Martin, 2002).

In their seminal work, Ryan and Gross (1943) found that the rate of adoption was 13 years for almost all farmers to convert from traditional corn seed to planting hybrid corn seed. Specifically, they serendipitously found that rate of adoption follows an 'S-shape' curve. The S-shape curve differs depending on the innovation being diffused.

Condom Use

Condom use is known to reduce transmission of HIV and, therefore, one of the two innovations being reviewed here. Specifically, exploration of potential factors known to influence condom use is examined.

Knowledge dimension.

Family planning.

Family planning is a compilation of methods available to control the number of children born. Family planning policy is important to nations to increase their development status because, historically, population control and development coincide. Of course, at a micro level, family planning has to do with both knowledge and behavior.

Accurate reproductive health knowledge is important to reducing unwanted pregnancies. Yet in a purposive sample of 704 single youth in three Ghanaian towns, only 17% were able to correctly identify when during the female menstrual cycle that pregnancy can occur (Glover, et al., 2003). Additionally, one-third of the sample did not know that pregnancy is possible at first heterosexual intercourse. Similar results were found by Hulton, Cullen, and Wamala Khalokho (2000) in 12 single-sex focus groups of 17-18 year old Ugandan adolescents on sexual behavior. Despite all groups indicating knowledge that there were particular days during the female menstrual cycle that are deemed 'safe' from pregnancy, the results unequivocally demonstrated that there was inaccuracy in knowledge of when these days occur during the menstrual cycle (Hulton, Cullen, & Wamala Khalokho,

2000). In short, correct knowledge on reproductive health is the first step in controlling the number of pregnancies, and hence, children born.

In a study examining sexual behavior change among adults in Uganda, Pool, Kamali, and Whitworth (2006) found that only 14% ($N = 94$) reported consistent condom use and among those, the most common reason for condom use was attributed to family planning, not HIV prevention. Cleland & Ali (2006), in addition, analyzed representatively sampled surveys of single females between the ages of 15-49 by nation and found that approximately 59% ($N = 132,800$ for 18 countries) reported using condom at most recent sex in an effort to prevent pregnancy. However, when examining adolescent attitudes and behavior in terms of condom use and family planning, both male and female groups failed to discuss condoms in direct relation to family planning methods (Hulton, Cullen, & Wamala Khalokho, 2000). Instead, family planning methods preferred among adolescents were the use of 'safe days' and abstinence. The concern among Non-Governmental Organizations (NGO's) is that reported behavior of adolescents does not show adolescents consistently practicing sexual abstinence during a female's unsafe days. Moreover, adolescents have shown little interest in inquiring and learning how to calculate the female menstrual cycle (Hulton, Cullen, & Wamala Khalokho, 2000). Thus, NGO's tend to promote condom use for family planning in addition to HIV prevention. Yet condom use for the purpose of family planning is problematic in HIV prevention among adolescents because when a lack of commitment toward pregnancy prevention evolves or a decision to have children is reached, risky sexual behavior resumes.

Moreover, young people also indicate distrust of condoms when posed for family planning methods. A number of studies (Hulton, Cullen, Wamala Khalokho, 2000; Marindo, Pearson, & Casterline, 2003; Pool, Kamali, & Whitworth, 2006) indicate that adolescents view the use of condoms by partners as an indicator of promiscuity with the connotation that the person possesses a sexually transmitted infection (STI).

AIDS knowledge.

While behavior is the crux to HIV/AIDS prevention, individuals must first be knowledgeable of accurate facts regarding HIV. In many societies, there exist a number of myths leading to individuals practicing sexual behaviors that place them at risk for HIV infection; thus it is critical to make sure that educational campaigns spread accurate knowledge.

In a study of 704 single youth in three Ghanaian towns, Glover, et al. (2003) found that most of the youth possessed accurate knowledge on AIDS transmission and STI knowledge. But despite this knowledge, approximately 12% of adults in Ghana are infected with HIV/AIDS, and Ghanaian youth are the hardest hit with 46% of all new HIV infections (National AIDS Commission, 2004). In Uganda, a multi-stage random sampling plan of mosques followed by random sampling of heads of households were conducted to study the effects of a home visitor program in which community educators visited selected households repeatedly to educate on HIV/AIDS (Kagimu et al., 1998). Over 25% (N = 420,000) of program participants had five or more contacts with a community educator during the

program period. During the initial year of the program, condom use was not a part of the education due to religious concerns by Imams on the use of condoms. Therefore, the study was not able to report rate change in condom use, but HIV/AIDS knowledge reached statistical significance in its increase from baseline to post-test. The increase in AIDS knowledge also reduced the number of sexual partners among Muslim married participants. Focus groups supported the quantitative findings as participants were able to correctly identify modes of HIV transmission and prevention.

Condom procedures.

In a purposive sampling of 704 Ghanaian youth from three social groups - in school, apprenticeship, and street involved youth – Glover, et al. (2003) found that while 99% of youth reported knowing about condoms, only 48% were able to identify at least one of four correct steps in using condoms. Condom procedures measured were open condom carefully, squeeze top, unroll over erect penis, and withdraw penis from vagina before loss of erection.

Media influence.

Media can be powerful in reaching a greater number of people than is feasible through a single program. Additionally, the use of multiple media channels can reinforce messages and reach large populations (Bessinger, Katende, & Gupta, 2004; Myhre & Flore, 2000). In a systematic review of 41 empirical evaluations from 17 countries, Myrhe and Flora (2000) reported that one-quarter of the campaigns utilized only a single channel of communication (print, radio, TV, or short films) but most campaigns utilized multiple

channels. Channel selections were dependent on budgets with lesser-developed countries more likely to use print, radio and small media as these channels are considered lower-cost media. Radio was preferred over TV in lesser-developed countries. There have been a handful of studies examining the impact of mass communication on HIV and pregnancy prevention (Myhre & Flore, 2000; Shapiro, Meekers, & Tambashe, 2000; Van Rosem & Meekers, 2000; Vaughn, Rogers, Singhal, & Swalhele, 2000). However, few articles have provided the extent of media exposure, also referred to as the exposure dose, and most media campaigns address knowledge and attitudes but not behavioral changes (Myhre & Flore, 2000).

Most mass media campaigns are directed at the general audience and messages are not population specific (Myhre & Flore, 2000). But even so, in a stratified random sampling of 76 schools in Uganda using a mixed methods research design, 89% of 886 students reported mass media (that is, TV, videos, ads, radio, billboards, etc.) as a helpful method to learning about AIDS/HIV (Jacob, Shaw, Morisky, Hite, & Nsubuga, 2007). Wolf, Tawfik, and Bond (2000) reported that 91% (N = 526) of youth sampled had heard about AIDS in the past 30 days with mass media channels accruing the highest frequency of methods. Moreover, upon further analysis of their previous work (Wolf, Tawfik, & Bond, 2000), Wolf and Bond (2002) found that peer contacts who had heard of AIDS via newspapers, pamphlets/posters, TV, radio, and peer education, within the previous 30 days were 2.43 times (95% CI: 1.28, 4.58) more likely to have protected themselves against AIDS. Additionally, HIV/AIDS knowledge score increased with obtaining HIV/AIDS information

from the radio among adolescents attending religious schools (Stoskopf, Kim, & Richter, 2000/2001).

The promotion of condoms to be socially acceptable and to prevent pregnancy and HIV infection has been the focus of many mass media campaigns in addition to the promotion of sexual abstinence and monogamy. These three facets of mass media campaigns represent the most common instruments of social policy toward HIV prevention and are commonly referred to as the ABC's (Abstinence, Be faithful, and Condom use) of AIDS policy (Parikh, 2007).

Persuasion variables.

Many factors influence sexual decision making of adolescents and, according to diffusion of innovations, interpersonal communication networks play an integral role in the decision-making process of whether to adopt a particular innovation (Rogers, 2003). Thus, in examining adolescent behavior and adoption of safer sex methods, consideration must be given to the influence of peers and family on adolescent decision-making. For adolescents who listed important individuals in their lives, followed by individuals with whom they would feel comfortable discussing sexual matters, family and friends were identified similarly (44% and 42% (N = 1176), respectively). While 41% (N = 526) of youth sampled had not talked to anyone in the past 3 months regarding family planning, but of those who did, family and friends were equally represented at 37% (N = 774) (Wolf, Tawfik, & Bond, 2000). Moreover, for the 75% (N = 526) who reported that someone had encouraged them to

avoid pregnancy, 54% identified parents, 27% friends, and 9% (N = 1007) teachers/religious leaders. Thus, this study will examine the influence of peers and family members on adolescents in whether they choose to abstain from sexual relations or adopt condoms when having sex as two methods for reducing risky sexual behavior and, ultimately, lower HIV infection risk.

Peer influence.

A number of studies have examined the influence of peers on sexual behavior (Fekadu & Kraft, 2002; Kinsman, Nyanzi, & Pool, 2000). For example, Bhana, Zimmerman, and Cupp (2008), examined sexual coercion of adolescents due to peer influence and reported that both boys (8%, n = 57) (N = 713) and girls (19%, n = 117) (N = 616) felt coerced by peers to have sex. A critique of this particular study though is in the use of the word coercion. The word was open to interpretation as influence by peers as well as to signify that sexual violence and other forms of violence was used to force an individual to engage in sex. In spite of the critique of the operationalization of the term coercion in Bhana, Zimmerman, and Cupp's (2008) research, other studies have shown that peers are important to an adolescent's decision about whether to engage in sex (Hulton, et al. 2000; Kinsman, Nyanzi, & Pool, 2000). Boys and girls report that sex begins with peer pressure and that sophistication and more credibility occurs with peers when one has sex (Babalola, Ouedraogo, & Vondrasek, 2006; Hulton, et al, 2000; Kinsman, Nyanzi, & Pool, 2000). Sexually active girls develop a mutually supportive value system which in turn, stigmatizes girls who are not participating in sexual relations (Kinsman, Nyanzi, & Pool). Thus,

considerable pressure from peers to lose virginity as early as possible exists in Africa. Both sexes report it being a good thing to have many partners. Girls also report engaging in sex to see who would be a good marriage partner (Nyanzi, Pool, & Kinsman, 2001) as there is a belief by sexually active adolescents that virgins do not have the knowledge or skills to sexually satisfy husbands when they marry. Yet peer influence was found to be more important for sexually active girls than for virgins (Kinsman, Nyanzi, & Pool). Similar findings were corroborated by Zwane, Mngadi, Nxumalo (2004) in which adolescents from Swaziland reported being influenced by peers to engage in sexual relations as reported by a girl commenting that she is sexually active in order "... to feel that somebody cares, to be in fashion because all my friends have boyfriends and I don't want to be regarded as old fashioned" (p.21).

Yet peers placed in leadership or mentoring positions for other peers can influence peers in a positive manner in making healthier decisions related to sexual activity. Peer educators are influential in changing sexual behavior among adolescents by promoting sexual abstinence and condom use to prevent HIV transmission among peer contacts when peers were similar in age, sex, ethnicity, religion, and school status (Wolf, Tawfik, & Bond, 2000). Specifically, peer contacts with peer educators' who are highly similar are 1.74 times more likely (95% CI) to have done something to protect themselves against AIDS in last 3 months (Wolf & Bond, 2002).

Adolescent social networks tend to be homophilous. Therefore, it is important that particular attention be given to recruitment efforts for targeting at-risk populations, for

example, out-of-school youth. In the study by Wolf and Bond (2002), 64% (N = 106) of peer educators were in-school youth and 64% (N = 526) of peer contacts made by all peer educators were with in-school youth. Yet Wolf, Tawfik, and Bond found an association between youth who report that their friends protect themselves from AIDS and the research subject's personal behavior in protecting self against AIDS. In other words, for youth who report protecting self against AIDS, 61% report that their friends are protecting themselves against HIV infection in contrast to only 39% of youth report friends protecting themselves against AIDS when adolescents reports not protecting self against AIDS. Thus, friends are more likely to engage in similar behavior of protecting self against AIDS. Specifically, 17% (N = 605) of peer contacts who report that they have done something in past three months to protect self from AIDS report using a condom (Wolf & Bond, 2002).

Kinsman, Nyanzi, and Pool (2000) and Wolf, Tawfik, and Bond (2000) report socializing influences attached to adolescent sex. The learning process begins with young children often playing games such as hide and seek and playing doctor providing initial opportunities for exploring sex. As the child grows, listening to others having sex, including parents, as well as watching sex by others while urinating in the field are further initiation into coming to know sexual relations. Adolescents attend funerals and weddings which provide opportunities to slip away unnoticed. Additionally, adolescent boys are socialized to prove their manhood through sex (Hulton, et al., 2000). Wolf, Tawfik, and Bond (2000) purport that it is one's social context that needs to be understood and within this social context, intervention provided. Otherwise, no one is going to change sexual behavior.

Adolescents are social beings. Social context influences, shapes and shifts deeply held beliefs and perceptions. Social norms are created through significant others influencing another person's perceptions and beliefs.

Family influence.

Parents and other family members serve as socializing agents for adolescents and sexual behavior (Kinsman, Nyanzi, & Pool, 2000). For example, families in Ghana, Malawi, and Uganda often live in small houses and share a room with children. Children hear sex and learn of it at an early age. Thus, observation can serve as modeling sexual behavior to children and adolescents. Condoms are seldom used within marriage so most adolescents are observing sex without condoms. Condoms among adults are most commonly used in extra-marital affairs so adolescents fear being caught with condoms because condom use is seen as immoral and disappointing to parents (Babalola, Ouedraogo, & Vondrasek, 2006).

In a regression analysis of normative beliefs of young adult South Africans on condom use, the influence of family accounted for 15% of the variance and was the only significant predictor (Giles, Liddell, & Bydawell, 2005). For the 75% (N = 526) of Ghanaian adolescents indicating that someone had encouraged them to avoid pregnancy in the previous three months, 54% identified parents (Wolf, Tawfik, & Bond, 2000). Yet the study did not explore methods for avoiding pregnancy. In Zimbabwe, adolescents report that most often their parents do not discuss the use of condoms, but if they do, parents attribute negative characteristics to the use of condoms by adolescents, including the view that

condoms promote promiscuity and that condoms are not safe to use (Marinda, Pearson, & Casterline, 2003).

Control variables.

Much literature on condom use examines demographic variables. Demographic variables are important to investigate in understanding innovation adoption. In this case, the innovation adoption under consideration is condom use. The demographic variables reviewed here are being explored as potential control variables in the study under investigation. Control variables are variables that mask the effect of predictor variables and their impact on the dependent variable (Fields, 2000).

Age.

Age is important to understanding risk of HIV infection. Younger children, between ages 12 and 14 years, are more likely to report good knowledge on how to protect self from HIV infection (Jacob, Shaw, Morisky, Hite & Nsubuga, 2007) yet contraceptive use, including condoms, increases with age (Glover, et al., 2003). In a random assignment school-based study examining sexual risk behavior among South African youth, 30% (N = 377) of boys reported having had sex by the age of 13 and it rose to 80% (N = 377) by the age of 16 (Bhana, Zimmerman, & Cupp, 2008). Thus, as youth age, they also are more likely to have had sex and therefore, more likely to have used condoms. Additionally, Eaton, Flisher, and Aaro (2003) report that, by the age of 16, half of all youth have experienced sex, with males having sex at an earlier age than females. Despite boys being more likely to have

had sex at an earlier age, other research reports that girls debut sexually before boys (Glover et al., 2003; Zwane, Mngadi, Nxumalo, 2004).

Gender.

Males.

The societal image of males is one of power which allow males to disempower females through public shaming, use of coercion and physical force, and privilege in relationships (Lindgren, Rankin, & Rankin, 2005). Therefore, it is not surprising that in a case study of a co-educational, elite boarding school in Uganda, Mirembe and Davis (2001) reported that power relations are perpetuated and maintained within school, which are especially dangerous to girls placing them at additional risk of HIV infection. Males perpetuated and maintained power over females through four specific methods cited within the educational system

- Boys not listening to or obeying female teachers and even other male teachers not respecting female teachers.
- Gendered discipline patterns where girls are viewed as temptresses yet socialized to assume victim roles in that discipline is for their own safety.
- Sexual harassment of females by males through males controlling the classroom and language.

- Compulsory heterosexuality in which males controlled much of the agenda where males and females are pressured to engage in early sexual relations to prove heterosexuality (Mirembe & Davis, 2001).

Power by males over females in the form of control and sexualized violence combined with greater poverty experienced by females result in structural violence that relegates females to a subordinate status (Kathewera-Banda et al., 2005). Using violence for sex was viewed as acceptable by Ghanaian boys in purposive sample of three social groups of youth: in school, apprenticeship, and unaffiliated or street involved youth. Specifically, violence was supported most by out-of-school youth compared to in-school youth. In elaborating on the use of force by out-of-school Ugandan youth, boys reported ‘dragging’ girls into the bush (Bohmer & Kirumira, 2000).

Boys, regardless of age, believe sex with younger girls is best because there is no need to sexually satisfy a young girl (Bohmer & Kirumira, 2000). Also, younger girls are believed to be free of the HIV virus.

Both girls and boys attribute negative attributes to condom use. For example, adolescents believe that condom use indicates sexual promiscuity and infidelity along with sexually transmitted infections, including the partner is HIV+ (Hulton, Cullen, & Wamala Khalokho, 2000; Marindo, Pearson, & Casterline, 2003). Thus, these beliefs challenge use and consistent use of condoms by adolescents. While South African adolescents were found to use condoms inconsistently (Eaton et al., 2003), South African males are more likely to use condoms than females (Bryan, Kagee, & Broaddus, 2006).

Females.

Females bear most of the blame for HIV infection (Esu-Williams, 2000) and pregnancy (Hulton, Cullen, & Wamala Khalokho, 2000). Women and girls have greater rates of HIV infection (Esu-Williams, 2000) due to traditional practices of marriage at an early age, early childbearing, migration, sex trafficking and prostitution, and physiological differences (Weismann, et al., 2006). To change rates of infections, it is important to recognize the context of women's lives, as stigma of HIV/AIDS is experienced differently for males and females. Gender inequities exist in terms of sexual behavior, resource access, and romantic relationships. Murphy (2004) contends that organized family planning failed to recognize gender inequity in its programs or to examine other reproductive health needs beyond contraceptives which has left women vulnerable to STD and HIV as well as coerced sterilizations.

Despite knowledge that condom use and sexual abstinence decrease the spread of HIV/AIDS, youth integrate their own methods to decreasing the odds of becoming infected with HIV through the negotiation process of sex. Boys and girls are trying to determine if the other is HIV+ through inquiry into the reputation of their potential sex partner. Additionally, girls are expected to request money and gifts from boys in exchange for sex (Bohmer & Kirumira, 2000; Hulton, Cullen, & Wamala Khalokho, 2000). The other contributing factor is the length of time the girl makes the boy wait until she grants his request for sex. Boys tend to think that the longer a girl makes a boy wait for sex, there is

less risk of HIV infection from her. Also, it is perceived that a girl is promiscuous if she does not request money or gifts in exchange for sex (Bohmer & Kirumira, 2000).

While it appears that girls control the negotiation process of sexual transactions, they do not control the initiation of sex nor the use of male condoms. Boys and girls were unanimous in their agreement that females cannot propose sex as only males possess this right (Bohmer & Kirumira, 2000). Bryan, Kagee, and Broaddus (2006) found that girls who report not having control over the sexual encounter were less likely to use condoms. Additionally, in a convenience sample of females aged 17-54 with single and multiple partners, Hart et al. (1999) confirmed earlier findings that male condom use is often a disempowering experience for women as they are in a position of weakness because they do not control the male condom. In short, the male must be willing to use the condom because it is designed to fit his anatomy.

Yet to the contrary, Cleland and Ali (2006) report that condom use (women engaging in sex in which the male wears a condom) among single women, ages 15-49, in 18 African nations rose substantially from a median of 5.3% to 18.8% (N = 132,800). In nine of the nations, the rate change was greater than 10%. Yet despite the substantial increase in reported condom use, 25% of single women reported that they did not use contraceptives.

A number of studies (Esu-Williams, 2000; Marindo, Pearson, & Casterline, 2003) report that males have a greater number of sexual partners but Glover et al. (2003) found that among youth, females tend to have a greater number of sexual partners. According to Glover et al., females tend to have a greater number of sexual partners primarily because sexual

debut of females occur at an earlier age than males and it is common practice for males to marry younger females, including female youth. In their study, girls (35%; N = 343) were more likely to report having had a sex partner within the last 30 days compared to boys (24%; N = 361) (Glover et al., 2003). In a comparative analysis from secondary data of 132,800 females, ages 15-49, from 18 African nations, Cleland & Ali (2006) report the median rate of annual condom use rose from 19.3% to 28.4%. Additionally, Marindo, Pearson, and Casterline (2003) in their qualitative analysis of 36 focus groups on urban, out-of-school youth (age 14-20) in Zimbabwe showed that 60% (N = 157) of adolescent males and only 36% (N = 110) of adolescent females used a condom at last intercourse.

Roles of females are limited to wife and mother, which devalue women's image and social place. In qualitative research, Lindgren, Rankin, and Rankin (2005) heard over and over again, women describing themselves as being work mules and vessels for husbands but no self agency.

Sexual violence against female adolescents occurs at alarming rates with detrimental consequences. Twenty-five percent of females reported having been raped at first sexual experience (Glover et al., 2003). In a matched, quasi-experimental study of pregnant and non-pregnant adolescents, 32% and 18% of females, respectively, reported being raped at first intercourse (Jewkes, Vundule, Maforah, & Jordan, 2001). Sexual violence has a number of negative effects on females, including lower levels of condom use but greater number of sexual partners and a greater likelihood of experiencing unwanted pregnancy (Bryan, Kagee, & Broaddus, 2006; Glover, et al., 2003; Koenig et al., 2004).

In short, sexualized violence experienced by females and their economic disempowerment result in increased HIV transmission. Marriage increases risk of HIV infection for females because females have no bargaining power to get their partner to use condoms, and often, females will be subjected to physical violence if they initiate a discussion of condom use with their partner (Kathewera-Banda, 2005). Men report that they would only consider condom use when they have extramarital affairs and that they would lose trust in their wife if she indicated a desire to use condoms (Kagimu et al., 1998). Pool, Kamali, and Whitworth (2006) found that women reported wanting to negotiate condom use with their partner for HIV protection, but unable to do so. Women who reported condom use did so within the context of encouraging her male partner to wear a condom for family planning reasons. For sexually active girls using condoms, Bryan, Kagee, and Broaddus (2006) found significant correlation to their attitudes toward condom use and the level of correct knowledge on condoms and HIV transmission. Again, it can be viewed in context that females are more biologically susceptible to sexually transmitted infections and bear the immediate impact of unwanted pregnancy (Bryan, et al., 2006; Hulton, et al., 2000). Therefore, for adolescent females using condoms, they often do so to reduce the dual-risk of pregnancy and STI's.

In their quasi-experimental design of randomly assigned schools, Bhana, Zimmerman, and Cupp (2008) found that females who embraced more traditional gender roles were less likely to use condoms at last sex. Questions measuring role attitude were

focused on male socialization and included a statement placing the responsibility of deciding when to have sex only with the male.

Nation.

The following section of literature explores condom use within the nations of Ghana, Malawi, and Uganda. These three nations are geographically located in different parts of Africa and have responded to the AIDS epidemic differently. Yet these three nations rank in the lower quartile on the Human Development Index (HDI). The HDI is a measure of literacy, life expectancy, and standard of living.

Ghana.

In a comparative study of eight African nations with nationally representative samples, the schooling of females was found to be significantly related to increased condom use as well as to a greater number of sexual partners (Glick & Sahn, 2008). Wolf, Tawfik, and Bond (2000) were alarmed to find that 21% (N = 106) of peer educators, adolescent leaders trained to educate their peers on HIV transmission and condom use, indicated that they had not done anything to protect themselves from AIDS in the previous three months, and this rate rose to 42% (N = 526) among peer contacts. One possible explanation offered by the authors is that Ghanaian culture promotes the bearing of a high number of children beginning at an early age.

Malawi.

The literature appears inconsistent when it comes to whether sex is a taboo topic in Malawian culture. Lindgren, Rankin, and Rankin (2005) report that sex is not openly discussed in Malawi; however, it is important to recognize that the small qualitative study sampled administrators and stakeholders at a conference focused on family planning and sexual health. The individuals who participated in these three focus groups were likely to be more sensitized to the issue and hence, more critical of society, because an ethnographic study of rural Malawians found importance placed on sexual satisfaction and discussions regarding sex to be the norm rather than taboo (Watkins, 2004).

According to Watkins (2004), differences exist between rural and urban areas within Malawi when it comes to condom use. Rural communities embrace the concept of fidelity over the idea of using condoms. Being faithful is promoted more often than condom use. Yet, being faithful also goes against the concept of ‘the good life’ within Malawi culture, so other options to reduce HIV risk of infection are embraced such as reducing the number of sexual partners and carefully selecting sexual partners (Watkins, 2004).

Uganda.

Uganda is viewed by the international community as a nation that has combated the AIDS pandemic head-on. Glick and Sahn (2008) demonstrated that condom use in Uganda is able to be linked to that nation’s social policy because before condom provisions were made through the crafting of social policy in the early to mid-1990’s, condom access was difficult.

Moreover, for every additional year of schooling females receive, condom use among females increase by 1.6 points (Glick & Sahn, 2008).

Religiosity.

The impact of one's religion on HIV risk has been contradictory. In Africa, and specifically, Ghana, Malawi, and Uganda, the two dominant organized religions are Christianity and Islam. In general, Christianity and Islam are believed to reduce risky behaviors associated with HIV infection due to the importance placed on limiting sex to within marriage. Yet there are practices in each religion that increases the risk of HIV infection. For example, Muslim communities are at an additional risk of HIV infection due to polygamy and ablution of the dead (Kagimu, 1995). Ablution of the dead entails cleaning all orifices of the individual in burial preparation. The largest denomination of Christianity in Ghana, Uganda, and Malawi is Catholicism. Catholicism prohibits the use of artificial contraceptives, such as condoms, which are known to reduce the risk of HIV infection.

The conceptualization of religion has also yielded contradictory results. Babalola, Ouedraogo, and Vondrasek (2006) found that it is the level of commitment to religious teachings that confirmed commitment to sexual abstinence, not mere religious membership. They termed this operationalization of level of participation in religious ceremonies as religiosity.

Being Catholic was mentioned as a reason for not using condoms in a multi-method study of sexual behavior change among adults in Uganda (Pool, Kamali, & Whitworth,

2006). Religion, per se, was not a variable under study; however, in semi-structured interviews examining reasons given by adults for sexual behavior, 3% (N = 294) mentioned that their religion prohibits use of condoms. Yet, of all 575 sexually active female adolescents, Catholic females were significantly more likely to use contraceptives than 'other' religiously affiliated women (Koenig, Zablotska, Lutalo, et al., 2004).

Stoskopf, Kim, and Richter (2000/2001) conducted logistic regression analysis on condom use of a convenience sample of 197 adolescents from religious schools and found that HIV knowledge scores were higher among Muslims. Additionally, evaluative research within randomly sampled Muslim communities exposed to an AIDS prevention program utilizing home visitors demonstrated a small increase in condom use among married couples and a change in polygamous relationships among younger married couples. Younger Muslims, in this particular study, did not view polygamous relationships in the same positive perspective as older Muslims.

Residency.

There is much evidence pointing to greater condom use in urban areas versus rural communities (Adair, 2008; Glick & Sahn, 2008; Watkins, 2004). Urban populations tend to be better educated. Urbanites also tend to be exposed to multiple forms of media and at greater levels; whereas, the most common form in rural areas is radio. Lack of access to condoms and the myth that individuals living in rural areas are unlikely to be infected with HIV leads to less condom use by rural communities compared to urban areas (Adair, 2008).

In a small study of one rural community in South Africa, a majority of adolescents reported having used condoms at least once and just under half reported using a condom at last sex (Giles, Liddell, & Bydawell, 2005).

Education.

There is a complex relationship between education and condom use, with less education resulting in the least condom use (Adair, 2008). Yet, regardless of whether educated or not, females do not report a difference in levels of condom use (Gregson, Waddell, & Chandiwana, 2001). Increases in sexual abstinence among females were related to greater education and household wealth, but even so, educated females are not using condoms consistently. Because educated females tend to have increased abstinence but not consistent condom use, it appears that the slower rate of HIV infection among educated women is due to later sexual debut versus condom use (Gregson, Waddell, & Chandiwana, 2001).

Household wealth.

When household wealth is discussed in the literature it is almost exclusively discussed in terms of gender. Despite being expected to contribute to family livelihood, females experience less household wealth than males with two-third of the poorest people in sub-Saharan Africa being female (Weismann, et al., 2006). Girls are expected to purchase their own material goods with less money provided to them by families. As such, girls negotiate sex with older boys and men (Bohmer & Kirumira, 2000; Weismann, et al., 2006)

who have financial means to provide material necessities. Through focus group interviewing, Malawi women in their discussions made the link between poverty and risky sexual behavior (including no condom use) and connection between prostitution, divorce, and poverty (Lindgren, Rankin, & Rankin, 2005).

Sexual Abstinence

Sexual abstinence is operationalized in a variety of ways. For example, Marindo, Pearson, and Casterline (2003), in reviewing the literature on condom use and abstinence in Zimbabwe, report sexual “abstinence has been defined as ‘no sex until marriage,’ ‘no sex until one is ready,’ or ‘no sex,’ making cross-study comparison difficult” (p.4). Additionally, the term ‘secondary abstinence’ is often used to represent individuals who previously were sexually active but since that time ceased having sex (Cleland & Ali, 2006; Marindo, Pearson & Casterline, 2003). Thus, there is no standard definition for sexual abstinence reflected in the literature.

Knowledge dimension.

Family planning.

In twelve single sex focus group discussions, adolescents reported ‘safe days’ as a method to preventing unwanted pregnancy; however, all groups failed to correctly identify the days during a female menstrual cycle when it is unlikely that a female will conceive (Hulton, et al., 2000). Therefore, few adolescents are capable of using temporary sexual abstinence effectively in avoiding pregnancy.

AIDS knowledge.

Of Ugandan adolescents between 15-19 years of age, approximately 39% (N = 1585) of females and 50% (N = 385) of males identified sexual abstinence as a method to avoid HIV transmission (UDHS, 1996). In the same survey, inquiry was made into change in sexual behavior. Boys reported greater change in sexual behavior, which is attributed to boys having a greater number of sexual experiences than girls. The most notable change in sexual behavior was that 32 % (N = 184) of boys reported that they stopped having sex as a method to reducing their risk of acquiring HIV. Yet only 6% (N = 980) of girls reported sexual abstinence with 34% (N = 980) of girls reporting no change in sexual behavior. Hulton, et al. (2000) utilized focus group methodology to explore the perceptions of the risks of adolescent sex in Uganda and found that all groups knew that sexual abstinence and faithfulness to one partner were methods to reducing risk of HIV transmission.

Media influence.

Bertrand & Anhang (2006) reviewed 15 articles examining effects of HIV media campaigns on youth. The results of the study showed more promise on getting youth to use condoms than on abstaining from sex. There were no statistically significant effects in increasing delay of sexual debut or decreasing number of sexual partners.

Persuasion variables.

Peer influence.

Sexual abstinence among female adolescents was not seen as a convincing method of avoiding sexually transmitted infections or unwanted pregnancies due to the negative influence from peers for being sexually abstinent. Female adolescents report being concerned about the attitudes of their peers as evidenced in negative comments, such as “friends dislike you” and “others consider you to be abnormal” if adolescents believe one of their peers is sexually abstinent (Hulton, Cullen, & Wamala Khalokho, 2000, p. 43). Additionally, in a small qualitative study, it was found that boys and girls were equally likely to experience peer pressure to engage in sex (Nyanzi, Pool, & Kinsman, 2001). In short, sexually abstinent youth tend to be ostracized by peers. Thus, to be sexually abstinent requires strong personal ambitions and moral compass to maintain virginity (Babalola, Ouedraogo, & Vondrasek, 2006; Kinsman, Nyanzi, & Pool, 2000). Despite the stigmatization placed upon sexual abstinence, Wolf, Tawfik, and Bond (2000) found in their examination of influence of peer educators on peer contacts, that peer contacts who reported that they had done something in the previous three months to protect self from AIDS, 21% (N = 526) listed abstaining/delaying sex as the primary method. Moreover, youth who have remained sexually abstinent report that they do so due to negative vicarious experiences of peers. For example, an adolescent female decided to remain abstinent after watching three peers be ridiculed as a result of becoming pregnant (Babalola, Ouedraogo, & Vondrasek, 2006).

Family influence.

According to Marindo, Pearson, and Casterline (2003), both mothers and fathers encourage adolescents to abstain from sex and avoid sexual behavior. Moreover, parental influence served as an external factor among youth to abstain from sex often through indirect and implicit communication but also through strict monitoring and supervision (Babalola, Ouedraogo, & Vondrasek, 2006). But, often, aunts, uncles, cousins, and other siblings encourage the adolescent to engage in sex (Hulton, Cullen, & Wamala Khalokho, 2000). Therefore, it is important to examine the relationship of the family member to the adolescent.

Control variables.

Age.

In a stratified random sampling, Jacob, Shaw, Morisky, Hite, & Nsubuga (2007) found that the younger youth (age 12 – 14 years) were more likely to report greater knowledge on how to protect self against HIV/AIDS.

Gender.

Males

Secondary abstinence is when one previously had sex, but since that time, has decided to abstain from future sexual relations. Secondary abstinence leads to a reduction in number of sexual partners. Of the 89 adult participants who reported reducing the number of sexual partners, 18% did so through sexual abstinence (Pool, Kamali, & Whitworth, 2006).

However, the datum was not analyzed by gender so it is impossible to report whether males or females were more likely to report sexual abstinence. Yet, Pool, Kamali, and Whitworth (2006) found that men were more likely to report sexual behavior change than females due to the likelihood of men reporting greater number of sexual partners. Yet for adolescents, boys found sexual abstinence to be unacceptable in controlling unwanted pregnancies and sexually transmitted infections (including HIV transmission). Adolescent boys report sexual abstinence as unrealistic (Hulton, Cullen, & Wamala Khalokho, 2000). However, in a national survey of sexually active adolescents, 177 youth reported secondary abstinence for the previous 12 months, with males representing the majority of secondary abstaining youth ($n = 93$) (Simbayi, Chauveau, & Shisana, 2004). Thus, despite small numbers, male youth are choosing to be sexually abstinent.

Females.

Female youth are less likely to change sexual behavior and it is attributed to having fewer sexual partners when compared to males (Pool, Kamali, & Whitworth, 2006; Simbayi, Chauveau, & Shisana, 2004). However, sexual abstinence among female adolescents is not seen as a convincing method of avoiding sexually transmitted infections or unwanted pregnancies due to the force often used by males to obtain sex (Hulton, Cullen, & Wamala Khalokho, 2000). Additionally, girls reported the negative impact from peers of being sexually abstinent with comments such as “friends dislike you” and “others consider you to be abnormal” (Hulton, Cullen, & Wamala Khalokho, 2000, p. 43).

Cleland & Ali (2006) examined trends from representative samples of national surveys related to sexual abstinence among single females (age 15-49 years) in 18 African nations (N = 132,800) and found that abstinence for the three months prior to the surveying rose from 43.8% to 49.2%. Additionally, single females in a number of these nations reported an increase in secondary abstinence. The motive for secondary abstinence is unclear. It is not known whether abstinence resulted from the loss of a boyfriend or due to conscious choice to become sexually abstinent. Moreover, living with their father during childhood is statistically significant for females, but not males, in delaying sex (Babalola, Ouedraogo, & Vondrasek, 2006).

Gender socialization is important in understanding and promoting sexual abstinence as it is influential in promoting condom use as a method to reducing HIV transmission.

Hulton, et al. (2000) captures this salient point when stating that

Abstinence requires certain skills of communication and negotiation. ... as long as the power and resource imbalance between young men and women continues and strong social pressure for having sex and bearing children while young remain, abstinence is unlikely to become a realistic option for young women. The situation is exacerbated by boys' assumption that they lack responsibility for their actions, by peer pressure, and by their strong belief that having sex is natural and uncontrollable. These factors inhibit any active desire among boys to avoid the risks of sex to themselves or their partners. (p.45)

Religiosity.

The promotion of sexual abstinence is often associated with religion and one's religiosity because two of the primary religions, Christianity and Islam, in Africa condemn the act of sex outside of marriage (Gilbert, 2008; Rankin, Lindgren, Kools, & Schell, 2008). Within this context, it is not surprising that adolescents will often support sexual abstinence as the best strategy for HIV prevention (Marindo, Pearson, & Casterline, 2003). In their analysis of 36 focus groups on urban, out-of-school youth (age 14-20) in Zimbabwe, Marindo, Pearson, and Casterline (2003) found almost exclusive support for abstinence on grounds of immorality due to "the Bible teaches us about control and the importance of purity" (p.14). When probed for strategies when individuals are unable to abstain, responses included "I would say a prayer. Talk to your pastor, he will be able to help" and another respondent added that "when you start saying 'can't,' it's the devil speaking. The Bible says anything is possible."

In their mixed methods design on sexual abstinence among adolescents, Babalola, Ouedraogo, and Vondrasek (2006) found that degree of religiosity, not mere religious affiliation, was a strong predictor for males in delaying sexual debut but not for females. In this study, religiosity was measured as a categorical level variable. Adolescents possessing high religiosity were likely to describe strong internal commitment to remaining sexually abstinent as indicated in the following quotation "If I were not a Christian, I already would have known a man. Now that I am a Christian, with the help of God, I will persist to the end, even if it means waiting for a long time" (Babalola, Ouedraogo, & Vondrasek, 2006, p. 72).

Religious leaders are reported to be important sources of AIDS messages to youth (Wolf, Tawfik, & Bond, 2000) and are in a position to spread information on HIV prevention and care among their constituents through their respective faith based organization (Rankin, Lindgren, Kools, & Schell, 2008). In Malawi, all religions condemn premarital sex and most condemn the use of condoms (Rankin, Lindgren, Kools, & Schell). Gilbert (2008) reported similar findings in examining the influence of Islam on HIV prevention among college students. Although, a few religious leaders encouraged condom use for health reasons, primarily among married, HIV discordant couples. Thus, religious doctrine cannot be assumed to be the same in all countries (Airihenbuwa, Makinwa, & Obregon, 2000), yet it appears that religious leaders are unified in promoting sexual abstinence and may best be utilized to helping adolescents to remain abstinent. Additionally, interpersonal networks of individuals serve to help individuals resist sexual temptations (Watkins, 2004).

Nation.

The United States of America provides funding to many developing nations, including Ghana, Malawi, and Uganda for HIV prevention and AIDS intervention. Abstinence, Be faithful, and Condom use is referred to colloquially as the “ABC approach” to HIV prevention; however, during the most recent Bush administration, AIDS funding was restricted to the ABC approach with a full one-third of the monies having been earmarked specifically to abstinence and being faithful as core components of the model. Unfortunately, little scholarly material exists in the literature exploring the impact of sexual abstinence efforts within Ghana, Malawi, and Uganda.

Ghana

A longitudinal analysis of 18 African nations revealed that Ghana and Cameroon (not part of this investigation) were the only two African nations to show a proportion increase of over 10% between 1990 and 2004 of young females reporting to be virgins (Cleland & Ali, 2006). In a one-week sexual abstinence based educational model, girls from a religiously affiliated junior secondary school were found to gain significant knowledge in HIV facts and self efficacy to discuss HIV and sex with men and boys (Sarpomaa Fiscian, Obeng, Goldstein, Shea, & Turner, 2009). This study was comprised of a small sample (N=61) between ages of 10 - 14. In spite of using a quasi-experimental research design through the use of pre-post test design, one of the chief concerns is the fact that the reliability of the domains was low. The threshold of domains included in this study was a Cronbach Alpha of $\alpha = .60$.

Malawi

Published research on sexual abstinence in Malawi is essentially non-existent as only one resource was identified in a variety of database searches. Mtika (2007) writes that the political economy of Malawi is responsible for the AIDS epidemic in rural Malawi. Discussing the historical context of Malawi and imperialism, Mtika argues that colonialism forced Malawians to migrate from rural areas to regions that were rich in minerals which were mined for exploitation by non-Malawians. Even after Malawian independence in 1964, the new regime did not work to change the focus. As a matter of fact, the government collaborated with South African mining groups to recruit Malawi men for labor. So combining these factors with government corruption, most Malawian men, ages 20 – 49,

were engaged in circular migration by the 1990's. In turn, due to a patriarchal society that limited female economic activity, circular migration impacted women as men returned with more goods and increased their attraction among women. However, circular migration also introduced infectious diseases from tuberculosis to AIDS as men returned home after engaging in sexual relations with infected women. It was common that a few women in the nearby work areas provided sexual services. Thus, communicable diseases spread.

Through qualitative interviews, Mtika (2007) gained insight into men involved in circular migration through their perceptions regarding labor, sex, and AIDS. Men did not believe that sexual abstinence was feasible. Therefore, they relied on being able to detect women who are symptom free from disease. Of course, the concern is that one cannot always see visible symptoms. This mechanism of reducing HIV infection is ineffective. While beyond the scope of this article the question can be asked of how do fathers who return to their villages impact their children's behavior concerning HIV prevention. For example, for fathers who engage in discussions on sex related matters with their children, it is likely that they would pass along the idea that one can see AIDS and this is the way to avoid HIV infection, resulting in sexually active adolescents engaging in risky behavior.

Uganda

Uganda has been viewed as a model country for combating AIDS due to its ability to drastically reduce infection rates (Cohen, Schleifer, & Tate, 2005; Melby, 2006; Murphy, Greene, Milhailovic, & Olupot-Olupot, 2006). Beginning in 2005, televised advertisements began promoting faithfulness through the use of cranes, which are a national symbol. Cranes choose one partner for life. In a review of Uganda's ABC model, Kirby reported that it was

all three that contributed to lower HIV prevalence rates, and that among adolescents, a delay in sexual debut coupled with the use of condoms has been effective in reducing rates of infection among youth (Melby, 2006). Yet, the promotion of sexual abstinence until marriage has received criticism from human rights activists because same-sex marriage is not recognized in Uganda. As a matter of fact, same sex sexual activity is criminalized, and in March, 2010 became punishable by death! Policy such as this puts gay men at particularly high risk for HIV infection (Cohen, Shleifer, & Tate, 2005). Cohen, Shleifer, and Tate argue that a nation should not be viewed as a model state when they are violating basic human rights.

Education.

In 36 focus group discussions held with 14-20 year-old adolescents, Marindo, Pearson, and Casterline (2003) report that adolescents universally reported sexual abstinence as primary strategy for sexual health. These groups also openly discussed their deceit and deception of sexual activity to others with none admitting to current sexual involvement. It appears that denying sexual behavior, especially to adults, was the norm for this study in Zimbabwe.

Because educated females tend to have increased abstinence but not consistent condom use, it appears that the slower rate of HIV infection among educated women is due to later sexual debut versus condom use (Gregson, Waddell, & Chandiwana, 2001). Additionally, longer periods between sexual debut and getting married are reported for educated women.

Residency.

Mtika (2007) reports that the spread of AIDS in rural Malawi results from the political economy in which rural Malawians are pushed into circular migration. Circular migration is not a phenomenon restricted to Malawi, but rather is common in rural areas where opportunities to make money are limited. Thus, males will migrate to more industrialized areas seeking work. While away, these men often engage in sexual relations. Male participants in Mtiko's (2007) study indicated that sexual abstinence was not an option because men need a mechanism to release sexual tension. Then, after earning money, the men will return to their wives in the rural community passing on communicable diseases.

Numerous studies (Glick & Sahn, 2008) indicate that sexually active urban adolescents are more likely to use condoms and are more likely to delay sexual debut, and therefore, be sexually abstinent than rural adolescents. Additionally, rural adolescents are less likely to believe that females will reach their 18th birthday and be a virgin (Bohmer & Kirumira, 2000). Yet when resource equity and school health education performance is emphasized, rural adolescents benefit equally to urban adolescents in the likelihood of being sexually abstinent (Shuey, Babishangire, Omiat, & Bagarukayo, 1999).

Household wealth.

A comparison between sexually active adolescents and virgin adolescents demonstrated that the two groups were statistically significantly different when it came to their household situation (Simbayi, Chauveau, & Shisana, 2004). Simbayi, Chauveau, and Shisana used an ordinal level variable to measure household wealth through the following categories: Not enough money for basic things; Have food and clothes, but short on many

other things; Most of important things, few luxury goods; Some money for extra things. They then recoded the variable into a dichotomized variable of the options: Not enough money for basic things and Others. In analysis of both variables, virgin adolescents were significantly more likely to report that they had most of the important things but few luxury items or reported some money for extra things compared to adolescents who had engaged in sexual intercourse. Sexually active youth were more likely to report that they did not have enough money for basic things or that they had food and clothes, but were short on many other items. Thus, sexual behavior occurs within an economic context and can be operationalized through a socioeconomic or household wealth index. A number of studies have examined transactional sexual relationships as a function of survival for adolescents (Amirkihani, Kabakchieva, McAuliffe, & Vassileva, 2003; Bohmer & Kirumira, 2000; Nyanzi, S., Pool, & Kinsman, 2001; Smith, Nalagoda, Wawer, Serwadda, Sewankambo, Konde-Lule, & et al., 1999; Weissman, Cocker, Sherburne, Powers, Lovich, & Mukaka, 2006).

CONCLUSION

Condom use and sexual abstinence are two key methods to reducing HIV infection. And these two methods are part of the three prong ABC approach promoted by international donor nations to Ghana, Malawi, and Uganda. Yet how do we promote the adoption of sexual abstinence or condom use among adolescents as protective measures against HIV infection? Diffusion of innovations theory provides a useful framework when examining processes to innovation adoption, such as condom use and sexual abstinence. This chapter has reviewed the theoretical framework of diffusion of innovations from which the variables under investigation were selected. The literature on each of these variables with respect to condom

use and sexual abstinence were then reviewed. The selected variables emerged from an understanding of the chosen theoretical framework, diffusions of innovations. In the next chapter, Methodology, the reader will view the integration of the literature reviewed in the current chapter as the chapter moves through research design and conceptualization of variables under study. The Methodology chapter is a nuts-and-bolts chapter providing concrete steps from beginning to end for the design of the investigation under study.

CHAPTER III: METHODOLOGY

This chapter outlines the research methodology utilized in this investigation, giving primary attention to the main research question and hypotheses. Additionally, the type of study, research design, sampling, conceptualization and operationalization of criterion, predictor, and control variables are described. Protection of human subjects is reviewed. In reading this chapter, one will come to understand the design of the study and all steps involved in variable preparation in order to answer stated hypotheses.

Purpose of Study and Research Hypotheses

The purpose of the study was to examine how knowledge on family planning, AIDS, condom procedures and efficacy, and communication channels of media and interpersonal communication networks (family and friends) influence choices in sexual activity among adolescents from Ghana, Malawi, and Uganda. Additionally, the study examines how the characteristics of adolescents may influence their decision-making process. Finally, the study questioned whether differences exist between the nations of Ghana, Malawi, and Uganda in adoption of condoms. The three hypotheses for this study were:

- **H₁:** Controlling for background variables, reporting greater levels of knowledge in family planning, AIDS, condom efficacy and more media exposure to family planning and AIDS messages, and greater communication with family and non-family members about sex-related matters, the greater the odds for adolescents in having ‘ever used’ condoms;
- **H₂:** Controlling for background variables, greater levels of knowledge in family planning, AIDS, and more media exposure to family planning and AIDS messages,

- and more persuasion from family to not engage in sex, the greater the odds for adolescents to engage in sexual abstinence;
- **H₃:** Controlling for background variables except nation in which survey was taken, Uganda will report more condom utilization than Ghana and Malawi.

Research Design

The study was a comparative cross-sectional survey design utilizing secondary data of the National Survey of Adolescents from Ghana, Malawi, and Uganda on sexual practices and reproductive needs of adolescents between 12 to 19 years of age spearheaded by the Guttmacher Institute under the auspices of The Bill and Melinda Gates Foundation, the Rockefeller Foundation, and the U.S. National Institute of Child Health and Human Development Grant (grant no. 5 R24 HD043610). The project was titled *Protecting the Next Generation: Understanding HIV Risk among Youth*. Survey data were collected in 2004 and are available in the public domain through the Inter-University Consortium for Political and Social Research.

A comparative cross-sectional survey is a design in which data are collected at one-point in time, providing a snapshot of a particular phenomenon (Rubin & Babbie, 2011). According to Rubin and Babbie, cross-sectional designs can be used for exploratory, descriptive, or explanatory purposes. In this study, the cross-sectional survey design was used for explanatory purposes in testing the research hypotheses and answering the study questions.

Sampling

The study population was composed of youth between ages of 12 and 19 in Ghana, Malawi, and Uganda in 2004. The samples in each of the three nations utilized a two-stage stratified, random clustering (rural v. urban) design in which households were selected and initially interviewed followed by interviews of each adolescent between the ages of 12 and 19 years of age considered *de jure* or *de facto* within the household. *De facto* means that the adolescent was a usual member of the household having spent the night before in the household whereas, *de jure* signifies that the adolescent was legally defined as a member of the household. This resulted in 5,496 adolescent participants in Ghana; 4,879 adolescent participants in Malawi; and, 6,659 adolescent participants in Uganda. The Guttmacher Institute, the original researchers, stated that due to incomplete interviews and possible redundancy, only cases that had been weighted greater than zero were to be used in analysis. In other words, the weighting was applied to each case, not by variable, which means that if that person had a weight that was not greater than zero, then that particular case was not selected as part of my sample. Additionally, the study under investigation was interested in single, never married youth. Thus, the sample for the study was 12,848 single, never married youth between 12-19 years from Ghana, Malawi, and Uganda. Analyzing the data separately on the two dichotomous dependent variables required two separate selections from the sampling frame. Therefore, in proceeding forward with analysis of predictors on sexual abstinence (H_2), the whole sample outlined above of the 12,848 single, never married youth between 12-19 years from Ghana, Malawi, and Uganda was employed. However, in preparing the data for analysis on the criterion variable, ever used a condom, it was necessary

to select a subsample of adolescents that have previously had sex. The results would have been skewed if sexually abstinent youth were included in condom use analysis when condoms are utilized for the purposes of sex. Therefore, the subsample was attained by using SELECT IF command in SPSS and selecting respondents who were coded as 1 = SEXEVER. The subsample was comprised of 2,693 sexually active adolescents with 455 from Ghana, 1,060 from Malawi, and 1,178 from Uganda. The subsample of sexually active adolescents was used to test H_1 and H_3 .

Protection of Human Subjects

There were no significant human subject concerns as the data set was secondary data and the Guttmacher Institute, the original contributors, provided no personal identifying information. Informed consent was attained from parents and then informed assent was sought from adolescents prior to interviewing. This study was exempted under 46.101(b)(4) from the Institutional Review Board at The Catholic University of America where the researcher is completing the study in fulfillment of degree obligations. Additionally, the study was also exempted under 46.101(b)(4) from the Committee on Research with Human Subjects at Shippensburg University as the researcher is employed at this educational institution and required to seek human subject protection through the institution on any research conducted.

Study Variables

Criterion variables.

The criterion variables were the implementation dimensions of the innovation-decision process and conceptualized as the adoption or rejection of innovation. The two

innovations known to reduce pregnancy and sexually-transmitted HIV are condom use and sexual abstinence.

Condom use was a variable created in the original data represented by condom ever used (CONEVUSE) and was conceptualized broadly to include condom use regardless of reason. However, due to the current study's design of selecting the subsample of sexually active adolescents, this variable became restricted to condom use for sexual purposes. In order for the higher value to represent the presence of something, in this case condom use, the original variable was re-coded into CONDOM with 0 = No and 1 = Yes. Thus, condom use in the study was a dichotomous variable of ever having used a condom for sexual intercourse.

Sexual abstinence was conceptualized in the literature as primary or secondary abstinence; however, sexual abstinence in this study was conceptualized as individuals who have never had sexual intercourse, which falls under the category of primary abstinence. Thus, a dichotomous variable measuring the presence or absence of sexual intercourse, PRIMABS, was created by re-coding the variable, R2_Age1stSex into 1 = Not had sexual intercourse and 0 = participants who indicated having sex at least once. In short, the variable is operationalized to answer the statement, "never had sexual intercourse", with 0 = No and 1 = Yes.

Predictor variables.

The independent or predictor variables (IVs) for this study are the broad innovation-decision processes of knowledge of HIV and persuasion to accept an innovation. The IVs representing the knowledge dimension are conceptualized as levels of actual knowledge of:

a) *family planning*; b) *AIDS*; c) *condom procedures*; and, d) *media on family planning and AIDS prevention*. All of the additive indexes, where utilized, were coded in a manner in which higher scores represented greater knowledge. See Appendix A for the questions comprising the knowledge dimension.

The persuasion dimension is conceptualized as interpersonal communication networks that may influence adolescent decision-making on sexual activity. The two interpersonal communication networks studied were: a) *family influence* and b) *friends influence*. See Appendix A for the questions comprising the persuasion dimension.

Knowledge dimension.

Family planning. There were a number of questions asked in the original survey pertaining to family planning. In the current study, the variable was conceptualized as possessing knowledge of contraceptives that reduces one's chance in becoming pregnant. Due to the fact that the study was trying to capture the presence of knowledge, a lack of knowledge could be indicated by a Don't Know response in the original dataset as this was deemed equal to incorrect knowledge for the current study. Thus, each variable was re-coded 0 = No or Don't Know. The presence of correct knowledge was re-coded as 1 = Yes for each of the variables. The additive Family Planning Scale (FP_KNOW) of twelve dichotomous variables produced a Cronbach alpha of $\alpha = .786$ for sexually active adolescents and $\alpha = .839$ for the complete sample. The range of responses of the family planning scale was 0 to 12. See Appendix A for a list of family planning questions.

AIDS knowledge. AIDS knowledge was conceptualized as possessing an accurate understanding of how the AIDS virus is transmitted and how one can reduce chances of HIV

infection. The individual items were operationalized into dichotomous variables in which the original variables were re-coded where 0 = No or Don't Know and 1 = Yes. In short, 0 = wrong information and 1 = correct knowledge concerning AIDS. The eleven dichotomous items were then summed together to compose the AIDS Knowledge scale (AIDS_KNOW) with a range of 0 to 11 points. The 11-item scale produced acceptable Cronbach alphas for purposes of research. Specifically, a Cronbach alpha of $\alpha = .600$ was produced in the subsample of sexually active adolescents while the entire sample fared better with $\alpha = .732$. See Appendix A for this list of questions comprising AIDS Knowledge.

Condom knowledge and efficacy. Condom knowledge and efficacy were conceptualized to mean having correct information when it comes to male condom use and one's own efficacy in either wearing a male condom or getting a partner to wear one. Condom knowledge and efficacy was operationalized through the use of eight questions that tested knowledge on how to use a male condom correctly, one's confidence in wearing or getting a partner to wear a condom, and whether the adolescent disagreed with common condom myths. The original variables were coded as 1 = Agree, 2 = Disagree, and 8 = Don't Know.

Questions testing knowledge of correct procedures for condom use were re-coded into dichotomous variables in which 0 = No, Disagree or Don't Know and 1 = Yes or Agree. A sample of the questions are 'have you ever seen a male condom demonstration', and 'a male condom should be put on the penis only if the penis is fully erect or stiff'. Three questions were reverse coded during the recoding process so that the responses aligned themselves in the correct direction. A higher number represented greater knowledge and

efficacy when it came to male condoms. The questions requiring reversed coding were three questions testing myths surrounding condom use. The reverse recodes for the study were operationalized into 0 = wrong information indicated by responses of Agree or Don't Know and 1 = correct information indicated by having selected the option Disagree. Finally, there was one question examining efficacy in male condom use which was originally coded as *Very*, *Somewhat* and *Not at All*. The variable was reverse re-coded and then re-coded for a second time into a dichotomous variable in which 0 = Not Confident as indicated by respondents who selected Not at All and 1 = Confident for those selecting Somewhat and Very Confident. Only the second recode was used in analysis. The variables comprising the domain of condom knowledge and efficacy was only used in analyzing predictors of the sexually active subsample. Despite a poor Cronbach Alpha of $\alpha = .499$, the scale was used due to the theoretical importance of measuring condom knowledge and efficacy. Refer to Appendix A for the list of questions.

Media impact on family planning and AIDS prevention. Because of the power of media in educating and influencing decision making, media was a predictor variable conceptualized as print, television, and radio methods. Specifically, the Media Impact Scale (MEDIA) was operationalized through ten questions asking whether adolescents had heard or seen messages about family planning or AIDS in the past few months. Each question gave focus to a particular media with each question being a dichotomous variable. For the purposes of this study, the questions were coded 0 = No and 1 = Yes with missing data coded as SYSMIS. Thus, the range of the scale was 0 to 10 points with the greater number of points representing greater exposure to family planning and AIDS knowledge via media. The

reliability for the scale was strong with a Cronbach alpha of $\alpha = .807$ in the sexually active adolescent subsample and $\alpha = .821$ in the complete sample. Refer to Appendix A for the list of questions.

Persuasion dimension.

Family influence. Families are influential in the lives of adolescents and due to the importance of extended family networks and clans in Ghana, Malawi, and Uganda, the variables were conceptualized to include influence on adolescents by immediate family members plus aunts, uncles, cousins, and grandparents. Operationally, the variables concerning each family members' influence on the adolescent in sex-related matters were originally coded as 0 = No, 1 = Yes, 8 = Don't Know, and 9 = No Answer. There were two types of questions asked. One set of questions tried to discover whether family members communicated with adolescents concerning sexual matters, and the second set of questions were targeted at whether adolescents perceived family members pressuring him/her to being sexually abstinent. For purposes of studying H_1 , family influence was operationalized as one dummy variable capturing whether adolescents had someone in their family that spoke to them on sex-related matters. The variable was coded 0 = No and 1 = Yes. In examining H_2 , a family pressure scale (FAM_PRESS) with a Cronbach alpha of $\alpha = .596$ was created utilizing six items. The range of the scale was 0 to 6 with a larger integer representing greater levels of pressure from family members to not engage in sex. Refer to Appendix A for the list of questions.

Friends influence. In addition to family, peers are particularly influential on adolescent decision-making. Persuasion by friends is conceptualized as non-family members

who talk to adolescents about sexual matters. Due to a lack of variability in questions within this domain, only one question was utilized to measure this domain for testing condom utilization. The question, “did anyone outside your family ever talk to you about sex-related matter?” defined this domain. The variable was re-coded into 0 = No and 1 = Yes. There were no equivalent questions in the original data on peer pressure to remain sexually abstinent. Therefore, peer influence was not represented in the statistical modeling of sexual abstinence.

Control variables.

Age. Age is important to sexual health and practices. In addition to age being conceptualized as a chronological ordering based on years, age is also conceptualized in terms of sexual debut. In operational terms age is an interval level variable restricted to the years 12 through 19 because participant eligibility was defined by these years. Sexual debut is operationalized as age at first sex (Age1stSex) represented in years. Sexual debut is a ratio level variable. Thus, in H_1 and H_3 both variables will be utilized in the model, but only the chronological age will be used in H_3 .

Gender. Gender is thought of as a term that encompasses characteristics from one’s sex to one’s gender identity and therefore, not limited to being male or female. However, the conceptualization of gender for this study was restricted to one’s sex and its operationalization as Male = 0 and Female = 1.

Residency. The geography of physical location can influence sexual values, attitudes, and behaviors. As such, the variable was conceptualized as a dichotomous variable of either urban or rural area with research participants living in an urban area coded as 1 and

adolescents residing in a rural location coded as 0. Due to the secondary nature of this data, the researcher does not know how urban and rural geography were conceptualized to arrive at participants being dichotomized into these two categories.

Nation. Nations are conceptualized as entities marked by boundaries and capable of asserting citizenship, rights, and services to human inhabitants living within its borders. In the investigation under study, nation is conceptualized as the country in which the survey was taken. There were three possible nations: Ghana, Malawi, and Uganda. Multiple variables were created to represent the nations. For example, one variable, Nation, was operationalized as 1 = Ghana, 2 = Malawi, and 3 = Uganda. This categorical variable of three groupings was used in testing H₃. Also, a dummy variable was created for each nation. For example, Ghana, was operationalized as 0 = No and 1 = Yes. Malawi was operationalized as 0 = No and 1 = Yes. And, Uganda was operationalized as 0 = No and 1 = Yes. The dummy variables representing each nation were utilized in binary logistic regression modeling.

Religiosity. Religiosity is conceptualized in the literature as the amount of involvement in one's faith. As such, the variable is operationalized through the question of "how often do you attend religious services" where the variable was re-coded 1 = *Not at all*, 2 = *Less than once a month*, 3 = *At least once a month*, 4 = *Once a week*, and 5 = *More than once a week*. There were seven cases that were missing and these seven cases were coded at the Median of 4 (*Once a week*).

Education. The literature is robust on the influence education has on adolescents knowledge of AIDS and family planning. Unfortunately, each nation under investigation has different education systems but the variable was standardized in the original data to provide

the highest level of education attained. The ordinal level variable was operationalized as 0 = *No education*, 1 = *Primary*, 2 = *Secondary*, and 3 = *Higher education*.

Household wealth. Household wealth is conceptualized in the literature as assets that enable individuals' access to resources. In the investigation under study, the household wealth index was operationalized through the summation of the following five dichotomous variables: electricity, television, telephone, refrigerator, and vehicle ownership of car or truck. The range was 0 to 5 with each question being re-coded as 0 = No and 1 = Yes. The index produced a Cronbach alpha of $\alpha = .832$ in the complete sample and $\alpha = .813$ in the subsample of sexually active adolescents.

Media. Media is a predictor in the investigation under study and has been conceptualized earlier. Here, however, the main objective is to control for already existing levels of media engagement. Therefore, there were three variables conceptualized to control for media exposure and each was operationalized as 1 = *Not at all*, 2 = *Less than once a week*, 3 = *At least once a week*, and 4 = *Almost every day*. However, due to concerns of multicollinearity which is discussed fully in the next chapter, only one media control variable ("Do you listen to the radio almost every day, at least once a week, less than once a week or not at all?") was included in the model building.

Plan for Data Analysis

The investigation under study employed descriptive statistics of frequencies and measures of central tendency to describe the sample. Then, inferential statistical methods were utilized to test the research hypotheses. Zero-order correlations, commonly called bivariate correlations, indicated which predictors to include in model building. Then,

reliability analysis was conducted on items the researcher was interested in summing to create scales for the model. In preparing to run binary logistic regression, collinearity diagnostics were utilized through the multiple regression analysis function. Using the findings from multicollinearity diagnostics methodological decisions were made in terms of variable choice. Finally, binary logistic regression was utilized to provide insight into the research hypotheses as the two criterion variables were dichotomous. The criterion variables were examined individually, not simultaneously. Controlling for the background variables, both the enter and backward method was utilized in model building. The odds-ratio was examined to determine the predictive value of independent variables on the criterion variables. And to answer whether differences exist between the three nations in condom utilization while controlling for a number of factors, the Analysis of Covariance (ANCOVA) was the most appropriate statistical tool. PASW Statistics Grad Pack 18.0 for Windows (SPSS, 2009) was employed to conduct all statistical analyses.

SUMMARY

This chapter outlined the methodology utilized in this study. The study population of youth from Ghana, Malawi, and Uganda along with the recruitment and selection of adolescents were discussed. Protection of human subjects and rationale for exemption status were provided. Risk to human subjects was minimized through the use of secondary data that has been stripped of all potentially identifying information. Conceptualization and operationalization of criterion, predictor, and control variables were thoroughly described. The two criterion variables were condom use and sexual abstinence with the main predictors being constructs to measure knowledge and implementation dimensions of the diffusion of

innovations theory explored in the literature review. Additionally, background variables that were identified as important variables to control for during data analysis were discussed. The plan for data analysis described the statistical techniques utilized to test the identified hypotheses. Descriptive and inferential statistical procedures utilized to examine the hypotheses were outlined. Finally, the next chapter, Findings, picks up where the plan for data analysis in this chapter ends. The Findings chapter describes the results of hypotheses testing.

CHAPTER IV: ANALYSIS OF DATA

Picking up where the methodology chapter ends, this chapter reports on the statistical analysis of data, specifically, the following findings are included: 1) demographic characteristics of the sample; 2) zero-order correlations; 3) reliability of additive scales; 4) binary logistic regression on condom use in testing H_1 , 5) binary logistic regression on sexual abstinence in testing H_2 , and 6) analysis of covariance (ANCOVA) on condom use by subjects from Ghana, Malawi, and Uganda in testing H_3 . Binary logistic regression and ANCOVA were utilized in testing multivariate hypotheses.

Demographic Characteristics of the Sample

Complete Sample

The sample contained 12,848 single adolescents between 12 and 19 years of age residing in Ghana, Malawi, and Uganda, and this sample was utilized when examining the criterion variable of sexual abstinence in testing H_2 . There were 4,293 (33%) adolescents from Ghana, 3,798 (30%) youth from Malawi, and 4,757 (37%) adolescents from Uganda. Approximately 74% ($n = 9,441$) of the sample resided in rural communities. Males were slightly more represented in the study ($n = 6,678$; 52). The mean age of respondents from the entire sample was 14.89 years ($SD = 2.14$).

Just over 4% ($n = 563$) of the sample reported having no formal education experience, while 70% ($n = 9,016$) had completed primary education and another quarter ($n = 3,250$) of the participants completing secondary education. A mere 19 individuals reported having completed higher education; however, a low completion of higher education would be

expected due to the sample mean age being 14.89 years, as most adolescents only finish school around the age of 18.

Overall, the sample was impoverished. Income as an indicator of wealth is not commonly used in developing countries but rather various household items are identified. As such, heads-of-households that were interviewed in the initial round of interviewing when seeking consent to interview eligible adolescents, provided general household information. Almost 71% (n = 9,013) of the households reported possessing no wealth assets. Approximately 25% (n = 3,142) of the households had electricity, 18% (n = 2,278) of the households had a television, 13% (n = 1,635) had a refrigerator, 10% (n = 1,288) had a telephone, and only 6% (n = 717) of the households owned a car or truck.

Religiosity has often been attributed as an important cultural force in societal sexual practices, including the adherence to sexual abstinence until marriage. In terms of the sample under study, 11,669 or 92% of all adolescents, regardless of sexual activity, attended religious services at least once per week with one-quarter of them attending services more than once a week. Religious affiliation was removed from the dataset to maintain confidentiality of research participants; therefore, it was impossible to study any potential effects this variable might have with the criterion variable included in this study.

Sexually Active Subsample

A subsample of sexually active adolescents was selected for use when examining condom use. The size of the subsample was 2,693 adolescents. The subsample was comprised of 455 (16.9%) sexually active adolescents from Ghana, 1,060 (39.4%) sexually active adolescents from Malawi, and 1,178 (43.7%) sexually active adolescents from

Uganda. Similarly, the majority ($n = 2094$; 77.8%) of the subsample resided in rural communities. Of the sexually active adolescents, 1,762 (65.4%) were male and 931 (34.6%) were female. The mean age of respondents from the sexually active subsample was 16.4 years ($SD = 1.95$) with age at sexual debut being 14.3 years ($SD = 2.48$).

The literature demonstrates that education is an important factor in sexual debut. With only 563 of the adolescents (4.4%) reporting no formal education, the majority of adolescents had at least some schooling. Ninety of the sexually active research participants (3.3%) reported no formal education. Specifically, 1,772 adolescents (65.8%) had completed primary education and an additional 825 respondents (30.6%) had completed secondary education. Only six individuals (.2%) reported having completed higher levels of education beyond secondary education.

Approximately 93% ($n = 2468$) of the sexually active sample reported attending religious services at least once per week. This percentage is similar to the frequency reported earlier in the complete sample.

The data revealed that 70% of all households from the sexually active subsample reported no assets with only 16% ($n = 445$) of the households of the 2,693 sexually active adolescents interviewed reporting having electricity, only 12% ($n = 322$) of the households owned a television, 8% of the households ($n = 214$) possessed a telephone, just over 8% ($n = 224$) of the households owned a refrigerator, and a mere 4% of the households ($n = 98$) from the sexually active subsample owned a car or truck. While 289 sexually active adolescents (10.7%) reported not listening to the radio at all, over one half ($n = 1,477$; 54.8%) of the subsample reported listening to the radio almost every day. Within the continuum, 343

respondents (12.7%) reported listening to the radio less than once a week and 584 adolescents (21.7%) listened to the radio at least once a week.

Zero-order Correlations

Condom Use

Zero-order correlations, commonly referred to as bivariate correlations, were run against the criterion variable, condom use. Only significant zero-order correlations were then utilized in further analysis. In short, running bivariate correlations was one of the first steps completed in analyzing the data. The zero-order correlations were also utilized in examining the data for collinearity concerns. Multicollinearity is discussed more fully later in the chapter.

Table 4.1 presents the significant bivariate correlations of condom use regressed on control and predictor variables. Uganda was the only nation that did not reach statistical significance in its bivariate relationship with condom use. In other words, there is no linear relationship between living in Uganda and condom use. All other control and predictor variables were statistically significant. There is a positive linear relationship between living in Ghana and condom use, $r = .038$. In a bivariate relationship, Ghanaians are more likely to report using condoms. On the other hand, there is a negative linear relationship between Malawi and condom use, $r = .053$, indicating that Malawians are less likely to use condoms compared to Ghanaians and Ugandans. There is a positive linear relationship between residency and condom use, $r = .124$. Condom use was higher among youth from urban areas compared to rural communities. There is a positive linear relationship between age at sexual debut and condom use, $r = .281$. As adolescents delay sexual debut signifying they are older

at first sex, condom use increases. There is a positive linear relationship between education and condom use, $r = .291$. As adolescents complete more schooling, condom use increases. Adolescents from households with greater wealth report more condom use than poorer adolescents, $r = .117$. There is a weak, but statistically significant positive linear relationship between religiosity and condom use, $r = .025$. As frequency of attendance at religious services increase, so does condom use.

There were positive linear relationships between all four scales of the knowledge dimension and condom use. As family planning knowledge increases, so does condom use ($r = .281$). Greater condom knowledge and condom efficacy correlates with greater condom use ($r = .314$). As AIDS knowledge increases, so does condom use ($r = .127$). Finally, greater condom use is reported by those with greater exposure levels to media messages on family planning and HIV prevention.

Two of the research questions guiding this study involved inquiry into the influence of the persuasion dimension. One question examined whether family relationships impacted condom use, while the other question explored whether peer relationships (non-family members) influenced condom utilization. With respect to both of these dimensions the data indicated a positive linear relationship with condom use, signifying that adolescents who reported family and non-family members discussing sexual matters with them, reported greater condom use than adolescents reporting that no one spoke to them concerning sexual matters ($r = .108$ and $r = .101$, respectively).

Table 4.1: Zero-order Correlations on Condom Use

Background Variables	<i>r</i>
Ghana	.038*
Malawi	-.053**
Uganda	.024
Residency: Rural/Urban	.124**
Gender	.079**
Age of respondent	.333**
Age of Sexual Debut	.281**
Highest level of education	.291**
Frequency of TV Watching	.150**
Frequency of reading the newspaper	.211**
Frequency of radio listening	.101**
Household Wealth	.117**
Religiosity	.025**
Knowledge Dimension	
Family Planning Scale	.281**
Condom Knowledge & Efficacy Scale	.314**
AIDS Knowledge Scale	.127**
Family planning and AIDS prevention media	.223**
Persuasion Dimension	
Non-family member spoke about sexual matters?	.101**
Family member spoke about sexual matters?	.108**

*Correlation is significant at $p < 0.05$ level (1-tailed).

**Correlation is significant at $p < 0.01$ level (1-tailed).

Sexual Abstinence

Table 4.2 illustrates the bivariate relationships of control and predictor variables on sexual abstinence. Religiosity was not significantly correlated with sexual abstinence. There is a positive linear relationship between living in Ghana and sexual abstinence, $r = .18$. Ghanaians reported greater sexual abstinence compared to Malawi and Uganda. Meanwhile, there is a negative linear relationship between living in Malawi and sexual abstinence ($r = -.11$) and living in Uganda and sexual abstinence ($r = -.07$) signifying that both of these countries reported less sexual abstinence than Ghana. There is a positive linear relationship

between residency and sexual abstinence, $r = .050$. Urban adolescents report more sexual abstinence than adolescents from rural communities. Gender and sexual abstinence are significantly correlated with females reporting more sexual abstinence than males, $r = .14$. There is a negative linear relationship between age and sexual abstinence, $r = -.369$. As age increases, sexual abstinence decreases. There is a positive linear relationship between household wealth and sexual abstinence. $r = .09$. As household wealth increases, so does sexual abstinence.

There are negative linear relationships between the three knowledge dimension scales and sexual abstinence. Thus, as family planning knowledge increases, sexual abstinence decreases ($r = -.30$). Lower sexual abstinence is reported as AIDS knowledge increases ($r = -.13$). As exposure to media messages on family planning and HIV prevention increase, sexual abstinence decrease ($r = -.10$).

Pressure by family members on adolescents to remain sexually abstinent is significantly correlated with sexual abstinence. The positive linear relationship indicates that as family pressure increases, so does sexual abstinence among adolescents ($r = .06$).

Table 4.2: Zero-order Correlations on Sexual Abstinence

Background Variables	<i>r</i>
Ghana	.180**
Malawi	-.111**
Uganda	-.072**
Residency: Rural/Urban	.050**
Gender	.139**
Age of respondent	-.369**
Highest level of education	-.066**
Frequency of radio listening	-.078**
Household wealth	.086**
Religiosity	-.008
Knowledge Dimension	
Family planning scale	-.302**
AIDS knowledge scale	-.134**
Family planning and AIDS prevention media	-.103**
Persuasion Dimension	
Family pressure to remain sexually abstinent	.056**

**Correlation is significant at the 0.01 level (1-tailed).

*Correlation is significant at the .05 level (1-tailed).

Reliability Analysis

From the beginning, the researcher desired to create a number of additive indices to capture different phenomena instead of placing a large number of individual variables into the model. Again, only variables that first correlated significantly with the criterion variables were considered for scale development or placement in the model.

The household wealth scale (HH_WEALTH) was created using five dichotomous variables yielding a strong Cronbach alpha of $\alpha = .832$ in the complete data set and $\alpha = .813$ in the subsample of sexually active adolescents. The five dichotomous variables were the availability of electricity, telephone, television, refrigerator, and whether the household owned a car or truck. The scale ranged from 0 to 5 with the majority ($n = 2,100$; 78%) of households scoring zero. Despite little variability within each variable, each individual item

correlated significantly with the criterion variables and, theoretically, it was important to include in the analysis. Both the theoretical framework of diffusion of innovations as well as other studies completed on condom use and sexual abstinence among adolescents pointed to the importance of wealth as a control variable. Therefore, the HH_WEALTH scale was utilized in model building, and will be reported on later in the chapter.

The knowledge dimension of the study was captured by four scales: family planning, condom procedures and efficacy, AIDS knowledge, and the impact of media in transmitting knowledge on family planning and HIV prevention. Family planning knowledge produced a respectable Cronbach alpha of $\alpha = .786$ in the subsample of sexually active adolescents and a strong Cronbach alpha of $\alpha = .839$ for the complete data set. The family planning scale made use of 12 items measuring the various contraception methods the respondent had heard of previously.

The eight variables comprising the condom knowledge and efficacy scale were significantly correlated with condom use in the bivariate correlation. Unfortunately, condom knowledge and efficacy produced a poor Cronbach alpha of $\alpha = .499$. Despite the poor Cronbach alpha, the scale was used in analysis because of its theoretical connection to the criterion variable being examined (condom use). The scale was not used in analysis on sexual abstinence as there was no theoretical underpinning to it influencing this particular criterion variable.

The AIDS knowledge scale was comprised of 11 items and produced a Cronbach alpha of $\alpha = .600$ in the sexually active adolescent subsample and $\alpha = .732$ for the complete

adolescent sample. Each question was dichotomous; therefore, the scale range was 0 – 11 with a larger number representing greater AIDS knowledge.

The fourth and final scale used in the study was the media scale. Evenly split between family planning and HIV knowledge, the 10 questions measured exposure to messages on family planning and HIV prevention through the radio, television, newspaper, poster, and leaflets. The media scale (KNOW_MEDIA) resulted in a Cronbach alpha of $\alpha = .807$ in the subsample of sexually active adolescents and Cronbach alpha of $\alpha = .821$ for the complete data set.

Binary Logistic Regression

Binary logistic regression is appropriate to use when the criterion variable is dichotomous and the predictor variables are categorical and continuous (Fields, 2005), such as in the current study. In logistic regression, membership into the criterion variable groups is produced through the odds ratio (OR). The logistic beta coefficient (b) indicates a one-unit change in each predictor variable on the criterion variable depending on whether the value is positive or negative (Fields, 2005). Thus, the beta coefficient and odds ratio is reported for each independent variable. Additionally, the overall model is tested through the -2 Log Likelihood coefficient (-2LL), which operates like an F-test statistic and indicates the overall model's goodness of fit. The chi-square (X^2) and its degrees of freedom (df) are also reported for each model.

Binary logistic regression is not as robust as multiple regression analysis but it is the best statistical method when the dependent variable is dichotomous. Unfortunately, logistic regression is more sensitive to multicollinearity. While there is no clear path to take in

addressing collinearity problems (Fields, 2005), it is important to recognize them and its potential bearing on statistical modeling. As such, the first step is to observe the tolerance and the Variance Inflation Factor (VIF). If the tolerance is $< .1$ and the VIF > 10 , then there is concern for collinearity. Tolerance and VIF values were all within the normal range in this study.

Eigenvalues represent independent relationships in normally distributed data. Eigenvectors are the lines in a picture of data points in which an ellipse is drawn around the linear relationship. Two lines are placed inside the ellipse representing the height and width of the dimension of that particular correlation, and if the lines are perpendicular, then the variables (represented by lines) are said to be independent of one another (Fields, 2005). The eigenvectors produce an eigenvalue and the eigenvalue illustrate the variances between variables.

Eigenvalues were produced in SPSS, which were then examined to determine whether the model would be susceptible to small changes. First, the eigenvalues should be similar to one another, and therefore, a small range among eigenvalues. Secondly, the eigenvalues were used to generate the condition index which is the square root of the largest ratio of the largest eigenvalue of interest (Fields, 2005). Thirdly, the variance proportion of each eigenvalue was generated which is the proportion of variance attributed to the eigenvalue of each predictor's regression coefficient (Fields, 2005). When multivariate regression analysis was run to examine the eigenvalues in terms of multicollinearity, the model did pose a considerable range in eigenvalues from .003 to 24.0. Moreover, the variance of proportion on age and sexual debut produced results of .54 and .51, respectively,

which is problematic. Collinearity likely exists between these two variables. Additionally, these two variables were highly correlated in bivariate correlations. However, due to the importance of age and age at sexual debut as described in the literature, both variables were kept in the model.

After examining the eigenvalues, Fields (2005) recommends examining all bivariate relationships among the independent variables to identify if any of the predictors are correlated at 0.4 or higher. If there exists a relationship at $r \geq .4$, Fields (2005) recommends deleting one of the two variables before logistic regression is performed. Ghana and Uganda were very close to the $r = .40$ cutoff with an $r = .398$. Residency and household wealth were correlated at $r = .55$; residency and watching television were correlated at $r = .44$; household wealth was significantly correlated with watching television at $r = .524$; reading the newspaper was correlated at $r = .429$ with media; and knowing that one can become HIV infected from sharing razors and injecting self with an already used needle was correlated at $r = .453$. Additionally, as mentioned previously, age and sexual debut were highly correlated with each other, $r = .614$.

Thus, before further analysis could be conducted the researcher had to consider the risks associated with multicollinearity and make decisions concerning which of the predictors from each pair, if any, to omit from further statistical modeling. Despite being close to the cutoff point, Ghana and Uganda were kept in the model due to the fact that one of the hypotheses was testing for differences between the nations. Moreover, residency (rural versus urban) and household wealth were kept in the model despite a statistically significant, high bivariate correlation because the literature points to both of these variables being

important predictors in condom use and sexual abstinence. It was expected that frequency of television viewing would be correlated significantly with household wealth and, because the frequency of television viewing was conceptualized to be a control variable against the media scale, the researcher believed wealth to be the more important predictor based on the literature, and therefore, the variable, frequency of television viewing, was removed. Additionally, the frequency of reading the newspaper was a control variable and because it was highly correlated with media, it was also removed from the model. As previously discussed, age and age at sexual debut were highly correlated yet they were not removed from modeling due to the fact that the variables would only be used together in the condom use model and not sexual abstinence. Moreover, the literature pointed to these two variables as being important predictors. In short, while collinearity is problematic in logistic regression and it likely exists in the current study, no clear methods exist in removing the concerns (Fields, 2005) because theoretical considerations need to be taken into account in addition to statistical findings. Therefore, the implications of multicollinearity will be discussed further in the next chapter.

Finally, it is recommended that 50 cases exists for each variable placed in the model. Taking into consideration the above deletions, 17 predictors and one criterion variable were entered into the full model using binary logistic regression in examining condom use and 14 predictors and one criterion variable were entered into the full model in examining sexual abstinence. The sample size was large enough to accommodate this number of variables.

Condom Use as Outcome

Binary logistic regression was utilized to test H_1 : Controlling for background variables, reporting greater levels of knowledge in family planning, AIDS, condom efficacy and more media exposure to family planning and AIDS messages, and greater communication with family and non-family members about sex-related matters, the greater the odds for adolescents in having ‘ever used’ condoms. Table 4.3 shows the binary logistic results of the full model of predictors on condom use (yes = 1; no = 0). Hierarchical and backwards methods were utilized but no differences emerged. The modeling began with the background variables (Model 1), then the knowledge dimension of the theoretical framework was added (Model 2), with the final block being the persuasion dimension (Model 3). The variables that were not statistically significant were then dropped from the model, which resulted in the reduced binary logistic model (Table 4.4).

The chi-square statistic suggests that the overall Model 1 was significant with 68% of cases having been classified correctly based on background variables alone. Ghana, gender, age of research participant, age at sexual debut, level of education, and level of radio listening were statistically significant. Ghanaians were 55.8% less likely to use a condom ($1 - OR = 1 - .442 = .558$) compared to Malawians and Ugandans. Females were eight times more likely to use a condom than males ($OR = 8.34$). Older adolescents were 1.29 times more likely to use a condom than younger adolescents ($OR = 1.29$). Adolescents who debut sexually at a later age were 1.13 times more likely to use condoms than adolescents who experience first sex at a younger age ($OR = 1.13$). Education increases the odds of adolescents utilizing a condom by almost 2.5 times as compared to adolescents with less

education (OR= 2.43). The final statistically significant variable in model 1 was radio listening in that adolescents with more frequent radio listening were 1.13 times more likely to use condoms compared to adolescents with less radio listening frequency (OR = 1.13).

The knowledge dimension scales were added to Model 2. The statistically significant background variables in model 1 remained significant except for frequency of radio listening. In addition to the remaining statistically significant background variables, family planning, condom efficacy, and media on family planning and AIDS prevention attained statistical significance. Adolescents possessing greater family planning knowledge were 1.1 times more likely to use condoms than adolescents with less family planning knowledge. Possessing greater knowledge and efficacy in condom use resulted in adolescents being almost 1.5 times more likely to use a condom (OR = 1.39). Adolescents reporting greater media exposure to family planning and AIDS prevention messages were 1 time more likely to use a condom compared to adolescents with less media exposure (OR = 1.1). AIDS knowledge was not statistically significant in the model. The overall model predicted almost 71% of group membership correctly as indicated by the chi-square statistic. In short, model 2 improved about 3% over Model 1.

Model 3 was not statistically significant as indicated by the chi-square statistic meaning that the persuasion variables did not improve the odds of condom use among adolescents.

Table 4.3: Summary of Binary Logistic Regression Analysis: Predictors of Condom Use (No= 0; Yes= 1)

	Model 1		Model 2		Model 3	
	B	OR	B	OR	B	OR
<i>Background Variables</i>						
Ghana	-.817	.442**	-.763	.466**	-.757	.469**
Malawi	-.127	.881	-.173	.841	-.162	.850
Uganda		1.00		1.00		1.00
Residency: Rural/Urban	.137	1.15	.036	1.04	.039	1.04
Gender	.288	8.34**	.458	1.58**	.465	1.59**
Age of respondent	.248	1.29**	.195	1.22**	.197	1.22**
Age at 1st Sex	.122	1.13**	.142	1.15**	.141	1.15**
Highest level of education	.888	2.43**	.549	1.73**	.546	1.73**
How often do you listen to the radio?	.125	1.13**	.047	1.05	.045	1.05
Religiosity	.023	1.02	-.044	.957	-.045	.956
Household Wealth	.06	1.06	.062	1.06	.061	1.06
<i>Knowledge Dimension</i>						
Family Planning			.099	1.10**	.096	1.10**
Condom Efficacy			.327	1.39**	.326	1.39**
AIDS Knowledge			-.014	.986	-.017	.983
Family Planning & AIDS Media			.045	1.05*	.042	1.04*
<i>Persuasion Dimension</i>						
Non Family member spoke about sexual matters?					.115	1.12
Family member spoke about sexual matters?					-.008	.992
<i>Model Summary</i>						
% of cases classified correctly	68%		70.7%		71.1%	
Model χ^2 (df) (n=2693)	10.569 (8)		6.517 (8)		9.621 (8)	
-2 Log Likelihood	2964.09		2775.64		2774.19	
Pseudo R ² Range	.170 - .228		.231 - .309		.231 - .309	

* $p < .05$; ** $p < .01$

Table 4.4: Reduced Model of Binary Logistic Regression Analysis: Predictors of Condom Use (No= 0; Yes= 1)

	B	OR
<i>Background Variables</i>		
Ghana	-.625	.535**
Gender	.472	1.60**
Age of respondent	.200	1.22**
Age at 1st Sex	.135	1.14**
Highest level of education	.602	1.83**
<i>Knowledge Dimension</i>		
Family Planning	.088	1.09**
Condom Efficacy	.328	1.39**
Family Planning & AIDS Media	.055	1.06**
<i>Model Summary</i>		
% of cases classified correctly		70.5%
Model χ^2 (df) (n=2693)		9.43 (8)
-2 Log Likelihood		2852.34
Pseudo R ² Range		.228 - .305

** $p < .01$

The final reduced model (Table 4.4) only included statistically significant variables. All variables entered into the model remained statistically significant. Ghanaians were 47% (1 - .535) less likely to use condoms than Malawians and Ugandans. Females were 1.6 times more likely to use condoms than male adolescents. Older adolescents were more likely to use condoms (OR = 1.22). Sexual debut was associated with condom use. Being older at first sexual experience results in adolescents being 1.14 times more likely to use condoms than the adolescents who are younger at first sexual experience. Adolescents with greater education are almost twice as likely (OR = 1.83) to use condoms compared to adolescents with less education. Greater family planning knowledge leads to adolescents being 1 time more likely to use condoms compared to adolescents with less family planning knowledge

(OR = 1.09). Adolescents possessing greater knowledge and efficacy in condom use are almost 1.5 times more likely to use condoms compared to adolescents with less condom knowledge (OR = 1.39). Adolescents reporting higher levels of media exposure to family planning and HIV prevention messages were 1 time more likely to use condoms than adolescents reporting less media exposure (OR = 1.06). The reduced model was significant as indicated by the chi-square statistic and reported 70.5% of the group membership correctly.

Sexual Abstinence as Outcome

Sexual abstinence as an innovation to prevent pregnancy and HIV infection was the second outcome under analysis. The corresponding hypothesis was H₂: Controlling for background variables, greater levels of knowledge in family planning, AIDS, and more media exposure to family planning and AIDS messages, and more persuasion from family to not engage in sex, the greater the odds for adolescents to engage in sexual abstinence. In order to examine sexual abstinence, the complete data set (sexually active and sexually abstinent adolescents) was utilized in the analysis. The full model contained variables that were based on the diffusions of innovations theoretical framework and significantly correlated with the criterion variable. Religiosity was not significantly correlated with sexual abstinence but it was included in the model as it was a variable of interest to the researcher because most literature referring to sexual abstinence in terms of HIV prevention appears to be theoretical and not empirically tested. Thus, the researcher was interested in testing this variable in the model to examine the effect, if any, it may have in adolescents adopting sexual abstinence. Binary logistic regression was utilized in which background variables

were entered first, followed by the knowledge dimension, and finally, the persuasion dimension. A reduced model of only statistically significant variables follows the full model discussion.

Ghana, gender, age, and household wealth were the only background variables that proved statistically significant in Model 1 (Table 4.5). Ghanaians were four times more likely to be sexually abstinent than adolescents from Malawi and Uganda ($OR = 4.03$). Females were almost twice as likely to be sexually abstinent compared to male adolescents ($OR = 1.91$). For each year of age, adolescents were 35% less likely to be sexually abstinent when compared to adolescents one year younger ($1.00 - OR = 1 - .65 = .35$). Meanwhile, adolescents residing in households with greater wealth were 1.11 times more likely to be sexually abstinent than lower wealth households. Model 1 correctly classified 85.4% of the cases.

In adding the knowledge dimension variables of family planning, AIDS knowledge, and family planning and AIDS prevention media to the model, the same background variables from model 1 remained statistically significant plus the background variable of education became statistically significant. Moreover, from the knowledge dimension, family planning and AIDS knowledge showed statistical significance while media did not reach statistical significance. Adolescents with higher levels of education were 1.18 times more likely to be sexually abstinent than adolescents with less education. With each unit of gain in family planning knowledge, adolescents were 14% ($1 - OR = 1 - .86 = .14$) less likely to be sexually abstinent. Similarly, adolescents with higher levels of AIDS knowledge were 9%

less likely to be sexually abstinent than adolescents with less AIDS knowledge. While statistically significant, Model 2 only improved the classification of cases .5% from Model 1.

The previously significant background and knowledge dimension variables remained statistically significant in Model 3 when the persuasion dimension was added to the model. The family pressure scale to remain sexually abstinent was statistically significant in Model 3. Adolescents reporting more pressure from various family members to not engage in sex were 1.19 times more likely to be sexually abstinent than adolescents reporting less family pressure to be sexually abstinent (OR = 1.19). Interestingly, the percentage of cases classified correctly in model 3 (83.8%) decreased slightly from model 2 (85.9%) but still remained statistically significant as indicated by the Chi-square statistic. Moreover, the -2 Log Likelihood of Model 3 continued to decrease from the previous two models indicating that Model 3 provided a better model fit of the data.

Table 4.6 illustrates the reduced model of statistically significant predictors from the full model on sexual abstinence. Ghana, gender, age, education, wealth, family planning knowledge, AIDS knowledge, and family pressure to remain sexually abstinent were the predictors placed into the reduced model. Each of these predictors remained statistically significant with the reduced model classifying 85.9% of the cases correctly.

Table 4.5: Summary of Binary Logistic Regression Analysis: Predictors of Sexual Abstinence (No= 0; Yes= 1)

	Model 1		Model 2		Model 3	
	B	OR	B	OR	B	OR
<i>Background Variables</i>						
Ghana	1.39	4.03**	1.41	4.11**	1.43	4.19**
Malawi	-.07	.94	.01	1.01	.06	1.06
Uganda		1.00		1.00		1.00
Residency: Rural/Urban	-.02	.98	.05	1.05	.06	1.06
Gender	.65	1.91**	.66	1.93**	.60	1.83**
Age of respondent	-.43	.65**	-.37	.69**	-.37	.69**
Highest level of education	-.09	.91	.16	1.18*	.16	1.17*
How often do you listen to the radio?	-.05	.10	.01	1.01	.01	1.01
How often do you attend religious services?	-.07	.94	-.05	.954	-.05	.96
Household Wealth	.11	1.11**	.13	1.14**	.13	1.14**
<i>Knowledge Dimension</i>						
Family Planning			-.15	.86**	-.15	.86**
AIDS Knowledge			-.09	.91**	-.09	.91**
Family Planning & AIDS Media			.01	1.01	.00	1.00
<i>Persuasion Dimension</i>						
Family pressure to remain sexually abstinent					.18	1.19**
<i>Model Summary</i>						
% of cases classified correctly	85.4%		85.9%		85.8%	
Model χ^2 (df) (n=2693)	18.19 (8)		10.492 (8)		9.621 (8)	
-2 Log Likelihood	6983.449		6773.81		6746.148	
Pseudo R ² Range	.132 - .231		.150 - .262		.153 - .267	

* $p < .05$; ** $p < .01$

Table 4.6: Reduced Model of Binary Logistic Regression Analysis: Predictors of Sexual Abstinence (No= 0; Yes= 1)

	B	OR
<i>Background Variables</i>		
Ghana	1.42	4.12**
Gender	.59	1.80**
Age of respondent	-.37	.69**
Highest level of education	.16	1.17*
Household wealth	.14	1.15**
<i>Knowledge Dimension</i>		
Family Planning	-.15	.86**
AIDS Knowledge	-.09	.91**
<i>Persuasion Dimension</i>		
Family Pressure to remain sexually abstinent	.17	1.19**
<i>Model Summary</i>		
% of cases classified correctly		85.9%
Model χ^2 (df) (n=2693)		5.95 (8)
-2 Log Likelihood		6875.35
Pseudo R ² Range		.153 - .268

* $p < .05$; ** $p < .01$

Differences in Condom Utilization by Nation

Analysis of covariance (ANCOVA) is a statistical technique that partials out specified variables from the results that are believed to affect the criterion variable in addition to the predictor variable(s) under study. The specified variables are believed to covary with predictors in their influence on the criterion variable. Specifically, ANCOVA compares the means of a criterion variable for three or more groups as determined by the independent variable(s) while controlling for covariates. In the study under examination, ANCOVA was utilized to fully test H₃: Controlling for background variables except nation in which survey was taken, Uganda will report more condom utilization than Ghana and Malawi. From the

literature reviewed, it was hypothesized that Uganda would have higher levels of condom utilization compared to Ghana and Malawi because Uganda has been hailed by the international community as a model nation in terms of their approach to HIV/AIDS. Therefore, the researcher wanted to test whether increased condom utilization was being reflected in Ugandan adolescents.

In determining the number of covariates that the model was able to support, the following formula was used to guide decision-making:

$$[C + (J - 1)] \div N < .10$$

in which C represents the number of covariates, J is the number of groups, and N is the total number of research participants (Mertler & Vannatta, 2005). Using the formula in solving for the number of covariates (C),

$$[C + (3 - 1)] \div 2693 < .10$$

the number of covariates would need to be less than 267.3. Thus, the seven proposed covariates (residency, gender, age, sexual debut, education, household wealth, and religiosity) fall within the range of an appropriate number that the model can support signifying that the adjusted means from the ANCOVA will be stable.

Table 4.7: Measures of Central Tendency by Nation

	Standard Deviation (<i>SD</i>)	Variance (<i>s</i> ²)
Ghana	.500	.250
Malawi	.491	.241
Uganda	.498	.248

The Levene's test of equality was significant signifying that the homogeneity of variances was violated. In short, the three groups (Ghana, Malawi, and Uganda) did not

possess similar variances. However, Fields (2005) purports that the Levene test alone is not sufficient in testing for violation of homogeneity and recommends calculating the variance with the following formula:

$$\text{Largest group variance} \div \text{Smallest group variance}$$

and if the value is less than two then there is little concern in the differences in variance causing problems in analysis and interpretation. Table 4.7 lists the standard deviation (*SD*) and the variance (s^2) of the three nations. Ghana had the largest variance while Malawi had the smallest variance. Thus, the mathematical computation,

$$.250 \div .241 = 1.04$$

was less than two, and thus, does not threaten the homogeneity of variances assumption.

Therefore, statistical analysis of the ANCOVA continued.

Table 4.8: Univariate Analysis of Covariance of Background Variables on Condom Use

Variable	Between-Subjects		Regression Parameters	
	<i>df</i>	<i>F-ratio</i>	<i>beta</i>	<i>t-test</i>
Residency	1	1.687	.033	1.299
Gender	1	4.739*	.042	2.177*
Age	1	75.374**	.051	8.682**
Sexual Debut	1	31.370**	.025	5.601**
Education	1	107.331**	.200	10.360**
Religiosity	1	1.083	.014	1.041
Wealth	1	1.495	.012	1.223
Nation	2	17.341**		
1 = Ghana			-.163	-5.886**
2 = Malawi			-.041	-2.082*
3 = Uganda			0	
Overall model	9	61.03**		
Error	2633			

* $p < .05$; ** $p < .01$

The results of the tests of between-subjects effects and parameter estimates are illustrated in Table 4.8. The overall model is significant showing that adolescent condom use is influenced by the nation in which they reside, $F(9, 2633) = 61.03, p < .01$. There was also significant effects of nation on condom use after controlling background variables, $F(2, 2633) = 17.341, p < .01$. When the nation variable was removed from the model, the F -test on gender, age, sexual debut, and education were shown to be statistically significant. The estimates were calculated by using a regression analysis with nation divided into two dummy variables. The third group, 3 = Uganda, was the reference group. Thus, 1 = Ghana symbolizes the difference between the group coded as one (Ghana) and the reference category of Uganda. Similarly, 2 = Malawi denotes the difference between the group coded as two (Malawi) and Uganda, the reference category. The beta coefficients signify the differences between the means of these groups, and therefore, the t -test indicates whether group means differ significantly. Thus, Uganda had significantly higher condom utilization than Ghana, $t(2633) = -5.89, p < .01$, and Malawi $t(2633) = -2.08, p < .05$. The ad-hoc simple contrast results confirmed these findings with a statistically significant difference, $p < .01$, in higher condom use in Uganda than Ghana, as well as greater condom use in Uganda compared to Malawi ($p < .05$). Additionally, if the statistically significant covariates of gender, age, sexual debut, and education increase by 1-unit, then condom use increases by the absolute value of the beta coefficient due to the fact that all beta coefficients were positive indicating a positive relationship in which the pair of variables move in the same direction. Education has the greatest strength in the model, $b = .200$ with $t(1) = 5.60, p < .01$.

To this point, statistical analysis indicates that Uganda differs from Ghana and Malawi in condom utilization. In addition to the difference being confirmed by regression parameters and contrasts, as previously outlined, the adjusted group means for condom utilization by nation also differs. To test whether the adjusted group means differ significantly from one another, pairwise comparisons using the Bonferroni adjustment was conducted in which the adjusted group means between Uganda and Ghana were statistically significant, but unlike in previous statistical tests where a statistically significant difference emerged between Uganda and Malawi, the relationship did not reach statistical significance in pairwise comparisons, $p = .112$. See Table 4.9 for results.

Table 4.9: Adjusted Group Means on Condom Use by Nation

Nation	Mean
Ghana	.318
Malawi	.440
Uganda	.481

According to Fields (2005), a change in statistical significance can result from a loss of power through the ad hoc comparison but that other reasons exist so one needs to be reticent in interpreting the significant ANCOVA model. Using only the significant covariates from the full ANCOVA model, a reduced ANCOVA model was conducted to analyze whether it changed the effects between Uganda and Malawi. However, the non-significant relationship between Uganda and Malawi remained, $t(2, 2686) = -1.652, p = .099$.

SUMMARY

In testing the three hypotheses of this study on adoption of condom use and sexual abstinence by adolescents, binary logistic regression and ANCOVA were the main statistical methods utilized. Sample demographics were described. To prepare data for statistical

testing, zero-order correlations were reviewed along with collinearity diagnostics prior to binary logistic regression. The researcher's rationale for addressing multicollinearity concerns was provided. This was followed by an examination of the scale development and instrument reliability. The binary logistic regression models were then analyzed. The first binary logistic regression model demonstrated that when controlling for background variables, family planning, condom knowledge and efficacy, and media intervention on family planning and HIV prevention increased the likelihood of condom use. In the second binary logistic regression model, family planning, AIDS knowledge, and pressure from family to remain sexually abstinent were statistically significant in the odds on sexual abstinence when controlling for background variables.

The final section of this chapter tested whether there were differences in condom utilization by nation while controlling for residency, gender, age, sexual debut, education, religiosity, and household wealth. Residency, religiosity, and wealth were not statistically significant in the ANCOVA model. Uganda had a higher mean for condom utilization compared to Ghana and Malawi but only the mean difference between Uganda and Ghana was statistically significant. Now that data analysis is completed, the next chapter will present the interpretation of the findings and consider the implications to social work practice. Additionally, the upcoming chapter will outline the strengths and limitations of the research study.

CHAPTER V: SUMMARY & CONCLUSION

The previous chapter reviewed descriptive and inferential statistics in analyzing the hypotheses under investigation. This chapter will take the statistical analysis from the previous chapter and interpret the findings in terms of whether each of the three hypotheses was supported through the lens of diffusion of innovations theory. Too, implications for social work policy and practice are explored. Finally, this chapter will review implications for future research. Before concluding the chapter, the author will outline strengths and limitations of the investigation.

THEORETICAL APPLICATIONS

The research design for this study emerged from the author's understanding of and interest in diffusion of innovations theory. The innovation-decision process contains five components (Rogers, 2003), of which three were utilized. These three stages were knowledge, persuasion, and implementation. The communication channels of mass media and interpersonal networks are critical to the adoption or rejection of innovation. However, these two communication channels, mass media and interpersonal networks, influence the diffusion process differently. Mass media is effective in raising awareness, and thus, contributes to the knowledge dimension of the process. Whereas, the subjective interpretation of an innovation is experienced through the interpersonal networks as individuals share their opinions regarding innovation and, thereby, influencing others to either adopt or reject a particular innovation. The component just described is the persuasion step within the innovation-decision process. Implementation is the stage at which the individual adopts the innovation. In the case of this study, the two innovations studied were sexual abstinence and

condom use as methods in preventing early pregnancy and HIV infection. In short, the study examined the odds of the knowledge and persuasion dimensions on influencing adoption of the innovation.

Knowledge and Persuasion on Condom Use Adoption

With diffusion of innovations theory driving the selection of variables in understanding sexual practices of African adolescents, the following hypothesis was tested:

H₁: Controlling for background variables, reporting greater levels of knowledge in family planning, AIDS, condom efficacy and more media exposure to family planning and AIDS messages, and greater communication with family and non-family members about sex-related matters, the greater the odds for adolescents in having 'ever used' condoms.

The hypothesis tested the knowledge and persuasion components on the implementation step of the innovation-decision process from diffusion theory. Statistical testing only partially supported this hypothesis. In terms of background variables, Ghana, gender, age of respondent, age at sexual debut, and education were statistically significant control variables.

Glover, et al., (2003) and Bhana, Zimmerman, and Cupp (2008) found age to be an important variable when examining condom use. The study under investigation also found age of respondent to be statistically significant in both correlational and logistic regression analysis. With each passing year, adolescents were more likely to have used a condom during sex. Additionally, through logistic regression modeling, the study also found that sexual debut influences condom use in that each year that sexual debut is delayed, adolescents are 1.4 times more likely to use condoms.

This literature reports that adolescent boys and girls believe that condoms promote sexual promiscuity and condom use indicates that the partner is HIV+ (Hulton, Cullen,

&Wamala Khalokho, 2000; Marindo, Pearson, & Casterline, 2003). Additionally, much of the literature points to males utilizing condoms at higher rates due to power differentials between the sexes, including inequity inherent in the gender socialization processes of girls (Bohmer & Kirumira, 2000; Bryan, Kagee, & Broaddus, 2006) as well as the anatomical fitting of the male condom that places females in subordinate position in terms of negotiation (Hart, et al., 1999), and therefore, a weakened position from which to negotiate the adoption of condom use. Thus, it was surprising in the investigation to find that females were 1.6 times more likely to use condoms than males. The investigation supports the findings of Cleland and Ali (2006) who reported a significant increase of condom use among single women, ages 15 – 49 in 18 African nations. Yet this significant finding can also be framed in terms of the possibility that females are socialized to be compliant, and therefore, higher response bias or social desirability among female participants is expected. Moreover, Pool, Kamali, and Whitworth (2006) found females negotiate condom use in terms of pregnancy prevention versus HIV prevention. The findings from the research study can be framed in terms of the view that female adolescents encouraging condom use as a way to prevent the pregnancy due to the immediate issue of pregnancy. Unlike HIV status that can be hidden or denied, pregnancy cannot and therefore, female adolescents may have found a way to decrease their risk of HIV infection through framing the issue within the context of avoidance of early pregnancy.

Education increases condom use (Adair, 2008; Gregson, Waddell, & Chandiwana, 2001) and is consistent with current findings in which more education increased the odds of

condom use by almost two times. Correlational analysis also illustrated the importance of education on increasing condom use among adolescents.

The final statistically significant control variable on condom use were subjects in the nation of Ghana. Logistic regression modeling on condom use supported the literature in showing that Ghanaians were 46.5% less likely to use condoms compared to Malawians and Ugandans. Literature discussed low condom use in Ghanaian culture may be attributed to influence of culture which promotes early child bearing for large families (Wolf, Tawfik, & Bond, 2000).

The knowledge dimension investigated was comprised of family planning, AIDS knowledge, condom efficacy, and media exposure. Hypothesis testing tended toward supporting the role of knowledge in the innovation adoption (condom use), although not in its entirety, as the AIDS knowledge scale did not have a statistically significant relationship with the criterion variable. Statistical testing supported the hypothesis in terms of the knowledge dimension, and specifically, the knowledge scales on family planning, condom efficacy and media, increasing the odds of condom use.

Pool, Kamali, and Whitworth (2006) found the most common reason for using condoms among youth is for family planning purposes and not HIV prevention, which appears to coincide with the current investigation in which AIDS knowledge was not statistically significant on condom use. Rather, in the current study, the researcher found through logistic regression modeling that adolescents with higher family planning knowledge were 1.09 times more likely to use condoms than youth with less family planning knowledge.

Regardless of reason for utilizing condoms, proper condom procedures are critical. As such, the study investigated adolescents' knowledge and efficacy regarding condom use. The hypothesis was supported in terms of adolescents possessing greater condom knowledge and efficacy was almost 1.5 times more likely to use condoms. The literature is limited in examination of specific condom procedures, but Glover et al. (2003) reported that of a sample of 704 youth, only 48% were able to identify one correct procedure out of four.

Several studies examined the impact of mass communication on HIV and pregnancy prevention (Myhre & Flore, 2000; Shapiro, Meekers, & Tambashe, 2000; Van Rosesem & Meekers, 2000; Vaughn, Rogers, Singhal & Swalhele, 2000). Wolf, Tawfik, and Bond (2000) reported 91% of youth heard of AIDS in past 30 days with mass media having the highest frequency. Upon additional research, Wolf and Bond (2002) found adolescents 2.43 times more likely to protect self against AIDS among those who heard of AIDS through media. Media were measured similarly via newspaper, television, radio, leaflets, and posters in Wolf and Bond and the current study. The current study found adolescents were 1.06 times more likely to use condoms with higher media exposure.

Knowledge and Persuasion on Sexual Abstinence

The second innovation studied in the prevention of HIV was sexual abstinence. Thus:

H₂: Controlling for background variables, greater levels of knowledge in family planning, AIDS, and more media exposure to family planning and AIDS messages, and more persuasion from family to not engage in sex, the greater the odds for adolescents to engage in sexual abstinence.

There were some similarities found between statistical significance of particular variables and innovation adoption of condom use (H₁) and sexual abstinence (H₂). Yet, there

were also critical differences. The most notable difference between the two criterion variables of condom use and sexual abstinence is that the persuasion dimension of the innovation-decision process is statistically significant on the odds of sexual abstinence but it fails to reach statistical significance on condom use. In terms of H_2 , adolescents who experienced greater levels of family pressure, indicated by multiple family members telling adolescent to abstain from sex, the odds for sexual abstinence increased.

Several background variables were again significant, but this time in increasing the odds of sexual abstinence. Specifically, Ghanaians, gender, age of respondent, education, and household wealth were all statistically significant in the logistic regression model with sexual abstinence. The literature pointing to Ghana as one of the few African nations to see an increase in sexual abstinence supports the finding in the current study in which the odds of Ghanaians being sexually abstinent are over four times more likely compared to adolescents from Malawi and Uganda (Cleland & Ali, 2006). Adolescent boys do not view sexual abstinence as a realistic option (Hulton, Cullen, & Wamala Khalokho, 2000; Mtika, 2007). Yet, the use of sexual abstinence is occurring as a method to reducing HIV infection. While they did not explore the results by gender, Pool, Kamali, and Whitworth (2006) reported that of 89 adult participants reporting a reduction in sexual partners, 18% accomplished this through sexual abstinence. Moreover, Cleland and Ali (2006) found both primary and secondary abstinence increased among single females between the ages of 15-49 in 18 African nations. Only primary sexual abstinence was examined in the current investigation and the odds of females adopting sexual abstinence was approximately twice as often compared to male adolescents. Gender roles are socially constructed. Boys are socialized to

believe that their manhood is defined through strength, including sexual activity, while females are socialized that sex is not something they need or want. It is within this paradigm that the current findings can be explained.

Education can be an important indicator of innovation adoption, and it is no exception when examining adoption of sexual abstinence. Education increased the odds of sexual abstinence over sexual activity by 1.2 times in logistic regression modeling. Gregson, Waddell, and Chandura (2001) outline the role education plays in slowing the HIV infection rates through the delay of sexual debut, and thereby increasing sexual abstinence. Specifically, among secondary educated women, HIV infection rates have slowed in a few African nations through both the increase of sexual abstinence and condom use. Gregson, Waddell, and Chandura report that household wealth increases sexual abstinence in females. The current investigation supported the hypothesis (H_2) that the control variable of household wealth increased the odds of sexual abstinence as odds for sexual abstinence increased by 1.15 times among more wealthy adolescents compared to poorer adolescents. Additionally, the bivariate relationship on sexual abstinence and household wealth reached statistical significance in which youth with greater wealth reported more sexual abstinence.

While two components of the knowledge dimension were statistically significant, hypothesis testing did not support the hypothesis in terms of the knowledge dimension being significant to the innovation adoption of sexual abstinence. That is, at least not in the direction hypothesized. It was hypothesized that more knowledge in family planning and AIDS prevention would increase odds of sexual abstinence. However, despite reaching statistical significance in the model, family planning knowledge and AIDS knowledge

decreased the odds of adolescent adoption of sexual abstinence over sexual activity.

Specifically, the odds of sexual abstinence were decreased by 14% with greater family planning knowledge and a decrease of 9% in the odds with increased AIDS prevention knowledge.

Hulton, Cullen, and Wamala Khalokho (2000) say that adolescents are not capable of using sexual abstinence as a viable family planning method due to a lack of knowledge. The current study would support this claim because greater family planning knowledge resulted in decreased odds that the adolescent will be sexually abstinent. Yet it is important to note that the family planning scale utilized in this investigation was comprised of adolescents identifying which contraceptives they had previously heard of versus testing knowledge on when pregnancy can occur, as described in the literature. Original scale development included the testing of family planning knowledge in terms of pregnancy, but due to poor reliability analysis, items were deleted in order to strengthen the Cronbach alpha.

In general, the literature (UDHS, 1996; Hulton, Cullen, & Wamala Khalokho, 2000) shows that adolescents know that sexual abstinence is a method to reducing HIV infection, yet only the UDHS (1996) explores how knowledge translates into behavior change. Interestingly enough, boys were the ones that changed their sexual behavior. The results from the current study show that more knowledge on how AIDS is transmitted decreases the odds by 9% that adolescents will be sexually abstinent. Similar findings emerged from the bivariate relationship. One explanation may be attributed to Non-Governmental Organizations (NGO) promoting condom use as the primary method to reducing AIDS as

many NGO's view the idea of abstinence as fundamentally flawed, outdated, and tied to religiously affiliated agendas.

The literature outlines the importance of family influence on adolescent sexual decision making (Babalola, Ouedraogo, & Vondrasek, 2006; Hulton, Cullen, & Wamala Khalokho, 2000; Marindo, Pearson, & Casterline, 2003). Survey questions in the current study were formulated in a way to permit the creation of a family pressure scale and the subsequent analysis of family pressure on adolescent adoption of sexual abstinence. The findings appear to support the literature in that the odds ratio did support the hypothesis in indicating that increased family pressure on the adolescent to remain sexually abstinent increased the odds of the adolescent being sexually abstinent by 1.19 times. Unfortunately, the survey did not explore the methods of pressure exhibited by various family members.

Differences in Condom Use by Nation

Hypothesis three was developed for a few reasons. First of all, in accordance with the theoretical framework of diffusion of innovations, it made sense to test how boundaries created differences in innovation adoption (Rogers, 2003). In essence, the unit of analysis becomes the nation. Stokes Berry and Berry as cited in Sabatier (1999) examine adoption of lotteries by neighboring states and demonstrate that proximity of states influence rate of adoption. Another reason that this particular hypothesis was created was due to the literature pointing to Uganda being a model nation when it came to addressing the AIDS epidemic. In particular, Glick and Sahn (2008) demonstrated that condom use in Uganda is linked to social policy because before distribution of condoms were made available through social policy development, access to condoms were limited. Low condom use in the Ghanaian

culture is attributed to the importance of culture promoting early child bearing for large families (Wolf, Tawfik, & Bond, 2000). Then, in Malawi, the societal concept of the “good life” limits condom utilization and sexual abstinence (Watkins, 2004). Hence, the researcher was interested in testing whether higher condom use was able to be observed in the adolescent population in Uganda compared to the adolescent population in Ghana and Malawi.

Therefore, the following hypothesis was tested:

H₃: Controlling for background variables except nation in which survey was taken, Uganda will report more condom utilization than Ghana and Malawi.

The hypothesis was initially supported; however the Bonferroni Adjustment within the ANCOVA only confirmed mean difference between Uganda and Ghana but not Uganda and Malawi, and therefore, all declarations regarding Uganda’s superior condom utilization need to be conservative. Thus, the writer is only comfortable in stating that the data lean toward supporting the hypothesis that Uganda has higher condom utilization among adolescents. The statistical modeling shows higher condom use by Ugandan adolescents compared to Ghanaian adolescents. In terms of significant control variables, education was the biggest predictor in the ANCOVA of condom use by nations.

IMPLICATIONS FOR SOCIAL POLICY & SOCIAL WORK PRACTICE

The findings of this investigation have implications for social work practice at the micro, mezzo, and macro levels. Micro-level social work gives attention to the individual, while mezzo focuses on families and small groups, and macro-level social work practice is concerned with groups, organizations, and communities. A hallmark of social work practice

is its person-in-environment approach to practice, recognizing that life does not occur in a vacuum. Thus, effective social work practice can only be achieved when carried out within an environmental context. After all, environmental influences can be helpful or harmful to a person's behavior.

The environmental context within which social work practice occurs in Ghana, Malawi, and Uganda is one in which HIV/AIDS is a staggering phenomena. An entire generation is being eliminated, leaving grandparents caring for grandchildren, children becoming heads-of-households; and nations with no vibrant workforce are saddled with broken or underdeveloped health infrastructure to address the multi-faceted chronic disease of AIDS. Unfortunately, for each of these countries, the AIDS pandemic is not the only phenomena requiring attention and resources. For example, attention to the AIDS pandemic competes with armed conflict in the northern part of Uganda, refugee settlement camps in Malawi due to conflict in neighboring countries, and deforestation in Ghana are examples of other issues requiring attention.

Macro-level Social Work Practice

As mentioned previously, there are three levels of intervention at the macro-level of social work practice. They are groups, organizations, and communities, all of which are crucial in addressing HIV/AIDS.

Community level prevention work focusing on adolescents is multi-faceted. For example, findings show that pieces of the knowledge and persuasion dimensions are important in diffusing innovations of condom use and sexual abstinence to the adolescent

population. As such, communities can nurture adolescent development through engaging youth in community groups, and in particular, AIDS peer education.

Community organizing is another arena of community work among social workers, which is important in HIV prevention and intervention work targeted at adolescents as adolescents are the ones entering the labor market for the first time. Social workers can work to expand labor markets available to boys and girls. Otherwise, adolescents remain vulnerable to HIV infection as males engage in jobs that require them to migrate while girls turn to “sugar daddies” to provide basic amenities, and in turn, adolescent females engage in sex with men who are at least a generation older than they.

Communities have the power to change this norm, especially the sugar daddy phenomena, as tribes and elders are central to communities in all three African nations. Change does not occur without engaging and earning the respect of the tribe elders. Thus, social workers need to utilize community organization skills if they are to decrease the vulnerability of adolescents to HIV infection.

Additionally, community organization tactics can be utilized to reduce stigma associated with AIDS so that adolescents can be encouraged to get tested for HIV and disclose their status. Disclosing one’s status is important to AIDS work because it is a burden to carry this diagnosis and it is difficult to access treatment without others knowing. It is often empowering to individuals when they disclose their HIV status, but this decision needs to be carefully and thoughtfully explored.

Even at the grassroots level of community organization, often there exist formal and informal organizations. There are a plethora of organizations developing, coordinating,

implementing, and evaluating HIV/AIDS social services. In the social development context of international social work practice, these organizations often seek to improve capacity through increase of human and social capital, both of which are relevant to achieving the Millennium Development Goal of reversing the rate of HIV infection.

Mezzo-level Social Work Practice

Mezzo-level social work practice is comprised of family practice and small groupwork. As indicated previously when implications of AIDS work on family policy was outlined, strengthening families can improve communication channels between adolescents and family. This particular communication channel for families along with peer communication demonstrated significant bivariate direct relationships on condom use. Family communication was also significant in increasing odds of sexual abstinence in adolescents. Therefore, family social work practice can be important field of practice in HIV prevention. However, due to the staggering phenomena of AIDS, it is not realistic to conceptualize family social work practice as it is done in the West, for example. It would be more realistic that family social work practice would be placed within context of community or small groupwork, whereby a greater number of families can be offered services. This also makes sense in terms of cultural values that place importance on extended family and clans. Peers are important to adolescents so groupwork could be very effective in promoting healthy sexual decision-making in both HIV prevention and AIDS intervention work.

Micro-level Social Work Practice

Case management and clinical social work practice are two relevant components of micro-level social work practice in AIDS work. While case management and clinical therapy

are essential client services in HIV intervention, clinical social work practice also has a place in HIV prevention work. Yet in understanding the environmental context of the AIDS phenomena, micro-level social work practice is the least likely area of social work practice to be utilized in Africa for reasons previously outlined. However, social workers are beneficial in the pre- and post-counseling surrounding HIV testing.

Social Policy

In giving consideration to the potential of the findings of this investigation contributing to social policy, a few areas come to mind. First of all, prevention work with youth needs to be elevated. Adolescents are a challenging population to engage in treatment yet critical to future HIV infection rates. Youth are also a marginalized group in society. Marginalization increases vulnerability to HIV infection. Thus, social policy should be age appropriate and adolescent centered. There are a few areas where this would be applicable. Obviously, AIDS policy must address adolescent sexual and reproductive needs. In particular, the investigation indicated that media exposure to HIV and family planning prevention messages contributed significantly to increasing the odds of condom use among adolescents. Thus, comprehensive media campaigns should continue being utilized and particular campaigns that target adolescents. Adolescents need to feel that information is pertinent to their life. Engaging youth from the beginning processes of development through the implementation and evaluation stages is critical if social work is genuine in working to empower youth.

Secondly, family social policy is another logical area to place services due to the findings in this study indicating that families who make known their preferences to their

children to remain sexually abstinent have adolescents who are more likely to report sexual abstinence. Social workers often work with adolescents and their families and know that effective practice encourages the involvement of the family unit in resolving identified issues. Social workers attempt to empower the client system and promote resource development, which can include support systems. Strong bonds are developed within many families and these bonds can serve as a buffer to adolescents as they grow, develop, and experience life challenges. Therefore, strengthening families is important to addressing AIDS.

Additionally, educational policy is another avenue that can be utilized to develop or further strengthen health education, specifically family planning and HIV prevention programming, so that curriculum provides correct information that adolescents can use in their decision making process. From the data of this investigation, most youth who saw a condom demonstration viewed it within the context of school programming and condom knowledge and efficacy increased the odds of using condoms. Moreover, education increased the odds of both condom use and sexual abstinence. Thus, comprehensive health education programs can make differences in the lives of adolescents.

The final area of policy that social workers will want to address in order to indirectly affect the AIDS phenomena is labor policy. Household wealth was statistically significant in its bivariate relationships with condom use and sexual abstinence indicating that as wealth increased so do condom use and sexual abstinence. And despite household wealth falling out of the logistic regression model on condom use, there is no doubt that increasing wealth, decreases vulnerability to HIV infection. Ghana, Malawi, and Uganda are developing nations

with high unemployment which then pushes males to migrate when they start working, at which time, they are away from their traditional support systems and often engage in sex with prostitutes. On the other hand, high unemployment and limited gender appropriate labor for females push girls into transactional sex situations whereby adolescent girls become involved with much older men. In terms of diffusing sexual abstinence as an innovation to HIV prevention, household wealth was significant in both the bivariate relationship and the logistic regression modeling. In short, increased wealth permits adolescents to delay sexual debut.

IMPLICATIONS FOR FUTURE RESEARCH

The study set out to examine a set of three hypotheses that emerged from diffusion of innovations theory. However, none of the hypotheses were fully supported. Thus, there are two primary implications for future research as this study seems to raise more questions than it answered.

First, the finding that females were almost twice as likely to use condoms as male adolescents begs future research into further examining gender differences. It is difficult for the researcher to embrace this finding due to the overwhelming and longstanding evidence in the literature pointing to the increased vulnerability of females to HIV infection. Part of the explanation for this phenomenon has been outlined as lower levels of condom use due to gender inequity in relationships as well as the need for anatomical fit of the condom to the male penis that places the female in a weakened position in sex negotiation.

Beyond additional analysis by gender, future qualitative research on methods of influence utilized by family members and how adolescents experience these techniques by

their family members can lead to further insight into how sexual abstinence can be promoted. It is encouraging that children try to follow their parents' wishes, but not all pressure tactics are created equal. So what makes some techniques more useful with children following the advice of their family while other adolescents assert their autonomy in self expression and go against family advice and engage in sex?

There were both strengths and drawbacks in using diffusion of innovations as the theoretical framework for this study. Diffusion of innovations is a theory that has been applied to a variety of innovation adoptions and across various cultures. Using the knowledge and persuasion dimensions from this framework for the investigation was useful in conceptual mapping. Further, survey questions appeared to fit well to the model. However, there were also drawbacks to using this model. For one, this study only examined condom use in terms of whether a condom had ever been used in sexual intercourse, but did not examine consistent condom use. Consistent condom use would have fallen in the confirmation dimension of the theoretical framework in which individuals decide whether to continue their use of the innovation or to reject the innovation. Additionally, because cross-sectional survey designs are the norm in diffusion of innovations application, the critique of the concept of time applies. This study collected data at one point in time and required adolescents to recall previous sexual experiences. Recalling previous experiences can be problematic in terms of reporting events accurately. Therefore, testing of the theoretical framework would benefit from more rigorous research designs in the future.

LIMITATIONS OF THE STUDY

There are a number of threats to internal validity inherent in this investigation due to the research design being pre-experimental design with a cross-sectional approach. Cross-sectional design signifies that data is collected at one point in time. Cross-sectional data requires for individuals to accurately recall their history which is a threat to the internal validity (WHO, 2004) as well as an identified criticism from diffusion of innovations theory (Rogers, 2003). Data were self-reported and collected through face-to-face interviewing, which is prone to social desirability bias (WHO, 2004) due to individuals underreporting on taboo topics such as sexual activity. The official language of Ghana, Malawi, and Uganda is English, yet even so, each nation has a number of additional tribal languages. Attempts were made at matching the language of respondent and interviewer, in which the interviewer translated questions into the requested language, and then translated responses back into English before recording. Thus, interviewer bias (WHO, 2004) could be introduced.

These identified limitations are of particular concern in this study in which results reached statistical significance in unexpected gender differences where female adolescents were 1.5 times more likely to utilize condoms as males. This finding is not supported by previous empirical evidence including higher rates of HIV infection for females. Females are socialized to be obedient, and even though the survey was administered by the same gendered person, the fact that females were asked to report on highly sensitive behavior to another adult, likely skewed results.

STRENGTHS OF THE STUDY

In spite of the research design limitations, a strength of the original data collection was the sampling plan. The sampling plan utilized a two-tiered, random sampling clustering approach. The first round of random sampling was based on census data identifying all households within the sampling frame. Then, random number generation identified which households were contacted. This first round of contact focused on the household level data. The interviewer sought to identify all members living in the household, ages of each member, background data, such as household wealth items, and then consent was sought to interview each adolescent in the household. Once consent and assent were achieved, the second round of interviews randomly selected identified adolescents to answer the survey plus a special section of sensitive questions ranging from information about household hunger, anal sex, rape, and child abuse. These questions were asked of only one member within each household to help ensure confidentiality in that no other household adolescent would be asked these particular sensitive questions. Additionally, the survey questions were designed to be used across countries for cross country comparative analysis. Therefore, survey questions were identical.

CONCLUSION

HIV/AIDS is present on every continent in the world; however, Africa has been particularly hard hit for a myriad of reasons. While there are pharmaceutical drugs available to prolong the life span to the point where AIDS is no longer referred to as a death sentence, drugs are expensive, pose risks, and not easily accessible in Africa. There is still no cure for HIV and the virus is rapidly spreading within the youth population with over 3 million youth,

ages 15 – 24 years, living with HIV in Africa (UNAIDS, 2008a). Adolescence is a period of rapid human development characterized by risk taking and developing self autonomy. Sexual activity most often starts in adolescence and provides the primary conduit for HIV infection in this population. The only two known methods to prevent HIV infection are sexual abstinence and the use of condoms. Therefore, using the diffusion of innovations theory and framing sexual abstinence and condom use as innovations available for adoption in preventing HIV infection, this study set out to determine the contributing factors of innovation adoption among adolescents in three African nations. In particular, HIV/AIDS knowledge and persuasion dimensions were examined in their effects on the adoption of sexual abstinence or condom use.

Data analysis yielded partial support for all three multivariate hypotheses. Due to the criterion variables being dichotomous, binary logistic regression was used in testing the effect that knowledge and persuasion had on innovation adoption while controlling for a number of background variables. Then, analysis of covariance was employed to determine whether differences exist by nation on condom utilization. In preparing the data for analysis, zero-order correlations were run to determine which variables were entered into the full model and in exploring multicollinearity. Moreover, reliability analysis was utilized in scale development.

In summarizing the most salient findings, Uganda had higher condom use when compared to Ghana utilizing the analysis of covariance as well as the logistic regression modeling. Additionally, Ghanaians were four times more likely to engage in sexual abstinence compared to Ugandans and Malawians. Education was shown to be the most

important background variable in Ugandan condom utilization. Education was also the strongest predictor in increasing the odds of condom use in the logistic model. The more family planning knowledge, condom knowledge and efficacy, and media exposure, the more likely the odds were for adolescents to have used condoms in the three nations. In terms of background variables in the model, the finding that females were over 1.5 times more likely to use condoms compared to male adolescents was perplexing. Peer and family influence did not reach statistical significance on condom use, but family pressure to remain sexually abstinent did increase the odds of adolescents being sexually abstinent by 1.2 units. In addition to Ghana and education previously discussed, household wealth and being female increased the odds of sexual abstinence. On the other hand, age, greater family planning and AIDS knowledge decreased the odds of sexual abstinence among adolescents.

Implications for macro, mezzo, and micro-level social work practice were discussed. More attention was given to macro-level social work practice due to international social development modeling which is most appropriately practiced at the macro-level involving both social policy and community practice. There are four main areas of social policy that the findings from this study can influence: AIDS, family, education, and labor. Implications for community practice in addressing HIV prevention and intervention among adolescents involve community development and community organizing. Of course, much community organization involves mezzo-level social work practice through the use of small groups. Thus, implications for social work groupwork are explored.

The final chapter ends with a discussion of future research implications and limitations of the current study. The writer reports on two key areas of future research: a

more thorough analysis on gender and the potential of qualitative research in promoting a greater understanding of how family relationships can delay sexual debut and, thereby, promote sexual abstinence.

APPENDIX A

	Family Planning Knowledge
501 (Q501_01)	Which ways or methods have you heard about? [Pill]
501 (Q501_02)	Which ways or methods have you heard about? [Injectables]
501 (Q501_03)	Which ways or methods have you heard about? [Male Condom]
501 (Q501_04)	Which ways or methods have you heard about? [Female Condom]
501 (Q501_05)	Which ways or methods have you heard about? [Foam or Jelly]
501 (Q501_06)	Which ways or methods have you heard about? [Rhythm or Periodic Abstinence]
501 (Q501_07)	Which ways or methods have you heard about? [Withdrawal]
501 (Q501_08)	Which ways or methods have you heard about? [Emergency Contraception]
501 (Q501_09)	Which ways or methods have you heard about? [Female Sterilization]
501 (Q501_10)	Which ways or methods have you heard about? [Male Sterilization]
501 (Q501_11)	Which ways or methods have you heard about? [IUD/Coil]
501 (Q501_12)	Which ways or methods have you heard about? [Implants]

	Condom Knowledge and Efficacy
513 (Q513)	Have you ever seen a male condom demonstration?
514 (Q514A)	A male condom should always be put on before sexual intercourse starts.
514 (Q514B)	A male condom should be put on the penis only if the penis is fully erect or stiff.
514 (Q514C)	A male condom can be used more than once?
514 (Q514D)	Using a male condom reduces sexual pleasure.
514 (Q514E)	Using a male condom is a sign of not trusting your partner.
514 (Q514F)	It is embarrassing to buy or ask for male condoms.
515 (Q515)	How confident are you that you could get a male partner to wear a condom if you wanted him to use one? [Males: ... know how to wear a male condom if you wanted to?] Very Confident, somewhat confident, not confident at all?
	AIDS Knowledge
802 (Q802)	Can people get the AIDS virus from having sex with persons who are infected with the AIDS virus?
803 (Q803A)	Can the AIDS virus be transmitted from a mother to child: [During pregnancy?]
803 (Q803B)	Can the AIDS virus be transmitted from a mother to child: [During delivery?]
803 (Q803C)	Can the AIDS virus be transmitted from a mother to child: [During breastfeeding?]
804 (Q804)	Can people get the AIDS virus from sharing razors or other sharp objects used for skin piercings or cutting? Q804 deleted due to collinearity.
805 (Q805)	Can people get the AIDS virus from getting infections with a

	needle that was already used by someone else?
806 (Q806)	Can people get the AIDS virus from a blood transfusion?
810 (Q810)	Can people reduce their chances of getting AIDS by not having sex at all?
811 (Q811)	Can people reduce their chances of getting AIDS by having just one sex partner who is not infected and who has no other partners?
812 (Q812)	Can people reduce their chances of getting AIDS by using a condom correctly every time they have sex?
813 (Q813)	Can people reduce their chances of getting AIDS by avoiding sharing injections/needles?
818 (Q818)	Is it possible for a healthy-looking person to have the AIDS virus?
	Family Planning and AIDS Prevention Media
530 (Q530A)	In the last few months have you heard or seen messages about family planning? On the radio?
530 (Q530B)	In the last few months have you heard or seen messages about family planning? On the television?
530 (Q530C)	In the last few months have you heard or seen messages about family planning? In a newspaper or magazine?
530 (Q530D)	In the last few months have you heard or seen messages about family planning? In a poster?
530 (Q530E)	In the last few months have you heard or seen messages about family planning? In leaflets or brochures?
847 (Q847A)	In the last few months have you heard or seen messages about HIV/AIDS? On radio?
847 (Q847B)	In the last few months have you heard or seen messages about HIV/AIDS? On the television?

847 (Q847C)	In the last few months have you heard or seen messages about HIV/AIDS? In a newspaper or magazine?
847 (Q847D)	In the last few months have you heard or seen messages about HIV/AIDS? In a poster?
847 (Q847E)	In the last few months have you heard or seen messages about HIV/AIDS? In a leaflet or brochure?
	Peer Influence on Condom Use
1012 (Q1012)	Did anyone outside your family ever talk to you about sex-related matters?
	Family Influence on Condom Use
1010 (Q1010)	Did anyone in your family ever talk to you about sex-related matters?
	Family Pressure on Sexual Abstinence
786 (Q786B)	From whom do you feel pressure not to have sexual intercourse? [Mother]
786 (Q786C)	From whom do you feel pressure not to have sexual intercourse? [Father]
786 (Q786D)	From whom do you feel pressure not to have sexual intercourse? [Brother]
786 (Q786E)	From whom do you feel pressure not to have sexual intercourse? [Sister]
786 (Q786F)	From whom do you feel pressure not to have sexual intercourse? [Other Female Family Member]
786 (Q786G)	From whom do you feel pressure not to have sexual intercourse? [Other Male Family]

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