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HIV Knowledge and Behaviors Among Young People in Kenya and Lesotho

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Beatrice Ochieng

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Walden University
2020

Abstract

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by

Beatrice Ochieng

MPH, Jomo Kenyatta University of Agriculture and Technology, 2012

BS, Egerton University, 1998

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Public Health

Walden University

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Abstract

Sub-Saharan Africa (SSA) has a great burden of human immunodeficiency virus (HIV) and high new HIV infection rates among youths age 15-24 years. Suboptimal practice of HIV risk-reducing sexual behaviors among youths threatens to reverse the gains made in preventing the spread of HIV in SSA. The purpose of this quantitative cross-sectional study was to investigate the effects of comprehensive knowledge of HIV transmission and prevention, on individuals' attitude toward people living with HIV, and ability to obtain condoms (if needed) on practice of HIV risk-reducing sexual behaviors, in adolescents age 15-19 years and young adults age 20-24 years in Kenya and Lesotho. The information-motivation-behavioral skills model was used to frame the study. Secondary data were collected from the demographic health survey in Kenya and Lesotho using responses from 11,120 individuals. Statistical analyses included chi-square and multinomial logistic, bivariate, and multiple regression. Findings indicated that individuals with comprehensive knowledge of HIV were more likely to report having one sexual partner and using a condom with them ($p < 0.05$). Those with negative attitudes toward people living with HIV were more likely to report abstaining ($p < 0.05$), and those not able to obtain a condom were more likely to report abstaining ($p < 0.05$). Adolescents were more than 3 times more likely to report abstaining than young adults. There were no differences noted between Kenya and Lesotho. Results indicate providing age-appropriate information to stakeholders and increasing youth-friendly condom distribution points, which may enable adolescents and young adults to practice sexual fidelity and use condoms, may result in reduction of new HIV infections in Kenya and Lesotho.

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Dedication

I dedicate this doctoral study to a special friend, Simon-Pierre (SP) Tegang, and my children, Tevin Oyugi and Rose Chiara Oyugi. Through SP's constant follow-up, advice, and support, I found the strength to push on when all was extremely difficult. He saw the potential in me and cheered me on even when I greatly doubted myself; for this, I just had to do right by him and soldier on. My son Tevin challenged me during my work and constantly asked for the graduation dates as he had to be there to celebrate with me. On days that I did not have the strength, I remembered him saying, "You are the most determined person I know." How could I then fail him? My daughter Rose was my other inspiration, especially to hang on to the end. I named Rose after my mum who died in 2015 when I had just begun my doctoral journey. At the height of my mourning, I almost gave up. In fact, I took almost a year's break before resuming. My daughter is one of the cleverest and most supportive people I know; she has a lovely voice and was my voice over in one of my assignments in my doctoral journey. To these two roses in my life, this journey had to be completed. Thank you very much for believing in me and giving me the courage to achieve this.

Acknowledgments

First, I would like to express my sincere appreciation to my committee chair, Dr. Barnett, to my committee member, Dr. Li, and to other faculty members. I wish to thank Dr. Barnett for her untiring guidance through this doctoral study. I am indebted to her follow-up to ensure that I kept on track, her prompt feedback on numerous drafts, her passion for the MEAL plan approach to writing, her resourcefulness in sharing reference documents, and her encouragement and guidance. Special thanks to Dr. Li for the support in identifying the appropriate statistics for my study and ensuring that it was coherent with the study design and addressed my research questions. Thank you for allowing me the opportunity to bounce ideas off you prior to including them in my write-up. To Dr. Vania Bright, capstone support editor, thank you very much for your 1-hour edit. Through it, you taught me about sentence structure, use of the MEAL plan, and APA format. This short and brief interaction was essential to improving my writing, and I referred to it constantly as I wrote this final document.

To my family, I appreciate you for bearing with me when I was too busy to attend to you or when I snapped due to my heavy workload. Thank you for your understanding, love, patience, and support.

Finally, I am grateful to all the fallen heroes who succumbed to HIV, all those living with HIV, and families affected by HIV worldwide, in Africa, and in my beloved country Kenya. Your lives and struggles were the motivation to do this. I am forever grateful for your contribution to the information I read in my literature review to ground my work.

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Section 1: Foundation of the Study and Literature Review

HIV remains an enormous public health problem in sub-Saharan Africa (SSA), negatively affecting the lives of people living with HIV and their families. In West Africa, where an estimated five million people live with HIV, Dauda (2018) found that HIV had a significant negative impact on life expectancy. Mudzengi et al. (2017) estimated the economic burden of HIV on people living with HIV (PLHIV) in South Africa to be 40 U.S. dollars per month, increasing to 74 dollars a month for those with TB coinfection. Another concern was the effect of HIV on the health system. Naicker and Maharaj (2016) found that 50% of patients visiting the emergency department in KwaZulu-Natal in South Africa had HIV. These visits to the emergency department were likely due to opportunistic infections that resulted from a weakened immune system following an HIV infection (Centers for Disease Control and Prevention [CDC], 2017). The pooled prevalence of pneumocystis pneumonia among PLHIV in SSA was 15.4% (Wasserman, Engel, Griesel, & Mendelson, 2016). In certain SSA settings, TB prevalence among children living with HIV was estimated at 57% (Rabie, Frigati, Hesseling, & Garcia-Prats, 2015). These studies illustrated the negative impact HIV had on health through increased morbidity and mortality because of HIV and HIV-related infections, high strain on the health system, and increased costs to the patients and their families. The studies also show that although the burden of HIV remained important across SSA, HIV prevalence and rate of new infections varied across ages.

Globally, new HIV infections among youths 15-24 years of age remained high. The World Health Organization (WHO) (2018a) estimated that as many as 30% of all

estimated new HIV infections globally were among. Over 80% of these new infections occurred among youths in SSA (The Joint United Nations Programme on HIV/AIDS [UNAIDS], 2018). UNAIDS (2018) estimated that 34% of the 53,000 new infections in Kenya in 2017 occurred among individuals age 15-24 years. Similarly, in Lesotho, 30% of the estimated 15,000 new infections in 2017 were among this same age-group (UNAIDS, 2018). Although efforts had been made to promote safer sexual behaviors, a high proportion of these new infections were sexually transmitted, likely because of unsafe sexual practices (WHO, 2018a; Ng'eno et al., 2018). For example, Ng'eno et al. (2018) found that 84% of the infections among 15- to 24-year-olds in Kenya were attributed to sexual transmission. Studies in Kenya and Lesotho indicated that there was a high proportion of men engaging in multiple sexual relationships without using condoms (Mhele, 2017; Sandøy et al., 2012). The studies confirmed that although safer sexual practices would reduce HIV transmission (CDC, 2018), youths 15-24 years of age were still engaged in high-risk sexual behavior, which predisposed them to HIV transmission. Although the studies provided critical information on HIV infection among young people, the researchers assumed that individuals age 15-24 years were homogenous. Therefore, to reduce new infections among youths, it was important to gather evidence on influencers of practice of safer sexual practices among youths that addressed adolescents (15-19 years) and young adults (20-24 years) separately.

I conducted a quantitative cross-sectional study using secondary data to investigate the effects of comprehensive knowledge of HIV transmission and prevention, an individual's attitude toward PLHIV, and ability to obtain condoms (if needed) on HIV

risk-reducing sexual behaviors, specifically abstinence, condom use, and limiting sex to one sexual partner, among adolescents age 15-19 years and young adults age 20-24 years in Kenya and Lesotho. This study design focused on Kenya and Lesotho because these countries had high burdens of HIV (UNAIDS, 2018) and because they had comparable data sets from the demographic health surveys (DHSs) conducted around the same time. Further, I examined how sexual knowledge and behavioral practices differed among adolescents age 15-19 and young adults age 20-24 while controlling for confounding variables of gender, socioeconomic status, education level, and marital status. The study contributed age-specific information on adoption of safer sexual practices related these two-key age-groups, which was identified in previous studies as limited (Idele et al., 2014). The study may lead to positive social change by providing information that would enable public health providers to target their programs to improve HIV knowledge, promote adoption of safer sexual practices, and ensure a reduction in new HIV infections for adolescents and young adults.

Section 1 includes the problem statement that provided an analysis of the gaps in literature relating to youths and new HIV infections that were addressed in the study. Additionally, Section 1 includes the purpose of the study, the research questions and hypotheses, the theoretical foundation of the study, the nature of the study, and literature search strategies. The section also contains a literature review that includes an exhaustive discussion of published articles related to key variables and research questions, as well as the definitions, assumptions, scope and delimitations, significance, summary, and conclusions.

Problem Statement

HIV incidence among youths age 15-24 years in SSA seemed to be high because of high-risk sexual behavior. According to UNAIDS (2018), an estimated 36% (or 290,000 infections) of the new HIV infections in Eastern and Southern Africa in 2017 occurred among youths age 15-24 years. In Kenya and Lesotho, an estimated 34% and 33%, respectively, of the number of new HIV infections were among youths in the same time period. As in other parts of SSA, the new HIV infections among youths were largely due to heterosexual sex (Kharsany & Karim, 2016). High-risk sexual practices were predominant in Kenya and Lesotho and could have contributed to the high rate of HIV infections witnessed among youths (Mhele, 2017; Sandoy et al., 2012). However, data on the effects of the comprehensive knowledge of HIV, an individual's attitude toward PLHIV, and ability to obtain condoms (if needed) on practice of HIV risk-reducing sexual behaviors disaggregated by ages 15-19 years and 20-24 years was limited. These disaggregated data were needed for use in developing programs targeting young people that would promote safer sexual practices required to hasten declines in HIV incidence and reduce variabilities across ages.

HIV infections among youths had declined, but their proportionate contribution to total number new HIV infections remained high. Across SSA, the number of new HIV infections among youths 15-24 years fell by 48% (from 870,000 to 420,000) between 1996 and 2017 (UNAIDS, 2018). In Kenya, new infections among youths 15-24 years declined by 70% from 65,000 in 1996 to 18,000 in 2017 (UNAIDS, 2018). Although these declines among youths were commendable, HIV infections among youths

amounted to 34% of the new infections reported in Kenya in 2017 (The Joint United Nations Programme on HIV/AIDS, 2018). According to Becker et al. (2018), 36% of the 56,000 new HIV infections in Kenya were among adolescent girls and young women (15-24 years). In Lesotho, new infections among youths declined by 55% from 11,000 in 1996 to 5,000 in 2017 (UNAIDS, 2018). However, new infections among youths were 33% of the estimated new infections in Lesotho in 2017 (Dellar, Dlamini, & Karim, 2015; UNAIDS, 2018). Although new infections among youths in Kenya and Lesotho had declined, the youths still accounted for a significant proportion of new infections (UNAIDS, 2018). Increases in reductions were possible through adoption of safer sexual practices.

Suboptimal adoption of safer sexual practices such as abstinence, consistent use of condoms, and limiting sex to one sexual partner could have been contributing to the new HIV infections among youths in Kenya and Lesotho. Ng'eno et al. (2018) studied 10- to 24-year-olds in Kenya and observed that 84% of HIV infections among them were due to sexual transmission, which could have been prevented if safe sex had been practiced. In Lesotho, Mhele (2017) found that 29% of men reported having multiple sexual relationships in the last 12 months. However, Mhele did not indicate whether condoms were used during the sexual encounters in the multiple sexual relations. In Malindi Kenya, Sandoy et al. (2012) found that consistent condom use with casual sexual partners was 64% in urban settings and 36% in rural settings. These studies suggested that the prevalence of high-risk sexual practices in Kenya and Lesotho could have been contributing to the new HIV infections among youths (Koenig, Hoyer, Purcell, Zaza, &

Mermin , 2016; Mhele, 2017; Sandøy et al., 2012). There was a need for in-depth analysis of factors that would improve adoption of safer sexual practices among youths in Kenya and Lesotho to reduce new HIV infections.

Previous studies suggested that inadequate knowledge of HIV transmission, prevention, and treatment could have been impacting practice of HIV risk-reducing behaviors such as abstinence, condom use, and limiting sex to one partner among youths in Kenya and Lesotho. Awotidebe, Phillips, and Lens (2014) in their study in South Africa (Lesotho's only neighbor) found that HIV knowledge was one of the factors that influenced age at first sex, condom use at first and last sex, and number of lifetime partners among young people age 15-18 years. Idele et al. (2014) found that low HIV knowledge among young people (10-19 years) affected the use of condoms, access to HIV counseling and testing, and enrollment in antiretroviral therapy. Ndabarora and Mchunu (2014) found that although knowledge of HIV prevention was high among university students age 17-48 years in South Africa, use of HIV preventive services remained low due to inadequate knowledge and awareness of the availability and location of these HIV services. These studies illustrated the value of correct HIV knowledge in the practice of different risk-reducing behavior ranging from delaying sexual debut, reducing number of sexual partners, condom use, and seeking HIV services. However, the issue of the possible effect of age and developmental changes on HIV knowledge and subsequent practice of risk-reducing behaviors was not discussed and needed to be examined.

Developmental changes and associated behavioral control manifest differently across age. Adolescence is marked by changes in social, physical, psychological,

emotional, and brain development (Pettifor et al., 2014). These developmental changes have been associated with an overactive reward system and increased need for sense of belonging, which when coupled with imbalanced behavioral control and low self-esteem leads to risky decision-making as compared to adults (Braams, van Duijvenvoorde, Peper, & Crone, 2015; Pettifor, et al., 2014). Even within the adolescent stage, risk-taking behaviors vary with early adolescents taking more risks than mid to late adolescents (Defoe, Dubas, Figner, & van Aken, 2015; Mwale & Muula, 2017). These nuances in risk taking across ages suggested that adolescents (15-19 years) and young adults (20-24 years) were not homogenous in the kinds of HIV risk behaviors in which they engaged, even though they were defined as youths (Soto & Tackett, 2015). These findings suggested the importance of delineating these two groups when designing behavior change programs.

Specific information on the two groups (15-19 years and 20-24 years) was needed to better understand the influence of HIV knowledge and attitudes on HIV risk-reducing behaviors among youths. The study population comprised youths between 15 and 24 years who participated in the DHS in Kenya and Lesotho. Individuals 15-19 years of age, also referred to as adolescents and still in the transitional stage of development, were separated from those age 20-24 years, also referred to as young adults (Kingston, Heaman, Fell, & Chalmers, 2012). I anticipated that this in-depth comparative analysis of adolescents and young adults would contribute to the literature on the effect of age differences on HIV knowledge and attitudes and their interrelation with risk-taking behaviors.

Purpose of the Study

The purpose of this quantitative cross-sectional study was to investigate the effects of the comprehensive knowledge of HIV transmission and prevention, an individuals' attitude toward PLHIV, and ability to obtain condoms (if needed) on practice of HIV risk-reducing sexual behaviors, specifically abstinence, condom use, and limiting sex to one sexual partner, in adolescents age 15-19 years and young adults age 20-24 years in Kenya and Lesotho. I used secondary data to examine how the independent variables comprehensive knowledge of HIV transmission and prevention, individual's attitude toward PLHIV, and reported ability to obtain condoms [male or female]) impacted HIV risk-reducing behaviors (abstinence, having one sexual partner, and/or consistent condom use). The dependent variable was self-reported practice of HIV risk-reducing behaviors (i.e., abstinence, having one sexual partner, and/or consistent condom use).

Research Questions and Hypotheses

Research Question 1: What is the relationship between comprehensive knowledge of HIV transmission and prevention and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years)?

H_a1: There is a relationship between comprehensive knowledge of HIV transmission and prevention and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years).

$H_0$1: There is no relationship between comprehensive knowledge of HIV transmission and prevention and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years).

Research Question 2: What is the relationship between an individual's attitude toward PLHIV and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years)?

H_a2: There is a relationship between an individual's attitude toward PLHIV and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years).

$H_0$2: There is no relationship between an individual's attitude toward PLHIV and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years).

Research Question 3: What is the relationship between the ability to obtain male or female condoms (if needed) and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years)?

H_a3: There is a relationship between the ability to obtain male or female condoms (if needed) and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years).

$H_0$3: There is no relationship between the ability to obtain male or female condoms (if needed) and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years).

Research Question 4: What is the mediating effect of the ability to obtain condoms on the relationship between the two independent variables, namely an individual's comprehensive knowledge of HIV transmission and prevention and their attitude toward PLHIV, and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years)?

H_a4: The ability to obtain condoms is a mediator in the relationship between the two independent variables, namely an individual's comprehensive knowledge of HIV transmission and prevention and attitude toward PLHIV, and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years).

H_04: The ability to obtain condoms is not a mediator in the relationship between the two independent variables, namely an individual's comprehensive knowledge of HIV transmission and prevention and attitude toward PLHIV, and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years).

Theoretical Foundation for the Study

Origin and Key Assumptions of the Information-Motivation-Behavioral Skill Model

There are several models that frame studies to access the effect of correct and relevant information, motivation to act, and appropriate behavioral skills on a desired behavior change to occur. This study was framed by the information-motivation-behavioral skills (IMB) model developed in 1992 (Tuthill, Butler, Pellowski, & McGrath, 2017). The IMB model is a general social psychological model for understanding and

promoting health-related behavior (Tuthill et al., 2017). The IMB was developed to establish the psychological determinants of HIV risks and prevention (Fisher & Fisher, 1992). The model is based on three constructs: information, motivation, and behavioral skills (Fisher & Fisher, 1992). The model assumes that health-related information, motivation, and behavioral skills are fundamental determinants of performance of health behaviors (Fisher, Fisher, & Harman, 2003). The extent to which an individual possesses correct information on a behavior, is motivated to act on it, and has the required behavioral skill determines their likelihood to initiate and maintain a health-promoting behavior and experience the associated positive health outcomes.

Appropriate manipulation of each of the three IMB constructs is necessary for desired behavior outcome to occur. As shown in *Figure 1*, the three constructs play an important role in influencing practice of a recommended behavior (Fisher & Fisher, 1992). Information that is relevant to a given health behavior is important in influencing its performance or practice (Fisher et al., 2003). In the current study, such information included facts about health promotion, for example that using a condom protects a person from HIV, and relevant heuristics such as monogamous sex is safe. For a well-informed individual, motivation acts as an additional determinant to performing or practicing the recommended behavior (Fisher et al, 2003). The model presupposes that personal motivation, such as attitudes toward an aspect of the health behavior, and/or social motivation, such as support to perform the behavior, are crucial influences to performing the behavior (Fisher et al., 2003). In the current study, I presupposed that attitudes toward people living with HIV would influence the practice of HIV risk-reducing behaviors. The

likelihood to act or perform the recommended health behavior among individuals who are well-informed and well-motivated is enhanced by behavioral skills. Behavioral skills as defined by the IMB model are a person's objective ability and their sense of self-efficacy (Fisher et al., 2003). In the current study, I assumed that an individual who knew about and felt comfortable with acquiring a condom (male or female) was more likely to use the condom. All three constructs of the IMB model play a complementary role in enabling the performance of a given health behavior, which in this study was the practice of any risk-reducing behaviors, namely abstinence, limiting number of sexual partners to one, and/or consistently using condoms.

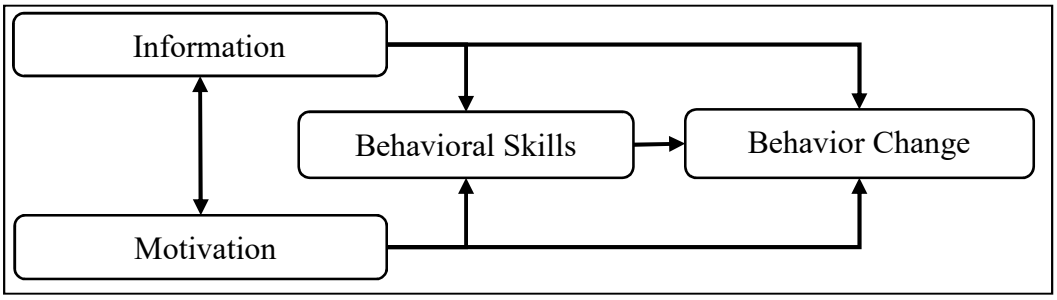

Figure 1. The information-motivation-behavioral skills (IMB) model. Adapted from Social Psychological Foundations of Health and Illness (p.86), by W. A. Fisher, J. D. Fisher, and J. Harman, 2003. Maiden, MA: Blackwell. Copyright 2009 by Blackwell Publishing.

Rationale for Applying the IMB Model to the Study

The IMB model has been used to guide the development of programs to address complex health problems targeting different population groups with mixed success. Pitpitan et al. (2015) used the IMB to design an experimental intervention to promote condom use among sexually transmitted infection (STI) clinic clients focusing on providing appropriate information through counseling on condom use and its role in HIV prevention. Dewing et al. (2015) used the IMB model to describe the frequency of

structural- and individual-level barriers experienced by people on antiretroviral treatment (ART) and determine the predictors of nonadherence to ART. These studies were based on the model's assumption that specific sets of information, personal and social motives, and behavioral skills would be relevant in influencing behavior change in targeted population groups (Fisher et al., 2003; Pitpitan et al., 2015). Although Dewing et al. found that the three constructs (information, motivation, and behavioral skills) influenced adherence to ART, Pitpitan et al. found that the IMB constructs did not have any influence on the STI patients in which it was applied. The model's constructs and relationship among them are considered generalizable determinants of health promotion behavior across populations and in different health areas (Fisher et al., 2003; Pitpitan et al., 2015). However, there were limited studies framed by the model that addressed factors that influence practice of HIV risk-reducing behaviors among adolescents. The rationale for using the IMB model was to determine, which of the model constructs would be influential in promoting the adoption and practice of risk-reducing behaviors among youths in Kenya and Lesotho.

IMB was selected to inform this study because it describes the influence of relevant information, motivation (personal and social), and behavioral skill on behavior change. The four research questions related to the model and were designed to determine what relationship existed between any of the IMB constructs and practice of risk-reducing behaviors among adolescents (15-19 years) and young adults (20-24 years) in Kenya and Lesotho. The study was also designed to determine whether any relationships were observed across age-groups and geography. The final research question addressed

whether there were interrelationships between the constructs that influence practice of risk-reducing behaviors (see Fisher, et al., 2003). Therefore, the study was built on the model assumption that a person's ability to adopt recommended HIV risk-reduction behavior was dependent on their information on HIV transmission and prevention, their motivation to adopt the risk-reducing behavior, and their behavioral skills to perform the proposed behavior (see Fisher & Fisher, 1992). *Figure 2* provides an illustration of the factors in this study that aligned with the model constructs.

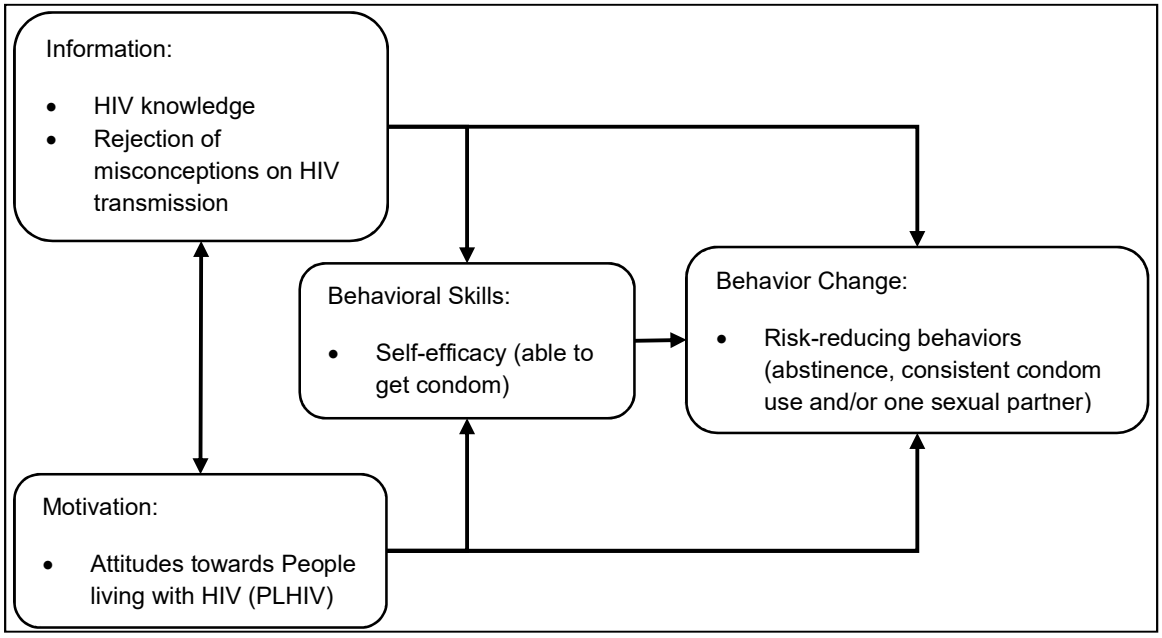

Figure 2. Illustration of application of the IMB model in this study.

Logical Connections Among Key Elements of IMB

In the IMB model, information, motivation, and behavioral skills are the three main constructs whose interrelation leads to desired behavior change. For an individual to practice a recommended behavior, there is need for the individual to be exposed to and comprehend appropriate information on a desired behavior (Fisher et al., 2003). The

likelihood of practicing the recommended behavior is enhanced if the individual is well-motivated personally or socially (Tuthill et al., 2017). The probability of practicing the recommended behavior is increased further if the individual is exposed to and comprehends relevant information, is well motivated, and has suitable behavioral skills (Fisher et al., 2003). I expected that having good knowledge of HIV prevention and transmission (information), positive attitudes relating to HIV (motivation), and high self-efficacy (behavioral skills) would increase the likelihood of practicing HIV risk-reducing behaviors such as condom use, reduced number of sexual partners, and avoidance of sex. Behaviors such as practicing abstinence are simple or uncomplicated; therefore, not all three constructs are in play to influence the practice of abstinence, only information and motivation (Fisher et al., 2003; Pettifor et al., 2014). All three constructs play different roles in promoting practice of desired health outcomes, and in some uncomplicated health outcomes only information and motivation constructs are needed.

Relationship of the IMB and Study Approach

A good understanding of the target population is key in developing effective programs that would lead to desired health outcome. According to the IMB model, the first step to promoting health behavior is conducting an elicitation study with a representative sample of the target population to better understand their practice of risk-reducing behaviors and IMB constructs that influence them (Fisher et al., 2003; John, Walsh, & Weinhardt, 2017; Smith, et al., 2013). The current study was conducted to understand whether the IMB constructs influenced the practice of risk-reducing behaviors among youths in Kenya and Lesotho using a quantitative approach based on secondary

data collected from a nationally representative survey (DHS). Additionally, I sought to determine whether there were differences between individuals age 15-19 years and those age 20-24 years. The interrelationship between the three constructs was also examined to determine whether they act singularly or jointly to influence practice of risk-reducing behaviors. Findings may provide a better understanding of the target population that could be used in the design of future programs.

In this study, the interrelationship between each of the three constructs and risk-reducing behaviors among youths was examined. Firstly, I sought to determine what relationship existed between information and risk-reducing behavior (outcome). Information was measured by comprehensive HIV knowledge defined as the correct knowledge of HIV transmission and preventive approaches (including sexual abstinence, having one sexual partner, and correct and consistent condom use) and dispelling of misconceptions of HIV transmission (for example, that mosquitos transmit HIV). Second, I determined what relationship existed between motivation and risk-reducing behavior. Motivation in the study was defined as the participant's attitudes toward PLHIV (for example, whether they think a person living with HIV should be allowed to engage in economic activities such as teaching). Third, I examined what relationship existed between behavioral skills and risk-reducing behavior. In the study, behavioral skills or an individual's self-efficacy was defined as the perceived ability to obtain a condom (male or female) if desired. Finally, I examined whether behavioral skill mediated the influence of information and/or motivation to adopt risk-reducing behaviors. The outcome variable was the practice of risk-reducing behaviors. The risk-reducing behaviors were one or

more of the following: abstinence (primary or secondary), correct and consistent condom use, and limiting sex to one sexual partner.

Nature of the Study

Rationale for the Selection of the Design

This was a quantitative cross-sectional study that included secondary data to determine the relationships, if any, between the three independent variables (IVs) and the self-reported practice of HIV risk-reducing behaviors (DV). The data set came from DHS studies that included internationally recognized sampling approaches to collect nationally representative data through household interviews. The data set allowed for in-depth analysis of the relationships between the independent and dependent variables, and results were generalizable across eligible youths in the respective countries (Kenya and Lesotho).

Description of Key Study Variables

The study had three independent variables (IVs) and one dependent variable (DV). The IVs were comprehensive knowledge of HIV transmission and prevention, an individual's attitude toward PLHIV, and reported ability to obtain condoms (male or female). Comprehensive knowledge of HIV transmission and prevention related to the information construct and established the respondent's understanding of sexual means of HIV transmission including dispelling misconceptions. An individual's attitude toward PLHIV was the motivation construct and was measured by whether individuals had a supportive attitude toward PLHIV. The last independent variable was the reported ability to obtain condoms (male or female), which illustrated the respondent's self-efficacy

relating to sexual decision-making. The DV was self-reported practice of HIV risk-reducing behaviors. The DV attributes included reported practice of known ways of prevention of sexual HIV transmission, namely sexual abstinence, limiting sexual partners to one, or use of condoms.

Summary of Methodology

The data set used was from DHS studies conducted in Kenya and Lesotho in 2014. DHS studies are national representative studies that include information on different health issues among individuals age 15 years and above and are conducted at the household level (Kenya National Bureau of Statistics and Ministry of Health, 2015). The data were collected using standardized questionnaires that had been pretested and tested over time across different countries. The questionnaires were composed mainly of closed-ended questions with provision to record other options not included in the precode list. In each country, the questionnaires were translated to the local languages and were taken through further pretesting to ensure appropriate comprehension and that question meaning was not lost in translation (Harris, 2010).

Data manipulation was conducted before I proceeded to analysis because the study included two different data sets from Kenya and Lesotho. Data on all individuals between 15 and 24 years of age in the Kenya and Lesotho DHS data sets were extracted and merged. The extraction and merging included the IVs and DV that were multidimensional concepts whose data in the DHS data set were collected through a set of two or more indicators or questions. Prior to analysis, the indicators or questions forming the IVs were combined to form composite variables with their attributes defined

during this process. A similar process was applied to the indicators or questions related to the DV.

Literature Search Strategy

List of Accessed Library Databases and Search Engines

The search for current peer-reviewed articles was conducted using the Walden University online library. The databases included CINAHL, MEDLINE, ProQuest health and medical collection, ProQuest nursing and allied health source, PsycINFO, and PubMed. Google Scholar was also used to find open access articles published in different journals worldwide. The internet was also used to search for articles and documents published by different credible organizations and governments on HIV.

List of Key Search Terms Used

In the search, the following search terms and combination of terms were used to locate articles specific to this study: *HIV*, *HIV incidence in Kenya*, *HIV incidence in Lesotho*, *HIV prevention*, *HIV risk factors*, *HIV risk factors in Kenya*, *HIV risk factors in Lesotho*, *sexual behavior*, *multiple sexual partners*, *condom use, HIV* and *adolescents*, *HIV* and *young people*, *unsafe sexual practices*, and *information-motivation-behavior model*.

Description of Scope of Literature Review

The literature review search was limited primarily to peer-reviewed articles published between 2014 and 2019. Older articles were reviewed to provide context where newer articles were limited or not available. The literature review comprised peer-reviewed articles published in journals, relevant books, and information and documents

from credible organizations and government websites. The CDC, WHO, and UNAIDS websites were used to obtain facts on HIV prevention, transmission, and treatment as well as policy guidance.

Literature Review Related to Key Variables and/or Concepts

In this section, I provide an extensive review of the current literature on HIV infection in SSA. The review provides a description of studies related to the constructs of interest as well as the methodology and methods. I also explain ways researchers in the discipline have approached the problem; provide an analysis of relevant studies related to the key independent, dependent, and covariate variables in the study; and synthesize studies related to the research questions. Finally, I provide definitions, assumptions, and the scope and delimitations of the study.

Studies Related to IMB and HIV Risk Reduction

There was considerable empirical support for the assumptions of the IMB model in HIV prevention. For example, Macapagal, Greene, Andrews, and Mustanski (2016) examined links between the relationship-oriented IMB model, relationship characteristics, and HIV risks among young men who have sex with men (MSM). Macapagal et al. noted that the lack of condom use was associated with low relationship-related HIV preventive information, motivation, and behavioral skills. Further, low behavioral skills were associated with lack of HIV testing and alcohol use before sex (Macapagal et al., 2016). Low motivation and behavioral skills were associated with individuals feeling trapped in the relationship or being physically abused by a partner (Macapagal et al., 2016). Shrestha, Altice, Huedo-Medina, Karki, and Copenhaver (2017)

used the IMB model to characterize and guide intervention development for promoting use of pre-exposure prophylaxis (PrEP) among high-risk people who use drugs. Shrestha et al.'s study, which involved analysis of people who reported drug and/or sex-related HIV risk behavior, indicated that PrEP-related behavioral skills facilitated the influence of PrEP-related information and motivation on the willingness to use PrEP. Bahramia and Zaranib (2015) found that among male students in the United States, there was a significant relationship between perception of HIV risk and sexual behavior. These studies illustrated the relevance of the IMB model in understanding and promoting health-related behavior. Further, the researchers used quantitative approaches with representative samples to examine how IMB impacted different health behaviors under investigation.

Information construct. Although IMB presupposes that an individual with relevant information about a health issue is likely to practice the desired health behavior, studies indicated mixed findings (Fisher et al., 2003). Do, Figueroa, and Lawrence (2016) found that communication did not result in young people age 16-24 years seeking HIV testing; rather, communication led to open discussions related to HIV. A study conducted in Nigeria indicated that ignorance or lack of information regarding the need for regular use of medication was an inhibitor to hypertension treatment adherence (Odusola et al., 2014). Van Veen, Winkels, Janssen, Kampman, and Beijer (2018) found that individuals who obtained nutritional information were more likely to change their dietary behaviors to align with the recommendations of the World Cancer Research Fund. These studies illustrated that information could lead to desired changes in some instances but not

always. I sought to determine whether the information construct influenced practice of risk-reducing behaviors among youths in Kenya and Lesotho.

Motivation construct. This construct presupposes that a person's personal motivation could determine their practice of a health behavior change. Motivation represents multiple dimensions in beliefs, attitudes, perceptions, and feelings and how these affect specific actions on the recommended behavior (Fisher et al., 2003). Motivation determines whether an individual will act on what they know regarding HIV prevention and transmission. Bahramia and Zaranib (2015) found a significant relationship between perception of HIV risk and sexual behavior. Other studies indicated that attitudes affect utilization of HIV services. A mixed methods study indicated that motivational factors influenced adherence decision-making among Spanish-dominant Hispanics living with HIV (Jacobs, Caballero, Ownby, Acevedo, & Kane, 2015). However, the relationship between motivation and sexual behavior has not always been found to be significant. Pitpitan et al. (2015) found no relationship between motivation and sexual risk reduction among STI patients in Cape Town South Africa. Based on the findings from these studies, I concluded that it was important to examine the relationship between motivation and sexual risk reduction among youths in Kenya and Lesotho.

Behavioral skill construct. The IMB model asserts that having knowledge and motivation is not always enough for behavior change to occur. An individual need to have the skill or self-efficacy to implement the behavior (Fisher et al., 2003). Previous studies showed a correlation between behavior skill and HIV behavior change. Camilleri, Kohut, and Fisher (2015) found a positive correlation between condom negotiation

strategies and motivational constructs and found a negative association between strategies for avoiding condom use and consistent condom use. Espada, Morales, Guillen-Riquelme, Ballester, and Orgiles (2016) established that behavioral skills predicted behavior through motivation. Condom use self-efficacy was found to be directly associated with frequent condom use (Camilleri et al., 2015). The IMB model presupposes that HIV information and motivation are facilitated through behavioral skills, though information may sometimes act directly without behavioral skill. The interrelationships across these IMB constructs related to HIV prevention among youths in Kenya and Lesotho was unclear.

Strengths and Weaknesses of Previous Studies

Researchers have applied a wide range of approaches to understanding HIV transmission and prevention among youths with mixed outcomes. Macapagal et al. (2016) sought to improve research on young MSM's knowledge, motivation, and behavioral skills regarding relationship-related HIV prevention and how they relate to HIV risk and partnership characteristics. Macapagal et al. conducted a quantitative study involving 96 young MSM and assessed condom use and HIV testing (IVs) and not engaging in sex after consumption of alcohol (DV). The IVs were relationship-oriented IMB. The study indicated the influence of the different constructs on the different HIV risk-reducing behaviors (Macapagal et al., 2016). For example, the condom use was associated with relationship-related HIV preventive information, motivation, and behavioral skills (Macapagal et al., 2016). However, Macapagal et al. did not explore the interrelationship between the model constructs and whether any of the constructs played

an additive role (see Fisher et al., 2003). It was not clear whether information and/or motivation influences behavioral skills (Fisher et al., 2003). Although Macapagal et al.'s study illustrated mixed outcomes with the use of IMB, other studies have shown different findings.

Some researchers have documented the influence of the IMB constructs on behavior change and the interrelationship of the constructs. Shrestha et al. (2017) conducted an IMB-based study to explore willingness of high-risk drug users to use PrEP. Shrestha et al. conducted a secondary data analysis involving 400 HIV-negative high-risk people who use drugs enrolled in a community-based methadone maintenance treatment program. Shrestha et al. found that willingness to use PrEP was influenced by provision of PrEP-related information as well as the individual's motivation. Further, Shrestha et al. found that PrEP-related behavioral skills mediated the effect of the PrEP-related information and motivation on willingness to use PrEP. Bahramia and Zaranib (2015) conducted a study based on the IMB model to determine the relationship between with the model constructs and risky sexual behavior. Bahramia and Zaranib (2015) study used 151 male students randomly selected. The male students responded to four different questionnaires including the quality of HIV information questionnaire, national AIDS questionnaire, international AIDS questionnaire, and global positive attitude to AIDS questionnaire. Bahramia and Zaranib established that behavioral skills or HIV risk perception influenced sexual behavior. Although correlations were tested, Bahramia and Zaranib did not find any interrelationship between the constructs. These studies corroborated the IMB model assumptions that behavioral skill may or may not influence

the effect of information and motivation. These studies illustrated the relationship between the model constructs, the dependent variable, and the interrelationships between the model constructs.

Rationale for Selecting the Study Variables

There was limited information on the interrelationship between comprehensive knowledge of HIV transmission and prevention, an individual's attitude toward PLHIV, and reported ability to obtain condoms (male or female) (IVs), and IVs and the practice risk-reducing behaviors (DV). Based on the IMB model assumptions, I presupposed that having appropriate information on a specific health issue, being well-motivated, and having the necessary behavioral skills would lead to behavior change (Fisher et al., 2003). In this study, I assumed that youths who had the correct information of HIV prevention, had positive attitudes toward PLHIV, and were able to obtain a condom were more likely to practice risk-reducing behaviors. Macapagal et al. (2016) found that these IVs improve risk-reducing behaviors among college and high school students. In this study, I examine the relationship between these IVs and practice of HIV risk-reducing behaviors among youths age 15-24 years.

Review of Studies Related to Independent, Dependent, and Covariate Variables

In this sub-section, I describe studies related to the independent, dependent, and covariate study variables. The study independent variables are comprehensive knowledge of HIV transmission and prevention, an individual's attitude toward PLHIV, and reported ability to obtain condoms (male or female) if needed. The dependent variable is self-reported practice of HIV risk-reducing behaviors including abstinence, having one sexual

partner, and consistent condom use. Covariate variables such as socioeconomic status, sociocultural factors, and gender, influence, the practice of HIV risk-reducing behaviors (WHO, 2018a) as such I have discussed them herein.

Comprehensive knowledge of HIV transmission and prevention. Previous studies showed the importance of HIV knowledge in the practice of risk-reducing behaviors and the prevention of HIV. Engelbrecht, Letsoalo, and Chirowodza (2017) conducted a study in North West province of South Africa to determine how knowledge of HIV and TB influenced provision of HIV and TB related services among home-based caregivers. Engelbrecht et al. found that HIV knowledge was comparatively higher than TB knowledge, but knowledge did not affect service delivery. Faust and Yaya (2018) conducted a systematic review and meta-analysis to determine the effect of HIV-related interventions in SSA on improving HIV-related knowledge and condom use. Faust and Yaya found that HIV-related knowledge interventions were effective at improving HIV-related knowledge and condom use. Hogg et al. (2017) conducted a study among adolescents age10-14 years living in Soweto, South Africa to establish their beliefs regarding the origin of HIV. Hogg et al. found that male participants, those unemployed and those that had lost a parent or close relative to HIV were more likely to believe in conspiracy theories regarding the origin of HIV. Kingori, Haile, Ngatia, and Nderitu (2017) in their study in Central Kenya found that HIV knowledge differed across gender, age, level of education, and marital status. Kingori et al. found that those with lower HIV knowledge were three times more likely to support the social exclusion of PLHIV. These studies illustrated the importance of having correct knowledge of HIV prevention and

transmission in promoting practice of HIV risk-reducing behavior (Faust & Yaya, 2018; Hogg, et al., 2017). There were limited studies on the relationship between knowledge of HIV prevention and transmission and practice of HIV risk-reducing behaviors among youths in Kenya and Lesotho.

Individual's attitude toward PLHIV. I presupposed that an individual's attitude toward PLHIV could potentially affect access and use of HIV services. Previous studies found that negative attitudes toward PLHIV was associated with stigma and discrimination and influenced the use of HIV services (Brown et al., 2016). Moalusi (2018) found that lack of acceptance of PLHIV was directly associated with HIV disclosure. According to Moalusi, the fear of unfair treatment by the employer and fellow colleagues, prevented employees living with HIV from disclosing their HIV status. Katz et al.'s (2015) study in South Africa found that the fear of unintended disclosure and social isolation prevented PLHIV from taking their HIV treatment. Jacobson, Niccolai, Mtungwa, Moll, and Shenoi (2017) found that some PLHIV lied about their HIV status and medication to prevent stigma and discrimination. Chao, Szrek, Leite, Ramlagan, and Peltzer (2017) found a 50% reduction in customers among businesses operated by PLHIV with known HIV status. Chao et al. established that customers did not patron the businesses for fear of contracting HIV. Previous qualitative studies also illustrate the negative attitudes toward PLHIV. Mukolo et al. (2013) describe the statement "*person who has AIDS should not be allowed to work with other people to protect the people who don't have AIDS*" as negative labeling and devaluation (NLD) construct. Mukolo et al. found that a positive association between knowledge of HIV prevention and transmission

and NLD and a negative association between efficacy of ARV and NLD. These studies illustrated that negative attitudes toward PLHIV could lead to negative health outcomes including treatment initiation delays, treatment interruption, poor health outcomes for the patient, and potentially onward transmission of HIV (Centers for Disease Control and Prevention, 2018). Negative attitudes toward PLHIV also affected their economic wellbeing as a result of loss of income (Chao et al., 2017). Based on these findings, I concluded that it was important to conduct studies to examine whether interventions in place are reducing HIV-related stigma and improving HIV prevention and treatment.

Reported ability to obtain condoms. There were limited studies on the ability to obtain condoms with most studies focusing on condom use. Condoms are highly effective in the prevention of HIV and other STIs and have been widely distributed in SSA as part of prevention programs (CDC, 2018). Hampanda, Ybarra, and Bull (2014) study explored the factors that influence the ability of youths in Uganda to obtain condoms. Hampanda et al. found that peer influence, self-esteem, family support, and demographic characteristics (such as age) were associated with condom acquisition. Musinguzi, et al. (2015) found that high cost of condoms and availability influenced the inability to obtain condoms. Further research is needed to understand factors associated with ability to obtain condoms when needed among youths in Kenya and Lesotho.

Self-reported practice of HIV risk-reducing behaviors. The dependent variable in this study is the practice of HIV risk-reducing behaviors. In this study, HIV risk-reducing behaviors were confined to abstinence, being faithful/ having one sexual partner, and consistent condom use, also known as the ABC of HIV prevention (Reid-

Hresko, 2014) . According to CDC (2018), sexual abstinence is the most effective way of preventing sexual transmission of HIV. Ng'eno et al. (2018) found that sexual transmission of HIV among youths is high implying low practice of abstinence. In the recent years, research has focused on determining factors that influence the practice of abstinence among young people. Eggers et al. (2017) study in South Africa found that social norms was the main predictor of intention to abstain among sexually inactive youths, but it had no effect among sexually active youths. According to Eggers et al., knowledge was associated with sexual activity among sexually inactive boys, attitudes and intention were associated with sexual activity among sexually inactive girls, and perceived risk was associated with abstinence among sexually active and inactive youths. Zhang, Jemmott, and Heeren (2015) study found that peer pressure and environmental security influenced decision were associated to decision to abstain among young people. Although these studies provided critical information that could inform programs targeting young people with abstinence, not all young people would choose to abstain.

Previous studies have demonstrated a correlation between HIV transmission and number of sexual partners. Having sex with one sexual partner of known HIV status reduces the risk of sexual transmission of HIV (CDC, 2018). When the sexual partner is HIV positive, use of ARVs is recommended for prevention of HIV through provision of PrEP to the HIV negative partner and provision of antiretroviral treatment to the HIV positive partner (CDC, 2018; Günthard et al., 2016; Thomson, et al., 2016). However, previous studies show that multiple concurrent partnerships (MCP) persist and the reasons for this were varied (Mhele, 2017; Sandøy et al., 2012). Krugu, Mevissen, Flore,

and Ruiter (2017) found that multiple sexual partnership was associated with lack of trust and masculinity beliefs among young boys. Onoya, Zuma, Zungu, Shisana, and Mehlomakhulu (2015) study in South Africa found that race, history of STI, length of relationships, and partner infidelity were predictors of MCP. Chialepeh and Sathiyasusuman (2015) study among youths in Malawi found that MCP was practiced by 69% of males and 35% of females. Onoya, Zuma, Zungu, Shisana, and Mehlomakhulu (2015) found that it was more acceptable to the community for MCP to be practiced by men than by women. Although these studies provided information on the prevalence of MCP and factors associated with its practice, the studies did not address the interrelationship between MCP and comprehensive knowledge of HIV or the ability to obtain condoms.

Correct and consistent use of condoms was the other risk-reducing behavior assessed in this study. Condoms when used consistently at each sexual interaction protects a person from HIV, other STIs, and unintended pregnancies (CDC, 2018). Although condom use has increased, its use is still suboptimal especially among youths (Appiah, Tenkorang, & Maticka-Tyndale, 2017; Simbayi et al., 2014). Studies on condom use among youths in Lesotho is limited, but there are some studies in neighboring South Africa. Ntshiqa et al.'s (2018) study in South Africa found that condom use at last sex was 68% and 55% among women aged 16-19 years and 20-24 years respectively. According to Ntshiqa et al., the use of condoms was associated with student status and exposure to HIV program. Heeren et al.'s (2014) found that 37% of men in South Africa with MCP used condoms in the last year with their casual partner.

Simbayi et al. (2014) found that condom use amongst young men was associated with MCP and amongst young women condom use was associated with type of settlement and length of the relationship. Appiah et al. (2017) study in Kenya using the theory of planned behavior found a direct relationship between attitudes toward condoms and condom use among young men and an indirect relationship among women. Appiah et al. found that young people with a higher intention to use condoms were more likely to report condom use at last sex. Ngure et al. (2012) found that the lack of appropriate knowledge of HIV prevented the use of condoms among sero-discordant couples in Kenya. These studies provided important information on barriers and motivators of condom use but did not look at risk-reducing behaviors in an integrated way.

Socioeconomic status. There are several studies on the interrelationship between socioeconomic status and health-seeking behaviors. However, the relationship between HIV infection and socioeconomic status is complex and not well understood (Bunyasi & Coetzee, 2017; Hajizadeh, Sia, Heymann, & Nandi, 2014). Magadi (2017) in a study in Kenya found that a disproportionately higher risk of HIV infection among urban poor as compared to rural poor. Magadi found that lower social cohesion combined with marked socioeconomic disparities increased vulnerability to HIV among the urban poor. Magadi found that declines in HIV infection in urban settings were mainly among those in the higher socioeconomic status (Magadi, 2017). Hajizadeh, Sia, Heymann, and Nandi (2014) conducted a metanalysis using data from 24 SSA countries and established that HIV infection was concentrated among individuals in higher socioeconomic status in all countries other than in Senegal and Swaziland. Hajizadeh et al. found that HIV infection

was concentrated among individuals in lower socioeconomic status in Senegal and Swaziland. Hajizadeh et al.'s findings were like Magadi's that found high HIV prevalence among the urban poor and rural rich in Kenya, Lesotho, Uganda, and Zambia. These studies established there was a relationship between socioeconomic status and HIV infection but that this relationship varied across geographies or settlements. In this study, socioeconomic status has been aligned to DHS definition, which is generated from a series of indicators including disposable income, poverty level, and education.

Previous studies have associated disposable income with health seeking behaviors and access and use of services. Gitahi-Kamau et al.'s (2015) study in Kenya established that progression to HIV disease was five times faster among PLHIV living on less than a dollar a day as compared to those living on five dollars a day. Munene and Ekman (2016) found that individuals from lower socioeconomic status were more likely to experience HIV treatment interruptions as compared to those from higher socioeconomic status. Handa et al.'s (2017) study in Kenya on the influence of a national poverty program on sexual debut did not find any correlation between socioeconomic status and age at sexual debut. Previous studies reported mixed findings on the relationship between HIV and education level. Hargreaveas, Davey, Fearon, Hensen, and Kristnaratne (2015) found higher HIV prevalence among more educated women in Ethiopia and Malawi and lower HIV prevalence among more educated women in Lesotho, Kenya, and Zimbabwe. Hargreaveas et al. established a relationship between HIV prevalence and education level among men in Tanzania. These studies illustrate the complex relation between

socioeconomic status and HIV. In the study, I controlled for socioeconomic status to minimize its effect on the outcome variables.

HIV and sociocultural factors. Culture could potentially influence access and use of HIV prevention and treatment services. Zimmermann (n.d.) defined culture as the characteristics, knowledge, and attributes shared by a group of people and includes language, religion, beliefs, practices, foods, social habits, music, and arts. Airhihenbuwa, Ford, and Iwelunmor (2014) defined culture as the way in, which a group of people behave and interact with each other and found that culture affected the success of health interventions. Although some cultural practices are okay, others have been associated with negative health outcomes. In Luo Nyanza in Kenya, the practice of wife inheritance and rites linked with funerals such as "*matanga disco*" [funeral disco] was associated with risky sexual behaviors and increased risk of HIV infection (Zolnikov, 2014). Perry et al. (2014) established that condoms were hardly used, and many times not recommended during these cultural practices. WHO (2018a) recommends the use of voluntary medical male circumcision in the prevention of HIV. Previous studies indicate that culture has impacted the implementation of voluntary medical male. Khumalo-Sakutukwa et al. (2013) found that male circumcision was rejected in some communities as it was considered alien and a deviation from traditional initiation practices conducted as a rite of passage into adulthood. These studies demonstrated that culture was important in the success of health interventions and should be incorporated in the design of behavior change interventions.

Culture and women. Previous studies found that culture placed undue pressure on women to conform to norms, beliefs, and practices that increased their vulnerability to HIV transmission. Perry et al. (2014) found that although women were aware of the risks associated wife inheritance, they were forced to practice it for fear of desertion and isolation that came from failure to meet cultural requirements. Okoro and Whitson (2017) established that, in some African communities, it was a taboo for women to discuss sex and sex-related issues and engaging in such discussions was considered a sign of promiscuity. Okoro and Whitson found that these cultural expectations influenced the women's ability to make decisions regarding sex, sexuality, sexual health, and negotiate for the use of condoms. Mugoya, Witte, and Ernst (2014) found that sociocultural factors were associated with higher incidences of intimate partner violence and partner rape. These studies illustrated that cultural practices negatively influenced the practice of HIV risk-reducing behaviors and put women and men at increased risk of HIV.

Religion. Religious beliefs as a component of culture could potentially influence the access and use of HIV services. De Jesus, Carrete, Maine, and Nalls (2015) found significantly lower rates of use of HIV testing services by foreign born black in the US as compared to US born black. De Jesus et al. found that the low use of HIV testing services was associated with various cultural and religious beliefs. De Jesus et al. established that an HIV test was associated with shame (to the person being tested and their families), deviating from cultural norms, and private. Muturi and Soontae (2010) observed that those who were highly religious displayed higher levels of stigma and referred to HIV as a curse or punishment from God. Arrey, Bilsen, Lacor, and Deschepper (2016) study

among African migrant women in Belgium found that religion was a source of inspiration, improved resilience, and helped individuals come to terms with their HIV positive diagnosis. These studies illustrate that religion can have a negative and positive influence on people's attitude and practices toward HIV and must be addressed for successful programming. Although I did not explore culture in this study, it is important in the implementation of HIV programs.

HIV and gender. There are several studies that explore the relationship between HIV and gender. According to UNAIDS (2018), women in SSA disproportionately bare the biggest burden of HIV. Although the female to male ratio remained slightly above one, HIV prevalence among women is higher with prevalence among young women in some settings being more than twice that of young men (Hegdahl , Fylkesnes, & Sandoy, 2016). According to Okoro and Whitson (2017) the higher HIV risk among women is as a result of social, behavioral, and structural factors, and gendered social norms that favor men and limit the ability of women to negotiate for safer sex. Harrison, Colvin, Kuo, Swartz, and Lurie (2015) established that structural factors included labor migration, family disruption, and social and economic inequalities. Durevall and Lindskog (2015) found that HIV infection among women in high HIV prevalence regions was associated with physical violence, emotional violence, and male dominance. Cools and Kotsadam (2017) found that sexual and gender-based violence amongst women in SSA was highly prevalent with some settings reporting more than 60% of cases. These studies illustrate that sociocultural factors disempower women, make discussions and decisions on sex, sexuality, and sexual health difficult, limit their ability to negotiate for safer sexual

practices, and increase their risk to HIV infection. Based on the findings from these studies, I incorporated gender comparisons to determine whether it influenced relationships between the IVs and DV.

Review of Studies Related to Research Questions

Comprehensive knowledge of HIV and HIV risk-reducing behavior. In this sub-section, I reviewed studies on the relationship between comprehensive knowledge of HIV and HIV risk-reducing behaviors. The IMB model presupposed that correct knowledge was key in prevention and treatment of different health issues (see, Fisher, Fisher, & Harman, 2003). According to Fisher et al., provision of relevant information on the desired behavior change was a prerequisite for the practice of the behavior. However, there were mixed evidence on the influence of HIV information on practice of HIV risk-reducing sexual behavior. Ngure et al. (2012) found that the lack of appropriate knowledge of HIV was a barrier to the use of condoms among sero-discordant couples in Kenya. Fonner, Armstrong, Kennedy, O'Reilly, and Sweat (2014), in their metanalysis of 64 studies conducted across different countries, found that school-based HIV education reduced HIV-related risk. Fonner et al. established that individuals with high HIV knowledge were more likely to report higher sexual self-efficacy in negotiating sex, use of condoms, and reduced number of sexual partners. Although Eggers et al (2017) found that knowledge was associated with sexual activity among sexually inactive boys, there was no relationship among sexually inactive girls. Marinho, Souza, Ferreira, Fernandes, and Cabral-Filho, (2012) established that high knowledge of HIV was not associated with the practice of HIV risk-reducing behaviors among adolescents. These findings illustrated

that knowledge of HIV was associated with practice of HIV risk-reducing behaviors in some settings, but not others. Based on these findings, I examined whether knowledge of HIV influenced practice of HIV risk-reducing behaviors among youths in Kenya and Lesotho.

Individual's attitude toward PLHIV and HIV risk-reducing behavior.

Although there were studies conducted focused on stigma and discrimination of PLHIV, studies on the effect of attitude toward PLHIV on practice of risk-reducing behaviors were limited. Beck et al. (2017) conducted a study on the attitudes toward MSM in seven Caribbean countries and its implication on an effective HIV response. Beck et al. found that there was lower participation in the national HIV response in countries where there were high negative attitudes toward MSM. Dahlui et al. (2015) study in Nigeria determined the existence of HIV-related stigma and discrimination, but did not examine the relationship between the negative attitude observed and practice of preventive behaviors and/or access to HIV services. Brown et al. (2016) illustrated the importance of addressing stigma and discriminating attitudes toward gay, MSM, and PLHIV for the successful roll out of new biomedical prevention technologies. Although there were several studies on stigma and discrimination, the studies did not explore how these influenced practice of HIV risk-reducing behaviors. In my study, I examine the relationship between an individual's attitude toward PLHIV and the practice of HIV risk-reducing behaviors.

Ability to obtain condoms (male/female) and HIV risk-reducing behavior.

There were limited studies on the relationship between ability to obtain condoms and

HIV risk-reducing behavior among youths in Kenya and Lesotho. Most researchers explored the inhibitors and promoters of condom use among different populations (Appiah, Tenkorang, & Maticka-Tyndale, 2017; O'Leary et al., 2015; Simbayi et al., 2014). Appiah et al. study examined the relationship between attitudes toward condoms and the use of condoms among young men. O'Leary et al. study found that interventions that addressed self-efficacy to negotiate condom use, correct condom use skills, and ability to exercise control were important in promoting risk-reducing behaviors. Simbayi et al. found that condom use was associated with MCP, which was higher among men as compared to women. Although these studies were on condoms, they did not explore the relationship between reported ability to obtain condoms and HIV risk-reducing behavior.

Definitions

The definitions of the independent, dependent, and covariate variables are provided in this subsection.

Adolescence: Is a transitional phase of growth and development between childhood and adulthood (WHO, 2018a).

Adolescent: Is any person between the ages of 10 and 19 years (WHO, 2018b).

Comprehensive knowledge of HIV transmission and prevention: In this study an individual was classified as having comprehensive knowledge of HIV transmission and prevention if, they knew that: HIV can be prevented through using condoms and having one uninfected faithful partner; a healthy-looking person can have HIV; HIV is not transmitted through mosquito bites; and HIV is not transmitted through sharing food with someone living with HIV.

Education level: Is the distribution of women and men age 15-24 by highest level of schooling completed at the time of the survey. Options included no schooling, primary completed, secondary completed, or higher than secondary completed. In DHS data set, education level was represented by codes mv149 for men and v149 for female (DHS program, 2018).

Individual's attitude toward PLHIV: In line with the DHS definition, individuals in this study were defined as having discriminatory attitude towards PLHIV if they: did not think that a female teacher living with HIV (but not having AIDS or sick) should be allowed to continue teaching; were unwilling to care for a family member living with HIV; would not disclose the positive HIV status of a close family member; and/or would not buy fresh vegetables from a shopkeeper who has HIV (DHS program, 2018).

Knowledge of HIV prevention: Individuals were defined as having knowledge of HIV prevention if they knew that risk of HIV transmission can be reduced through using condoms correctly at each sex and limiting sexual intercourse to one uninfected sexual partner. In the data sets, the responses to these questions were treated as separate variables. Those responding "yes" that people can reduce the risk of getting HIV by using a condom every time they have sex were coded as v754cp = 1 and mv754cp = 1 for women and men respectively; that people can reduce the risk of getting HIV by having just one uninfected sex partner who has no other sex partners was presented as women: v754dp = 1 and men: mv754dp = 1; and those responding "yes" to both were coded as women: v754cp = 1 & v754dp = 1 and men: mv754cp = 1 & mv754dp = 1 (DHS program, 2018).

Marital status: This is the marriage or cohabitation status as reported by the respondent. In the DHS data set, the variables were defined and coded as never married nor lived in a consensual union (women: v501=0; men: mv501=0); legally or formally married (women: v501 = 1; men: mv501 = 1); not legally or formally married but living with a man/woman in a consensual union (women: v501 = 2; men: mv501 = 2); widowed from a marriage or consensual union and not remarried or not in a consensual union (women: v501 = 3; men: mv501 = 3); divorced from a legal or formal marriage and not remarried or in a consensual union (women: v501 = 4; men: mv501 = 4); separated from a marriage or consensual union (women: v501 = 5; men: mv501 = 5); and married or living in a union (women: v501 = 1,2; men: mv501 = 1,2) (DHS program, n.d.).

Rejection of misconceptions on HIV: This was defined as positive acknowledgment that a healthy-looking person can have HIV, that HIV was not transmitted through mosquito bites, and that an individual could not acquire HIV through sharing food with someone living with HIV. In the data sets these codes were presented as below for women and men:

- Know that a healthy-looking person can have HIV (women: v756 = 1; men: mv756 = 1).
- Know that HIV cannot be transmitted by mosquito bites (women: v754jp = 0; men: mv754jp = 0).
- Know that a person cannot become infected by sharing food with a person who has HIV (women: v754wp = 0; men: mv754wp = 0).

Reported ability to obtain condoms: This is defined as access to male and/or female condoms as reported by the respondent. In this study, it relates to the behavioral skill that sometimes acts as a mediating variable for the IVs to have an influence on the DV (see Aguinis, Edwards, & Bradley, 2016).

Self-reported practice of HIV risk-reducing behaviors: This is the self-reporting of the practice of known recommended practices that prevent HIV or reduce the risk of HIV transmission (Centers for Disease Control and Prevention, 2017). In this study, HIV risk-reducing behaviors included primary and secondary abstinence, having sex with one uninfected and faithful partner, and/or using condoms correctly and consistently.

Sexual abstinence: This was classified as primary abstinence that was used to define someone who had never had sex and secondary abstinence that was used to define someone who had not had sex in the last twelve months (Okware, Kinsman, Onyango, Opio, & Kaggwa, 2005).

Socioeconomic status: Is an independent categorical variable that was a composite measure of a household's cumulative living standard. It included indicators on: household ownership of different consumer items such as television, car, and bicycle; the construction material used for floor and roof; access to toilet facilities; and source of water and electricity among other things (see DHS program, 2018).

Young people: Are individuals between the ages of 10 and 24 years (WHO, 2018b)

Youth: Is any person between the ages of 15 and 24 years (WHO, 2018b)

Assumptions

In this study, I assumed that the DHSs were conducted using internationally accepted research standards that ensured accuracy, reliability, and validity of the data set. I assumed that the questionnaire went through the necessary pretests to ensure a common understanding of questions among youths in Kenya and Lesotho and that the meaning of the questions was not lost in translation. I also assumed that the questionnaires were administered in the same way by enumerators who had gone through similar training designed to limit interviewer bias. Finally, I assumed that the survey data was collected under ethically sound conditions that respected and protected the rights of human participants.

Scope and Delimitations

In this study, I assumed that gender, marital status, socioeconomic status, and education level were confounding variables. I presupposed that the ability of an individual to obtain and comprehend basic health information and use it to make informed decisions was in part determined by their level of education (Center for Disease Control and Prevention, 2014). I considered gender as a key influencer of condom use especially in communities in Kenya and Lesotho where the discussion of condoms remained mainly the prerogative of men (see Ntshiqa et al., 2018; Okoro & Whitson, 2017). I also considered that the practice of abstinence among married individuals may not be possible and that they would be expected to either have one partner and/or use condoms. I controlled for these confounding variables during analysis to get an

understanding of the relationship between the study IVs and the practice of HIV risk-reducing behaviors.

In my study, I used data from nationally representative survey and results can be generalized to Kenya and Lesotho. In Kenya, the DHS sample was from a master sampling frame referred to as the fifth national sample survey and evaluation program (NASSEP V) (Kenya National Bureau of Statistics and Ministry of Health, 2015). In Lesotho, the sampling frame was from the 2006 Lesotho population and housing census provided by the Lesotho bureau of statistics (Ministry of Health Lesotho and ICF International, 2016). Both sampling frames were nationally representative and had been used to conduct different national household-based surveys. These sample frames excluded individuals aged below 15 years, nomadic populations, and institutional populations such as barracks and prisons. My study was representative of individuals aged 15-24 years at national level and excluded nomadic populations, and institutional populations such as barracks and prisons.

Significance

HIV remains a key public health problem in SSA. The persistent high HIV incidence among youths threatens progress made toward controlling the HIV epidemic and could potentially worsen if it not addressed (The Joint United Nations Programme on HIV/AIDS, 2018). Although there was recognition that youths are important in ending the HIV epidemic, age-specific information on youths was limited (Idele et al., 2014; Pettifor et al., 2014). In this study, I determine whether there is a relationship between comprehensive knowledge of HIV prevention and transmission, an individual's attitude

toward PLHIV, and ability to obtain condoms (IVs) and practice of risk-reducing behaviors (DV) among adolescents and young adults in Kenya and Lesotho. I anticipate that the findings of this study could assist public health specialists in developing age-appropriate interventions for adolescents and young adults to improve comprehensive HIV knowledge, promote risk-reducing behaviors, and reduce HIV incidence. I also envisage that the study could contribute to positive social change among individuals and communities by improving self-awareness and enabling individuals and communities to demand for quality HIV services and reducing HIV morbidity and mortality.

Summary and Conclusions

Although good progress has been made in reducing the number of new infections worldwide, infections among youths remains high. Previous studies provided information on the role of appropriate HIV-related information in promoting the practice of HIV risk-reducing behaviors. Many of these studies were not specific to adolescents and young adults but covered adolescent and student populations that ranged from 10 years and above. Studies on youths did not disaggregate the data by adolescents 15-19 years and young adults 20-24 years. The large age-groups used in the study did not consider the growth stages and variances between adolescents and young adults that affected their perception of HIV risk and influenced practice of HIV risk-reducing behaviors. The influence of an individual's attitude toward PLHIV on practice of risk-reducing behaviors was unclear. There were studies on the effect of stigma and discrimination on the use of HIV services among MSM, sex workers, and PLHIV. However, little was known on the influence of an individual's attitude on the individual's health-seeking behavior and

practice of risk-reducing behaviors. There was extensive research on condom use including barriers and motivators of use; factors contributing to multiple concurrent partners; as well as on abstinence. However, more age-specific information was needed to understand the changing dynamics of adolescents and young adults. There was a need to take a deep dive on the data to establish if there were any relationships between the different IVs that would explain factors influencing practice of risk-reducing behaviors among adolescents and young adults.

In this study, I sought to contribute to the literature available on factors that influence practice of HIV risk-reducing behaviors among youths. I conducted an in-depth analysis of secondary data that was collected through a rigorous and scientific process with a large enough sample size to allow for different kinds of analysis to be conducted without compromising the study power. Specifically, I sought to establish whether comprehensive knowledge of HIV transmission and prevention, an individual's attitude toward PLHIV, and/or ability to obtain a condom influenced practice of HIV risk-reducing behaviors. I also conducted a comparative analysis between Kenya and Lesotho to determine whether any observed relationships varied by geography. The IMB model that was used to frame this study is strong in predicting and promoting HIV preventive behavior. The study findings may provide information on the influences of different IMB model constructs on practice of risk-reducing behavior. This study provided information on how an individual's attitude toward PLHIV affect their own practice of risk-reducing behaviors. In section 2, I provide a detailed discussion on the research design and rationale; the study methodology; threats to validity; and ethical procedures that I used.

Section 2: Research Design and Data Collection

Study Purpose

The purpose of this doctoral study was to investigate the effects of comprehensive knowledge of HIV transmission and prevention, individual's attitude toward PLHIV, and ability to obtain condoms (if needed) on the reported practice of HIV risk-reducing sexual behaviors, specifically abstinence, condom use, and/or limiting sex to one sexual partner among adolescents age 15-19 years and young adults age 20-24 years in Kenya and Lesotho. Secondary data were used to examine how the independent variables (comprehensive knowledge of HIV transmission and prevention, individual's attitude toward PLHIV, and reported ability to obtain condoms [male or female]) impacted self-reported practice of HIV risk-reducing behaviors, namely sexual abstinence, limiting sex to one sexual partner in last 12 months, and consistently using a condom in the last 12 months.

In this section, I describe the research design and data collection approaches used to ensure the study was scientifically and ethically sound. The discussion includes the research design and rationale, the methodology applied including a description of the respondents, the sampling procedure and sample size determination, and the statistical analysis applied based on the types of variables. Further, the section includes the threats to validity as applied to the primary data as well as to the doctoral study and how they were addressed or minimized. Finally, I discuss the ethical considerations applicable to the study, including the requirements for accessing the data sets, how respondents' rights were protected, and how data confidentiality was ensured.

Research Design and Rationale

Study Variables

The DV in this study was self-reported practice of HIV risk-reducing behaviors, namely sexual abstinence, limiting sex to one sexual partner in the last 12 months, and/or consistent condom use in the last 12 months. The study had three IVs, namely comprehensive knowledge of HIV transmission and prevention, individual's attitude toward PLHIV, and reported ability to obtain condoms (male or female) if needed. The confounding variables included gender, education level, socioeconomic status, and marital status.

Research Design and Connection With Research Questions

This study was quantitative, cross-sectional, and retrospective in nature to compare data from Kenya and Lesotho. Secondary data from the Kenya demographic health survey (KDHS) and the Lesotho demographic health survey (LDHS) were analyzed to test relationships between the independent and dependent variables while controlling for the confounding variables. The DHS data sets were selected because they are nationally representative household surveys and contain data on a wide range of indicators on population health, including HIV and nutrition (DHS program, n.d.). For the study, I was interested in data on HIV, including risk-taking behaviors, sexual activity, and condom use, which were key variables in the research questions. The analysis included individuals between 15 and 24 years of age, which fell within the age bracket of data contained in the DHS data sets. Therefore, the DHS data sets were deemed suitable to be used in the study.

Time and Resource Constraints

I had minimal time and resource constraints. Secondary data from two national surveys conducted in 2014 were already cleaned and edited. Additionally, no costs related to collecting and collating the data were incurred because these costs had already been borne by the DHS program and stakeholders (Johnston, 2014). The DHS data sets were free to download and use and came with instructions on how to manipulate or merge them as needed (DHS program, n.d.). Further, the DHS program (n.d.) provided the data sets in standard recode file formats including SPSS, SAS, Stata, and CSPro, which were consistent with the analysis software I used. To access the data sets, I had to register, state the purpose for requesting the data sets, and agree to adhere to the terms and conditions for use. This process was easy, and there were no delays experienced.

Consistency of Design

Using DHS data sets allowed me to conduct the study quickly and with limited resources. The data sets were large enough to meet the requirements of the IMB model on which this study was based. The data sets allowed for relationships and interrelationship between variables to be adequately tested (see Fisher et al., 2003). Because the data sets were large, the findings of the study could be generalized to the communities in which the data were collected: Kenya and Lesotho (see Creswell, 2014; Frankfort-Nachmias & Leon-Guerrero, 2015). The approach of using secondary data reduced the burden on participants because they did not need to be interviewed again. Because I was using secondary data, I anticipated challenges given that the initial reason for data collection was different from that of my study (see Cheng & Phillips, 2014). Because the DHS data

sets were used to monitor key HIV indicators, they contained the key variables I needed to conduct this study. Further study limitations are addressed in section four, subtitle limitations of the study.

Methodology

Population

The populations targeted by the DHS were largely similar with slight variations across countries to cater to their specific needs. The 2014 LDHS targeted women age 15-49 years and men age 15-59 years (Ministry of Health and ICF International, 2016) while the 2014 KDHS targeted women age 15-49 years and men age 15-54 years (Kenya National Bureau of Statistics and Ministry of Health, 2015). In both surveys, the participants had to be either permanent residents of the selected households or visitors to the selected households who had stayed the night preceding the survey. Both surveys targeted half as many men as women and collected household demographics as well as individual-level data. These data sets formed my sampling frame from which I extracted individual-level data for my study. The study population was defined as youths both male and female age 15-24 years who had agreed to respond to questions on sexual activity, risk behaviors, and condom access.

At the time of the study, the population of Kenya was projected to be 47 million, of which 20.3% were youths age 15-24 years (Kenya National Bureau of Statistics, 2018). According to the Lesotho Demographic Survey (LDS) 2011, the population of Lesotho in 2011 was about 1.9 million, of which 39.8% were youths age 15-24 years (Bureau of Statistics, 2013).

Sampling and Sampling Procedure Used in the Secondary Data Collection

Sampling strategy. Sampling strategy affects the representativeness of a study. KDHS and LDHS used multistage sampling to select the sample from master sampling frames developed based on their latest population data (Kenya National Bureau of Statistics and Ministry of Health, 2015; Ministry of Health Lesotho and ICF International, 2016). The 2014 KDHS used the fifth National Sample Survey and Evaluation Program (NASSEP V) as its master sampling frame (Kenya National Bureau of Statistics and Ministry of Health, 2015). This NASSEP V was developed in 2012 using the 2009 Kenya Population and Housing Census and last updated in September 2014 (Kenya National Bureau of Statistics and Ministry of Health, 2015). The sampling frame comprised 5,360 clusters that were selected using stratified probability proportional to size sampling from 96,251 enumeration areas contained in NASSEP V (Kenya National Bureau of Statistics and Ministry of Health, 2015). In the development of the NASSEP V, each of the 47 counties in Kenya were stratified into urban and rural strata resulting into 92 sampling strata as Nairobi and Mombasa are fully urban (Kenya National Bureau of Statistics and Ministry of Health, 2015). The 2014 LDHS used the 2006 Lesotho Population and Housing Census provided by the Lesotho Bureau of Statistics. The sampling frame was intended to allow for representativeness at the national level (including urban and rural areas), the four ecological zones, and Lesotho's 10 districts.

Sampling procedure. The 2014 KDHS was designed as a representative sample at the national level (separate for urban and rural), regional level, and county level (for specific indicators). In the first stage of multistage sampling, 1,612 clusters (995 rural and

617 urban) across the country were selected with equal probability from the NASSEP V frame. In the second stage, a complete list of households in each of the EAs was used as the sampling frame to select 25 households from the each of the clusters, resulting in 40,300 households (Kenya National Bureau of Statistics and Ministry of Health, 2015). Only preselected households participated in the survey, and no replacements of households were allowed during data collection. At the household level, the household questionnaire and woman's questionnaire were administered at each household while the man's questionnaire was administered at every second household.

The 2014 LDHS adopted a similar two-stage sampling approach as the 2014 KDHS. In the first stage, 400 EAs were selected from the 2006 Population and Housing Census (118 urban and 282 rural). In the second stage, systematic sampling was done through initially listing all households in the selected EAs before randomly selecting about 25 households in each of the 400 EAs, yielding 9,942 households (Ministry of Health and ICF International, 2016). Like the KDHS, only preselected households were interviewed with no replacement, all women in the selected households were eligible to be interviewed, and men were targeted in only half of the households.

Inclusion and exclusion criteria. The sampling frames for the KDHS and the LDHS excluded nomadic communities and populations in institutions such as persons in hotels, barracks, and prisons. Visitors to the household who had not stayed the night prior to the study were also excluded. The LDHS and KDHS studies included eligible permanent household residents and visitors who had spent the night prior to the survey in

the household (Kenya National Bureau of Statistics and Ministry of Health, 2015; Ministry of Health and ICF International, 2016).

Procedures for recruitment, participation, and data collection. KDHS and LDHS questionnaires were based on standard DHS questionnaires. The 2014 LDHS used a set of three questionnaires that is the household questionnaire, the woman's questionnaire, and the man's questionnaire (Ministry of Health Lesotho and ICF International, 2016). The LDHS questionnaires were adapted to incorporate input from various stakeholders including government ministries and agencies, non-governmental organizations, and international donors (Ministry of Health Lesotho and ICF International, 2016). The 2014 KDHS sample size was significantly increased from 9,936 in 2008-09 KDHS to 40,300 in the 2014 KDHS to allow for estimation of key indicators at county-level as previous KDHS focused at provincial-level. The large increase in sample size raised concern on its potential effect on the data quality because of increase in time spent in field, respondent fatigue, and interviewer fatigue (Kenya National Bureau of Statistics and Ministry of Health, 2015). The study organizers conducted a two-day stakeholder workshop to identify priority indicators that were then included in a shortened version of the household and the woman's questionnaires. The shortened versions of the questionnaires were extracts of the longer versions and all the indicators in them were in the longer versions but results from the shortened questionnaires were estimated at county-level (Kenya National Bureau of Statistics and Ministry of Health, 2015). The 2014 KDHS used a set of five questionnaires that is the short and full version

of household questionnaire, the short and full version of woman's questionnaire, and the man's questionnaire (Kenya National Bureau of Statistics and Ministry of Health, 2015).

KDHS and LDHS used the same procedures for participant identification and enrolment. At the selected household, the interviewer listed all household members and visitors and included their basic demographic information such as age, sex, marital status, education, as well as their relationship to the head of the household (Kenya National Bureau of Statistics and Ministry of Health, 2015; Ministry of Health Lesotho and ICF International, 2016). The parent's survival status was also determined in children under 18 years of age. The eligible participants (men and women) were identified using data on sex and age collected through the household questionnaire (Kenya National Bureau of Statistics and Ministry of Health, 2015; Ministry of Health Lesotho and ICF International, 2016).

The interviewers invited all eligible participants for individual interview in private, read them the informed consent statement, obtained their consent, and interviewed them (Kenya National Bureau of Statistics and Ministry of Health, 2015; Ministry of Health Lesotho and ICF International, 2016). In Lesotho, the interviewer administered the household questionnaire and woman's questionnaire in the first household and the man's questionnaire in every second household (Ministry of Health Lesotho and ICF International, 2016). In Kenya, the interviewers administered the full household questionnaire and full woman's questionnaire in the first household and alternated with the shorter versions in the next household (Kenya National Bureau of Statistics and Ministry of Health, 2015). The interviewers also administered the men's

questionnaire in half of the households where the full and short versions of the household and the woman's questionnaires were administered; and ensured an even spread of the men interviews across the different questionnaire versions (Kenya National Bureau of Statistics and Ministry of Health, 2015).

The 2014 LDHS data collection was done using 15 field teams; each team was composed of a team supervisor, two or three female interviewers, two or three male interviewers, and one driver (Ministry of Health Lesotho and ICF International, 2016). The 2014 KDHS data collection was conducted with 48 field teams; and each team was composed of a supervisor, a field editor, three female interviewers, one male interviewer, and a driver (Kenya National Bureau of Statistics and Ministry of Health, 2015). All the field teams (Kenya and Lesotho) went through a three-week training that covered interviewing techniques, field procedures, detailed review of the questionnaires, and how to administer the questionnaires (Kenya National Bureau of Statistics and Ministry of Health, 2015; Ministry of Health Lesotho and ICF International, 2016).

Procedure for gaining access to DHS data sets. The DHS program (2018) provides free access to data sets that are used to conduct legitimate research. To access the data sets, I registered as a DHS data user on the website www.dhsprogram.com. The default language on the DHS website is English, but other preferred languages are available. At registration, I provided my basic information including my email address that was used as my user name; my user password that I used to later access the website; my first name and surname; my institution name and type; my country of residency; and my phone contact (see DHS program, n.d.). I later completed the data set registration

process by specifying how I was going to use the data, my project title, and my study description that included the research question, research design, and data analysis plan (see DHS program, n.d.). I had to submit a request to access the data by indicating the exact data sets I required through selecting the region of interest; selecting the type of data set that was either household survey or services provision assessments (SPA); and indicating the countries of interest. If the requests were incomplete then one received an email specifying the required information (see DHS program, n.d.). The DHS program approved my request within 24 hours through an email notification, from email account archives@dhsprogram.com, with details on how to download the requested information.

There were no additional permission letters for gaining access other than registration and request stipulated above. Once approval was granted, I received full access to all unrestricted survey data sets for Kenya and Lesotho. I did not request data sets with biomarkers such as GIS and HIV status because I did not require them for the purposes of this study. The conditions for accessing and using the DHS data sets are that data sets must not be transferred or shared with other researchers without written consent of the DHS program and that all reports and publications based on the requested data must be sent to the DHS program data archive in PDF format (see DHS program, n.d.).

Sample size determination using power analysis. Power analysis is the probability of detecting a statistically significant difference when such a difference exists thus rightly rejecting null hypothesis and avoiding type II error (see Columb & Atkinson, 2016). Power analysis enables an individual to determine the smallest sample size needed to detect the effect of a given test at a desired level of significance (see Sullivan & Feinn,

2012). There are three parameters needed to calculate sample size that is the effect size or the magnitude of difference between two groups and can either be absolute or calculated indices of effect (see Sullivan & Feinn, 2012); desired type I error rate (α) often set at 0.05; and the power that is based on the desired type II error rate (β) and normally set at 80% (see Columb & Atkinson, 2016). I determined the smallest sample size in this study through setting type I error rate (α) at 0.05 and using power at 80%. I used Cohen's (1969) convention of small effect size and set odds ratio at 1.2 (see Columb & Atkinson, 2016). Based on these assumptions and using G*Power application for logistic regression studies, I established that the smallest sample size required to conduct my study was 1,484 in Kenya and 1,484 in Lesotho (see Faul, Erdfelder , Buchner, & Lang, 2009).

Instrumentation and Operationalization of Constructs

Study instruments or questionnaires. The Kenya DHS and Lesotho DHS data were collected using an adapted set of questionnaires based on survey questionnaires developed by the DHS program (DHS program, n.d.). Kenya DHS collected data using five questionnaires that is a full household questionnaire, a short household questionnaire, a full woman's questionnaire, a short woman's questionnaire, and a man's questionnaire (Kenya National Bureau of Statistics and Ministry of Health, 2015). The shorter versions of the Kenyan questionnaires contained all variables in the full questionnaires (Kenya National Bureau of Statistics and Ministry of Health, 2015). Lesotho DHS collected data using three questionnaires that is a household questionnaire, a woman's questionnaire, and a man's questionnaire (Ministry of Health Lesotho and ICF International, 2016).

Well-trained interviewers administered the questionnaires using either paper-based questionnaires or computer-assisted personal interviewing. KDHS 2014 was collected using paper-based questionnaires that were later double entered with 100 percent verification using CSPro software (Kenya National Bureau of Statistics and Ministry of Health, 2015). The Lesotho DHS, interviewers used personal digital assistants (PDAs) to record responses and team supervisors used tablets to manage and supervise the data collection (Ministry of Health Lesotho and ICF International, 2016). The PDAs and tablets had Bluetooth capabilities to facilitate remote electronic transfer of survey files. The Kenya DHS and Lesotho DHS analyzed their data using the CSPro software that was developed jointly by the U.S. Census Bureau, The DHS Program, and Serpro S. A (Ministry of Health Lesotho and ICF International, 2016).

Household questionnaire. KDHS 2014 and LDHS 2014 used the household questionnaire to list all household members and visitors to the household (male and female) eligible for individual interviews based on age and sex. The questionnaire was also used to collect basic information on each person listed including their education level and their relationship to the head of household. The household questionnaire was used to collect information on the household characteristics including the household's source of water, type of toilet facilities, materials used on the floor and roof of the house, ownership of various durable goods, and ownership and use of mosquito nets. This information on the household characteristics were used to determine the household's wealth quintiles and socio-economic status that I used in this study.

Woman's questionnaire. Kenya DHS and Lesotho DHS administered similar woman's questionnaires to all consenting and eligible women 15-49 years. The woman's questionnaires covered demographic information including age and education; birth history and child mortality; knowledge and use of family planning methods; fertility preferences; antenatal, delivery, and postnatal care; breastfeeding and infant feeding practices; vaccinations and childhood illnesses; marriage and sexual activity; women's work and husbands' background characteristics; awareness and behavior regarding AIDS and STIs; and adult and maternal mortality (Kenya National Bureau of Statistics and Ministry of Health, 2015; Ministry of Health Lesotho and ICF International, 2016). KDHS 2014 also included malaria prevention and treatment; domestic violence; female circumcision and fistula (Kenya National Bureau of Statistics and Ministry of Health, 2015). LDHS 2014 included questions on Knowledge, attitudes, and behavior related to other health issues such as tuberculosis, diabetes, breast, and cervical cancer (Ministry of Health Lesotho and ICF International, 2016).

Man's questionnaire. The man's questionnaire in Kenya DHS and Lesotho DHS was like that of women but shorter as it excluded questions on maternal and child health, nutrition, adult, and maternal mortality, female circumcision, and fistula (in Kenya specifically) (Kenya National Bureau of Statistics and Ministry of Health, 2015; Ministry of Health Lesotho and ICF International, 2016). In both countries, the male questionnaire included male circumcision, which was not a component included in the woman's questionnaire (Kenya National Bureau of Statistics and Ministry of Health, 2015; Ministry of Health Lesotho and ICF International, 2016). In Lesotho the man's

questionnaire was administered to men 15-59 years of age and in Kenya it was administered to men 15-54 years of age (Kenya National Bureau of Statistics and Ministry of Health, 2015; Ministry of Health Lesotho and ICF International, 2016).

Validity and reliability of the instruments. The KDHS 2014 and LDHS 2014 questionnaires were developed based on standard questionnaires that have were extensively pretested and tested to ensure their reliability (see Creswell, 2014). The DHS standard questionnaires are pretested and tested to ensure that targeted respondents can comprehend them, and the questionnaires are further refined based on results from pilot exercises and past surveys (see DHS program, n.d.). Each country customizes the questionnaires to meet their requirements, translate them to local languages, and conduct further pretests and modifications before the survey is rolled out (Kenya National Bureau of Statistics and Ministry of Health, 2015; Ministry of Health Lesotho and ICF International, 2016). The purpose of the pretests, tests, and modifications was to ensure a common understanding of the questions across respondents and geographies and that responses are stable and consistent (see Creswell, 2014).

Validity is the ability of the questionnaires to provide true and accurate responses and it is important to identify possible factors that can compromise study validity and minimize them (see Creswell, 2014). Pretesting and testing of questionnaires addresses tool-related factors including the appropriate placing or ordering of questions (see Creswell, 2014). Training of interviewers improves their interviewing skills and helps in creating rapport with participants (see Creswell, 2014). Translation of questionnaires to local language(s) improves the participants ability to understand the research questions

(see Creswell, 2014). The pretesting and testing of questionnaires, their translation, and appropriate training of interviewers all contribute towards improving validity (see Creswell, 2014).

The Kenya DHS and Lesotho DHS questionnaires and data sets were appropriate to respond to my study questions. The DHS questionnaires in Kenya and Lesotho had all the variables that I needed for my study. In this study, I was interested in variables contained in the man's and the woman's questionnaires that is demographic variables including age, gender, education status, and marriage; sexual activity; and awareness and behavior regarding AIDS. In the household questionnaire, I was interested in the wealth quintile or socioeconomic level from the household questionnaire.

Operationalization of Variables

The purpose of this study was to investigate the effects of comprehensive knowledge of HIV transmission and prevention, an individual's attitude toward PLHIV, and ability to obtain condoms (if needed) on practice of HIV risk-reducing sexual behaviors among adolescents and young adults in Kenya and Lesotho. The DV, practice of HIV risk-reducing behavior, was a nominal variable with five categories. I computed the DV from three DHS variables that is reported sexual abstinence (primary and secondary abstinence in the last 12 months), condom use at last sex, and reported monogamous relationship in the last 12 months. I also computed all the three IVs from variables in the DHS'. Table 1 shows a description of the DV and IVs.

Table 1

Measurement Level of Variables in Analysis

Measurement level	Variables
Nominal	Knowledge of HIV
	Motivation
	Behavioral skill
	Risk-reducing behaviors
	Sex
	Selected country
Ordinal	Socio-economic status
	Education level
Interval	Age

Note. In the study, I used multinomial logistic regression because DV was computed as a categorical variable and the IVs were computed as dichotomous variables.

Comprehensive knowledge of HIV transmission or prevention. In this study, I described an individual as having comprehensive knowledge of HIV transmission and prevention if, they had correct knowledge of HIV transmission and prevention and dispelled misconceptions on HIV. The DHS collected data on respondents understanding on HIV sexual transmission that is that HIV can be prevented by using a condom at each sex or by having sex with one uninfected and faithful sex partner. DHS also contained data that assessed HIV misconceptions including whether a healthy-looking person could be HIV positive and if HIV could be transmitted through mosquito bites or by sharing food with a person who has AIDS. In my analysis, I defined an individual to have correct knowledge of HIV prevention if they knew the two sexual prevention methods and dispelled of all three misconceptions on HIV. Those with correct knowledge were coded this as 1 and those with incorrect knowledge of HIV as 2.

Individual's attitude toward PLHIV. The other study IV was an individual's attitudes toward PLHIV. DHS used four dichotomous questions to assess respondent's attitude toward PLHIV that included their willingness to buy fresh vegetables from a person living with HIV; to care for a family member living with HIV; to disclose the positive HIV status of a close family member; and for a female teacher living with HIV but is not sick to be allowed to continue teaching in school (DHS program, n.d.). I defined those having positive attitudes toward PLHIV as those responding positively to all the four questions. In the analysis, I coded those that had positive attitudes as 1 and those that had negative attitudes as 2.

Ability to obtain condom. This IV assessed an individual's perceived self-efficacy to perform the desired behavior, which is reduction of HIV risk (Fisher et al., 2003). In this study, self-efficacy was the reported ability to obtain a condom whenever needed. DHS' included two questions on the ability of an individual to obtain condom; having a separate question for male condoms and a similar one for female condoms (DHS program, n.d.). In my analysis, anyone who felt they could obtain either a male or a female condom was classified as having the necessary behavioral skill. I coded those that had necessary behavioral skill as 1 and those that did not have the necessary behavioral skill as 2.

Risk-reducing behaviors. The DV, practice of risk-reducing behaviors reflected the proportion of youths who reported practicing at least one of the known HIV risk-reducing behavior assessed in this study. The HIV risk-reducing behaviors that I assessed in this study were abstinence (primary and secondary in the last 12 months),

monogamous sexual relationship in the past 12 months, and consistent use of condom at last sex. Based on the DHS's data sets, I computed the study DV from three variables in the DHS to develop a composite variable with five categories. The categories in my study were 1 for abstained; 2 for had one sexual partner in the last 12 months and no condom used; 3 for one sexual partner in the last 12 months and used condoms consistently; 4 for had multiple sexual partner in the last 12 months and used a condom consistently; and 5 for had multiple sexual partners in the last 12 months and did not use a condom consistently.

Selected countries. The study participant's country of residency is described using this dependent variable. I used DHS data sets from studies conducted in 2014 in Kenya and Lesotho. I merged the two data sets before conducting any manipulation or analysis.

Sex. In the study sex an independent variable that I used to show the gender that the respondent identified with. In DHS' the sex was coded as either 1 for male or 2 for female. Although transgender is commonly recognized in several countries as a third gender, it was not included in the Kenya DHS and Lesotho DHS.

Control variables. Previous studies found several correlates that potentially affected the practice of abstinence, limiting to sex to one sexual partner, and condom use including socioeconomic status, the respondent's sex, their age, their marital status, and their education level. In DHS (n.d.), socioeconomic status was also referred to as wealth quintile. The wealth quintile were computed from questions on the number and kinds of consumer goods a household owns including television, bicycle or car, and housing

characteristics such as source of drinking water, toilet facilities, and roofing and flooring materials (DHS program, n.d.). DHS (n.d.) computed the household wealth quintile using principal component analysis by assigning each household member a score then ranking each member based on their score after which they were divided into five equal categories. DHS (n.d.) described the wealth quintiles on a five-point score with five being the richest and one being the poorest. I used the same wealth quintiles in my analysis. In the study, I controlled for control variables in all my four research questions. I also included age and sex as independent variables in the research because I wanted to explore whether the observed results are consistent across age and sex.

Data Analysis Plan

I downloaded the KDHS 2014 and LDHS 2014 data sets from the DHS program website. I conducted all my analysis using SPSS version 24 for Window using complex sample procedures and accounting for weighted survey data.

Data analysts at DHS program had already conducted data editing, cleaning, and imputation based on DHS program standards (DHS program, n.d.). The Kenya DHS team conducted rigorous data cleaning that included coding of open-ended questions; entering manual questionnaires in CSPro software; and checking the entered data for completeness and consistency. CSPro is a software that was designed and implemented by ICF International, the US Census Bureau, and others for use in processing data and conducting data tabulation. The Lesotho DHS 2014 data, though collected electronically, also had similar data cleaning and editing processes to ensure the data was accurate and consistent.

DHS program used laid down procedures to conduct data quality checks that define how missing values and other quality issues are handled (DHS program, n.d.). According to DHS (n.d.), "missing value" is defined as a variable that should have been responded to but does not have a response. The reason for lack of response maybe because the question was not asked (relating to interviewer error) or that the respondent declined to answer. As a rule, DHS assigns all "missing variables" a value during analysis and include them in the data set. Other special responses and codes included in the data sets are "inconsistent", "don't know", and "blank". DHS excludes "missing", "inconsistent", "don't know", and "blank" codes when calculating statistics such as means or medians; but treated them as real values in other instances (see DHS program, n.d.).

As noted, the DHS program collected data separately for household, women, and men with most of the important variables included in each of the files. However, I had to merge four different DHS files to meet my analysis needs (DHS program, n.d.). I used the four step guidelines provided by the DHS program for merging that includes understanding the file relationship type; identifying unique case identifiers; identifying the matching variables; and merging the data sets.

Research questions. The purpose of this study was to investigate the effects of comprehensive knowledge of HIV transmission and prevention, an individual's attitude toward PLHIV and ability to obtain condoms (if needed) on the self-reported practice of HIV risk-reducing sexual behaviors. I conducted a comparative analysis to determine

whether there were variances across ages, sex, and countries (Kenya and Lesotho). I answered the following four research questions:

Research Question 1: What is the relationship between comprehensive knowledge of HIV transmission and prevention and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years)?

H_a1: There is a relationship between comprehensive knowledge of HIV transmission and prevention and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years).

H_01: There is no relationship between comprehensive knowledge of HIV transmission and prevention and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years).

Research Question 2: What is the relationship between individual's attitude towards PLHIV and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years)?

H_a2: There is a relationship between individual's attitude towards PLHIV and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years).

H_02: There is no relationship between individual's attitude towards PLHIV and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years).

Research Question 3: What is the relationship between the ability to obtain male or female condoms (if needed) and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years)?

H_a3: There is a relationship between the ability to obtain male or female condoms (if needed) and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years).

$H_0 3$: There is no relationship between the ability to obtain male or female condoms (if needed) and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years).

Research Question 4: What is the mediating effect of the ability to obtain condoms on the relationship between the two independent variables namely an individual's comprehensive knowledge of HIV transmission and prevention and their attitude towards PLHIV and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years)?

H_a4: Ability to obtain condoms is a mediator in the relationship between the two independent variables namely individual's comprehensive knowledge of HIV transmission and prevention and attitude towards PLHIV and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years).

$H_0 4$: Ability to obtain condoms is not a mediator in the relationship between the two independent variables namely individual's comprehensive knowledge of HIV

transmission and prevention and attitude towards PLHIV and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years).

Statistical analysis. In the statistical analysis I used a pre-determined significance level of <0.05 for all tests and 95% confidence intervals. I conducted a descriptive univariate analysis that used percentages and absolute numbers to provide a description of the survey respondents. I performed inferential bivariate analysis using chi-square tests to determine interactions between the practice of HIV risk-reducing behavior with the three IVs that is comprehensive HIV knowledge, attitude towards PLHIV, and behavioral skill. I developed a series of multinomial logistic regression models to test for relationship between the independent variables and the DV. I also calculated the variance inflation factors (VIF) to test for multicollinearity or the increase of standard errors of co-efficiency that reduces the reliability of the multinomial logistic regression data. In the study, I removed from the analysis VIFs greater than 10 because it indicated multicollinearity. I also conducted Wald test to understand the contribution of each independent variable to the model and their statistical significance to the regression output. In the final model, I included only independent variables with significance level of $p \leq 0.05$. Finally, I conducted linear and multiple regression to test whether the ability to obtain condoms had a mediating effect on the relationship between comprehensive knowledge of HIV knowledge and an individual's attitude toward PLHIV (IVs) and the DV.

Threats to Validity

The validity of a study is its ability to measure what it claims to measure (Creswell, 2014). All four kinds of validity that is external, internal, construct, and statistical conclusion need to be identified and minimized during the development of the study (see Heale & Twycross, 2015). In surveys factors that threaten external validity or extent to which study findings can be generalized to a larger population include poor sample selection, poor administration of the survey, and wrong survey setting (Creswell, 2014). DHS program used a two-stage cluster sampling procedure using nationally representative sampling frames, which ensured representation of respondents across different demographic profiles. DHS also used well-established methods for selecting the respondents to be interviewed at household-level and systematic approaches to select female and male respondents to be interviewed (DHS, n.d.). DHS collected data for different administrative units and applied weights to the data using known factors developed based on census data. The DHS's data is generalizable at national- and subnational-levels and has external validity. This study shares the same external validity because it was based on DHS data sets.

Internal validity refers to the certainty that an experiment or treatment is responsible for the observed differences if at all and that there is enough evidence to support the claim (Creswell, 2014; Frankfort-Nachmias & Leon-Guerrero, 2015). The DHS's and this study are cross-sectional studies that use data collected at one-point in time as such internal validity threats such as history, maturation, and experimental mortality do not apply. There was no statistical regression bias because the Kenya DHS

and Lesotho DHS used systematic approaches to select households and respondents and did not base their selection on certain characteristics (see DHS, n.d.). Internal validity threats related to respondent selection were not applicable because the Kenya DHS and Lesotho DHS studies were not experimental surveys and respondents were not distributed into experimental and control groups. In this study, the main threat to internal validity is related to instrumentation because I merged data sets from Kenya and Lesotho. Although the questionnaires used in the two surveys were based on the standard DHS questionnaires, each country included additional questions and translated the questionnaire to their local languages (Kenya National Bureau of Statistics and Ministry of Health, 2015; Ministry of Health Lesotho and ICF International, 2016). The Kenya DHS and Lesotho DHS questionnaires were translated and back-translated, pre-tested and tested, and iterated several times before the start of data collection; to minimize threats to internal validity. In this study, the threats to internal validity are further minimized because the IVs and DV are variables that have been used in more than two DHSs in the past, which implies that they have been adequately tested.

Threats to construct validity occurs when the study variables are insufficiently defined or inappropriately measured (Creswell, 2014; Heale & Twycross, 2015). DHS minimized this through providing extensive definitions of all the study variables and providing code frames for the data sets. I aligned the definition of my study variables to those used by DHS and those from credible organizations such as WHO and CDC.

It is important to identify and minimize threats to statistical conclusion validity because this study used statistics to test hypothesis (see Taylor, Fossey, & Kielhofner,

2017). Threats to statistical conclusion validity include measures of effect size, statistical power, and significance level. In the study I calculated the smallest small size needed to minimize threats to statistical conclusion validity using the G*Power application for logistic regression studies with power set at 80%, significance level at 0.05 and small effect size of odds ratio at 1.2. Based on these assumptions, I arrived at a minimum sample size of 1,484 in Kenya and 1,484 in Lesotho. The threats to statistical conclusion were minimized in this study because the final sample size I used was 7,678 in Kenya and 3,442 in Lesotho, which was higher than the minimum recommended sample size.

Ethical Procedures

The DHS program grants free access to the DHS data sets to be used for educational research. I used the DHS data sets to conduct my study and did not share the data sets to any unauthorized persons, in accordance to the conditions provided by DHS program. In the study, I acknowledged the source of the data sets and committed to share the final report with DHS program (DHS program, n.d.).

Treatment of Human Subjects

The DHSs were conducted in accordance with the U. S. Department of Health and Human Services regulations for the protection of human subjects (45 CFR 46). The ICF institutional review board (IRB) and by Lesotho Ministry of Health Research and Ethics Committee were reviewed and approved the protocols including procedures, methodologies, and questionnaires (Ministry of Health and ICF International, 2016). The Walden university institutional review board reviewed and approved this study prior to implementation; the Walden IRB number is 08-01-19-0560196.

Ethical Concerns Related to Recruitment Materials and Processes

DHS interviewers read the informed consent statement to all eligible respondents before conducting the interview (DHS, n.d.). The informed consent statement highlighted the respondent's rights, the purpose and use of the study, expected duration of the interview, and potential risks and benefits (see DHS, n.d.). The informed consent statement also provided the contacts of principal investigators that the respondent can contact in case of further queries (see DHS, n.d.). The interviewer used the informed consent statement to emphasize to the respondents that participation in the study was voluntary; that the respondent could choose not to answer any question; and that the respondents identify, and information would be kept strictly confidential (see DHS, n.d.).

DHS conducted several activities before, during and after data collection to secure data and protect the confidentiality of participants (see DHS, n.d.). All the personnel involved in the study were trained and signed confidentiality agreements before beginning the study (see DHS, n.d.). The confidentiality agreements stipulated that all DHS personnel (interviewers, health specialists, editors, and supervisors) could only discuss data with other team members, and that such conversations were to be limited to essential communications (see DHS, n.d.). The interviewer ensured that all interviews were conducted as privately as possible; an eligible respondent was not interviewed in the presence of another eligible respondent (see DHS, n.d.). Interviewers applied stricter privacy measures when eligible respondents were engaged in a sexual relationship (husband and wife) because some parts of the DHS questionnaire involved sensitive subjects such as sexual activity and domestic violence (see DHS, n.d.). Kenya DHS and

Lesotho DHS used a series of numbers that included the enumeration areas, household number, and individuals' number to identify a respondent's interview (Kenya National Bureau of Statistics and Ministry of Health, 2015; Ministry of Health Lesotho and ICF International, 2016). Kenya DHS and Lesotho DHS destroyed questionnaires cover sheets that contain identifier numbers and reassigned enumeration areas and household numbers are randomly after data entry was completed (Kenya National Bureau of Statistics and Ministry of Health, 2015; Ministry of Health Lesotho and ICF International, 2016). Kenya DHS and Lesotho DHS also randomly displaced geographic coordinates of each survey at a distance not less than two kilometers (Kenya National Bureau of Statistics and Ministry of Health, 2015; Ministry of Health Lesotho and ICF International, 2016).

Summary

In this section, I described the processes and activities that I conducted to ensure that the study was scientifically and ethically sound. I conducted a quantitative analysis of DHS data sets from Kenya and Lesotho to determine whether there was a relationship between comprehensive knowledge of HIV, an individuals' attitude toward PLHIV, and ability to obtain condoms (male or female) and the practice of HIV risk-reducing behaviors. In the study, I adopted a methodology that ensured the sample size was adequate for conducting all the required statistical analysis and was sufficiently powered. I performed a series of statistical analysis including descriptive univariate analysis, inferential bivariate analysis using chi-square tests, and multinomial logistic regression to describe the sample and test the interrelations. I pre-defined the significance level and

confidence intervals as $p < 0.05$ and 95% respectively for all tests. Finally, I discussed the potential threats to validity and how these were minimized, and the ethical considerations related to the DHS studies. In the next section, I describe the results and findings.

Section 3: Presentation of the Results and Findings

The purpose of this study was to investigate the effects of comprehensive knowledge of HIV transmission and prevention, individual's attitude toward PLHIV, and ability to obtain condoms (if needed) on the self-reported practice of HIV risk-reducing sexual behaviors. Additionally, I conducted a comparative analysis to determine whether there were variances observed across ages, sex, and countries (Kenya and Lesotho). I attempted to answer the following research questions with corresponding hypotheses:

Research Question 1: What is the relationship between comprehensive knowledge of HIV transmission and prevention and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years)?

H_a1: There is a relationship between comprehensive knowledge of HIV transmission and prevention and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years).

H_01: There is no relationship between comprehensive knowledge of HIV transmission and prevention and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years).

Research Question 2: What is the relationship between an individual's attitude toward PLHIV and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years)?

H_a2: There is a relationship between an individual's attitude toward PLHIV and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years).

$H_0 2$: There is no relationship between an individual's attitude toward PLHIV and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years).

Research Question 3: What is the relationship between the ability to obtain male or female condoms (if needed) and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years)?

H_a3: There is a relationship between the ability to obtain male or female condoms (if needed) and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years).

$H_0 3$: There is no relationship between the ability to obtain male or female condoms (if needed) and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years).

Research Question 4: What is the mediating effect of the ability to obtain condoms on the relationship between the two independent variables, namely an individual's comprehensive knowledge of HIV transmission and prevention and their attitude toward PLHIV, and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years)?

H_a4: The ability to obtain condoms is a mediator in the relationship between the two independent variables, namely an individual's comprehensive knowledge of HIV transmission and prevention and attitude toward PLHIV, and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years).

H_04: The ability to obtain condoms is not a mediator in the relationship between the two independent variables, namely an individual's comprehensive knowledge of HIV transmission and prevention and attitude toward PLHIV, and self-reported practice of at least one HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years).

In the remainder of this section, I describe the data collection for the study, followed by the results of the retrospective quantitative analysis of the secondary data set.

Data Collection of Secondary Data Set

Data Collection Time Frame

The LDHS and KDHS were conducted within the same year but in different periods. The data for the 2014 LDHS were collected over a 2.5-month period from September 22, 2014, through December 7, 2014 (Ministry of Health Lesotho and ICF International, 2016). The KDHS 2014 data were collected over a 6.5-month period from May 7, 2014, to October 20, 2014 (Kenya National Bureau of Statistics and Ministry of Health, 2015). Kenya and Lesotho ministries of health determined the timing of the studies based on their country planning cycles; these timings had no effect on the study design and outcomes because the studies are cross-sectional in design.

Recruitment and Response Rates

The LDHS included three questionnaires addressing household, males, and females. Of the 9,942 households selected, 9,543 were occupied, and of those 9,402 were successfully interviewed, indicating a household response rate of 99% (Ministry of Health Lesotho and ICF International, 2016). A total of 6,818 women were eligible for individual interviews at the successful households, and 6,621 completed the woman's questionnaire, indicating a response rate of 97% (Ministry of Health Lesotho and ICF International, 2016). A total of 2,931 of the 3,133 eligible households were interviewed, indicating a response rate of 94% (Ministry of Health Lesotho and ICF International, 2016). In Lesotho, the lower response rate for men compared to women was due to men's frequent and longer absences from the households (Ministry of Health Lesotho and ICF International, 2016). Table 2 illustrates the results of the household and individual interviews according to residence in the Lesotho 2014 DHS.

Table 2

Unweighted Number of Households, Interviews, and Response Rates, According to Residence, Lesotho 2014

Result	Residence		Total
	Urban	Rural	
Household interviews			
Households selected	2,934	7,008	9,942
Households occupied	2,843	6,700	9,543
Households interviewed	2,798	6,604	9,402
Household response rate[1]	98.4	98.6	98.5
Interviews with women age 15-49			
Number of eligible women	2,282	4,536	6,818
Number of eligible women interviewed	2,202	4,419	6,621
Eligible women response rate[2]	96.5	97.4	97.1
Interviews with men age 15-59			
Number of eligible men	960	2,173	3,133
Number of eligible men interviewed	903	2,028	2,931
Eligible men response rate[2]	94.1	93.3	93.6

[1] Households interviewed/households occupied
[2] Respondents interviewed/eligible respondents

There were five sets of questionnaires in Kenya, namely full and short household questionnaire, full and short woman's questionnaire, and short versions of the man's questionnaire. Of the 39,679 households selected, 36,812 were occupied and 36,430 were interviewed, indicating a 99% response rate (Table 3). Households were counted as not occupied if the structures were vacant or destroyed or the household members were absent for an extended period (Kenya National Bureau of Statistics and Ministry of Health, 2015). A total of 32,172 women were eligible for woman's questionnaires (full and short versions) in the households interviewed. Of these, 31,079 women were interviewed, indicating a response rate of 97%. There was a total of 14,217 men eligible in the households targeted for full household questionnaire, and 12,819 were interviewed,

indicating a response rate of 90% (Table 3). As with Lesotho, response rates were lower for men than women because men were absent from the households for long periods during the implementation of the surveys. Table 3 illustrates the results of the household and individual interviews according to residence in the Kenya 2014 DHS.

Table 3

Unweighted Number of Households, Interviews, and Response Rates, According to Residence, Kenya 2014

Result	Residence		Total
	Urban	Rural	
Household interviews			
Households selected	15,419	24,260	39,679
Households occupied	14,177	22,635	36,812
Households interviewed	13,914	22,516	36,430
Household response rate[1]	98.1	99.5	99.0
Interviews with women age 15-49			
Number of eligible women	12,157	20,015	32,172
Number of eligible women interviewed	11,614	19,465	31,079
Eligible women response rate[2]	95.5	97.3	96.6
Interviews with men age 15-54			
Number of eligible men	5676	8,541	14,217
Number of eligible men interviewed	4915	7,904	12,819
Eligible men response rate[2]	86.6	92.5	90.2

[1] Households interviewed/households occupied

[2] Respondents interviewed/eligible respondents

Discrepancies in the Use of the Secondary Data Set

In the review and preliminary analysis, I discovered that questions pertaining to key variables of interest to the study were not included in the short version of the household questionnaires. A total of 6,160 households did not respond to questions on attitudes toward PLHIV, including whether it was okay to buy fresh vegetables from a person living with HIV (V825), to care for a family member living with HIV (V778), to

disclose the positive HIV status of a close family member (V777), and for a female teacher living with HIV but is not sick to be allowed to continue teaching in school (V779). Consequently, the inclusion criteria were changed to include only those households that responded to questions on sexuality and perceptions toward people living with HIV.

As anticipated, some variables had missing values because of a multitude of reasons including respondent's unwillingness to answer. In statistical analysis, I used listwise deletion to exclude the cases with missing values. I included the cases with missing values in the descriptive and univariate analysis.

Descriptive and Demographic Characteristics of the Sample

The study sample was composed of all eligible individuals in the respective data sets. There was a total sample of 7,678 of sample in the Kenyan data set and 3,442 in the Lesotho data set. I merged the two data sets to form the final sample data set that was composed of 11,120 cases and used this for analysis. Table 4 illustrates the descriptive and sociodemographic characteristics of youths in the study data set.

Table 4

Characteristics of Youths Ages 15-24 Years in the Final Study Data Set

	Kenya % (n=7,678)	Lesotho % (n=3,442)
Gender		
Male	52.6	30.3*
Female	47.4	69.7*
Age in 5-year groups		
15-19	50.3	50.7
20-24	49.7	49.3
Type of place of residence		
Urban	38.0	33.0*
Rural	62.0	67.0*
Highest educational level		
No education	2.9	0.5*
Primary	45.4	29.7*
Secondary	43.5	65.1*
Higher	8.2	4.6*
Literacy		
Cannot read at all	6.0	3.0*
Able to read only parts of sentence	7.3	5.4*
Able to read whole sentence	86.6	91.6*
No card with required language	0.0	0.1
Blind/visually impaired	0.1	0.0
Wealth index		
Poorest	18.1	14.8*
Poorer	21.2	17.2*
Middle	21.8	22.3
Richer	21.6	24.2*
Richest	17.4	21.6*
Religion		
Roman Catholic	20.4	38.1*
Protestant/ other Christian	66.2	58.7*
Muslim	11.0	0.2*
No religion	2.2	2.0
Other religion	0.2	0.9
Current marital status		
Never in union	74.8	68.7*
Married	20.2	28.3*
Living with partner	2.1	0.4*
Widowed	0.1	0.4
Divorced	0.5	0.6
No longer living together/ separated	2.2	1.6

* $p < 0.01$

There were significant differences between the cases in the Kenya and Lesotho data sets on most demographic characteristics when I conducted chi-square test. Although there were differences noted on the age distribution between 15-19 years and 20-24 years

in Kenya and Lesotho, these differences were not statistically different ($p>0.05$). There were significantly more females (69.7%) in the Lesotho sample as compared to Kenya sample (47.4%). There were more participants from rural residency (67.0%) in Lesotho sample as compared to Kenya (62.0%). I found significantly different education-levels between the two countries; those with secondary school-level in Lesotho were 65.1% and 43.5%in Kenya. Literacy levels were also significantly different; those able to read whole sentences in Lesotho were 91.6% and 86.6% in Kenya and 3.0% of the participants in Lesotho could not read as compared to 6.0% in Kenya. I also found significant differences across wealth index categories between Kenya and Lesotho (Table 4). There were significantly more Muslims (11.0%) in Kenya as compared to Lesotho (0.2%). Lesotho sample had a significantly higher proportion of married individuals (28.3%) as compared to Kenya (20.2%). Based on the differences I found on the confounding variables across the two countries, I conducted a comparative analysis between Kenya and Lesotho.

Representativeness of the Sample to Population of Interest

As earlier discussed, the DHS sampling frames used a two-stage cluster sampling approach to ensure representativeness of respondents across different demographic profiles (DHS program, n.d.). DHS used well-established and internationally recognized methods to select respondents at household-level (see Creswell, 2014). In this study, I used a census of all eligible respondents that responded to questions on sexuality and perceptions towards people living with HIV. Based on this, I determined that the DHS

data sets and this study data sets are representative at national-level of youths in Kenya and Lesotho.

Results of Basic Univariate Analyses

I conducted basic univariate analysis focusing on past 12 months HIV reported risk-reducing behaviors to rationalize the inclusion of covariates in the model. I also conducted chi-square to determine whether the differences noted were significant. A total of 11,095 individuals responded to the question on past 12 months HIV risk behavior, which was equivalent to an estimated 99.8% of the study sample (Figure 3). Of these, 43.2% had abstained; 26.2% had one sexual partner; 23.3% had one sexual partner and used a condom; and 5.0% had more than one sexual partner and used a condom (Figure 3). The proportion that did not practice any protective behavior was 2.3%.

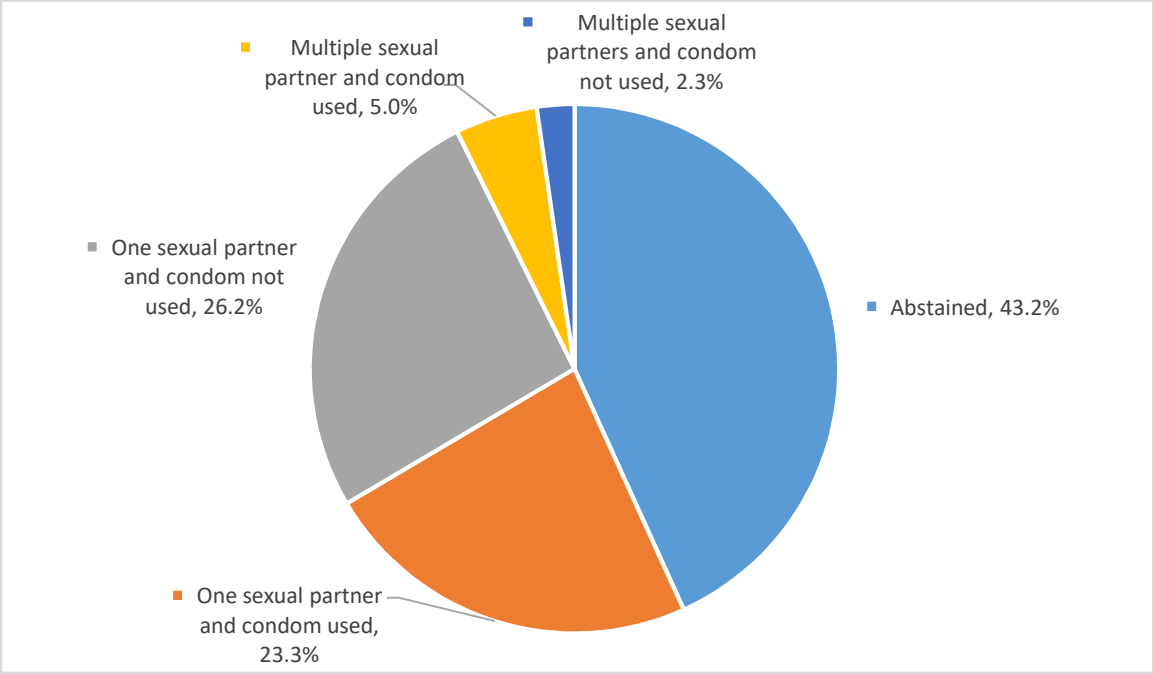

Figure 3. 12 month reported HIV risk-reducing behaviors (n = 2,963).

Reported HIV risk-reducing behavior adopted in the last 12 months varied significantly ($p<0.05$) between Kenya and Lesotho. Although in both countries most youths practiced abstinence in the last 12 months, there were significantly more youths in Kenya reporting this as compared to Lesotho (Figure 4). Figure 4 shows that there were significantly more youths who had one sexual partner and using a condom in Lesotho (32.3%) as compared to Kenya (19.2%). Further those that had one sexual partner and not using a condom were higher in Kenya (28.4%) as compared to Lesotho (21.3%).

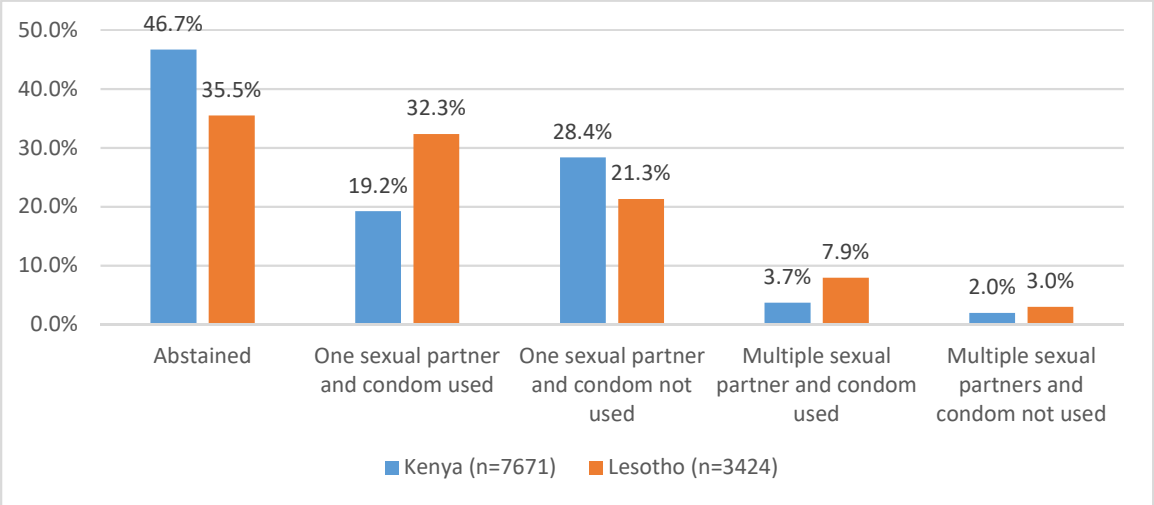

Figure 4. Past 12 months reported HIV risk-reducing behaviors by country.

Figure 5 illustrates the reported practice of HIV risk-reducing behaviors in the past12 months. There were significantly more male than female in all risk-reducing behaviors other than having one sexual partner and not using a condom (Figure 5). Significantly more female (36.6%) had one partner and not using a condom as compared to male (13.8%) (Figure 5). Males were more likely to have multiple sexual partners in the last 12 months as compared to females; regardless of condom use (Figure 5).

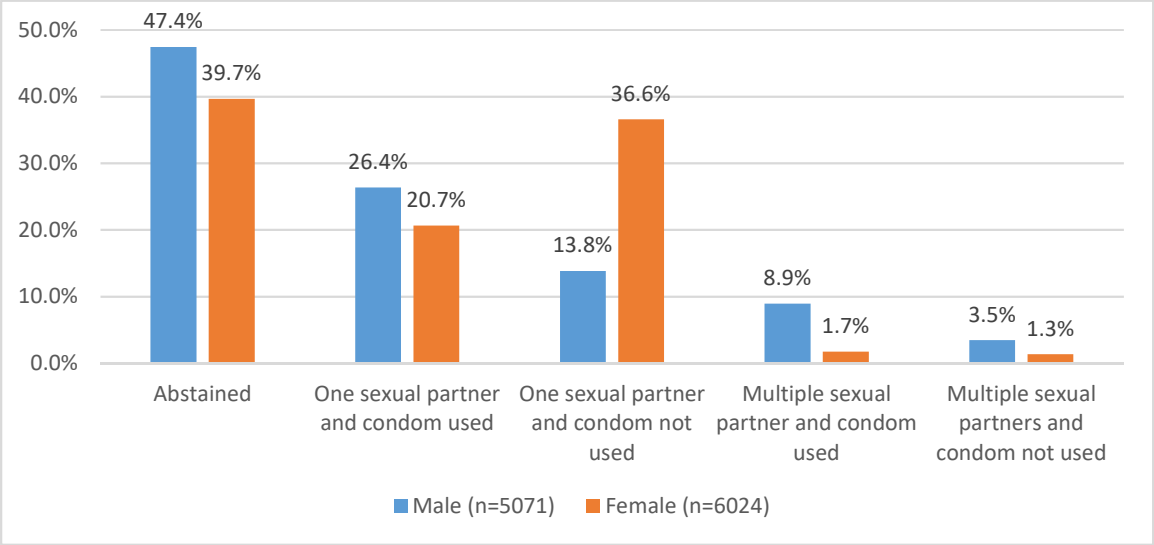

Figure 5. Past 12 months reported HIV risk-reducing behaviors by gender.

There were significant differences ($p<0.05$) across age-groups in all risk-reducing behaviors other than among those that had more than one sexual partner and did not use a condom (Figure 6). Almost thrice as many individuals 15-19 years of age had abstained in the last 12 months as compared to those 20-24 years of age. The proportion that had one sexual partner and did not use a condom was 38.8% among 20-24 years of age and 13.8% among 15-19 years of age (Figure 6). Condom use whether with one sexual partner or more was higher among those aged 20-24 years of age as compared to those aged 15-19 years of age (Figure 6).

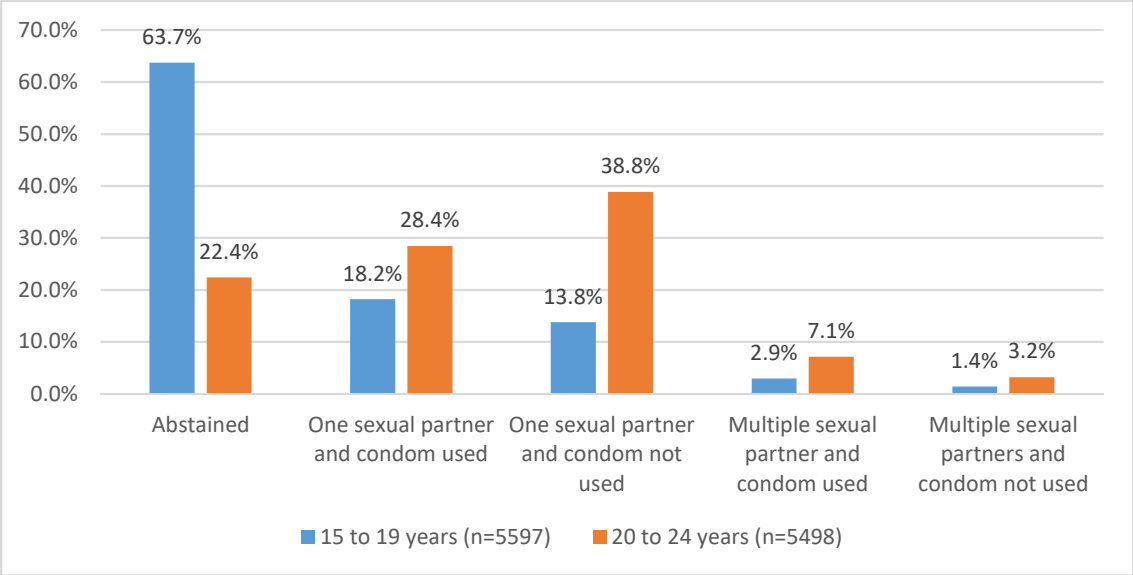

Figure 6. Past 12 months reported HIV risk-reducing behaviors by age-group.

No significant differences ($p>0.05$) were noted between individuals in urban and rural settings (*Figure 7*). As such, I excluded place of residency from the multinomial logistic regression model.

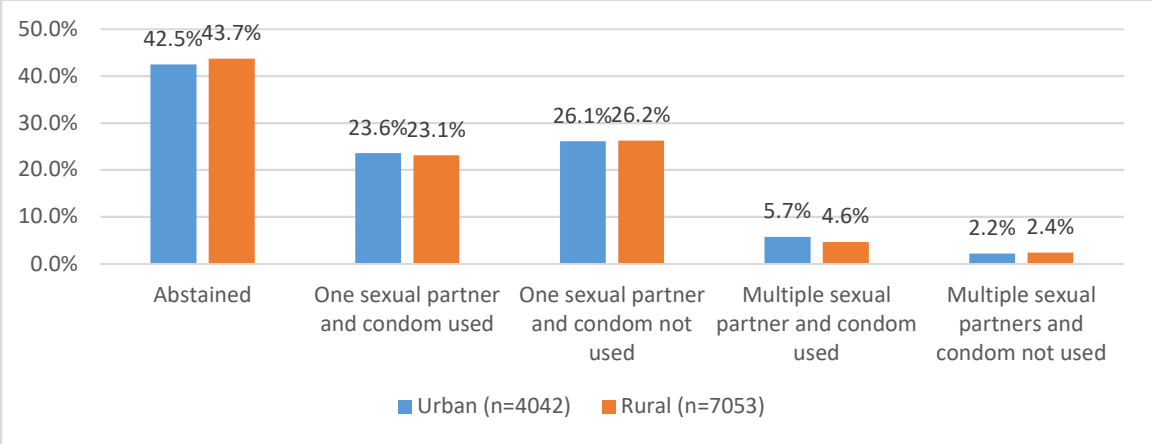

Figure 7. Past 12 months reported HIV risk-reducing behaviors by residency.

The practice of abstinence was the highest among youths in primary (40.6%) and secondary (48.0%) but relatively low amongst those with no education (23.6%) and higher (30.4%) (Table 5). I found a significant association between education and HIV risk-reducing behaviors practiced in the last 12 months using chi-square analysis (Table 6). In the multinomial logistic regression model, I recategorized education.

Table 5

Past 12 Months Reported HIV Risk-Reducing Behaviors by Education

	No education (n=242)	Primary (n=4496)	Secondary (n=5572)	Higher (n=785)
Abstained	23.6%	40.6%	48.0%	30.4%
One sexual partner and condom used	8.3%	19.7%	25.3%	33.9%
One sexual partner and condom not used	60.7%	32.5%	20.1%	22.7%
Multiple sexual partner and condom used	2.5%	4.6%	4.7%	10.8%
More than one sexual partner and used condoms consistently	5.0%	2.7%	1.9%	2.2%

Table 6

Chi-Square of Past 12 HIV Risk-Reducing Behavior by Education Level

	Value	df	Asymptotic significance (2-sided)
Pearson chi-square	517.813[a]	12	0.000
Likelihood ratio	486.660	12	0.000
Linear-by-linear association	53.552	1	0.000
N of valid cases	11095		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.56.

As illustrated in Table 7, abstinence was higher among youths who could read parts of sentences (35.2%) and whole sentences (45.0%). Slightly more than half of those that could not read had one sexual partner and did not use a condom as compared to 36.2% of those that read parts of sentences and 24.0% of those that read complete

sentences (Table 7). I excluded literacy from the multinomial logistic regression model because literacy is closely corelated to education and 40% of the total cells had less than the expected 5 counts in the chi-square (Table 8).

Table 7

Past 12 Months Reported HIV Risk-Reducing Behaviors by Literacy Level

	Cannot read at all (n=560)	Able to read only parts of sentence (n=741)	Able to read whole sentence (n=9771)	No card with required language (n=3)	Blind/ visually impaired (n=4)
Abstained	22.9%	35.2%	45.0%	0.0%	0.0%
One sexual partner and condom used	16.1%	21.6%	23.8%	33.3%	50.0%
One sexual partner and condom not used	50.7%	36.2%	24.0%	33.3%	25.0%
Multiple sexual partner and condom used	5.0%	4.2%	5.1%	33.3%	0.0%
Multiple sexual partners and condom not used	5.4%	2.8%	2.1%	0.0%	25.0%

Table 8

Chi-Square of Past 12 HIV Risk-Reducing Behavior by Literacy Level

	Value	df	Asymptotic significance (2-sided)
Pearson chi-square	305.898[a]	16	0.000
Likelihood ratio	276.991	16	0.000
Linear-by-linear association	177.539	1	0.000
N of valid cases	11079		

a. 10 cells (40.0%) have expected count less than 5. The minimum expected count is 0.07.

Abstinence was the highest practiced HIV risk-reducing behavior in the last 12 months in all religions. Slightly over 60% of Muslims, 43.9% Protestants, and 37.6% Roman Catholics practiced abstinence (Table 9). The second most practiced HIV risk-reducing behavior, across all religion categories other than Roman Catholics, was having

one sexual partner and not using a condom (Table 9). Condom use among Roman Catholic was 27.5% with one sexual partner and 5.9% with multiple partners. Amongst Protestants condom use was 22.9% with one sexual partner and 4.9% with multiple sexual partners (Table 9). I excluded religion from the multinomial logistic regression model because 8% of the total cells had less than the expected 5 counts in the chi-square (Table 10).

Table 9

Past 12 Months Reported HIV Risk-Reducing Behaviors by Religion

	Roman Catholic (n=2875)	Protestant/ other Christian (n=7084)	Muslim (n=854)	No religion (n=237)	Other (n=44)
Abstained	37.6%	43.9%	60.4%	29.5%	31.8%
One sexual partner and condom used	27.5%	22.9%	12.9%	20.3%	22.7%
One sexual partner and condom not used	26.4%	26.1%	24.1%	34.2%	27.3%
Multiple sexual partner and condom used	5.9%	4.9%	1.8%	9.3%	6.8%
Multiple sexual partners and condom not used	2.6%	2.2%	0.8%	6.8%	11.4%

Table 10

Chi-Square of Past 12 HIV Risk-Reducing Behavior by Religion

	Value	df	Asymptotic significance (2-sided)
Pearson chi-square	239.701[a]	16	0.000
Likelihood ratio	233.632	16	0.000
Linear-by-linear association	5.167	1	0.023
N of valid cases	11094		

a. 2 cells (8.0%) have expected count less than 5. The minimum expected count is 1.01.

Abstinence was the highest practiced HIV risk-reducing behavior in the last 12 months in all wealth index categories. Abstinence was practiced by 41.7% of the poorest,

42.2% of the poorer, 45.3% of the middle, 42.1% of the richer and 44.6% of the richest (Table 11). Condom use either with one sexual partner or multiple was significantly higher among the richer and the richest quintiles as compared to the other quintiles (Table 11). I included wealth index in the multinomial logistic regression model because I found significant variances across the wealth index quintiles when I performed chi-square tests (Table 12).

Table 11

Past 12 Months Reported HIV Risk-Reducing Behaviors by Wealth Index

	Poorest (n=1887)	Poorer (n=2217)	Middle (n=2437)	Richer (n=2482)	Richest (n=2072)
Abstained	41.7%	42.2%	45.3%	42.1%	44.6%
One sexual partner and condom used	17.9%	21.7%	24.0%	26.0%	25.6%
One sexual partner and condom not used	34.3%	29.0%	23.6%	23.5%	22.1%
Multiple sexual partner and condom used	3.3%	4.7%	4.9%	5.7%	6.2%
Multiple sexual partners and condom not used	2.8%	2.4%	2.2%	2.7%	1.5%

Table 12

Chi-Square of Past 12 HIV Risk-Reducing Behavior by Wealth Index

	Value	df	Asymptotic significance (2-sided)
Pearson chi-square	154.559[a]	16	0.000
Likelihood ratio	154.561	16	0.000
Linear-by-linear association	14.400	1	0.000
N of valid cases	11095		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 43.37.

Individuals who were never married were significantly more likely to have abstained in the last 12 months as compared to those currently married, co-habiting, widowed, divorced or separated (Table 13). Amongst those married 17.2% consistently

used a condom with one sexual partner, 74.8% had one sexual partner and did not use a condom, and 1.5% had multiple sexual partners and consistently used condoms. I recorded marital status before including it in the multinomial logistic regression model (Table 18) because 16.7% of the cells had counts less than 5 (Table 14).

Table 13

Past 12 Months Reported HIV Risk-reducing Behaviors by Current Marital Status

	Never married (n=8088)	Married (n=2523)	Living with partner (n=176)	Widowed (n=23)	Divorced (n=62)	Separated (n=223)
Abstained	57.7%	2.8%	1.1%	26.1%	24.2%	16.1%
One sexual partner and condom used	25.1%	17.2%	12.5%	30.4%	38.7%	30.9%
One sexual partner and condom not used	9.5%	74.8%	81.3%	30.4%	25.8%	39.0%
Multiple sexual partner and condom used	6.0%	1.5%	2.8%	8.7%	8.1%	8.1%
Multiple sexual partners and condom not used	1.7%	3.8%	2.3%	4.3%	3.2%	5.8%

Table 14

Chi-Square of Past 12 HIV Risk-reducing Behavior by Marital Status

	Value	df	Asymptotic significance (2-sided)
Pearson chi-square	5023.177[a]	20	0.000
Likelihood ratio	5220.746	20	0.000
Linear-by-linear association	1137.969	1	0.000
N of valid cases	11095		

a. 5 cells (16.7%) have expected count less than 5. The minimum expected count is 0.53.

Results

Descriptive Statistics

The study had a total sample of 11,120 respondents; 69.0% of the sample was from Kenya and 31.0% from Lesotho. Figure 8 shows that 54.3% of the respondents were female and 45.7% were male. Of the total sample, 50.4% were 15-19 years of age and 49.6% were 20-24 years of age (Figure 9). The sample had 63.5% from rural areas and 36.5% from urban areas (Figure 10).

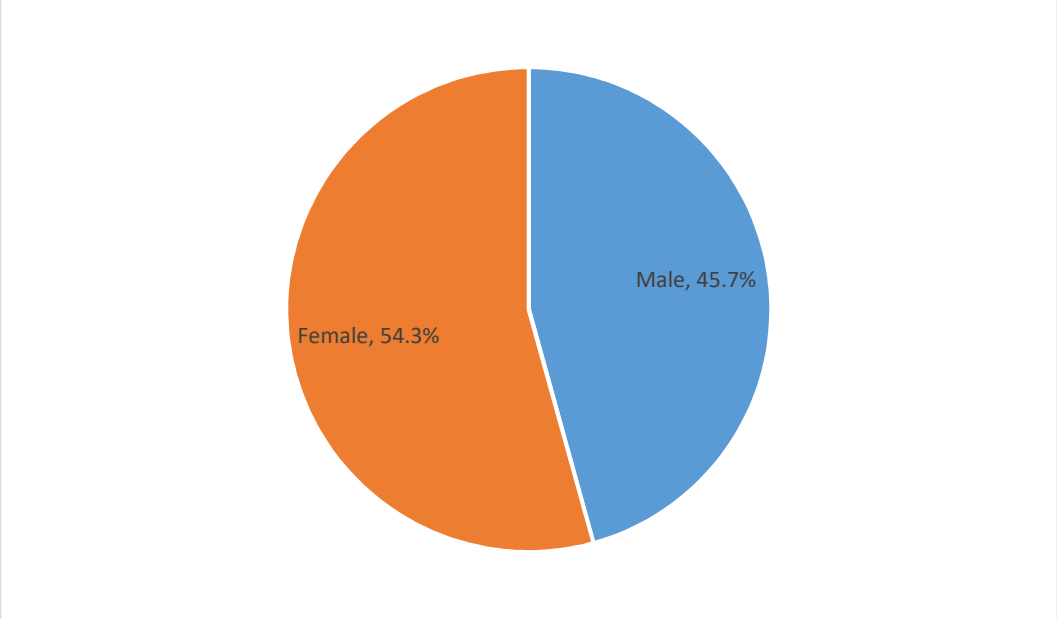

Figure 8. Sample distribution by sex.

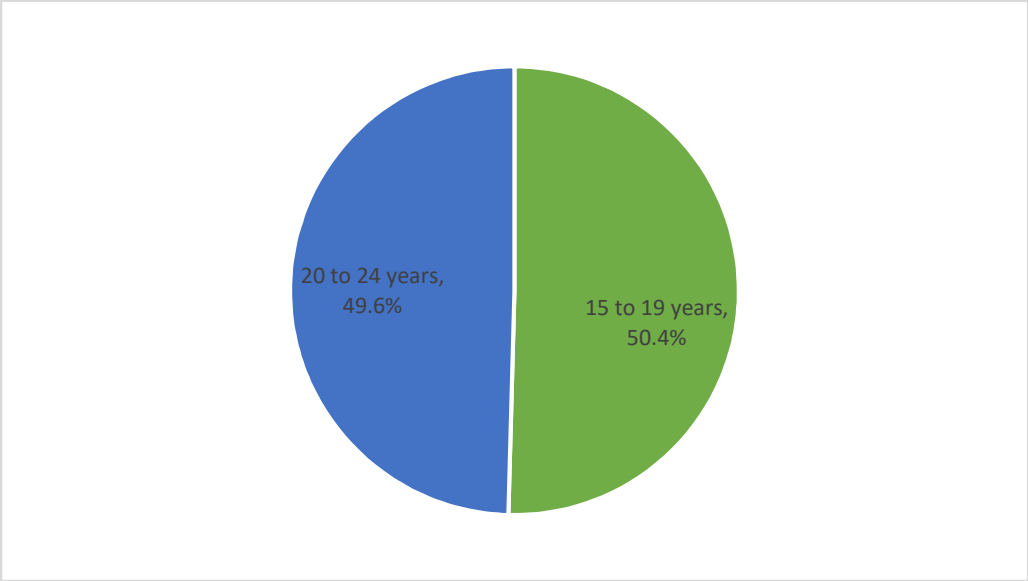

Figure 9. Sample distribution by age-group.

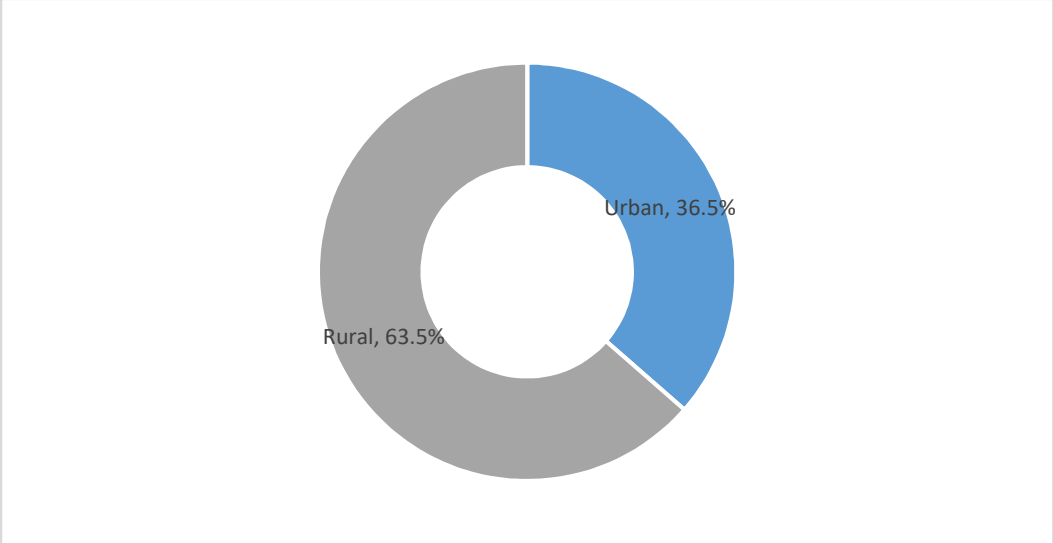

Figure 10. Sample distribution by place of residency.

Table 15 illustrates how education-level was recoded to a new variable recoded education attainment that had three categories namely primary and lower that combined no education and primary incomplete; secondary incomplete that included primary

complete and secondary incomplete; and secondary education and above. Table 16 shows that 26.4% of the respondents had primary or lower education, 52.4% had completed primary but had not secondary, and 21.2% had secondary education and above.

Table 15

Respondent Distribution by Education Level

		Frequency	Percent	Valid percent	Cumulative percent
Valid	No education	242	2.2	2.2	2.2
	Primary	4507	40.5	40.5	42.7
	Secondary	5583	50.2	50.2	92.9
	Higher	788	7.1	7.1	100.0
	Total	11120	100.0	100.0	

Table 16

Recoded Education Attainment

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Primary and lower	2934	26.4	26.4	26.4
	Secondary incomplete	5825	52.4	52.4	78.8
	Secondary and above	2361	21.2	21.2	100.0
	Total	11120	100.0	100.0	

I recoded current marital status to two categories that is married or in union and not married or in union (Table 17). Table 18 shows that 75.7% of the respondents were single or not married and 24.3% were married, in union, or living with their sexual partners.

Table 17

Respondent's Distribution by Current Marital Status

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Never in union	8106	72.9	72.9	72.9
	Married	2529	22.7	22.7	95.6
	Living with partner	176	1.6	1.6	97.2
	Widowed	24	0.2	0.2	97.4
	Divorced	62	0.6	0.6	98.0
	No longer living together/ separated	223	2.0	2.0	100.0
	Total	11120	100.0	100.0	

Table 18

Respondent's Distribution by Recoded Marital Status

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Not married/ not in union	8415	75.7	75.7	75.7
	Married/ in union	2705	24.3	24.3	100.0
	Total	11120	100.0	100.0	

Table 19 illustrates that respondents were normally distributed across wealth index. Seventeen percent of the respondents were in the poorest wealth index, 20.0% in poorer, 22.0% in middle, 22.4% in richer, and 18.7% in richest wealth index (Table 19).

Table 19

Respondent's Distribution by Wealth Index

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Poorest	1894	17.0	17.0	17.0
	Poorer	2219	20.0	20.0	37.0
	Middle	2442	22.0	22.0	58.9
	Richer	2487	22.4	22.4	81.3
	Richest	2078	18.7	18.7	100.0
	Total	11120	100.0	100.0	

Twenty-two respondents did not indicate whether they had engaged in sex in the past 12 months. Of the 11,098 that responded, 56.8% had sex in the past 12 months and 43.2% did not have sex in the last 12 months (Table 20).

Table 20

Respondent's Distribution by Past 12 Months Sexual Activity

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Did not abstain	6302	56.7	56.8	56.8
	Abstained	4796	43.1	43.2	100.0
	Total	11098	99.8	100.0	
Missing	System	22	0.2		
Total		11120	100.0		

Evaluation of Statistical Assumptions

I evaluated the data to ascertain whether it could be analyzed using multinomial logistic regression before conducting statistical analysis (see Lund Research Ltd, 2018). I evaluated the following six statistical assumptions:

Nominal dependent variable. I confirmed that the DV, self-reported practice of HIV risk-reducing behavior, was measured at the nominal level. It had five categories that is abstained, had one sexual partner and used condom consistently, had one sexual partner only and did not use condoms consistently, had more than one sexual partner and did not use condoms consistently, and had more than one sexual partner and used condoms consistently.

One or more independent variables are continuous, ordinal, or nominal (including dichotomous variables). All the study independent variables were either dichotomous or ordinal. Comprehensive knowledge of HIV transmission and prevention, individual's attitude towards PLHIV, and ability to obtain male or female condoms are dichotomous independent variables. The model includes country, gender, age-group, education, and place of residency as covariates and these are dichotomous variables as well. Wealth index that is an ordinal variable measured on a five-point scale running from poorest to richest was treated as a continuous variable and I included it in the model as a factor.

Independence of observations. All five categories of the dependent variable were mutually exclusive and exhaustive. I observed a similar situation with the independent variables and co-founding variables that were included in the model. Based on this, I concluded that independence of observations was achieved.

Multicollinearity. I tested multicollinearity using linear regression in SPSS. The test, which was conducted on all the variables that were included in the model showed no multicollinearity. The results of the multiple linear regression showed VIF of 1.360 and

below with tolerance lower than 0.990 (Table 21). Based on this, I concluded that none of the variables in the model were correlated as VIF was below the threshold of 3.

Table 21

Multicollinearity Tests (Coefficients [a])

Model		Collinearity statistics	
		Tolerance	VIF
1	(Constant)		
	Attitude towards people living with HIV	0.945	1.058
	Knows where to get a condom (male or female) if needed	0.857	1.167
	Age in 5-year groups	0.769	1.300
	Sex of respondent	0.782	1.279
	Wealth index	0.824	1.214
	Education attain recode	0.737	1.357
	Recoded marital status	0.735	1.360

a. Dependent Variable: Reported HIV risk-reducing behaviors

Linear relationship. I used Pearson's chi-squared test and Crammer's V to check for a linear relationship between key independent variables and the dependent variable because most of the independent variables were categorical. I found a linear relationship between the key independent variables and the dependent variable.

Outliers. I checked for outliers in the data using the interquartile range (IQR) rule in SPSS that looks at cases following outside the 1.5 IQR multiplier but less than 3IQRs (Wagner III, 2016). I did not find any outliers in the outcome variable and the IVs.

Statistical Findings by Research Question

In this sub-section, I provide the statistical analysis findings organized by research questions and/or hypotheses and include exact statistics and associated probability values; confidence intervals around the statistics, as appropriate; and effect sizes, as appropriate.

Research Question 1. I used multinomial logistic regression to determine what relationship existed between comprehensive knowledge of HIV transmission and prevention and self-reported practice of HIV risk-reducing behavior (outcome) among adolescents (15-19 years) and young adults (20-24 years) and controlling for the known confounders. I applied listwise deletion thereby excluding cases with missing values from the analysis because I used SPSS in the analysis. Based on this, the model had 11,088 out of the 11,120 cases in the combined data set (Table 22).

Table 22

Case Processing Summary Relationship Between Comprehensive Knowledge of HIV and HIV Risk-Reducing Behaviors

	N	Marginal percentage
HIV risk-reducing behavior last 12 months		
Abstained	4791	43.2%
One sexual partner and condom used	2581	23.3%
One sexual partner and condom not used	2904	26.2%
Multiple sexual partner and condom used	557	5.0%
Multiple sexual partners and condom not used	255	2.3%
Comprehensive HIV knowledge		
Incomprehensive knowledge	4967	44.8%
Comprehensive knowledge	6121	55.2%
Country		
Kenya	7664	69.1%
Lesotho	3424	30.9%
Gender		
Male	5064	45.7%
Female	6024	54.3%
Age-group		
15-19	5592	50.4%
20-24	5496	49.6%
Current marital status		
Not married/ not in union	8389	75.7%
Married/ in union	2699	24.3%
Educational level attained		
Primary and lower	2920	26.3%
Secondary incomplete	5814	52.4%
Secondary complete and above	2354	21.2%
Valid	11088	100.0%
Missing	32	
Total	11120	
Subpopulation	411[a]	

a. The dependent variable has only one value observed in 74 (18.0%) subpopulations.

Based on the model fitting information (Table 23), the chi-square was 7175.024 and the degree of freedom was 32 and significance (p) was 0.000. The full model was statistically significant to predict the dependent variable better than the intercept-only model because p was less than 0.05. As such, I proceeded to examine the parameter estimates.

Table 23

Model Fitting Information on Relationship Between Comprehensive Knowledge of HIV and HIV Risk-Reducing Behaviors

Model	Model fitting criteria	Likelihood ratio tests		
	-2 Log likelihood	Chi-square	df	Sig.
Intercept only	11231.613			
Final	4056.589	7175.024	32	0.000

The Pseudo R-Square (Table 24) shows the Cox and Snell's R^2 was 0.476 and because the dependent variable was categorical, even with a "perfect" model, R^2 would not be 1. Thus, Nagelkerke adjusted R^2 and McFadden were provided as 0.516 and 0.251 (Table 24) (Laureate Education, 2016b).

Table 24

Pseudo R-Square on Relationship Between Comprehensive Knowledge of HIV and HIV Risk-Reducing Behaviors

Cox and Snell	0.476
Nagelkerke	0.516
McFadden	0.251

I checked the contribution of each variable to the model using the likelihood ratios tests. Based on the analysis (Table 25), all variables in the model other than "wealth index" had a significance level (p) of below 0.05 and can contribute to the

model. I excluded the wealth index from the model because it did not contribute to the model given that its *P* value was higher than the set significance level.

Table 25

Likelihood Ratios Tests on Relationship Between Comprehensive Knowledge of HIV and HIV Risk-Reducing Behaviors

Effect	Model fitting criteria	Likelihood ratio tests		
	-2 log likelihood of reduced model	Chi-square	df	Sig.
Intercept	4056.589[a]	0.000	0	
Comprehensive knowledge of HIV	4076.433	19.844	4	0.001
Country code and phase	4729.285	672.696	4	0.000
Sex of respondent	4657.354	600.765	4	0.000
Age in 5-year groups	4783.201	726.612	4	0.000
Recoded marital status	7130.044	3073.454	4	0.000
Education attain recode	4161.413	104.823	8	0.000
Wealth index	4062.527	5.938	4	0.204

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

a. This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

Table 26 illustrates the model parameter estimates, also known as the coefficients of the model. When all possible confounders are controlled for, the model showed a significant relationship between comprehensive knowledge of HIV and decision to have one sexual partner and use a condom (p=0.043) (Table 26). As complete knowledge was used as the reference category and *B* was negative, I assumed that those with comprehensive knowledge were more likely (0.748) to have one sexual partner and use condoms with them than having multiple partners and not using condoms as compared to individuals with incomprehensive HIV knowledge (Table 26). There were no significant differences between those who abstained (p=0.572), those who had one sexual partner

and did not use condoms (p=0.557), and those who had multiple sexual partners and used condoms (p=0.058) as compared to those with comprehensive knowledge and had multiple sexual partners and not using a condom.

Across age-group, I found significant relationship only among who abstained as compared to those who had multiple partners and did not use condoms (p=0.000). Individuals 15-19 years of age were more than three times (3.283) likely to report having abstained in the last 12 months than having multiple partners and not using a condom when compared to those 20-24 years of age (Table 26).

Based on the findings, I rejected null hypothesis because there was a relationship between comprehensive knowledge of HIV transmission and the logit for those who report having one sexual partner and using condoms. However, there was no relationship between comprehensive knowledge of HIV transmission and prevention and the practice of abstinence, having one sexual partner and not using a condom with them, or having multiple partners and using a condom with them when compared to having multiple partners and not using a condom with them. The results show that age-group influenced the practice of abstinence when compared to having multiple sexual partners and not using a condom; those 15-19 years of age were more than thrice (3.283) as likely to practice abstinence as compared to those 20-24 years of age.

Table 26

Parameter Estimates on Effect of Comprehensive Knowledge of HIV on HIV Risk-Reducing Behaviors

Reported HIV risk-reducing behaviors[a]		B	Wald	Sig.	Exp(B)	95% Confidence interval for exp(B) Lower bound	Upper bound
Abstained	Intercept	-0.798	6.300	0.012			
	Comprehensive HIV knowledge						
	Incomprehensive	-0.081	0.319	0.572	0.922	0.697	1.221
	Comprehensive	0[b]					
	Wealth index	0.037	0.468	0.494	1.038	0.933	1.153
	Country						
	Kenya	0.923	36.633	0.000	2.516	1.866	3.393
	Lesotho	0[b]					
	Gender						
	Male	-1.694	108.579	0.000	0.184	0.134	0.253
	Female	0[b]					
	Age-group						
	15-19 years	1.494	91.898	0.000	4.456	3.283	6.047
	20-24 years	0[b]					
	Current marital status						
	Not married/ not in union	3.762	366.004	0.000	43.029	29.267	63.260
	Married/ in union	0[b]					
	Educational level attained						
	Primary and lower	-0.298	1.869	0.172	0.742	0.484	1.138
	Secondary incomplete	0.175	0.831	0.362	1.191	0.818	1.736
	Secondary complete and above	0[b]					
One sexual partner and condom used	Intercept	2.237	56.926	0.000			
	Comprehensive HIV knowledge						
	Incomprehensive	-0.291	4.076	0.043	0.748	0.564	0.992
	Comprehensive	0[b]					
	Wealth index	0.019	0.118	0.732	1.019	0.916	1.133
	Country						
	Kenya	-0.046	0.094	0.759	0.955	0.709	1.284
	Lesotho	0[b]					
	Gender						
	Male	-1.114	46.761	0.000	0.328	0.238	0.452
	Female	0[b]					
	Age-group						

Reported HIV risk-reducing behaviors[a]		B	Wald	Sig.	Exp(B)	95% Confidence interval for exp(B) Lower bound	Upper bound
	15-19 years	0.261	2.777	0.096	1.299	0.955	1.766
	20-24 years	0[b]					
	Current marital status						
	Not married/ not in union	1.464	80.424	0.000	4.324	3.140	5.955
	Married/ in union	0[b]					
	Educational level attained						
	Primary and lower	-0.857	15.337	0.000	0.425	0.277	0.652
	Secondary incomplete	-0.150	0.617	0.432	0.861	0.592	1.251
	Secondary complete and above	0[b]					
One sexual partner and condom not used	Intercept	2.885	94.230	0.000			
	Comprehensive HIV knowledge						
	Incomprehensive	-0.085	0.345	0.557	0.919	0.692	1.220
	Comprehensive	0[b]					
	Wealth index	-0.013	0.059	0.808	0.987	0.887	1.098
	Country						
	Kenya	1.423	84.462	0.000	4.149	3.063	5.620
	Lesotho	0[b]					
	Gender						
	Male	-2.006	151.245	0.000	0.135	0.098	0.185
	Female	0[b]					
	Age-group						
	15-19 years	0.279	3.031	0.082	1.322	0.966	1.810
	20-24 years	0[b]					
	Current marital status						
	Not married/ not in union	-0.870	29.260	0.000	0.419	0.305	0.574
	Married/ in union	0[b]					
	Educational level completed						
	Primary and lower	-0.110	0.251	0.617	0.896	0.583	1.377
	Secondary incomplete	-0.117	0.365	0.546	0.890	0.609	1.300
	Secondary complete and above	0[b]					
Multiple sexual partner and condom used	Intercept	-0.425	1.349	0.246			
	Comprehensive HIV knowledge						
	Incomprehensive	-0.318	3.603	0.058	0.728	0.524	1.010
	Comprehensive	0[b]					
	Wealth index	0.076	1.460	0.227	1.079	0.954	1.221
	Country						
	Kenya	-0.784	20.302	0.000	0.456	0.324	0.642

Reported HIV risk-reducing behaviors[a]	B	Wald	Sig.	Exp(B)	95% Confidence interval for exp(B) Lower bound	Upper bound
Lesotho	0[b]					
Gender						
Male	0.390	3.980	0.046	1.477	1.007	2.168
Female	0[b]					
Age-group						
15-19 years	-0.345	3.640	0.056	0.708	0.497	1.009
20-24 years	0[b]					
Current marital status						
Not married/ not in union	2.053	84.195	0.000	7.789	5.024	12.075
Married/ in union	0[b]					
Educational level attained						
Primary and lower	-0.634	6.323	0.012	0.531	0.324	0.870
Secondary incomplete	-0.174	0.657	0.418	0.840	0.552	1.280
Secondary complete and above	0[b]					

a. The reference category is: Multiple sexual partners and condom not used.

b. This parameter is set to zero because it is redundant.

Research Question 2. I also used multinomial logistic regression to determine what relationship existed between an individual's attitude toward PLHIV and self-reported practice of HIV risk-reducing behavior among adolescents (15-19 years) and young adults (20-24 years) and controlled for the known confounders as previously explained. Hereto, I applied listwise deletion to exclude cases with missing values from the analysis. Based on this, I used 11,078 out of the 11,120 cases in the combined data set to generate the model (Table 27).

Table 27

Case Processing Summary Relationship Between Individuals' Attitude Toward PLHIV and HIV Risk-Reducing Behaviors

	N	Marginal percentage
HIV risk behavior last 12 months		
Abstained	4787	43.2%
One sexual partner and condom used	2579	23.3%
One sexual partner and condom not used	2902	26.2%
Multiple sexual partner and condom used	555	5.0%
Multiple sexual partners and condom not used	255	2.3%
Attitude towards people living with HIV		
Negative attitude	6929	62.5%
Positive attitude	4149	37.5%
Country		
Kenya	7654	69.1%
Lesotho	3424	30.9%
Gender		
Male	5054	45.6%
Female	6024	54.4%
Age-group		
15-19	5586	50.4%
20-24	5492	49.6%
Current marital status		
Not married/ not in union	8381	75.7%
Married/ in union	2697	24.3%
Educational level attained		
Primary and lower	2917	26.3%
Secondary incomplete	5810	52.4%
Secondary complete and above	2351	21.2%
Valid	11078	100.0%
Missing	42	
Total	11120	
Subpopulation	413a	

a. The dependent variable has only one value observed in 67 (16.2%) subpopulations.

Based on the model fitting information (Table 28), the chi-square was 7164.069 and the degree of freedom was 32 and significance (p) was 0.000. The data demonstrated that the full model was statistically significant to predict the dependent variable better than the intercept-only model because p was less than 0.05. As such, I proceeded to examine the parameter estimates.

Table 28

Model Fitting Information on Relationship Between Individuals Attitude Toward PLHIV and HIV Risk-Reducing Behaviors

Model	Model fitting criteria	Likelihood ratio tests		
	-2 log likelihood	Chi-square	df	Sig.
Intercept only	11255.408			
Final	4091.338	7164.069	32	0.000

The Pseudo R-Square (Table 29) shows the Cox and Snell's R^2 of 0.476 and because the dependent variable was categorical even with a "perfect" model R^2 would not be 1. Based on this, Nagelkerke adjusted R^2 and McFadden were provided as 0.515 and 0.251 (Table 29) (see Laureate Education, 2016b).

Table 29

Pseudo R-Square on Relationship Between Individuals' Attitude Toward PLHIV and HIV Risk-Reducing Behaviors

Cox and Snell	0.476
Nagelkerke	0.515
McFadden	0.251

I used the likelihood ratio tests to check the contribution of each variable to the model. From the analysis (Table 30), all variables in the model other than "wealth index" contributed to the model because they had a significance level (p) of below 0.05. P value

for “wealth index” was 0.223, which was higher than the set significance level and I concluded that it did not contribute to the model.

Table 30

Likelihood Ratios Tests on Relationship Between Individuals’ Attitudes Toward PLHIV and HIV Risk-Reducing Behaviors

Effect	Model fitting criteria	Likelihood ratio tests		
	-2 log likelihood of reduced model	Chi-square	df	Sig.
Intercept	4091.338[a]	0.000	0	
Attitude towards people living with HIV	4102.877	11.538	4	0.021
Wealth index	4097.038	5.700	4	0.223
Country code and phase	4752.128	660.789	4	0.000
Sex of respondent	4689.873	598.534	4	0.000
Age in 5-year groups	4824.203	732.865	4	0.000
Recoded marital status	7166.241	3074.903	4	0.000
Education attain recode	4213.593	122.254	8	0.000

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

a. This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

Error! Reference source not found. shows the model coefficients with all the key confounders controlled for. The results show that an individual’s attitude toward PHIV only had a significant relationship with the decision to abstain (p=0.045) (**Error! Reference source not found.**). Individuals who had negative attitudes toward PLHIV were 1.321 times likely to have abstained in the last 12 months than having had multiple partners and did not use condoms as compared to those who have a positive attitude toward PLHIV (**Error! Reference source not found.**). There were no significant relationships between an individual’s attitude toward PLHIV and those who had one sexual partner and used a condom with them (p=0.125), had one sexual partner and did

not use a condom with them (p=0.533), or those who had multiple sexual partners and used condoms (p=0.083) when compared to those who had multiple sexual partners and did not use condoms.

There were significant relationships (p=0.000) between age-group and those who abstained as compared to having multiple partners and not using a condom (**Error! Reference source not found.**). Individuals 15-19 years of age were more than three times (3.335) likely to abstain in the last 12 months than having multiple relations and not using a condom as compared to those 20-24 years of age (**Error! Reference source not found.**).

I rejected the null hypothesis because these results show a relationship between an individual's attitude toward PLHIV and self-reported practice of HIV risk-reducing behavior (outcome) by adolescents (15-19 years) and young adults (20-24 years). There were significant relationships between those with negative attitudes toward PLHIV and practice of abstinence in the last 12 months when compared to those who had multiple sexual partners and did not use condoms (Table 31). The results did not show a relationship between attitudes toward PLHIV and other risk-reducing behaviors. This logit also showed significant relationship between age-group and abstinence; those 15-19 years of age were more than thrice (3.335) likely to abstain as compared to those aged 20-24 years of age.

Table 31

Parameter Estimates on Effect of Attitudes Toward PLHIV on HIV Risk-reducing Behaviors

Reported HIV risk-reducing behaviors[a]		B	Wald	Sig.	Exp(B)	95% Confidence interval for exp(B) Lower bound	Upper bound
Abstained	Intercept	-1.031	10.230	0.001			
	Attitude towards people living with HIV						
	Negative attitude	0.278	4.006	0.045	1.321	1.006	1.734
	Positive attitude	0[b]					
	Wealth index	0.040	0.539	0.463	1.041	0.936	1.157
	Country						
	Kenya	0.977	44.074	0.000	2.656	1.991	3.544
	Lesotho	0[b]					
	Gender						
	Male	-1.726	111.844	0.000	0.178	0.129	0.245
	Female	0[b]					
	Age-group						
	15-19 years	1.510	93.616	0.000	4.529	3.335	6.149
	20-24 years	0[b]					
	Current marital status						
	Not married/ not in union	3.769	366.628	0.000	43.318	29.454	63.709
	Married/ in union	0[b]					
	Educational level attained						
	Primary and lower	-0.348	2.631	0.105	0.706	0.464	1.075
	Secondary incomplete	0.161	0.714	0.398	1.175	0.808	1.708
	Secondary complete and above	0[b]					
One sexual partner and condom used	Intercept	1.934	41.304	0.000			
	Attitude towards people living with HIV						
	Negative attitude	0.214	2.357	0.125	1.239	0.942	1.628
	Positive attitude	0[b]					
	Wealth index	0.026	0.227	0.634	1.026	0.923	1.141
	Country						
	Kenya	0.055	0.144	0.705	1.057	0.794	1.406
	Lesotho	0[b]					
	Gender						
	Male	-1.139	48.543	0.000	0.320	0.232	0.441
	Female	0[b]					
	Age-group						

Reported HIV risk-reducing behaviors[a]		B	Wald	Sig.	Exp(B)	95% Confidence interval for exp(B) Lower bound	Upper bound
	15-19 years	0.273	3.032	0.082	1.315	0.966	1.788
	20-24 years	0[b]					
	Current marital status						
	Not married/ not in union	1.470	80.999	0.000	4.351	3.159	5.994
	Married/ in union	0[b]					
	Educational level attained						
	Primary and lower	-0.956	19.811	0.000	0.384	0.252	0.586
	Secondary incomplete	-0.190	1.008	0.315	0.827	0.571	1.198
	Secondary complete and above	0[b]					
One sexual partner and condom not used	Intercept	2.775	84.779	0.000			
	Attitude towards people living with HIV						
	Negative attitude	0.087	0.388	0.533	1.091	0.829	1.437
	Positive attitude	0[b]					
	Wealth index	-0.009	0.030	0.862	0.991	0.890	1.103
	Country						
	Kenya	1.454	94.526	0.000	4.282	3.194	5.741
	Lesotho	0[b]					
	Gender						
	Male	-2.016	151.511	0.000	0.133	0.097	0.184
	Female	0[b]					
	Age-group						
	15-19 years	0.286	3.181	0.075	1.331	0.972	1.823
	20-24 years	0[b]					
	Current marital status						
	Not married/ not in union	-0.869	29.146	0.000	0.419	0.306	0.575
	Married/ in union	0[b]					
	Educational level completed						
	Primary and lower	-0.140	0.422	0.516	0.869	0.570	1.326
	Secondary incomplete	-0.128	0.445	0.505	0.880	0.604	1.282
	Secondary complete and above	0[b]					
Multiple sexual partner and condom used	Intercept	-0.645	3.010	0.083			
	Attitude towards people living with HIV						
	Negative attitude	0.100	0.384	0.535	1.105	0.805	1.518
	Positive attitude	0[b]					
	Wealth index	0.079	1.550	0.213	1.082	0.956	1.224
	Country						
	Kenya	-0.682	16.690	0.000	0.506	0.364	0.701

Reported HIV risk-reducing behaviors[a]	B	Wald	Sig.	Exp(B)	95% Confidence interval for exp(B) Lower bound	Upper bound
Lesotho	0[b]					
Gender						
Male	0.366	3.477	0.062	1.441	0.982	2.116
Female	0[b]					
Age-group						
15-19 years	-0.342	3.562	0.059	0.710	0.498	1.013
20-24 years	0[b]					
Current marital status						
Not married/ not in union	2.057	84.460	0.000	7.822	5.044	12.129
Married/ in union	0[b]					
Educational level attained						
Primary and lower	-0.741	8.951	0.003	0.477	0.293	0.774
Secondary incomplete	-0.218	1.049	0.306	0.804	0.530	1.221
Secondary complete and above	0[b]					

a. The reference category is: Multiple sexual partners and condom not used.

b. This parameter is set to zero because it is redundant.

Research Question 3. I also used multinomial logistic regression to establish what relationship existed between ability to obtain male or female condoms (if needed) and self-reported practice of HIV risk-reducing behavior among adolescents (15-19 years) and young adults (20-24 years) and controlled for the known confounders. I also used listwise deletion to exclude cases with missing values from the analysis. Consequently, the analysis included 11,095 out of the 11,120 cases in the model (Table 32).

Table 32

Case Processing Summary Relationship Between Ability to Obtain Male or Female Condoms (if Needed) and HIV Risk-Reducing Behaviors

	N	Marginal percentage
HIV risk behavior last 12 months		
Abstained	4796	43.2%
One sexual partner and condom used	2582	23.3%
One sexual partner and condom not used	2905	26.2%
Multiple sexual partner and condom used	557	5.0%
Multiple sexual partners and condom not used	255	2.3%
Able to get a condom (male or female) if needed		
Not able to get a condom (male or female)	2847	25.7%
Able to get a condom (male or female)	8248	74.3%
Country		
Kenya	7671	69.1%
Lesotho	3424	30.9%
Gender		
Male	5071	45.7%
Female	6024	54.3%
Age-group		
15-19	5597	50.4%
20-24	5498	49.6%
Current marital status		
Not married/ not in union	8396	75.7%
Married/ in union	2699	24.3%
Educational level attained		
Primary and lower	2926	26.4%
Secondary incomplete	5815	52.4%
Secondary complete and above	2354	21.2%
Valid	11095	100.0%
Missing	25	
Total	11120	
Subpopulation	381[a]	

a. The dependent variable has only one value observed in 83 (21.8%) subpopulations.

Table 33 of the model fitting information showed that the chi-square was 7457.430 and the degree of freedom was 32 with a significance (p) of below 0.000. These data demonstrated that the full model was statistically significant to predict the dependent variable better than the intercept-only model. Consequently, I proceeded to examine and interpret the parameter estimates.

Table 33

Model Fitting Information on Relationship Between Ability to Obtain Male or Female Condoms (if Needed) and HIV Risk-Reducing Behaviors

Model	Model fitting criteria	Likelihood ratio tests		
	-2 log likelihood	Chi-square	df	Sig.
Intercept only	11040.912			
Final	3583.482	7457.430	32	0.000

Table 34 shows the Cox and Snell's R^2 was 0.489 and because the dependent variable was categorical, even with a "perfect" model, R^2 would not be 1. Thus, Nagelkerke adjusted R^2 and McFadden were provided as 0.530 and 0.261 (Table 34) (see Laureate Education, 2016b).

Table 34

Pseudo R-Square on Relationship Between Ability to Obtain Male or Female Condoms (if Needed) and HIV Risk-Reducing Behaviors

Cox and Snell	0.489
Nagelkerke	0.530
McFadden	0.261

Table 35 presents the likelihood ratio tests that were used to check the contribution of each variable to the model. The data demonstrated that all variables other than "wealth index" had significant readings (p<0.05) as such contributed to the model

(Table 35). Wealth index had a *P* value of 0.215, which was higher than the set significance level as such it did not contribute to the model.

Table 35

Likelihood Ratios Tests on Relationship Between Ability to Obtain Male or Female Condoms (if Needed) and HIV Risk-Reducing Behaviors

Effect	Model fitting criteria	Likelihood ratio tests		
	-2 log likelihood of reduced model	Chi-square	df	Sig.
Intercept	3583.482[a]	0.000	0	
Knows where to get a condom (male or female) if needed	3880.697	297.215	4	0.000
Wealth index	3589.271	5.789	4	0.215
Country code and phase	4160.939	577.457	4	0.000
Sex of respondent	4008.172	424.690	4	0.000
Age in 5-year groups	4164.864	581.381	4	0.000
Recoded marital status	6566.380	2982.898	4	0.000
Education attain recode	3692.090	108.608	8	0.000

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

a. This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

In the model logits, I explored the relationship between ability to obtain a condom and past 12 months self-reported HIV risk-reducing behaviors using those who had multiple sexual partners and did not use condoms as the reference category (Table 36). The results demonstrated that ability to obtain condoms was significantly related to those who had abstained in the last 12 months ($p<0.000$). Those who could not obtain a condom were more than three times as likely to have abstained as compared to those who could obtain a condom. There were no significant relations reported between other risk-reduction behaviors and ability to get a condom (Table 36).

There was significant relationship (p<0.000) between age-group and abstinence. Individuals 15-19 years of age were almost four times (3.964) as likely to abstain rather than having multiple sexual partners and not using a condom as compared to those 20-24 years of age (Table 36).

These results showed that a relationship exists between the ability to obtain a condom (male or female) if needed as such the null hypothesis was rejected. I concluded that the ability to get condoms was related to self-reported abstinence; those who were not able to obtain a condom were more likely to practice abstinence as compared to those who were to obtain a condom. The results did not show any significant relationship between the ability to obtain a condom and other risk-reducing behaviors. There were significant relations across age-groups and as shown those 15-19 years of age were almost four times (3.964) as likely to practice abstinence as compared to those 20-24 years of age in the logit model assessing relationship between ability to get a condom and risk-reducing behavior (Table 36).

Table 36

Parameter Estimates on Effect of Ability to Obtain Male or Female Condoms (if Needed) on HIV Risk-reducing Behaviors

						95% Confidence interval for exp(B)	
Reported HIV risk-reducing behaviors[a]		B	Wald	Sig.	Exp(B)	Lower bound	Upper bound
Abstained	Intercept	-0.968	9.819	0.002			
	Able to get a condom (male or female) if needed						
	Not able	1.118	22.193	0.000	3.058	1.921	4.869
	Able	0[b]					
	Wealth index	0.032	0.345	0.557	1.032	0.928	1.148
	Country						
	Kenya	0.837	31.701	0.000	2.310	1.726	3.092

Reported HIV risk-reducing behaviors[a]		B	Wald	Sig.	Exp(B)	95% Confidence interval for exp(B) Lower bound	Upper bound
	Lesotho	0[b]					
	Gender						
	Male	-1.378	66.568	0.000	0.252	0.181	0.351
	Female	0[b]					
	Age-group						
	15-19	1.377	77.710	0.000	3.964	2.919	5.385
	20-24	0[b]					
	Current marital status						
	Not married/ not in union	3.687	350.583	0.000	39.931	27.145	58.740
	Married/ in union	0[b]					
	Educational level attained						
	Primary and lower	-0.450	4.389	0.036	0.638	0.419	0.971
	Secondary incomplete	0.112	0.346	0.556	1.119	0.770	1.625
	Secondary complete and above	0[b]					
One sexual partner and condom used	Intercept	2.065	52.220	0.000			
	Able to get a condom (male or female) if needed						
	Not able	0.043	0.032	0.857	1.044	0.650	1.678
	Able	0[b]					
	Wealth index	0.024	0.203	0.653	1.025	0.922	1.139
	Country						
	Kenya	0.040	0.074	0.785	1.041	0.780	1.390
	Lesotho	0[b]					
	Gender						
	Male	-1.114	43.591	0.000	0.328	0.236	0.457
	Female	0[b]					
	Age-group						
	15-19	0.266	2.860	0.091	1.304	0.959	1.774
	20-24	0[b]					
	Current marital status						
	Not married/ not in union	1.469	80.905	0.000	4.343	3.154	5.980
	Married/ in union	0[b]					
	Educational level attained						
	Primary and lower	-0.940	19.123	0.000	0.391	0.256	0.595
	Secondary incomplete	-0.190	1.009	0.315	0.827	0.571	1.198
	Secondary complete and above	0[b]					

Reported HIV risk-reducing behaviors[a]		B	Wald	Sig.	Exp(B)	95% Confidence interval for exp(B) Lower bound	Upper bound
One sexual partner and condom not used	Intercept	2.798	95.491	0.000			
	Able to get a condom (male or female) if needed						
	Not able	0.403	2.844	0.092	1.497	0.937	2.393
	Able	0[b]					
	Wealth index	-0.013	0.057	0.811	0.987	0.887	1.098
	Country						
	Kenya	1.413	87.181	0.000	4.109	3.054	5.528
	Lesotho	0[b]					
	Gender						
	Male	-1.935	130.880	0.000	0.144	0.104	0.201
	Female	0[b]					
	Age-group						
	15-19	0.254	2.510	0.113	1.289	0.941	1.766
	20-24	0[b]					
	Current marital status						
	Not married/ not in union	-0.879	29.860	0.000	0.415	0.303	0.569
	Married/ in union	0[b]					
	Educational level attained						
	Primary and lower	-0.161	0.557	0.455	0.851	0.558	1.299
	Secondary incomplete	-0.137	0.509	0.476	0.872	0.599	1.270
	Secondary complete and above	0[b]					
Multiple sexual partner and condom used	Intercept	-0.552	2.422	0.120			
	Able to get a condom (male or female) if needed						
	Not able	-0.555	2.956	0.086	0.574	0.305	1.081
	Able	0[b]					
	Wealth index	0.082	1.678	0.195	1.085	0.959	1.227
	Country						
	Kenya	-0.689	16.773	0.000	0.502	0.361	0.698
	Lesotho	0[b]					
	Gender						
	Male	0.334	2.751	0.097	1.397	0.941	2.073
	Female	0[b]					
	Age-group						
	15-19	-0.312	2.976	0.085	0.732	0.513	1.043
	20-24	0[b]					
	Current marital status						
	Not married/ not in union	2.074	85.786	0.000	7.954	5.128	12.335

Reported HIV risk-reducing behaviors[a]	B	Wald	Sig.	Exp(B)	95% Confidence interval for exp(B) Lower bound	Upper bound
Married/ in union	0[b]					
Educational level attained						
Primary and lower	-0.720	8.466	0.004	0.487	0.300	0.791
Secondary incomplete	-0.222	1.096	0.295	0.801	0.528	1.214
Secondary complete and above	0[b]					

a. The reference category is: Multiple sexual partners and condom not used.

b. This parameter is set to zero because it is redundant.

Research Question 4. I used bivariate and multiple regression to establish whether ability to obtain condoms had a mediating effect on comprehensive knowledge of HIV transmission and prevention (IV_1) on self-reported practice of HIV risk-reducing behavior (DV) and/or on an individual's attitude toward PLHIV (IV_2) on self-reported practice of HIV risk-reducing behavior (DV) as summarized in Figure 11 and Figure 12. I applied listwise deletion that excluded cases with missing values from the statistics.

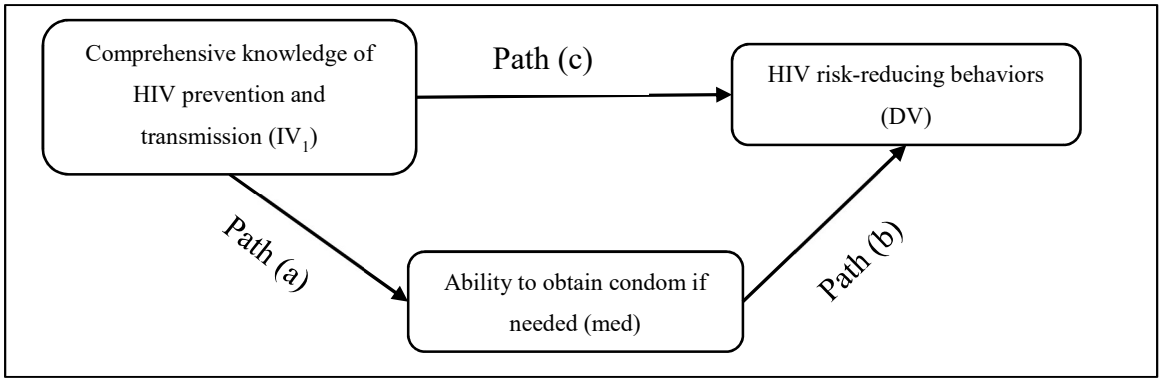

Figure 11. Mediating model for ability to obtain condom on comprehensive knowledge of HIV.

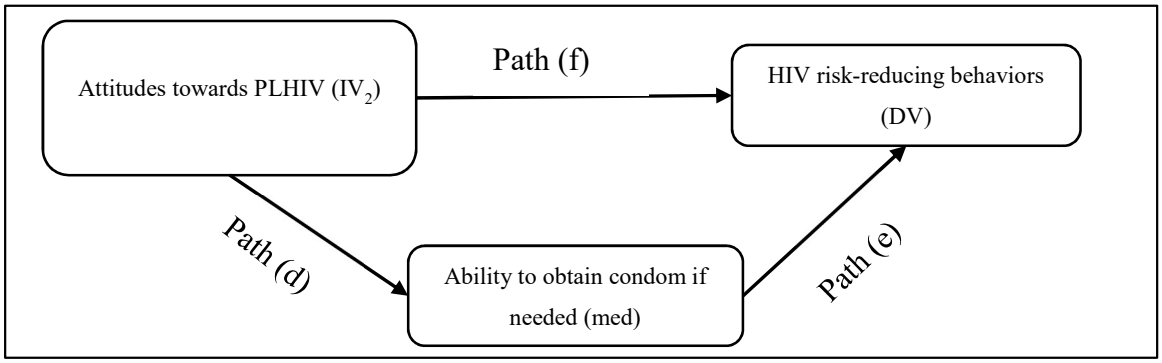

Figure 12. Mediating model for ability to obtain condom on attitudes towards PLHIV.

In the mediating analysis, the original beta of comprehensive knowledge of HIV was very small and insignificant (p=0.278) but after adding ability to obtain a condom it increased slightly and became significant (p=0.031) (Table 37). Similarly, the beta for ability of obtaining a condom was quite high and significant. These results showed that ability to obtain a condom was a mediator for comprehensive knowledge of HIV.

Table 37

Coefficients for Mediating Effect of Ability to Get a Condom on Comprehensive Knowledge of HIV as Relates to HIV Risk-Reducing Behavior

			95.0% Confidence interval for B			
Testing path	B	Std. error	Lower bound	Upper bound	Beta	Sig.
Path c: DV = HIV risk-reducing behavior						
Comprehensive knowledge of HIV	-0.022	0.020	-0.061	0.018	-0.010	0.278
Path a: DV = knows where to get a condom						
Comprehensive knowledge of HIV	0.045	0.008	0.029	0.062	0.052	0.000
Path b & c: DV = HIV risk-reducing behavior						
Comprehensive knowledge of HIV	-0.043	0.020	-0.081	-0.004	-0.020	0.031
Ability to get a condom (male or female) if needed	0.452	0.022	0.408	0.496	0.188	0.000
Total (a)*(b)					0.010	

Table 38 presents data that shows that the original beta of attitudes towards PLHIV was very small and insignificant (p=0.105) and even when the ability to obtain a condom was added to the model it remained insignificant (p=0.080). The beta for ability of obtaining a condom was also low though it was significant (p=0.000). Based on the results, I concluded that ability to obtain a condom was not a mediator for an individual's attitude toward PLHIV.

Table 38

Coefficients for Mediating Effect of Ability to Obtain a Condom on Attitudes Toward PLHIV as Relates to HIV Risk-Reducing Behavior

			95.0% Confidence interval for B			
Testing path	B	Std. error	Lower bound	Upper bound	Beta	Sig.
Path f: DV = HIV risk-reducing behavior						
Attitude towards PLHIV	0.033	0.021	-0.007	0.074	0.015	0.105
Path d: DV = knows where to get a condom						
Attitude towards PLHIV	-0.004	0.009	-0.021	0.013	-0.005	0.619
Path e & f: DV = HIV risk-reducing behavior						
Attitude towards PLHIV	0.035	0.020	-0.004	0.075	0.016	0.080
Knows where to get a condom (male or female) if needed	0.449	0.022	0.405	0.493	0.187	0.000
Total (a)*(b)					-0.000935	

I accepted the null hypothesis was because although the ability to obtain condoms was found to be a mediator to comprehensive knowledge of HIV, it was not a mediator to an individual's attitude toward PLHIV.

Summary

In response to research question one, there was a relationship between comprehensive knowledge of HIV transmission and prevention and self-reported practice of HIV risk-reducing behaviors among adolescents (15-19 years) and young adults (20-24 years). However, this relationship was only significant among those who had one sexual partner in the last 12 months and used a condom as compared to other risk-reducing behaviors. The results also showed that age-group influenced the choice of risk-reducing behaviors in the last 12 months. Youths 15-19 years of age were more than three times as likely to abstain as compared to those 20-24 years of age in the logistic model for comprehensive knowledge of HIV.

In research question two, I rejected the null hypothesis because there was a significant relationship between an individual's attitude toward PLHIV and at least one of the self-reported HIV risk-reducing behavior among adolescents (15-19 years) and young adults (20-24 years). There was a significant relationship between those who had negative attitudes toward PLHIV and self-reported abstinence in the last 12 months. In this logistic model, there was a significant relationship between abstinence and age-group with those 15-19 years of age being more than three times likely to report abstain as compared to those 20-24 years of age.

I also rejected the null hypothesis in research question three because there was a relationship between at least one of the self-reported HIV risk-reducing behaviors practiced in the last 12 months and ability to obtain a condom if needed among adolescents (15-19 years) and young adults (20-24 years). Those who were not able to

obtain a condom were more likely to practice abstinence as compared to those who were able to get a condom. There was no significant relationship between ability to obtain a condom and other risk-reducing behaviors. This logistic model also demonstrated a significant relationship between age-group and practice of abstinence. Youths 15-19 years of age were almost four times as likely to practice abstinence as compared to those 20-24 years of age.

In research question four, I explored whether ability to obtain condoms had a mediating effect on the relationship; between comprehensive knowledge of HIV transmission and prevention and self-reported practice of HIV risk-reducing behavior and that between an individual's attitude toward PLHIV and self-reported practice of HIV risk-reducing behavior. Although the results showed that ability to obtain a condom was a mediator for comprehensive knowledge of HIV, it did not have a mediating effect on an individual's attitude toward PLHIV. Based on these results, I accepted the null hypothesis because the ability to obtain condoms did not have a mediating effect on both IVs.

In the chapter four, I discuss the interpretation of the results and how these results reflect findings in the peer-reviewed literature and provide recommendations for professional practice and the implications for social change.

Section 4: Application to Professional Practice and Implications for Social Change

Purpose and Nature of the Study

The purpose of this quantitative cross-sectional study was to investigate the effects of the comprehensive knowledge of HIV transmission and prevention, individuals' attitudes toward PLHIV, and the ability to obtain condoms (if needed) on practice of HIV risk-reducing sexual behaviors, specifically abstinence, condom use, and limiting sex to one sexual partner, in adolescents age 15-19 years and young adults age 20-24 years in Kenya and Lesotho. The study was quantitative cross-sectional in nature and included secondary data from the DHS data sets to determine whether there were relationships between the IVs and DV. The study data were extracted from Kenya and Lesotho demographic health survey (DHS) data sets and merged for analysis. There were three IVs: comprehensive knowledge of HIV transmission and prevention, individuals' attitudes toward PLHIV, and ability to obtain condoms (male or female). Comprehensive knowledge of HIV transmission and prevention was the information construct and indicated the respondent's understanding of sexual means of HIV transmission and prevention, including dispelling misconceptions. An individual's attitude toward PLHIV was the motivation construct and indicated whether individuals had supportive attitudes toward PLHIV. The last independent variable was the reported ability to obtain condoms (male or female), which was used to indicate the respondent's self-efficacy related to sexual decision-making. The DV (outcome) was self-reported practice of at least one HIV risk-reducing behavior. The HIV risk-reducing behaviors considered in this study included sexual abstinence, limiting sexual partners to one, and use of condoms (male or

female). In the DHS data sets, the three IVs and DV were measured as two or more variables. Consequently, prior to analysis, the data on these variables had to be computed to form the three IVs and the DV.

Summary of Key Findings

In the analysis, I found that youths who had comprehensive knowledge of HIV prevention and transmission were likely to report having had one sexual partner with whom they had used condoms in the last 12 months. Those who had negative attitudes toward PLHIV were more likely to report having practiced abstinence in the last 12 months, and those not able to obtain a condom were more likely to have practiced abstinence. In the logit models, individuals 15-19 years of age were more likely to have practiced abstinence than those age 20-24 years. Finally, the ability to obtain condoms had a mediating effect on comprehensive knowledge of HIV transmission but not on attitudes toward PLHIV and self-reported practice of HIV risk-reducing behavior.

Interpretation of Results

Ways Findings Confirm, Disconfirm, or Extend Knowledge in the Discipline

Comprehensive knowledge of HIV and HIV risk-reducing behavior. In this study, I sought to determine what relationship existed between comprehensive knowledge of HIV transmission and prevention and the practice of HIV risk-reducing behaviors. Previous studies indicated mixed results regarding the role of comprehensive knowledge on practice of HIV risk-reducing behaviors. Fonner et al. (2014) found a relationship between school-based HIV education and HIV-related risk with those with higher HIV knowledge reporting higher sexual self-efficacy in sex negotiation and condom use and

reduced number of sexual partners. In Eggers et al.'s (2017) study, knowledge was a predictor of sexual activity among sexually inactive boys but not among sexually inactive girls. Although Marinho et al. (2012) found that although knowledge of HIV was high among adolescents, this knowledge did not translate to practice of HIV risk-reducing behaviors. These studies showed that in some cases knowledge led to the desired behavior, but in others, it had no effect.

According to findings from the current study, comprehensive knowledge of HIV transmission and prevention was related to some HIV risk-reducing behaviors but not others. Consistent with Fonner et al.'s (2014) findings, I found a relationship between comprehensive knowledge of HIV transmission and prevention and having one sexual partner and using a condom with them. However, no relationship was found between comprehensive knowledge of HIV transmission and prevention and other risk-reducing behaviors such as condom use with multiple sexual partners or abstinence, which in part is consistent with Marinho et al.'s (2012) findings. Age-group was an important factor in the comprehensive knowledge of HIV transmission and prevention logit. When applied in this logit, age-group was related to abstinence with those age 15-19 years being more likely to report practicing abstinence compared to those age 20-24 years. My findings confirmed that comprehensive knowledge of HIV is important in practice of one sexual partner with whom a condom is used but not in practice of abstinence or condom use with multiple sexual partners.

Individuals' attitude toward PLHIV and HIV risk-reducing behavior. In this study, I used individuals' attitude toward PLHIV as a proxy indicator for stigma and

discrimination. According to the DHS definition, an individual is defined as having a discriminatory attitude toward PLHIV if they do not think that a female teacher living with HIV (but not AIDS or sick) should be able to continue teaching, they are unwilling to care for a family member living with HIV, they would not disclose the positive HIV status of a close family member, and/or they would not buy fresh vegetables from a shopkeeper who is living with HIV (Kenya National Bureau of Statistics and Ministry of Health, 2015). There were limited studies on the effect of an individual's attitude toward PLHIV on HIV risk-reducing behavior. Most of the studies addressed the effect of stigma and discrimination on access to services and service delivery (Beck et al., 2017; Brown et al., 2016; Dahlui et al., 2015) and not the effect on individual risk-reducing behavior. Therefore, my findings extended knowledge of the relationship between an individual's attitude toward PLHIV and HIV risk-reducing behavior.

My findings indicated that an individual's attitude toward PLHIV impacts their HIV risk-reducing behavior. Those with negative attitudes toward PLHIV were more likely to report practicing abstinence in the last 12 months. Further, those age 15-19 years were more than 3 times more likely to report practicing abstinence than those age 20-24 years. However, there was no relationship between attitude toward PLHIV and other risk-reducing behaviors. My study showed that although negative attitude toward PLHIV affects access and utilization of HIV services by PLHIV as reported in previous studies (Beck et al., 2017; Brown et al., 2016; Dahlui et al., 2015), it leads to practice of HIV risk-reducing behaviors by those who are HIV-negative. As noted in Chao et al.'s (2017) study, negative attitude toward PLHIV led customers to refrain from purchasing and

using goods sold by someone infected with HIV. This negative relationship can be explained by fear, which although positive in this case can be detrimental.

Ability to obtain condoms (male/ female) and HIV risk-reducing behavior. Studies that addressed the relationship between ability to obtain condoms and HIV risk-reducing behavior were limited. However, there were several studies that addressed factors that influence the use of condoms, which is one of the recommended HIV risk-reducing behaviors (Appiah et al., 2017; O'Leary et al., 2015; Simbayi et al., 2014). O'Leary et al. (2015) found that self-efficacy to negotiate condom use, correct condom use, and ability to exercise control promoted risk-reducing behaviors. Appiah et al. (2017) established that condom use among young men was affected by their attitudes toward condoms. Simbayi et al. (2014) found that condom use was higher in men in multiple concurrent partnerships compared to women. These studies indicated the factors that promote condom use but did not address the ability to obtain condoms as one of the factors.

I found a relationship between the ability to obtain condoms (male or female) if needed and self-reported abstinence. Individuals who reported not being able to obtain condoms were more likely to report having abstained in the last 12 months than those who were able to obtain condoms. Further, individuals age 15-19 years were almost 4 times more likely to report practicing abstinence in this logit compared to those age 20-24 years. There was no relationship between the ability to obtain condoms and reported condom use. These findings contribute to the knowledge of factors that promote condom use and the relationship between the ability to obtain condoms and condom use.

Mediating action of ability to obtain condoms. Studies addressing the factors that have a mediating effect on the relationship between comprehensive HIV knowledge or an individual's attitude toward PLHIV and practice of HIV risk-reducing behaviors were limited. Several studies focused on the direct relationship between comprehensive HIV knowledge or attitudes toward PLHIV and practice of HIV risk-reducing behaviors (Faust & Yaya, 2018; Hogg et al., 2017; Kingori et al., 2017). Faust and Yaya (2018) established a relationship between HIV-related knowledge and condom use but did not address any mediators to this relationship. Hogg et al. (2017) established the existence of several conspiracy theories regarding origin of HIV but did not explore their effect on the practice of HIV risk-reducing behaviors. Kingori et al. (2017) showed that individuals with lower HIV knowledge were 3 times more likely to agree to the social exclusion of PLHIV. These studies, as demonstrated, did not address the mediating relationship between the independent variables.

The findings showed that ability to obtain condoms had a mediating effect on the relationship between comprehensive knowledge of HIV and reported HIV risk-reducing behaviors. However, ability to obtain condoms had no effect on the relation between an individual's attitude toward PLHIV and reported HIV risk-reducing behaviors. These findings contribute to information on mediating factors that influence the relationship between comprehensive HIV knowledge or attitudes towards PLHIV and practice of HIV risk-reducing behaviors.

Interpretation of Findings in a Theoretical Context

The information-motivation-behavioral skill (IMB) model that was originally developed in 1992, was used to frame this study (Tuthill et al., 2017). The model was developed to establish the psychological determinants of HIV risks and prevention and it assumes that health-related information, motivation, and behavioral skills are important to promote the practice of recommended health behavior (Fisher et al., 2003). The IMB model presupposes that practice of recommended health is dependent on the interrelationship between its three constructs. Previous studies demonstrated the importance of the IMB model constructs in promoting behavior change (Shrestha et al., 2017; Macapagal et al., 2016; Bahramia & Zaranib, 2015). Macapagal et al. found that individuals with low behavioral skills reported lower levels of HIV testing and use of alcohol before sex. Shrestha et al. found that PrEP-related behavioral skills had a mediating effect on the influence of PrEP-related information and motivation on the willingness to use PrEP. Bahramia and Zaranib (2015), using the IMB model, found a significant relationship between perception of HIV risk (as motivation construct) and sexual behavior. The study findings confirmed the IMB model assumptions that not all the three constructs are required for the desired behavior change to occur. This study found that although ability to obtain a condom had a mediating effect on the relationship of comprehensive knowledge of HIV (information construct) and self-reported HIV risk-reducing behaviors, it had no effect on the relationship between an individual's attitudes toward PLHIV (motivation construct) and self-reported HIV risk-reducing behaviors.

According to the study findings, there was a relationship between each of the model constructs and reported HIV risk-reducing behaviors (outcome variable). There was an association between comprehensive knowledge of HIV transmission and prevention (information construct) and reported HIV risk-reducing behaviors (outcome variable). There was also a negative relationship between an individual's attitude toward PLHIV (motivation construct) and reported condom use in the past 12 months, which was part of the outcome variable. The results also showed that there was a negative relationship between ability to obtain condoms if needed (behavioral skill construct) and HIV risk-reducing behavior (outcome variable). As the model presupposed, the constructs could act on their own or mediate on each other. The study findings showed that ability to obtain condoms was a mediator for comprehensive knowledge of HIV but not for attitudes towards PLHIV.

Limitations of the Study

There were several limitations related to sampling procedures and sample design in this study. Although I used a data set from a nationally representative sample, the sampling procedure excluded nomadic populations and populations in institutions such as barracks, prisons and boarding schools. Based on this, the study was not representative of the opinions of individuals 15-24 years in nomadic communities and institutions including barracks, prisons and boarding schools. I used DHS data sets that are based on self-reported data are based on participant's recall and understanding of research questions. Although the questionnaires were pre-tested and tested several times, this does not eliminate inaccuracies and/or biases associated with recall and misunderstanding of

questions. The study findings and interpretation may have been altered because the outcome variable, HIV risk-reducing behaviors practiced in the last 12 months, was based on recall (Kenya National Bureau of Statistics and Ministry of Health, 2015; Ministry of Health Lesotho and ICF International, 2016). These findings can only be generalized to Kenya and Lesotho because although I used a census of all eligible participants in the data sets, the population characteristics were significantly different between the Kenya and Lesotho data sets. The DHS data sets were collected through cross-sectional study design implemented at different times in Kenya and Lesotho, which precluded any causal inferences and relationship among variables. Therefore, although a relationship was noted between my dependent and independent variable, it was not possible to make causal inferences or conclusions. This study was limited to measuring the reported practice of HIV risk-reducing behaviors in the past 12 months but there was no means of verification. Although the verification of reported risk-reducing behaviors was difficult, HIV testing would have helped in confirming if (at least) the key objective of HIV risk-reduction was realized (Centers for Disease Control and Prevention, 2018). Finally, my study was limited to the reported practice of abstinence, reduced number of sexual partners, and condom use. The study did not include pre-exposure prophylaxis (PrEP) or voluntary medical male circumcision that also prevent HIV transmission.

The limitations with the highest potential to influence my findings were related to data collection methodology that is recall and understanding of questions. In this study, I used self-reported data that relied on the ability of the participant to accurately recall and report on the research questions. Further, I assumed that all participants in Kenya and

Lesotho had a common understanding of the research questions regardless of different languages that the survey was administered. The Kenya DHS and Lesotho DHS assured the reliability and validity of the data collection process through extensive pretesting and testing of the research questions in the original language (English) and in translated languages including Swahili, Sesotho, and other local dialects (see Creswell, 2014). The Kenya DHS and Lesotho DHS conducted translations and back translations of the questionnaires administered in languages other than English to ensure question understanding was not lost during translations. Kenya DHS and Lesotho DHS conducted interviewer training to improve the quality of data by minimizing interviewer biases (see Murphy, et al., 2016). Finally, I assumed that results from the DHS questions used in this study were stable and consistent because the questions had been used more than twice in past DHS'. The lack of verification of the self-reported HIV risk-reducing behaviors and follow up to confirm their effect on HIV prevention, remains as a residual limitation of this study.

Recommendations

The results showed a relationship between an individual's attitude toward PLHIV and self-reported practice of risk-reducing behaviors in the past 12 months. I found that those with negative attitudes towards PLHIV were more likely to abstain as compared to those with positive attitude. The study did not establish the causal relationship between an individual's attitude toward PLHIV and abstinence because of the limitation of study design being a cross-sectional study. Previous researchers found that negative attitudes toward PLHIV negatively impacted on the health of PLHIV and did not support

prevention of onward transmission of HIV (Beck , et al., 2017; Brown, et al., 2016; Dahlui , et al., 2015). Based on this, future researchers may want to consider a longitudinal experimental design that includes a study arm composed of individuals with positive attitudes and another study arm of individuals with negative attitudes to be able to determine any causal inferences and conclusions. Further, the research could integrate HIV testing at baseline, during the follow ups, and at the end of the study to act as a means of verification of the reported HIV risk-reducing behaviors and confirm their effect on HIV reduction.

In this study an individual's attitude toward PLHIV was computed from four questions contained in the DHS that is perception whether a female teacher living with HIV (but not AIDS or sick) should be allowed to continue teaching; willingness to care for a family member living with HIV; willingness to disclose the HIV positive status of a close family member; and willingness to buy fresh vegetables from a shopkeeper who is living with HIV. I would recommend that future researchers examine these four variables separately to determine, which of the four aspects was most related to the self-reported risk-reducing behaviors. The recommended research would contribute to information on effect of negative attitudes toward PLHIV and their impact HIV prevention that would be used to develop and implement HIV prevention interventions.

In this study, I used abstinence, reduction of sexual partners, and condom use as the HIV risk-reducing measures and did not include PrEP. PrEP is one of the recommended strategies for use in preventing HIV among HIV-negative individuals at risk of HIV (CDC, 2018; Günthard, et al., 2016). I recommend that future researchers

conduct studies to determine the effect of comprehensive knowledge of HIV prevention and transmission, an individual's attitude toward PLHIV, and ability to obtain condom on the use of PrEP.

Implications for Professional Practice and Social Change

Professional Practice

Although new HIV infections in East and Southern Africa have declined, number of infections among adolescents and young adults remains high. Of the 800,000 new HIV infections in 2018, 36% were among individuals 15-24 years of age (The Joint United Nations Programme on HIV/AIDS, 2018). Public health professionals recognize that more needs to be done to be able to reduce the number of HIV infections among adolescents and young adult in order to end the HIV epidemic. Previous research findings have shown that HIV transmission among adolescents and young adult was mainly through sexual contact, indicating that youths still engaged in risky sexual practices (Ng'eno, et al., 2018; Mhele, 2017). Based on this, it is important to identify ways to improve practice of HIV risk-reducing behaviors amongst the youths. I anticipate that these study findings would clarify interrelationship between comprehensive knowledge of HIV transmission and prevention, an individual's attitude toward PLHIV, ability to obtain condoms and practice of HIV risk-reducing behaviors.

This quantitative cross-sectional study was framed on the IMB model and used secondary data to confirm that comprehensive knowledge on HIV is positively related to practice of monogamous sexual relations and use of condoms; negative relation between attitudes towards PLHIV and abstinence; and negative relationship between ability to

obtain condoms and abstinence. Public health professionals could use this information to advance HIV interventions that emphasize on HIV prevention and transmission, dispelling misconceptions and accentuate the importance of adopting risk-reducing behaviors for those with positive attitudes towards PLHIV. The findings further show that the ability to obtain condoms is a mediating variable for comprehensive HIV knowledge. Consequently, public health professional could use this information to strengthen or put in place HIV interventions that would empower individuals and improve their ability to obtain condoms. Public health professionals could also use these findings to enhance HIV knowledge program to emphasize importance of positive attitudes toward PLHIV and practice risk-reducing behaviors even for those with positive attitudes and improve self-efficacy relating to obtaining condoms.

Positive Social Change

These study findings could lead to positive social change at individual-, family-, organizational-, and policy-levels. At individual-level, positive social change may be realized through improving knowledge of HIV prevention and transmission and ability to obtain condoms among adolescents and young adults. Youths who are well-informed on HIV prevention and have high self-efficacy, are more likely to maintain exclusive sexual relations and use condoms with their sexual partners. Increased sexual fidelity and condom use among sexually active youths could reduce new HIV infections and contribute to the ending of the HIV epidemic.

The findings showed that those with positive attitudes towards PLHIV were less likely to abstain than those with negative attitudes. Considering that most families in

Kenya and Lesotho are either infected or affected with HIV, the practice of abstinence is negatively affected because of the accepting attitude toward PLHIV. Based on this, positive social change at family-level may be achieved through implementing programs that address the need to adopt HIV risk-reducing behaviors within programs that aim at addressing stigma and discrimination toward PLHIV. Further, positive social change at family-level maybe realized when families can support youths with positive attitude toward PLHIV to practice of risk-reducing behaviors. In the long-term, supporting families to embrace PLHIV may help ensure that PLHIV are not discriminated, access services, and remain on treatment thus helping reduce onward transmission.

The results showed that those who were not able to obtain condoms were more likely to abstain. Positive social change may be achieved through improving access to and availability of condoms. Support is needed to expand condom distribution points that are provided through organizations delivering HIV services and the health facilities in Kenya and Lesotho. Organizations delivering HIV services need to be youth-friendly to improve condom distribution and use. The findings showed the need to ensure that HIV information is age appropriate because the needs of the adolescents and young adults are different. In the study, I found that adolescents were more than three times likely to abstain as compared to young adults. I anticipate that improving HIV information and access to condoms among adolescents and young adults would empower them to make informed decisions regarding the appropriate risk-reducing behavior to adopt and lead to reduction of new infections.

Conclusion

HIV can be prevented through adopting safe sexual practices. The high number of new HIV infections among adolescents and young adults suggest suboptimal practice of risk-reducing behaviors (Ng'eno, et al., 2018). The purpose of this study was to investigate the effects of comprehensive knowledge of HIV transmission and prevention, an individual's attitude toward PLHIV, and ability to obtain condoms (if needed) on practice of HIV risk-reducing sexual behaviors that is abstinence, condom use, and limiting sex to one sexual partner among adolescents 15-19 years of age and young adults 20-24 years of age in Kenya and Lesotho using data from DHS. I determined whether ability to obtain condoms acted as a mediator in the relationship between comprehensive knowledge of HIV, an individual's attitude toward PLHIV, and practice of HIV risk-reducing sexual behaviors. I found that having comprehensive HIV knowledge was associated with having one sexual partner and using condoms with them. I also found that the ability to obtain condoms was a mediator to the relationship between comprehensive knowledge of HIV and HIV risk-reducing behaviors. I further found that negative attitudes toward PLHIV and inability to obtain condoms were associated with abstinence. These findings could contribute to positive social change at individual-, family-, organizational-, and policy-levels through clarifying the essential intervention mix needed to improve practice of HIV risk-reducing behaviors among adolescents and young adults. Improving practice of HIV risk-reducing behaviors among adolescents and young adults is a priority in achieving the global goals of ending HIV epidemic.

References

Aguinis, H., Edwards, J. R., & Bradley, K. J. (2016). Improving our understanding of moderation and mediation in strategic management research. *Organizational Research Methods*, 665-685. doi:10.1177/1094428115627498

Airhihenbuwa, C. O., Ford, C. L., & Iwelunmor, J. I. (2014). Why culture matters in health interventions: lessons from HIV/AIDS stigma and NCDss. *Health, Education and Behavior, 41*(1), 78-84. doi:10.1177/1090198113487199

Appiah, A. B., Tenkorang, E. Y., & Maticka-Tyndale, E. (2017). Modeling beliefs, attitudes, and intentions of condom use among secondary school students in Kenya. *Archives of Sexual Behavior, 46*(7), 1949-1960. doi:10.1007/s10508-017-0966-9

Arrey, A. E., Bilsen, J., Lacor, P., & Deschepper, R. (2016). Spirituality/religiosity: a cultural and psychological resource among sub-Saharan African migrant women with HIV/AIDS in Belgium. *PLoS One, 11*(7), e0159488. doi:10.1371/journal.pone.0159488

Awotidebe, A., Phillips, J., & Lens, W. (2014). Factors contributing to the risk of HIV infection in rural in school-going adolescents. *International Journal of Environmental Research and Public Health, 11*(11), 11805-11821. doi:10.3390/ijerph111111805

Bahramia, Z., & Zaranib, F. (2015). Application of the information-motivation and behavioral skills (IMB) model in risky sexual behaviors amongst male students.

Journal of Infection and Public Health, 8(2), 207-213. doi:10.1016/j.jiph.2014.09.005

Beck , E. J., Espinosa, K., Ash, T., Wickham, P., Barrow, C., Massiah, E., . . . Nunez, C. (2017). Attitudes towards homosexuals in seven Caribbean countries: Implications for an effective HIV response. *AIDS Care, 29*(12), 1557-1566. doi:10.1080/09540121.2017.1316355

Becker, M. L., Bhattacharjee, P., Blanchard, J. F., Cheuk, E., Isac, S., Musyoki, H. K., . . . Mishra, S. (2018). Vulnerabilities at first sex and their association with lifetime gender-based violence and HIV prevalence among adolescent girls and young women engaged in sex work, transactional sex, and casual sex in Kenya. *Journal of Acquired Immune Deficiency Syndromes, 79*(3), 296-304. doi:10.1097/QAI.0000000000001826

Braams, B. R., van Duijvenvoorde, A. C., Peper, J. S., & Crone, E. A. (2015). Longitudinal changes in adolescent risk-taking: a comprehensive study of neural responses to rewards, pubertal development, and risk-taking behavior. *Journal of Neuroscience, 35*(18), 7226-38. doi:10.1523/JNEUROSCI.4764-14.2015

Brown, G. A., Leonard, W. B., Lyons, A., Power , J., Sander , D., McColl, W., . . . Carman, M. (2016). Stigma, gay men and biomedical prevention: The challenges and opportunities of a rapidly changing HIV prevention landscape. *Sexual Health, 14*(1), 111-118. doi:10.1071/SH16052

Bunyasi, E. W., & Coetzee, D. J. (2017). Relationship between socioeconomic status and HIV infection: findings from a survey in the Free State and Western Cape

Provinces of South Africa. *BMJ Open, 7*(11), e016232. doi:10.1136/bmjopen-2017-016232

Bureau of Statistics. (2013). *Lesotho Demographic Survey 2011, Vol I.* Maseru, Lesotho: The Bureau of Statistics.

Camilleri, M., Kohut, T., & Fisher, W. (2015). Condom use behavioural skills mediate the relationship between condom use motivation and condom use behaviour among young adult heterosexual males: An information-motivation-behavioural skills analysis. *Canadian Journal of Human Sexuality, 24*(2), 131-140. doi:10.3138/cjhs.242-A1

Center for Disease Control and Prevention. (2014). *Learn About Health Literacy*. Retrieved from http://www.cdc.gov/healthliteracy/learn/index.html

Centers for Disease Control and Prevention. (2017). *HIV risks and prevention estimates*. Retrieved from https://www.cdc.gov/hiv/risk/estimates/index.html

Centers for Disease Control and Prevention. (2018). *Vaginal sex and HIV Risk*. Retrieved from https://www.cdc.gov/hiv/risk/vaginalsex.html

Chao, L.-W., Szrek, H., Leite, R., Ramlagan, S., & Peltzer, K. (2017). Do customers flee from HIV? A survey of hiv stigma and its potential economic consequences on small businesses in Tshwane (Pretoria), South Africa. *AIDS and Behavior, 21*(1), 217-226. doi:10.1007/s10461-016-1463-1

Cheng, H. G., & Phillips, M. R. (2014). Secondary analysis of existing data: Opportunities and implementation. *Shanghai Archives of Psychiatry, 26*(6), 371-375. doi:10.11919/j.issn.1002-0829.214171

Chialepeh, W. N., & Sathiyasusuman, A. (2015). Associated risk factors of STIs and multiple sexual relationships among youths in Malawi. *PLoS One, 10*(8), e0134286. doi:10.1371/journal.pone.0134286

Columb, M. O., & Atkinson, M. S. (2016). Statistical analysis: sample size and power estimations. *BJA Education, 16*(5), 159-161. doi:10.1093/bjaed/mkv034

Cools, S., & Kotsadam, A. (2017). Resources and intimate partner violence in sub-Saharan Africa. *World Development, 95*, 211-230. doi:10.1016/j.worlddev.2017.02.027

Creswell, J. W. (2014). *Research design: Qualitative, quantitative and mixed methods approaches* (4th ed.). Los Angeles, U.S.A: SAGE Publications.

Dahlui , M., Azahar, N., Bulgiba , A., Zaki, R., Oche, O. M., Adekunjo, F. O., & Chinna , K. (2015). HIV/AIDS related stigma and discrimination against PLWHA in Nigerian Population. *PLoS ONE, 10*(12), e0143749. doi:10.1371/journal.pone.0143749

Dauda, R. S. (2018). Impact of HIV/AIDS epidemic on human capital development in West Africa. *The International Journal of Health Planning And Management, 33*(2), 460-478. doi:10.1002/hpm.2486

De Jesus, M., Carrete, C., Maine, C., & Nalls, P. (2015). "Getting tested is almost like going to the Salem witch trials": Discordant discourses between Western public health messages and sociocultural expectations surrounding HIV testing among East African immigrant women. *AIDS Care, 27*(5), 604-611. doi:10.1080/09540121.2014.1002827

Defoe, I. N., Dubas, J. S., Figner, B., & van Aken, M. A. (2015). A meta-analysis on age differences in risky decision making: Adolescents versus children and adults. *American Psychological Association, 141*(4), 48-84. doi:10.1037/a0038088

Dellar, R. C., Dlamini, S., & Karim, Q. A. (2015). Adolescent girls and young women: Key populations for HIV epidemic control. *Journal of the International AIDS Society, 18*. doi:10.7448/IAS.18.2.19408

Dewing , S., Mathews , C., Lurie, M., Kagee, A., Padayachee, T., & Lombard, C. (2015). Predictors of poor adherence among people on antiretroviral treatment in Cape Town, South Africa: A case-control study. *AIDS Care, 27*(3), 342-349. doi:10.1080/09540121.2014.994471

DHS program. (2018). *Guide to DHS Statistics.* Retrieved from https://dhsprogram.com/pubs/pdf/DHSG1/Guide_to_DHS_Statistics_DHS-7.pdf

DHS program. (n.d.). *DHS Overview*. Retrieved from https://dhsprogram.com/What-We-Do/Survey-Types/DHS.cfm

Do, M., Figueroa, M., & Lawrence, K. D. (2016). HIV testing among young people aged 16-24 in South Africa: Impact of mass media communication programs. *AIDS and Behavior, 20*(9), 2033-2044. doi:10.1007/s10461-016-1402-1

Durevall, D., & Lindskog, A. (2015). Intimate partner violence and HIV in ten sub-Saharan African countries: What do the demographic and health surveys tell us? *The Lancet, 3*(1), e34-e43. doi:10.1016/S2214-109X(14)70343-2

Eggers, S. M., Mathews, C., Aaro, L. E., McClinton-Appollis, T., Bos, A. E., & de Vries, H. (2017). Predicting primary and secondary abstinence among adolescent boys

and girls in the Western Cape, South Africa. *AIDS and behavior, 21*(5), 1417-1428. doi:10.1007/s10461-016-1438-2

Engelbrecht , J. G., Letsoalo, M. R., & Chirowodza, A. C. (2017). An assessment of the HIV/TB knowledge and skills of home-based carers working in the North West province in South Africa: A cross-sectional study. *BMC Health Services Research, 17*(1), 285. doi:10.1186/s12913-017-2238-8

Espada, J. P., Morales, A., Guillén-Riquelme, A., Ballester, R., & Orgilés, M. (2016). Predicting condom use in adolescents: A test of three socio-cognitive models using a structural equation modeling approach. *BMC Public Health, 35*. doi:10.1186/s12889-016-2702-0

Faul, F., Erdfelder , E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods, 41*(4), 1149-60. doi:10.3758/BRM.41.4.1149

Faust, L., & Yaya, S. (2018). The effect of HIV educational interventions on HIV-related knowledge, condom use, and HIV incidence in sub-Saharan Africa: A systematic review and meta-analysis. *BMC Public Health, 18*(1), 1254. doi:10.1186/s12889-018-6178-y

Fisher, J. D., & Fisher, W. A. (1992). Changing AIDS - risk behavior. *Psychological Bulletin, 111*(3), pp. 455-474. Retrieved from https://opencommons.uconn.edu/chip_docs/2

Fisher, W. A., Fisher, J. D., & Harman, J. (2003). *The information–motivation–behavioral skills model: A general social psychological approach to*

understanding and promoting health behavior. (J. Suls, & K. A. Wallston, Eds.) New Jersey, U.S.A: Blackwell Publishing Ltd.

Fonner, V. A., Armstrong, K. G., Kennedy, C. E., O'Reilly, K. R., & Sweat, M. D. (2014). School-based sex education and HIV prevention in low- and middle-income countries: A systematic review and metanalysis. *PLoS One*, n.d. doi:10.1371/journal.pone.0089692

Frankfort-Nachmias, C., & Leon-Guerrero, A. (2015). *Social statistics for a diverse society* (7th ed.). Thousand Oaks, California, U.S.A: SAGE Publications, Inc.

Gitahi–Kamau, N. T., Kiarie, J. N., Mutai, K. K., Gatumia, B. W., Gatongi, P. M., & Lakati, A. (2015). Socio-economic determinants of disease progression among HIV infected adults in Kenya. *BMC Public Health, 15*, 733. doi:10.1186/s12889-015-2084-8

Günthard, H. F., Saag, M. S., Benson, C. A., del Rio, C., Eron, J., Gallant, J. E., . . . Volberding, P. A. (2016). Antiretroviral drugs for treatment and prevention of HIV infection in adults: 2016 recommendations of the international antiviral society-USA panel. *JAMA*, 191-210. doi:10.1001/jama.2016.8900

Hajizadeh, M., Sia, D., Heymann, J. S., & Nandi, A. (2014). Socioeconomic inequalities in HIV/AIDS prevalence in sub-Saharan African countries: evidence from the demographic health surveys. *International Journal For Equity In Health, 13*, 18. doi:10.1186/1475-9276-13-18

Hampanda, K., Ybarra, M., & Bull, S. (2014). Perceptions of health care services and HIV-related health-seeking behavior among Uganda adolescents. *AIDS Care, 26*(10), 1209-1217. doi:10.1080/09540121.2014.894612

Handa, S., Palermo, T., Rosenberg, M., Pettifor, A., Halpern, C. T., & Thirumurthy, H. (2017). How does a national poverty programme influence sexual debut among Kenyan adolescents? *Global Public Health, 12*(5), 617-638. doi:10.1080/17441692.2015.1134617

Hargreaves, J. R., Davey, C., Fearon, E., Hensen, B., & Krishnaratne, S. (2015). Trends in socioeconomic inequalities in HIV prevalence among young people in seven countries in eastern and southern Africa. *PLoS One, 10*(3), e0121775. doi:10.1371/journal.pone.0121775

Harris, M. J. (2010). *Evaluating public and community health programs* (1st ed.). San Francisco, CA 9, U.S.A: John Wiley & Sons, Inc.

Harrison, A., Colvin, C. J., Kuo, C., Swartz, A., & Lurie, M. (2015). Sustained high HIV incidence in young women in southern Africa: Social, behavioral, and structural factors and emerging intervention approaches. *Current HIV/ AIDS Reports, 12*(2), 207-215. doi:10.1007/s11904-015-0261-0

Heale, R., & Twycross, A. (2015). Validity and reliability in quantitative studies. *Evidence Based Nursing, 18*(3), 66-67. doi:10.1136/eb-2015-102129

Heeren, A. G., Icard, L. D., O'Leary, A., Jemmott, J. B., Ngwane, Z., & Mtose, X. (2014). Protective factors and HIV risk behavior among South African men. *AIDS and behavior, 18*, 1991-1997. doi:10.1007/s10461-014-0767-2

Hegdahl , H. K., Fylkesnes, K. M., & Sandoy, I. F. (2016). Sex differences in HIV prevalence persist over time: Evidence from 18 countries in sub-Saharan Africa. *PLoS One, 11*(2), e0148502. doi:10.1371/journal.pone.0148502

Hogg, R., Nkala, B., Dietrich, J., Collins, A., Closson, K., Cui, Z., . . . Miller, C. (2017). Conspiracy beliefs and knowledge about HIV origins among adolescents in Soweto, South Africa. *Plos One, 12*(2), e0165087. doi:10.1371/journal.pone.0165087

Idele, P., Gillespie, A., Porth, T., Suzuki, C., Mahy, M., Kasedde, S., & Luo, C. (2014). Epidemiology of HIV and AIDS among adolescents: Current status, inequities, and data gaps. *Journal of Acquired Immune Deficiency Syndromes, 66*, s144-s156. doi:10.1097/QAI.0000000000000176

Jacobs, R. J., Caballero, J., Ownby, R., Acevedo, A., & Kane, M. N. (2015). Motivational factors related to medication adherence in Spanish-dominant Hispanics living with HIV. *Journal of HIV/AIDS and Social Services, 14*(3), 337-358. doi:10.1080/15381501.2014.946119

Jacobson, K. B., Niccolai, L., Mtungwa, N., Moll, A. P., & Shenoi, S. V. (2017). "It's about my life": Facilitators of and barriers to isoniazid preventive therapy completion among people living with HIV in rural South Africa. *AIDS Care, 29*(7), 936-942. doi:10.1080/09540121.2017.1283390

John, S. A., Walsh, J. L., & Weinhardt, L. S. (2017). TThe information–motivation–behavioral skills model revisited: A network-perspective structural equation model within a public sexually transmitted infection clinic sample of hazardous

alcohol users. *AIDS and behavior, 21*(4), 1208-1218. doi:10.1007/s10461-016-1446-2

Johnston, M. P. (2014). Secondary data analysis: A method of which the time has come. *Qualitative and Quantitative Methods in Libraries, 3*(3), 619-626.

Katz, I. T., Dietrich, J., Tshabalala, G., Essien, T., Rough, K., Wright, A. A., . . . Ware, N. C. (2015). Understanding treatment refusal among adults presenting for HIV-testing in Soweto, South Africa: A qualitative study. *AIDS and behavior, 19*(4), 704-714. doi:10.1007/s10461-014-0920-y

Kenya National Bureau of Statistics. (2018). *Statistical Abstract* . Nairobi: Kenya National Bureau of Statistics.

Kenya National Bureau of Statistics and Ministry of Health. (2015). *Kenya Demographic and Health Survey*. Retrieved from http://dhsprogram.com/pubs/pdf/FR308/FR308.pdf

Kharsany, A. B., & Karim, Q. A. (2016). HIV infection and AIDS in sub-Saharan Africa: Current status, challenges and opportunities. *The Open AIDS Journal, 10*, 34-48. doi:10.2174/1874613601610010034

Khumalo-Sakutukwa, G., Lane, T., van-Rooyen, H., Chingono, A., Humphries, H., Timbe, A., . . . Morin, S. F. (2013). Understanding and addressing socio-cultural barriers to medical male circumcision in traditionally non-circumcising rural communities in sub-Saharan Africa. *An International Journal for Research, Intervention and Care*. doi:10.1080/13691058.2013.807519

Kingori , C., Haile , Z. T., Ngatia , P., & Nderitu , R. (2017). Factors that can influence feelings towards and interactions with people living with HIV/AIDS in rural Central Kenya. *International Journal of STD and AIDS, 28*(9), 910-919. doi:10.1177/0956462416680764

Kingston, D., Heaman, M., Fell, D., & Chalmers, B. (2012). Comparison of adolescent, young adult, and adult women's maternity experiences and practices. *Pediatrics journal*, e1228. doi:10.1542/peds.2011-1447

Koenig, L. J., Hoyer, D., Purcell, D. W., Zaza, S., & Mermin , J. (2016). Young people and HIV: A call to action. *American Journal of Public Health, 106*(3), 402-405. doi:10.2105/AJPH.2015.302979

Krugu, J. K., Mevissen, F. E., Flore, K. A., & Ruiter, R. A. (2017). Girls cannot be trusted: Young men's perspectives on contraceptive decision making and sexual relationships in Bolgatanga, Ghana. *The European Journal of Contraceptive and Reproductive Health Care, 23*(2), 139-146. doi:10.1080/13625187.2018.1458225

Laureate Education. (2016b). *Correlation and bivariate regression [Video file]*. Retrieved from Walden University: https://class.waldenu.edu/bbcswebdav/institution/USW1/201730_27/XX_RSCH/RSCH_8210/USW1_RSCH_8210_week08.html?course_uid=USW1.AN.201730&service_url=https://class.waldenu.edu/webapps/bbgs-deep-links-BBLEARN/app/wslinks&b2Uri=https%3A%2F%2Fclass.waldenu.edu%

Lund Research Ltd. (2018). *Multinomial logistic regression using SPSS statistics*. Retrieved from Laerd Statistics: https://statistics.laerd.com/spss-tutorials/multinomial-logistic-regression-using-spss-statistics.php

Macapagal, K., Greene, G. J., Andrews, R., & Mustanski, B. (2016). Evaluating the relationship-oriented information, motivation, and behavioral skills model of HIV preventive behaviors in young men who have sex with men. *AIDS Education and Prevention, 28*(2), 165-179. doi:10.1521/aeap.2016.28.2.165

Magadi, M. A. (2017). Understanding the urban-rural disparity in HIV and poverty nexus: The case of Kenya. *Journal of Public Health, 3*, 63-72. doi:10.1093/pubmed/fdw065

Marinho, T. M., Souza, A. L., Ferreira, A. L., Fernandes, E. C., & Cabral-Filho, J. E. (2012). Knowledge of HIV/AIDS prevention and factors associated with condom use among adolescents in northeast Brazil. *Journal of Tropical Pediatrics*, 220-225. doi:10.1093/tropej/fmr074

Mhele, K. E. (2017). Covariates of multiple sexual partnerships among sexually active men in Lesotho. *African Journal of Reproductive Health, 21*(1), 73-81.

Ministry of Health and ICF International. (2016). *Lesotho Demographic and Health Survey 2014.* Maseru, Lesotho: Ministry of Health and ICF International.

Ministry of Health Lesotho and ICF International. (2016). *Lesotho Demographic and Health Survey 2014.* Maseru, Lesotho: Ministry of Health and ICF International.

Moalusi, K. P. (2018). Employees' experiences of the stigma of HIV in a retail organisation: Secrecy, privacy or trust? *African Journal of AIDS Research, 17*(4), 313-322. doi:10.2989/16085906.2018.1536671

Mudzengi , D., Sweeney , S., Hippner , P., Kufa , T., Fielding , K., Grant , A. D., . . . Vassall , A. (2017). The patient costs of care for those with TB and HIV: A cross-sectional study from South Africa. *Health Policy And Planning, 33*(Supp_4), iv48-iv56. doi:10.1093/heapol/czw183

Mugoya, G. C., Witte, T. H., & Ernst, K. C. (2014). Sociocultural and victimization factors that impact attitudes toward intimate partner violence among Kenyan women. *Journal of International Violence, 30*(16), 2851-2871. doi:10.1177/0886260514554287

Mukolo, A., Blevins, M., Victor, B., Vaz, L. M., Sidat, M., & Vergara, A. (2013). Correlates of social exclusion and negative labeling and devaluation of people living with HIV/AIDS in rural settings: Evidence from a general household survey in Zambézia Province, Mozambique. *Plos One, 8*(10), e75744. doi:10.1371/journal.pone.0075744

Mûnene, E., & Ekman, B. (2016). Socioeconomic and clinical factors explaining the risk of unstructured antiretroviral therapy interruptions among Kenyan adult patients. *AIDS Care, 28*(9), 1110-1118. doi:10.1080/09540121.2016.1140890

Murphy, J., Biemer, P., Stringer, C., Thissen, R., Day, O., & Hsieh, P. Y. (2016). Interviewer falsification: Current and best practices for prevention, detection, and mitigation. *Statistical Journal of the IAOS*, 313-326. doi:10.3233/SJI-161014

Musinguzi, G., Bastiaens, H., Matovu, J. K., Nuwaha, F., Mujisha, G., Kiguli, J., . . . Wanyenze, R. K. (2015). Barriers to condom use among high risk men who have sex with men in Uganda: A qualitative study. *PLoS One, 10*(7), e0132297. doi:10.1371/journal.pone.0132297

Muturi, N., & Soontae , A. (2010). HIV/AIDS stigma and religiosity among African American women. *Journal Of Health Communication, 15*, 388-401. doi:10.1080/10810731003753125

Mwale, M., & Muula, A. S. (2017). Systematic review: A review of adolescent behavior change interventions (BCI) and their effectiveness in HIV and AIDS prevention in sub-Saharan Africa. *BMC Public Health, 17*, 718. doi:10.1186/s12889-017-4729-2

Naicker, B., & Maharaj, R. C. (2016). HIV in acute care: A review of the burden of HIV-associated presentations to an emergency department. *South African Family Practice, 58*(1), 13-17. doi:10.1080/20786190.2015.1079027

National Institute of Health. (2011). *Protecting Human Research Participants*. Retrieved from https://phrp.nihtraining.com/justice/02_justice.php

Ndabarora, E., & Mchunu, G. (2014). Factors that influence utilisation of HIV/AIDS prevention methods among university students residing at a selected university campus. *Journal of Social Aspects of HIV/AIDS Research Alliance, 11*, 202-10. doi:10.1080/17290376.2014.986517

Ng'eno, B. N., Kellogg, T. A., Kim, A. A., Mwangi, A., Mwangi, M., Wamicwe, J., & Rutherford, G. W. (2018). Modes of HIV transmission among adolescents and

young adults aged 10-24 years in Kenya. *International Journal of STD & AIDS, 29*(8), 800-805. doi:10.1177/0956462418758115

Ngure, K., Mugo, N., Celum , C., Baeten, J. M., Morris , M., Olungah , O., . . . Shell-Duncan, B. (2012). A qualitative study of barriers to consistent condom use among HIV-1 serodiscordant couples in Kenya. *AIDS Care, 24*(4), 509-516. doi:10.1080/09540121.2011.613911

Ntshiqa, T., Musekiwa, A., Mlotshwa, M., Mangold, K., Reddy, C., & Williams, S. (2018). Predictors of male condom use among sexually active heterosexual young women in South Africa, 2012. *BMC Public Health, 18*(1), 1137. doi:10.1186/s12889-018-6039-8

O'Leary, A., Jemmott III, J. B., Jemmott, L. S., Bellamy, S., Icard, L. D., & Ngwane, Z. (2015). Mediation of an efficacious HIV risk reduction intervention for South African men. *AIDS and Behavior, 19*(10), 1842-1849. doi:10.1007/s10461-015-1042-x

Odusola, A. O., Hendriks, M., Schultsz, C., Bolarinwa, O. A., Akande, T., Osibogun, A., . . . Haafkens, J. A. (2014). Perceptions of inhibitors and facilitators for adhering to hypertension treatment among insured patients in rural Nigeria: A qualitative study. *BMC Health Services Research, 14*, 624. doi:10.1186/s12913-014-0624-z

Okoro, O. N., & Whitson, S. O. (2017). HIV risk and barriers to care for African-born immigrant women: a sociocultural outlook. *International Journal on Womens Health, 9*, 421-429. doi:10.2147/IJWH.S129355

Okware, S., Kinsman, J., Onyango, S., Opio, A., & Kaggwa, P. (2005). Revisiting the ABC strategy: HIV prevention in Uganda in the era of antiretroviral therapy. *BMJ Postgraduate Medical Journal, 81*, 625-628. doi:10.1136/pgmj.2005.032425

Onoya, D., Zuma, K., Zungu, N., Shisana, O., & Mehlomakhulu, V. (2015). Determinants of multiple sexual partnerships in South Africa. *Journal of Public Health, 37*(1), 97-106. doi:10.1093/pubmed/fdu010

Perry, B., Oluoch, L., Agot, K., Taylor, J., Onyango, J., Ouma, L., . . . Corneli, A. (2014). Widow cleansing and inheritance among the Luo in Kenya: The need for additional women-centred HIV prevention options. *Journal of The International AIDS Society, 17*, 19010. doi:10.7448/IAS.17.1.19010

Pettifor, A., Bekker, L.-G., Hosek, S., DiClemente, R., Rosenberg, M., Bull, S., . . . Cowan, F. (2014). Preventing HIV among young people: Research priorities for the future. *Journal of Acquired Immune Deficiency Syndrome, 63*(2), s155-s160. doi:10.1097/QAI.0b013e31829871fb

Pitpitan, E. V., Kalichman, S. C., Garcia, R. L., Cain, D., Eaton, L. A., & Simbayi, L. C. (2015). Mediators of behavior change resulting from a sexual risk reduction intervention for STI patients, Cape Town, South Africa. *Journal of Behavioral Medicine, 38*, 194-203. doi:10.1007/s10865-014-9591-4

Rabie, H., Frigati, L., Hesseling, A. C., & Garcia-Prats, A. J. (2015). Tuberculosis: Opportunities and challenges for the 90-90-90 targets in HIV-infected children. *Journal of The International AIDS Society, 18*, 20236. doi:10.7448/IAS.18.7.20236

Reid-Hresko, J. (2014). Our bodies are our own: Resistance to ABC-based HIV-prevention programmes in northern Tanzanian conservation organisations. *Culture, Health and Sexuality, 16*(7), 765-779. doi:10.1080/13691058.2014.911959

Sandøy, I. F., Blystad, A., Shayo, E. H., Makundi, E., Michelo, C., Zulu, J., & Byskov, J. (2012). Condom availability in high risk places and condom use: A study at district level in Kenya, Tanzania and Zambia. *BMC Public Health, 12*(1030), 1471-2458. doi:10.1186/1471-2458-12-1030

Shrestha, R., Altice, F. L., Huedo-Medina, T. B., Karki, P., & Copenhaver, M. (2017). Willingness to use pre-exposure prophylaxis (PrEP): An empirical test of the information-motivation-behavioral skills (IMB) model among high-risk drug users in treatment. *AIDS and Behavior, 21*(5), 1299-1308. doi:10.1007/s10461-016-1650-0

Simbayi, L. C., Matseke, G., Wabiri, N., Ncitakalo, N., Banyini, M., Tabane, C., & Tshebetshebe, D. (2014). Covariates of condom use in South Africa: Findings from a national population-based survey in 2008. *AIDS Care, 26*(10), 1263-1269. doi:10.1080/09540121.2014.902419

Smith, L. R., Amico, R. K., Shuper, P. A., Christie, S., Fisher, W. A., Cornman , D. H., . . . Fisher, J. D. (2013). Information, motivation, and behavioral skills for early pre-ART engagement in HIV care among patients entering clinical care in KwaZulu-Natal, South Africa. *AIDS Care, 25*(12), 1485-1490. doi:10.1080/09540121.2013.775398

Soto, C. J., & Tackett, J. L. (2015). Personality traits in childhood and adolescence: Structure, development, and outcomes. *SAGE Journals, 24*(5), 358-362. doi:10.1177/0963721415589345

Sullivan, G. M., & Feinn, R. (2012). Using effect size or why the p-value is not enough. *Journal of Graduate Medical Education, 4*(3), 279-282. doi:10.4300/JGME-D-12-00156.1

Taylor, R. R., Fossey, E., & Kielhofner, G. (2017). Selecting the research method. In R. R. Taylor, *Kielhofner's research in occupational therapy: Methods of inquiry for enhancing practice* (2nd ed., pp. 119-140). Philadelphia, U.S.A: F A Davis Company.

The Joint United Nations Programme on HIV/AIDS. (2018). *Indicators*. Retrieved from http://aidsinfo.unaids.org/

Thomson, K. A., Baeten, J. M., Mugo, N. R., Bekker, L.-G., Celum, C. L., & Heffron, R. (2016). Tenofovir-based oral PrEP prevents HIV infection among women. *Current opinion in HIV and AIDS, 11*(1), 18-26. doi:10.1097/COH.0000000000000207

Tuthill, E. L., Butler, L. M., Pellowski, J. A., & McGrath, J. M. (2017). Exclusive breast-feeding promotion among HIV-infected women in South Africa: An information-motivation-behavioural skills model-based pilot intervention. *Public Health Nutrition, 20*(8), 1481-1490. doi:10.1017/S1368980016003657

van Veen, M. R., Winkels, R. M., Janssen, S. H., Kampman, E., & Beijer, S. (2018). Nutritional information provision to cancer patients and their relatives can

promote dietary behavior changes independent of nutritional information needs. *Nutrition and Cancer, 70*(3), 483-489. doi:10.1080/01635581.2018.1446092

Wagner III, W. E. (2016). *Using IBM SPSS Statistics for research methods and social science statistics* (6th ed.). Los Angeles, U.S.A: SAGE Publications.

Wasserman, S., Engel, M. E., Griesel, R., & Mendelson, M. (2016). Burden of pneumocystis pneumonia in HIV-infected adults in sub-Saharan Africa: A systematic review and meta-analysis. *BMC Infectious Diseases, 16*, 482. doi:10.1186/s12879-016-1809-3

World Health Organization. (2018a). *HIV and youth*. Retrieved from http://www.who.int/maternal_child_adolescent/topics/adolescence/hiv/en/

World Health Organization. (2018b). *Maternal, newborn, child and adolescent health: HIV and youth*. Retrieved from https://www.who.int/maternal_child_adolescent/topics/adolescence/hiv/en/

Zhang, J., Jemmott, J. B., & Heeren, A. G. (2015). Sub-Saharan African university students' beliefs about abstinence, condom use, and limiting the number of sexual partners. *Behavioral Medicine, 43*(1), 9-20. doi:10.1080/08964289.2015.1028321

Zimmermann, K. A. (n.d.). *What is Culture? Definition of Culture*. Retrieved from Livescience: http://www.livescience.com/21478-what-is-culture-definition-of-culture.html

Zolnikov, T. R. (2014). Let's talk about culture! Experiencing a disco funeral in Western Kenya. *Journal of Public Health, 36*(1), 2-4. doi::10.1093/pubmed/fdt102

Appendix: Permission to Access Data Sets

A1. Permission to Access DHS Data Sets

4/4/2020

DHS Download Account Application

Please see attached.

You have been authorized to download "Survey" data from the Demographic and Health Surveys (DHS) Program. To begin downloading, please login at: http://www.dhsprogram.com/data/dataset_admin/login_main.cfm. If you are approved for a large number of countries, please consider using the Bulk Download System. For instructions on bulk downloading, please go to: http://userforum.dhsprogram.com/index.php?t=msg&th=5246.

The requested data should only be used for the purpose of the registered research or study. To use the data for another purpose, a new research project must be "created" in your account. All DHS data should be treated as confidential, and no effort should be made to identify any household or individual respondent interviewed in the survey. The data must not be passed on to other researchers (other than co-researchers listed in your account), without the written consent of DHS. Users are required to submit a copy of any reports/publications resulting from using the DHS data files to DHS program.

The files you will download are in zipped format and must be unzipped before analysis. After unzipping, please print the file with the .DOC/DOCX extension (found in the Individual and Male Recode Zips). This file contains useful information on country specific variables and differences in the Standard Recode definition. You will also need the DHS Recode Manual: http://dhsprogram.com/publications/publication-dhsg4-dhs-questionnaires-and-manuals.cfm. This manual contains a general description of the recode data file, including the rationale for recoding; a description of coding standards and recode variables, and a listing of the standard dictionary, with basic information relating to each variable.

It is essential that you consult the questionnaire for the country, when using the data files. Questionnaires are in the appendices of each survey's final report: http://dhsprogram.com/publications/publications-by-type.cfm. We also recommend that you make use of the Data Tools and Manuals at: http://www.dhsprogram.com/accesssurveys/technical_assistance.cfm.

For problems with your user account, please email DHS program. For data related questions, please

register to participate in the DHS Program User Forum at: http://userforum.dhsprogram.com.

The Demographic and Health Surveys (DHS) Program