SUB-SAHARAN AFRICAN MILITARY POPULATION:
HIV PERCEPTION RISK AND CONDOM USE

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DEDICATION

To the Almighty God, the great I am that I am because without his grace, laboring is in vain.
ABSTRACT OF THE THESIS

Sub-Saharan African Military Population: HIV Perception Risk and Condom Use
by
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Master of Public Health with a Concentration in Epidemiology
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Sub-Saharan Africa has the highest regional HIV prevalence rate of all age groups. (UNAIDS, 2013). Reducing the spread of HIV infection is a top priority for militaries. Effective military focused HIV prevention intervention is needed to inform existing programs, identify areas that needs readjustment in the existing program and develop new behavioral HIV prevention intervention. Prophylactic properties of condom makes it highly effective against HIV. However, few studies have looked at perceived risk of HIV infection as it relates to condom use in the military population. This aim of this study is to examine the relationship between HIV risk perception and condom use controlling stepwise for age, number of life time sexual partners, having multiple partner per week, education attainment, marital status and HIV knowledge in a Sub-Saharan African military population. Analyses were based on 1153 military personnel, aged 18-90, who completed a cross sectional survey that collected baseline data for estimating the prevalence of HIV and other behavioral risks. Results showed that 68.74% reported using condoms always and almost always and 31.26% used condoms sometimes, rarely and never. Condoms use varied by self-reported HIV risk perception and it was higher among those who perceived themselves as not likely to acquire HIV. HIV perception risk was not significantly associated with condom use. Number of life time sexual partner, age and marital status were significantly associated with condom use. After adjustment for marital status and number of life time sexual partner, those who are already HIV positive are 4.1 (OR - 4.055, 95% CI - 1.088 -15.112) times more likely to use condoms always/almost always than those who perceive themselves as not at all likely to acquire HIV. Given the national security implication of HIV, consistent condom use should be promoted among those who are married, older and those with more than 1 lifetime sexual partner. The findings from this study also suggest the need for continuous promotion of safe sexual practices among those who are living with HIV.
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CHAPTER 1

INTRODUCTION

BACKGROUND

The Human Immunodeficiency Virus (HIV)/Acquired Immune Deficiency Syndrome (AIDS) pandemic has been identified as an eminent threat to the national security of Sub-Saharan African nations (World Health Organization [WHO], 1999). At the end of 2013, about 35.3 million people were living with HIV globally and the number of new infections was estimated at 2.1 million. The threat of increased infection is escalating among heterosexual males as well as other vulnerable populations including women, infants and children (Joint United Nations Programme on AIDS [UNAID], 2013a).

Sub-Saharan Africa continues to have an overwhelmingly high burden of new infections and deaths from AIDS, killing faster than other preventable cause of death. More than 22 million military personnel are serving in the armed forces around the world. Military personnel are a unique population that are at a high risk of exposure to sexually transmitted disease including HIV. In many Sub-Saharan African countries, the risk of acquiring HIV poses a greater threat to soldiers than the inherent danger of their profession. (Kingma & Yeager, 2005; Yeager, 2000). During peace time, STI infection rate are two to five times higher in the military population than their civilian counterparts. During the times of conflict, the rate can be fifty percent greater than the civilian population of their home country, because conflict condition often result in an increase in high risk sexual activities among deployed soldiers (UNAIDS, 1998). The estimated high rate of HIV among African military questions the capacity of African armed forces to respond to peace keeping mission and crisis. The epidemic poses a significant threat to the sustainable development in Africa as it affects males and females in their reproductive years (Whiteside, de Waal, & Gebre-Tensae, 2006). A meta-analysis of Sub Saharan African military population research study reported HIV prevalence rate as being 3 times higher than that the general civilian population. The
high HIV prevalence rate has led to the speculations that HIV/AIDS may destroy the stability of the African military (Lloyd, Papworth, Grant, Beyrer, & Baral, 2014).

Many Sub Saharan African countries with assistance from United Nations Security Council (UNSC) and The United States President Emergency Plan for AIDS Relief (PEPFAR) are fast tracking their response to end the AIDS epidemic which has resulted into more people living longer and healthier lives with HIV (UNAIDS, 2005, 2011). The increasing quality of treatment and care coupled with decreasing number of deaths due to AIDS has given HIV positive individuals the ability to conceal their diagnosis for longer time period thereby increasing their likelihood of transmitting the disease to another person. HIV seropositive individuals that continue to live an active sexual life without adequate protection risks the transmission of the virus to an uninfected partner as well as their own re-infection with HIV and other sexually transmitted diseases. Three-quarter of HIV positive individuals remain sexually active post diagnosis. The number of new case of HIV infection in Sub Saharan African countries occurs in sero-discordant couples that reported low condom use and HIV disclosure (Bunnell, Mermin, & De Cock, 2006; Medley, Garcia-Moreno, McGill, & Maman, 2004).

**STATEMENT OF THE PROBLEM**

The global prevalence of HIV and STI’s has created a multifactorial health problem of public health significance, affecting individual lives and the ability of communities to cope with the distress of health, social, cultural and economic consequences. An individual’s knowledge of HIV transmission and accurate judgment of their own risk is a key factor in the adoption of safer sexual practices. (UNAIDS, 2011). In addition, the military culture and its rigorous training encourage machismo, courage and the willingness of a soldier to take sexual risk behavior. The most significant factor that makes military personnel vulnerable to greater rate of HIV infection is the practice of posting individuals far from home communities (Adefolalu, 1999; Heinecken, 2005; Hendrix & Daniell, 1999). Military personnel are often required to spend long periods of time away from their families and friends, removing them from normal social controls and their regular sexual partners. Therefore, they may seek alternative ways to deal with loneliness, boredom, stress and more likely to be influenced by peer pressure (Kingma & Yeager, 2005). Conflict regions usually
have higher prevalence rates of HIV as a result of unstable government and a breakdown in the educational system and medical infrastructures (Bing et al., 2008; Heinecken, 2003; UNAIDS, 2003; Kilner 2009; Moodie et al., 2000). Soldiers most often have more money than the local population, more likely to drink alcohol, and engage in more sexual activity to fulfil emotional needs (Bianchi & Popper, 2000; Kane, 1993; Wollants et al., 1995). Professional ethos, mobility, age and the tedious demand of the military profession also makes the military population a vulnerable group (Heinecken, 2003; Sagala, 2008). Some peculiar characteristics such as risk taking behavior and self-perception of invincibility makes them more vulnerable to HIV infection (Kane, 1993; Sagala, 2008; Yeager, 2000).

Additionally, the Joint United Nation’s program in 2012, reported a fall in the rate of condom use in sub Saharan African countries with high HIV prevalence rate. This might have been due to “lack of perceived susceptibility” to the negative outcomes of unprotected sexual behavior. A yearly increase in the supply of condom to Africa does not correlate to the increase in use due to gender dynamics, education and limited HIV information (Maticka-Tyndale, 2012).

**PURPOSE OF THE STUDY**

HIV perception risk has been identified as an important antecedent for one’s adoption of protective behavior against contracting the disease (Macintyre, Rutenberg, Brown, & Karim, 2004). Correct and consistent use of condoms gives protection from HIV (Davis & Weller, 1999). However, consistent condom use is very low among sexually active military personnel (Tran et al., 2013).

Therefore, it is important for policy makers to understand how condoms fits within sexual practices and how risk perception can influence a military personnel’s perception to adopt protective behavior during unsafe sexual practice. The understanding of this relationship can assist in the design of effective policies and programs in the fight against HIV/AIDS among the African military population. Although studies have estimated HIV prevalence rate in Sub-Saharan African Military population, very few studies have assessed the association between HIV risk perception and condom use. This thesis helps to fill the knowledge gap by assessing the relationship between HIV risk perception and condom use in a Sub-Saharan military population.
Among active duty Sub-Saharan African Military personnel, 18 years and older, the purpose of the study was to:

1. To examine the crude relationship between HIV risk perception and condom use.
2. To examine the relationship between HIV risk perception and condom controlling step wise for age, marital status, education attainment, number of life time sexual partner, HIV knowledge and having multiple partner per week.

**HYPOTHESIS**

The hypotheses that will be tested is outlined using the diagram in Figure 1.

**Figure 1. Conceptual model being tested.**

This thesis intends to answer these research question:

- Is HIV risk perception associated with condom use without adjustment for any other covariates?
- What is the relationship between HIV risk perception and condom use controlling step wise for age, education attainment, marital status, having multiple partner per week, number of life time sexual partners and HIV knowledge?

The hypothesis listed below will be used to address the stated questions:

**Ho:**

HIV perception risk is not associated with condom use.
HIV risk perception is not associated with condom use controlling step wise for age, education attainment, marital status, having multiple partner per week, number of lifetime sexual partners and HIV knowledge?

**H1:**

HIV risk perception is associated with Condom use.

HIV risk perception is associated with condom use controlling step wise for age, education attainment, marital status, having multiple partner per week, number of lifetime sexual partners and HIV knowledge?

**THEORETICAL BASIS: HEALTH BELIEF MODEL AND THE PRECAUTION ADOPTION MODEL**

The relationship between perceived vulnerability and precautionary behavior is the fundamental basis of almost all health protective behavior. The health belief model (Stretcher & Rosenstock, 1997) and the precaution adoption model (Weinstein, 1993) constructs clearly underlined a person’s perceived susceptibility to illness as a precursor of preventive behavioral change. The health belief model contains 4 components that are thought to either promote or hinder health relevant actions. The components are:

1. Vulnerability to the negative event
2. Severity to the negative event
3. Benefit of specific preventive actions
4. Barrier to performing preventive actions

The combinations of this conceptual elements suggests that a person’s emotions may affect the veridicality of that person’s perception of threat. The precaution adoption model developed by Weinstein (1988) is a cognitive stage by stage model that assumes that the entire process of practicing preventive behavior follows an orderly sequential pattern. It’s a theoretical paradigm of protective behavior that postulates the orderly sequence of cognitive steps that an individual must complete in order to modify their behavior. The model is outlined in Figure 2.
Weinstein believed that the type of intervention or program that cause people to take action vary by stage. The behavior of people differs based on the stage of the model they are in. In the first stage, people find out that the hazard (e.g. HIV) actually exist then they recognize in the second stage that the hazard is significant for others but they themselves are not at risk. At the third stage, they acknowledge that they are vulnerable to the hazard (e.g. contracting HIV). Stage 3 is an important step because it precedes the decision to take action (e.g. use a condom) or not (no condom use). If the individual decides to take precaution, then preventive measures are taken in the final stage (Gerrard, Gibbons, & Bushman, 1996).

**Basic Assumptions**

The basic assumptions are that:

1. The dataset used for this study are accurately collected and collated into the database.
2. Self-reported responses to Seroprevalence and Behavioral Epidemiology Risks Survey (SABERS) completed using Computer Assisted Self Interview (CASI) are accurate.
3. The Sub-Saharan African Military are similar to other African Militaries.

**Definitions**

**Condom**: Condom is a device or barrier usually used during sexual intercourse to reduce the chances of pregnancy and transmission of sexually transmitted infections and diseases like HIV (Condom, n.d.).

**Perception**: It’s defined as the organization, identification and interpretation of sensory information in order to represent and understand the environment (Schacter, 2011).

**Risk Perception**: This is the evaluation of the probability and consequences of a negative outcome for a person (Haque & Soonthorndhada, 2009).
MILITARY: It’s defined as forces authorized to make use of lethal force to support the interests of the state and all citizens of the state (Wikipedia, 2015).

ACRONYMS

AIDS – Acquired Immunodeficiency Virus
CASI - Computer-assisted Self interview
HIV – Human Immunodeficiency Virus
PEPFAR - The United State of America President’s Emergency Plan for AIDS Relief
SABERS - Seroprevalence and Behavioral Epidemiology Risks Survey
SSA – Sub-Saharan Africa Country
UNGASS - United Nations General Assembly Special Session
HBM – Health Belief Model
PAM – Precaution Adoption Model
CO – Commanding Officer
CHAPTER 2

LITERATURE REVIEW

OVERVIEW OF HIV PROBLEM IN AFRICA

The Human Immunodeficiency Virus is a virus that spreads through body fluids and gradually leads to the destruction of specific cells in the immune system called the CD4 cells or T cells, if the viral proliferation process in the body is uninterrupted, it becomes harder for the body to fight off infections and diseases. Once this happens, HIV infection progresses to AIDS (Acquired Immunodeficiency virus) which makes the body more susceptible to life-threatening infections and diseases. The virus is transmitted from person to person through sexual contacts (oral, vaginal and anal sex), through the blood (blood transfusion) and mother to child transmission (breast feeding in nursing mothers and shared mother-fetal blood circulation) (Centers for Disease Control and Prevention [CDC], 2014).

By the end of 2013, about 35 million people are living with HIV globally and there were 2.1 million new HIV infections. Countries around the world are fast tracking their response to end the AIDS epidemic regionally however HIV is still a major pandemic of public health concern. Since the inception of the pandemic roughly 78 million individuals have contracted the disease and 39 million have died of AIDS related diseases. Sub-Saharan Africa continue to have a disproportionate over-representation of cases of HIV infections than the other regions as it accounted for 70% (24.7 million) of the case of infection and death in 2013 despite the fact that the entire continent of Africa only inhabits about 15.2 percent of the total world’s population. Sub-Saharan Africa accounted for 1.6 million of the 2.1 million new cases of HIV infection in 2013. HIV is no longer seen as an automatic death sentence to those infected as it is now being classified as an infectious chronic disease. More sophisticated quality of care and treatment has led to a lower number of people dying of AIDS and extension of healthy lives in such a manner that people living with HIV are able to
hide their diagnosis for extended time periods, which ultimately gives them the opportunity to spread the diseases to those that are not yet infected (UNAIDS, 2013b).

In sub-Saharan Africa, more than one percent of the general population is still infected hence it’s a generalized epidemic in that region unlike the concentrated epidemic trend seen in the US where MSM’s (Men who have Sex with Men) and IDU’s (Injection Drug users) are the drivers of the current US HIV prevalence rate. In spite of advances in care and antiretroviral treatment available in developed countries, HIV/AIDS still continues to spread in developing countries. Structural inequalities, fragmented programs and inadequate/poor access to necessary services are still persistent challenges fueling the epidemic. The global control of HIV will continue to be an issue until there’s a more effective prevention of HIV transmission. Currently, 22 million or 3 out of 5 people living with HIV still does not have access to life saving treatments. In sub-Saharan Africa, only 8 condoms are available per year for each sexually active individual (UNAIDS, 2014).

Misinterpretation of HIV related information and myths related to HIV continues to hinder the effective prevention of HIV in Africa. HIV seropositive individuals that continue to have unprotected sex risks the transmission of the disease to an uninfected partner and self-reinfection of HIV and other STI’s, potentially furthering the spread of the disease. In Sub-Saharan Africa, the myth that having sex with a virgin or an albino is prevalent (Thuku, 2011). Additionally, a lot of individuals living with HIV continue to seek alternative/complimentary medicine to be free from the virus especially in arears where conventional therapies and access to ART are less (Littlewood & Vanable, 2011). The belief that there’s no AIDS in Africa and that coining the word AIDS is a mere attempt by the developed world to associate the burden of the disease with Africa just like they did with tuberculosis, diarrhea and cachexia is prevalent (UNAIDS, 2000). A study in Malawi confirmed that the mortality rate of immunized children over 3 years old who survived the first year of life was 9.5 times higher among HIV-seropositive children than children who are HIV-seronegative (Miotti et al., 1999). For the reasons stated above, more Interventions are needed to support HIV-seropositive individuals in Africa in order to avoid the transmission of the virus to others, avoid new STI’s and delaying the onset of AIDS (UNAIDS, 2014).
**HIV in Military Forces in Sub-Saharan Africa**

Over 22 million militaries globally are one of the most susceptible populations for contracting and transmitting HIV. African military populations generally have increased risk to acquire HIV, compared to the general civilian populations. Risk factors associated with the African military include high rates of sexual partner change, elevated rates of STIs, low rates of condom use with commercial sex workers and other casual partners, and significant mixing between groups having high and low risk behavior patterns (Temoshok & Kingma, 1996). Militaries are unique population because they primarily consist of young and sexually active males who are highly vulnerable to peer pressure. They spend lengthy periods of time away from home, usually patronize commercial sex workers and often stationed in areas with high rate of HIV/AIDS (Russak, Ortiz, Galvan, & Bing, 2005).

Attitudes of insusceptibility and risk taking behavior may increase a military personnel's willingness to engage in high risk sexual behavior like having sex with commercial sex worker and heavy alcohol/drug use. Taken together, these distinct characteristics present the need for HIV/AIDS intervention that are unique to the military (Kane, 1993).

HIV/AIDS has been shown to disrupt programming and service delivery. Its effect on the military includes increased cost for recruitment, training as well as replacement of diseased staff (Heinecken, 2003; Ostergard, 2002; Rode 2005; Singer, 2002). As a result of the impact of HIV, African militaries are becoming part of the global HIV/AIDS humanitarian crisis requiring foreign aid to assist in the fight against HIV in their defense force. However, most militaries are excluded from foreign aid assistance (Kingma & Yeager, 2005) because they are intended to be funded by their own government.

Minimal data exist to describe the epidemiology of HIV/AIDS in Sub-Saharan African Countries Defense Forces. The prevalence rate of HIV in the defense force of Zimbabwe, Angola, Malawi, Botswana and South Africa were estimated at 55 percent, 50 percent, 50 percent, 33 percent and 21 percent respectively (Heinecken, 2003). For every ten deaths in South Africa defense force, seven are attributable to HIV/AIDS. In Nairobi Kenya, 50-60 percent of the armed forces memorial hospital bed were occupied by HIV/AIDS infected Soldiers (Beelen, 2003; Prins, 2004). AIDS-related illness has killed more soldiers
in Zambia than Zambian defense force’s combat-related deaths from all their military operations combined since their independence in 1964 (Rupiya, 2006).

Since there’s no known cure for HIV and treatment is not yet widely accessible to all infected regions. Behavioral Interventions like condom use, behavior and attitudes towards sex, alcohol/drug use and increasing HIV knowledge have been identified as the most viable approach for decreasing the spread of HIV (Peersman & Levy, 1998).

**HIV as a Threat to National Security**

The armed forces are an integral part of a country’s national security however they are usually the worst affected with life threatening disease like HIV/AIDS. The negative effect of the high prevalence of HIV/AIDS in Africa directly impacts their operational effectiveness. High infection rate in a nation’s military does not only reduce their ability to provide humanitarian and peace support to those in need, it also reduces their ability to effectively manage the internal disruptions caused by the disease. HIV infection presents a far greater danger to soldiers that the inherent hazard of their profession. High rate of HIV infection can undermine the defense force’s mission preparedness thereby increasing the risk of insecurity (Sagala, 2006).

The United Nations Security Council (UNSC) declared that HIV/AIDS was not only a humanitarian crisis for health and development but it is also regarded as a security threat that has destabilizing effect as any war. It does not only threaten individual citizens, it also threatens the institutions that define and defend the character of the society (Holbrooke, 2000). The UN Security Council also recognized HIV/AIDS as a threat to internal peace and security in Africa (United Nations Security Council, 2000). After the recognition, a resolution plan was developed to ensure that peace keeping troops were retained in the STI/HIV/AIDS education.

**History of Military Personnel’s Health and Military Effectiveness**

Historical military evidence and war records showed that healthy soldiers are a prerequisite for military effectiveness. Historically, infectious disease have significantly reduced the fighting capacity of military forces and created planning difficulties for military planners (Smallman-Raynor & Cliff, 2004). There’s an association between troops fitness
and military effectiveness. Malaria and Typhoid fever were fatal during the first and second world wars. STD’s have reduced the optimal performance of militaries and they are a problem for military planners (Condon-Rall, 2004).

According to Sagala (2006), “HIV/AIDS pandemic undermines the military’s organizational effectiveness through its medium and long term consequences. This results in capacity deficit and personnel attrition, increased cost of replacing diseased staff, absenteeism, loss of morale, internal dislocations and spiraling military health costs” (p. 56).

**HIV Risk Perception and Condom Use**

Behavioural models like the Health Belief Model and the Precaution Adoption Model has been identified as one of the several core components of public health interventions. The military population continue to be at most risk of acquiring and transmitting HIV and little is known about their perception towards the risk of acquiring HIV and how this perception depends upon their condom use behaviour. According to the Health Belief Model, a person must feel personally threatened by a disease with serious consequences; and then they must believe that the benefits of taking preventive action outweighs the perceived barrier/cost of preventive action (Becker, 1974). Individual knowledge of HIV transmission and accurate judgment of self-risk are among the key factors in the adoption of safe sexual practice (UNAIDS, 2001). A lot of studies have documented the effectiveness of condoms as an easy intervention to prevent HIV infection although over 200 myths, misconceptions and fear may hinder access to the use of condoms (Hearst & Chen, 2004). Reduction in the incidence of HIV in Sub Saharan Africa Military would require a fall in the level of higher-risk sexual practices and increase in condom use during higher-risk sex. There’s an overwhelmingly high evidence that condom use during sexual intercourse is the most effective strategy for the prevention of heterosexual transmission of STDs and HIV infection. Condoms, when used correctly and consistently can reduce the transmission of HIV by 80%-90% and pregnancy by 91-99% (Davis & Weller, 1999).

There’s need for policymakers to understand these factors in order to design effective policies in the fight against HIV and AIDS. Perception of risk is the evaluation of the probability and consequences of a negative outcome for a person. Therefore, risk mean different things to different people. Actions and personal understanding of risks are learnt by
socially and culturally structured conceptions (Haque & Soonthorndhada, 2009). An individual’s self-risk perception may have direct influence on the reception of STI’s/HIV prevention messages; this is possible as the choice of personal HIV-infection prevention strategy has been attributed with risks and benefits (Varghese et al., 2002).

Different studies conducted amongst different population have found a relationship between HIV risk perception and a lot of variables such as number of sexual partners, HIV knowledge, community perception of AIDS risk, fear of AIDS, knowledge of sexual partners, past sexual behavior, closeness of parent-child relationships and religious affiliation. Social-cultural norms and practices are major determinants of sexual risk taking behavior (Prata, Morris, Mazive, Vahidnia, & Stehr, 2006). Other studies conducted in different cultures, countries and populations have associated HIV risk perception with behavioral variables like the choice of partner, choice of sex act, and condom use (Maharaj & Cleland, 2005; Meekers & Klein, 2002; Prata et al., 2006).

In a condom use study, researchers found that the odds of having risky sexual behavior were more than tripled among men and women who perceived their risk of HIV as being high. They found no significant association between HIV transmission knowledge and sexual behavior (Akwara, Madise, & Hinde, 2003). Similarly, Maharaj and Cleland (2005) found out that women whom perceived themselves at risk of HIV because of their husbands were four times more likely to use condoms than women who did not. Adolescents who attend university in Nigeria and Zimbabwe and used condoms were more likely than non-users to have an accurate perception of their HIV risk (Akande, 1994).

A study conducted in Cameroon found an association between HIV perception risk and condom use among urban youths (Meekers & Klein, 2002). A 1999 Ghanaian study also concluded that there’s an association between self-perceived high risk of acquiring HIV and an increased odds of condom use at last sex among youths (Adih & Alexander, 1999). Studies in the Nigerian military revealed that consistent condom use was also reported by 16-20% (Okulate, Jones, & Olorunda, 2008) of the study participants and 41% reported no condom use the last time they had sex with a commercial sex worker (Nwokoji & Ajuwon, 2004). In the Angolan military, 54% of study respondents reported using a condom during their last sexual practice with a commercial sex worker (Bing et al., 2008).
NUMBER OF LIFE TIME SEXUAL PARTNER AND HAVING MULTIPLE PARTNER PER WEEK

Accurate judgment of a potential partner’s risk of HIV may assist an individual in making decision to avoid sexual contact or to adopt a protective behavior during partnership like using condoms. Having 5 or more sexual partners in the last five years and having primary partner who has other partners was significantly associated with self-perceived risk of HIV in a study that was conducted among women of multi ethnic group (Eversley et al., 1993).

Similarly, several studies have reported a significant association between HIV risk perception and having multiple partner (Hobfoll, Jackson, Lavin, Britton, & Shepherd, 1993; Kalichman, Hunter, & Kelly, 1992; Njogu & Martin, 2003). A person’s assessment of his own risk amongst many people is based on general rather than personal susceptibility to infection and this is only usually conceptualized in terms of those with multiple sexual partner (Smith, 2003).

Majority of the youths don’t view their behavior or the behavior of their sexual partner to be risky, and this lack of risk perception is more challenging when negative outcome are not immediately obvious. It has been reported that 36% of Nigerian service personnel did not think of using condoms during sexual encounters with their casual partners (Essien et al., 2005). In a study in Nigeria, female military personnel who were not consistent condom users were 65% less likely to encourage their casual partners to use condoms, therefore, suggesting that this group would be at elevated risk of STI’s/HIV infection (Essien, Mgbere, et al., 2010). Majority of Nigerian women indulge in risky sexual practices such as having multiple sexual partners, drug abuse, engaging in unprotected sex, and drinking alcohol. All these are risk factors for high rates of STI’s (Essien et al., 2006; Essien, Monjok, et al., 2010; Nwokoji & Ajuwon, 2004)

DEMOGRAPHIC VARIABLES (AGE, MARITAL STATUS AND EDUCATION)

Socio demographic and lifestyle variables are important elements that influence HIV preventive behaviors, specifically to condom use (Essien et al., 2006). Age is consistently reported as predictor of condom use in a lot of studies done in Africa (Lawoyin, 2004;
Kapiga, Lwihula, Shao, & Hunter, 1995). In a study that looked at married men’s behavior when their wives are unavailable for sex, lower educational status (primary and secondary), younger age of the wife as well as occupational status were reported to be predictors of condom use (Lawoyin, 2004). Higher educational attainment predicts condom use (Kapiga et al., 1995; Lugoe, Klepp, & Skutle, 1996).

A range of socioeconomic-demographic variables were found to be significantly associated with condom use and HIV risk perception. Married males were less likely to use condom (O’Connor, 1998). Similarly, another study reported that only 2% of their married study population used condoms (Knodel & Pramuralratana, 1996). Age, marital status, education attainment and income were reported to be significantly associated with condom use (Guaykietikul, Thongchaoen, & Voratis, 1994).

**HIV Knowledge**

The first line of counter action in the battle against HIV infection has been the campaign to improve general knowledge on HIV. International intervention, local interventions and extensive HIV prevention programs have successfully improved HIV knowledge and awareness worldwide (UNAIDS, 2008). Knowledge of HIV has increased globally. A study conducted in Nigeria showed that 90% of the Nigerian population had heard of HIV and condom use as a means of HIV prevention (National Bureau of Statistics, 2009).

However, in a study on knowledge of HIV and HIV-related sexual risk behaviors among Nigerian navy personnel, 88% of the personnel were reported to have had lifetime multiple sexual partners ranging from 1–40 with an average mean of 5.1. About 32% had sexual contact with female sex worker and 20% had sexual encounter with a female sex worker in the last six months of the survey (Nwokoji & Ajuwon, 2004). The participants of a study conducted in Tanzania reported that 57% and 41% of males and females respectively had never used condoms (Lugoe et al., 1996; Nuwaha, Fixelid, & Höjer, 1999). Despite the high improvement in HIV prevention knowledge, people in high HIV prevalence region still engage in high risk sexual practices. A plethora of literature has shown low level of condom use regardless of HIV infection risk (Ahmed et al., 2001; De Walque & Kline, 2009). A study in Ethiopia demonstrated that condom use is low despite the fact that HIV knowledge
is widely spread (Sahlu et al., 1999). A similar study conducted on condom use in 4 sub-Saharan African countries found that condom use did not significantly increase despite the high HIV prevalence rate (Lagarde et al., 2001).

**PUBLIC HEALTH SIGNIFICANCE**

The relationship between an individuals’ perceptions of their risk for acquiring STIs/HIV and their use of condoms is poorly understood among the African Military population. Understanding this relationship is essential to the development of effective strategies to fight HIV and AIDS (Prata et al., 2006). Perception of risk is considered to be the first step towards behavioral change from risk-taking to safer behavior (Cleland, 1995).

An individual’s subjective state of willingness to prevent and control measures is determined by the individual’s perception or likelihood of vulnerability to HIV and the possible severity of contracting HIV/AIDS. The whole concept of risk perception is the general assessment of one’s risk to the health hazard and it’s unique from beliefs about the consequences of condom use. The belief that using a condom may prevent HIV infection may encourage condom use. It is therefore important to examine the perceptions of Military personnel about HIV risk in order to understand how they relate their sexual experiences to the risk of disease or infection. Perceived risk of getting STIs/HIV may have important implications for health if the perceptions are rational and lead to a willingness to avoid risky behavior. An understanding of the association between perception of risk and sexual behavior may also facilitate the design of AIDS-prevention measures necessary to check the spread of HIV among different population (Prata et al., 2006).

**CONCEPTUAL FRAMEWORK**

Condom-use is generally influenced by a wide array of factors. Behavioral Scientist defined human behavior in the context of taking risks for morbidity and mortality (Rogers & Hackenberg, 1987). The constructs of the health Belief Model agrees with this research because it’s the frame work that utilizes the desire to avoid a negative health consequence for motivating people to take positive health actions. The HBM is used in different behavioral studies since the 1950’s. The elements of HBM includes perceived susceptibility which implies that people are ready to change if they believe they are susceptible to a condition. In
the perceived severity stage, people believe the condition has serious consequences, perceived benefit explained that taking action would reduce their susceptibility to the condition and finally perceived barriers explained that the cost of taking action are outweighed by the benefits. Self-efficacy is a person’s belief in his or her capacity to execute behaviors that is necessary to produce specific performance attainment (Hiltabiddle, 1996).
CHAPTER 3

METHODS

DESIGN

Data analyzed in this thesis were drawn from the 2013 HIV and syphilis Seroprevalence and Behavioral Epidemiology Risk Survey (SABERS) conducted in a Sub-Saharan African military population. The SABERS study was a cross sectional study that estimated the prevalence of HIV, syphilis and identified associated demographics and risk behaviors. The study, conducted from January to March, 2013, was a collaboration between the Department of Defense HIV/AIDS Prevention Program (DHAPP) and the Sub-Saharan African (SSA) country’s military. The original study procedures were reviewed and approved by the Naval Health Research Center Institutional Review Board (IRB) and the SSA country’s IRB. Data used for this thesis were completely de-identified and did not require San Diego State University’s IRB approval.

POPULATION

The initial study population of interest for the study was 1200 (1100 male and 100 female) active duty military personnel, aged 18 years and older. Military personnel were recruited from rural and urban sites, thereby generating a geographical representation of the country. Each site’s commanding officer (CO) worked hand in hand with the study team leaders to randomly select units for participation on a daily basis. This was done in order to ensure that all units had the same opportunity of being selected. From each selected unit, a stratified proportional sampling scheme was employed to randomly select participants for the study. Military personnel from the randomly selected units were asked to report to a muster parade where the commanding officer (CO) introduced the purpose of SABERS and the study team. At the muster parade, the site’s CO emphasized that participation in the SABERS was completely voluntary and that the military’s high command fully supported the study
and encouraged soldiers to participate. The CO mentioned that a random selection process would be used to select male officers for an informational briefing; all female soldiers would be invited to participate in the briefing. Following this speech, the CO left the room and the study team began selecting participants for the briefing. Male personnel were selected at random using a lottery system. They were asked to pull a piece of paper out of an envelope: those with the letter “X” marked on it were invited to participate in the informational briefing session. All females were invited to the briefing. An appointment card was issued to the potential participants, which included a date, time and location for the briefing.

Selected military personnel that showed up for their appointment were given a brief overview about the study by the team leader. Following the informational session, a comprehensive review of the consent form was done. The informed consent process involved reading through the consent document in a group setting and reviewing it on an individual basis with the counselor. The consent form included information on the purpose of the study, procedures that would be followed, any discomforts, risks, and benefits that might be associated with participation, the security and confidentiality of the data being collected, and finally the voluntary nature of the participant’s role in the study. Possible participants were given a hard copy of the consent form so that they can stay at the same pace with the team leader while the form was read aloud. Potential participants were informed that they have the option to consent or decline participation without bearing any undesirable consequences. Those who were not interested in participating were free to leave. Those who were interested in participating met with a counselor one-on-one to complete the informed consent process and get answers to their concerns if they have any. Individuals then provided consent to participate or not to participate using an electronic data collection device (Netbook). A total of 1153 (97%) of 1177 who showed up for the informational briefing consented to participate. Therefore, the final sample size was 1153.

**Data Collection**

Demographic and risk behavior data were collected using a computer-assisted self-interview (CASI). Following informed consent, participants completed the questionnaire on their own in a group setting. All participants were instructed by the team leader on the mode of operation of the netbook and how the CASI program worked.
The questions used in the CASI system were adapted from the surveys that were previously used in other African military populations. The questions were reviewed by the Department of Defense HIV/AIDS Prevention Program, the US Embassy in the African country, Research Technology Institute (RTI), behavioral scientists, statisticians and epidemiologists. A draft version of the questionnaire was piloted among a small group prior to its utilization for the study. Feedback and comments were obtained from this pilot group and from study personnel conducting the pilot before the questionnaire was finalized.

The final survey has the following sections:

1. General and military demographics: sex, age, education, religion, marital status, military branch and rank, occupation specialty, and years of military service.
2. Sexual history: number of sexual partners, types of sexual partners, types of sexual contact, age of sexual debut, condom use history and sexual partners during deployment.
3. Condom use, access, and attitudes.
4. HIV testing behavior: HIV testing history, use of and access to HTC services on base.
5. Male circumcision.
7. Alcohol use.
8. HIV transmission, prevention, and treatment knowledge.

Variables

Outcome Variable

Condom use: Participants were asked about their condom use behavior in the past 3 months. Specifically, the question was “In the past 3 months, how often did you use a condom when you had sex?” The response options are outlined below:

0 1 Always (100% of the time)
0 2 Almost always (75-99% of the time)
0 3 Sometimes (25-74% of the time)
0 4 Rarely/Never (0-24% of the time)
I did not have sex during the past 3 months

The response options were further collapsed into a dichotomous variable. The two groups are always/almost always versus Sometime/rarely/never. I did not have sex and the refused category were excluded from the analysis.

**Exposure Variable**

HIV Risk Perception: Respondents were asked about their chances of acquiring HIV. Specifically, the question was “What are the chances that you yourself may acquire HIV? “ The response options are outlined below;

- 0 1 Not at all likely
- 0 2 Somewhat likely
- 0 3 Highly likely
- 0 77 Don’t Know/Not sure
- 0 98 Already HIV positive
- 0 99 REFUSED

The exposure variable was collapsed into three levels; not at likely, somewhat likely/highly likely and already HIV positive. The don’t-know/not sure level and the refused level were excluded from the analysis.

**Covariates:** The selection of covariates was based on the review of literature. Variables that were found to be significantly associated with condom use in the literature and are found in SABERS were adapted for use in this study as covariates.

- **Age:** This variable was categorized into 3 levels; young adults (18-24 year olds), adults (25-34 year olds) and older adults (35 and above).
- **Marital status:** Respondents were asked about their marital status. The marital status variable has 2 levels; single never married and married with one partner.
- **Number of sexual partner:** The analysis excluded respondents that were irrelevant for the analysis, i.e., respondents that had never had sex. This variable was categorized into 2 levels; 1 partner and more than 1 partner.
- **Multiple partner per week:** This variable has a dichotomous (yes or no) response. Respondents were asked if they have more than one partner per week.
Education attainment: Respondents were asked about the highest level of education they have completed. This variable has 5 levels; primary, secondary, vocational training (not college/university), college/university and refused. This variable was further collapsed into 3 levels. The refused category was excluded from the analysis and the first category consist of primary alone. In the second category, secondary and vocational training were collapsed together. The college/university level made up the last category.

HIV knowledge: United Nations General Assembly Special Session (UNGASS) HIV knowledge indicator questions were used to assess HIV knowledge. In addition to the 5 UNGASS question, respondents were also asked about their knowledge of HIV cure. The five core HIV knowledge indicator questions and a knowledge of HIV cure variable were used to construct a composite HIV knowledge variable. The 5 indicator questions had dichotomous (yes/no) response. The first indicator question asked if the risk of HIV transmission can be reduced by having sex with one faithful partner. The second question asked if a person can get HIV through mosquito bites while the third question asked if the risk of transmission can be reduced through condom use. The fourth core indicator question asked if a person can get infected by sharing meal with someone who is HIV positive and the fifth question asked if a healthy looking person can have HIV. The sixth question is locally adapted and it tested knowledge by asking if HIV can be cured. Respondents that got all 6 HIV knowledge questions correctly were knowledgeable about HIV and those that got less than 6 correct were not as knowledgeable as those that got all 6 correct. Therefore, the HIV knowledge variable has 2 levels; those gave a right response to all the 6 questions and those that missed at least 1 question (All correct or <6 correct).

**Statistical Data Analysis**

Analysis of the data was carried out using Statistical Analysis System software version 9.3. Complete case analysis approach was used to deal with missing data. Therefore, only subjects who have all variables observed were used in the analysis. Descriptive statistics were computed, including frequencies and percentages for all categorical variables. To assess the association between the main outcome of interest, the main predictor variable and covariates, separate bivariate logistic regression models were conducted: odds ratio, corresponding 95% confidence intervals, and p-values were reported from these models.
Predictor variables achieving bivariate significance \((p < 0.05)\) were entered into a multiple logistic regression model with consistent condom use as the outcome, using a forward stepwise method. The model was used to calculate adjusted odds ratios (AOR), 95% confidence intervals, and corresponding \(P\) values of the predictor variables that remained significant in the multivariate analysis. Variables that were not significantly associated with the outcome were re-evaluated. This was done to access the effect of confounding variables that may cause a spurious relationship between the outcome and the primary predictor. Therefore, any variables that changed the point estimate of HIV risk perception by at least 10% were retained in the final model regardless of their significance level. An assessment of the interaction (effect modification) between variables that were found to be significant in the multivariate regression model was also conducted. Any significant interaction will be explained and if otherwise will be dropped from the model. Hosmer-Lemeshow goodness of fit test was used to assess the agreement of the observed and expected values in the sub groups of the model population.
CHAPTER 4

RESULTS

DESCRIPTIVE ANALYSIS

A total of 1153 Military personnel were analyzed from the Seroprevalence and Behavioral Epidemiology Survey data for this study. The descriptive statistics for all the variables are presented in Table 1. Most of the participants are married (64.81%) and had completed secondary education/vocational school (high school) (78.57%). Most of the respondents (79.97%) have more than one sexual partner in a lifetime. In the study sample, 68.74% reported using condom always and almost always during sexual intercourse in the past three months. Age ranged from 18 to 90 years and 40.15% of the respondents felt that they are not susceptible to contracting HIV while a quarter of the population felt they were somewhat likely or highly likely to contract HIV. A majority of the respondents gave a correct response to all the United Nations General Assembly Special Session (UNGASS) HIV knowledge indicator questions. Most of the participants reported not having multiple partners per week (82.15%).

BIVARIATE ANALYSIS

Table 2 shows the bivariate relationship between HIV risk perception and condom use. The assessment of the bivariate relationship between consistent condom use and each individual predictors revealed that consistent condom use was significantly associated with age and marital status (P<0.05). Consistent condom use is not significantly associated with HIV risk perception without adjusting for other predictors. The number of life time sexual was confounding the association between HIV risk perception and condom use. Hence, it will be controlled for in the multivariate analyses.
Table 1. Selected Demographics and Behavioral Characteristics of Participants Enrolled in the 2013 DOD HIV/AIDS Program’s Seroprevalence and Behavioral Epidemiology Study of a Sub-Saharan African Military Population (N=1153)

<table>
<thead>
<tr>
<th>Categorical Variables</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Condom Use (n=755)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Always/Almost Always</td>
<td>519</td>
<td>68.74</td>
</tr>
<tr>
<td>Sometimes/Rarely/Never</td>
<td>236</td>
<td>31.26</td>
</tr>
<tr>
<td><strong>HIV Risk Perception (n=674)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not at all likely</td>
<td>375</td>
<td>40.15</td>
</tr>
<tr>
<td>Somewhat likely/Highly likely</td>
<td>234</td>
<td>25.05</td>
</tr>
<tr>
<td>Already HIV+</td>
<td>65</td>
<td>6.95</td>
</tr>
<tr>
<td><strong>Marital Status (n=1057)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single never married</td>
<td>372</td>
<td>35.19</td>
</tr>
<tr>
<td>Married</td>
<td>685</td>
<td>64.81</td>
</tr>
<tr>
<td><strong>Number of Life Time Sexual Partner (n=674)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 partner</td>
<td>135</td>
<td>20.03</td>
</tr>
<tr>
<td>&gt;1 Partner</td>
<td>539</td>
<td>79.97</td>
</tr>
<tr>
<td><strong>Total Knowledge (n=1005)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;6 Correct</td>
<td>554</td>
<td>55.12</td>
</tr>
<tr>
<td>All correct</td>
<td>451</td>
<td>44.88</td>
</tr>
<tr>
<td><strong>Education Attainment (n=1148)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>29</td>
<td>2.53</td>
</tr>
<tr>
<td>Secondary/Vocational</td>
<td>902</td>
<td>78.57</td>
</tr>
<tr>
<td>College</td>
<td>217</td>
<td>18.9</td>
</tr>
<tr>
<td><strong>Having multiple partner per week (n=958)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>171</td>
<td>17.85</td>
</tr>
<tr>
<td>No</td>
<td>787</td>
<td>82.15</td>
</tr>
<tr>
<td><strong>Age (n=1068)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-24</td>
<td>284</td>
<td>26.59</td>
</tr>
<tr>
<td>25-34</td>
<td>539</td>
<td>50.47</td>
</tr>
<tr>
<td>35+</td>
<td>245</td>
<td>22.94</td>
</tr>
</tbody>
</table>

The odds of condom use (always/almost always) is 0.49 times (OR = 0.49; 95% CI 0.33-0.75) less likely for those who are adults (25-34 years age range) than those who are young adults (18-24 years age range) without adjusting for other predictors. In the same light, the odds of condom use (always/almost always) is 0.44 times (OR = 0.44; 95% CI 0.27-0.71) less likely for older adults (greater than 35 years of age) than those who are young adults (18-24 years age range) without adjusting for other predictors. The odds of condom use is 0.32
times (OR = 0.32; 95% CI 0.22 – 0.48) less likely for those who are married compared to those who are single without adjusting for any other predictor.

Table 2. Bivariate Analysis Between Condom Use and Predictors in A Sub-Saharan African Military Population. (N=755)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Inconsistent Condom use n (%)</th>
<th>Consistent Condom use n (%)</th>
<th>Consistent condom use OR(95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HIV Risk Perception</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not all likely</td>
<td>81(30.22)</td>
<td>187(69.78)</td>
<td>1</td>
</tr>
<tr>
<td>Somewhat/highly likely</td>
<td>64(33.33)</td>
<td>128(66.67)</td>
<td>0.87(0.58-1.29)</td>
</tr>
<tr>
<td>Already HIV+</td>
<td>12(24.00)</td>
<td>38(76.00)</td>
<td>1.37(0.68-2.76)</td>
</tr>
<tr>
<td><strong>Marital Status</strong>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single never married</td>
<td>41(17.23)</td>
<td>197(82.77)</td>
<td>1</td>
</tr>
<tr>
<td>Married</td>
<td>176(39.20)</td>
<td>273(60.80)</td>
<td>0.32(0.22-0.48)</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>5(26.32)</td>
<td>14(73.68)</td>
<td>1</td>
</tr>
<tr>
<td>Secondary/Vocation</td>
<td>182(31.27)</td>
<td>400(68.73)</td>
<td>0.79(0.28-2.21)</td>
</tr>
<tr>
<td>College/univer.</td>
<td>49(32.03)</td>
<td>104(67.97)</td>
<td>0.76(0.26-2.22)</td>
</tr>
<tr>
<td><strong>Number of Lifetime Sexual Partner</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Partner</td>
<td>28(38.89)</td>
<td>44(61.11)</td>
<td>1</td>
</tr>
<tr>
<td>&gt;1 Partner</td>
<td>133(31.89)</td>
<td>284(68.11)</td>
<td>1.40(0.81-2.28)</td>
</tr>
<tr>
<td><strong>Having Multiple Partner Per Week</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>54(35.06)</td>
<td>100(64.94)</td>
<td>0.80(0.55-1.16)</td>
</tr>
<tr>
<td>No</td>
<td>165(30.05)</td>
<td>384(69.94)</td>
<td>1</td>
</tr>
<tr>
<td><strong>HIV Knowledge</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;6 correct</td>
<td>103(28.53)</td>
<td>258(71.47)</td>
<td>1</td>
</tr>
<tr>
<td>All correct</td>
<td>120(34.88)</td>
<td>224(65.12)</td>
<td>0.75(0.54-1.02)</td>
</tr>
<tr>
<td><strong>Age</strong>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-24</td>
<td>38(20.21)</td>
<td>150(79.79)</td>
<td>1</td>
</tr>
<tr>
<td>25-34</td>
<td>130(33.94)</td>
<td>253(66.06)</td>
<td>0.49(0.33-0.75)</td>
</tr>
<tr>
<td>35&gt;</td>
<td>57(36.54)</td>
<td>99(63.46)</td>
<td>0.44(0.27-0.71)</td>
</tr>
</tbody>
</table>

Key: * - P<0.05; 1 - reference category; OR - Odds Ratio; Univer. -- University

**Multivariate Analysis**

The bivariate relationship between condom use and all of the predictors of interest showed that age and marital status were significantly (P<0.05) related to condom use. Number of life time sexual partner was confounding the association between HIV risk perception and condom use and therefore was controlled for in the construction of the final
A series of potential models were tested using these 3 variables including the primary predictor of interest (HIV risk perception) to evaluate the relationship between condom use and its predictors. After the construction of the series of potential models, the final parsimonious model was arrived at and it’s presented in table 3.

Overall, the study results did not support the primary hypothesis that HIV risk perception is associated with condom use without adjusting for any other variable neither did it support the secondary hypothesis that HIV risk perception is associated with condom use controlling step wise for the predictors that were significant in the bivariate analysis (age, marital status). The interaction variables that were constructed using HIV risk perception and marital status, HIV risk perception and number of sexual partners, marital status and number of sexual partners, were all insignificant and consequently excluded from the model. The P value (P=0.92) of the Hosmer-Lemeshow goodness of fit test was greater than 0.10 which indicated that the final model is a good fit. The study found out that those who are already HIV positive are 4.1 times more likely (OR = 4.1; 95% CI 1.12-14.83) to use condoms always/almost always than those who did not perceive themselves as likely to acquire HIV after adjusting for marital status and number of sexual partner. Also, adjusting for HIV perception risk and number of sexual partner, the odds of condom use always/almost always is 0.20 times (OR = 0.18; 95% CI 0.10 – 0.34) lower for those who are married compared to those who are single. Finally, adjusting for HIV perception risk and marital status, those who have more than 1 sexual partner in a life time are 2.54 times more likely (OR = 2.54; 95% CI 1.27-5.09) to use condoms consistently (always/almost always) than those who have 1 sexual partner in a life time.
### Table 3. The Multivariate Association of Condom Use and HIV Risk Perception Adjusting For Marital Status and Number of lifetime Sexual Partner

<table>
<thead>
<tr>
<th>HIV risk perception</th>
<th>Adjusted odds ratio(95% CI)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not likely</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Somewhat likely/Highly likely</td>
<td>0.76(0.45-1.29)</td>
<td>0.31</td>
</tr>
<tr>
<td>Already Positive*</td>
<td>4.1(1.12-14.83)</td>
<td>0.034</td>
</tr>
</tbody>
</table>

**Marital status**

<table>
<thead>
<tr>
<th>Marital status</th>
<th>Adjusted odds ratio(95% CI)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single never married</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Married*</td>
<td>0.18(0.10-0.34)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

**Number of sexual partner**

<table>
<thead>
<tr>
<th>Number of sexual partner</th>
<th>Adjusted odds ratio(95% CI)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 partners</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>&gt;1 partner*</td>
<td>2.54(1.27-5.09)</td>
<td>0.0085</td>
</tr>
</tbody>
</table>

Key: *p<.05; 1 – reference category
CHAPTER 5

DISCUSSION

In this study, we found out that consistent condom use in the last 3 months was associated with number of life time sexual partner, age and marital status. The first purpose of the study was to examine the crude relationship between HIV risk perception and condom use. The second was to examine the same relationship, while controlling stepwise for potential covariates including age, education, marital status, having multiple partners per week, number of life time sexual partners and HIV knowledge. Existing literature has shown mixed results on the association between HIV risk perception and condom use. Consistent with the literature (Anderson & Milsom, 2002; Maswanya et al., 1999; Stanton et al., 1999), HIV risk perception was not associated with condom use however, in contrast, some studies found a relationship between HIV risk perception and condom use (Akwara et al., 2003; Meekers & Klein, 2002).

KEY FINDINGS

Aligning with trends from previous studies, it was associated with behavioral variable (number of life time sexual partner) and demographic variables (marital status and age). In this study, HIV risk perception does not necessarily translate into behavioral change in this cohort. An explanation for the insignificant association between HIV risk perception and consistent condom use in this population as a whole may be due to reporting bias. Majority of the individual may be HIV positive and therefore undermine their risk. In line with this possibility, a study conducted in Nairobi showed that partners that are both HIV positive reported lower risk perception and increase in non-use of condoms (Mohamoud, 2009). In addition to that, since complete case analysis approach was used to deal with the multilevel missing data, the lack of significance may be due to loss of power. Also, no significant interactions on perceived risk between HIV risk perception, marital status, number of sexual
partner and condom use were found (data not shown). In other words, there were no consistent pattern between a military personnel’s HIV risk perception towards the number of lifetime sexual partner, there marital status and their associated condom use frequencies. Therefore, the lack of evidence of significant interactions insured that the main effect of each examined factor could be more reliably interpreted (Mertler & Vennatta, 2002). Additionally, female military personnel constituting part of this population, and being exposed to the same - and sometimes even greater - pressure as men to enter into casual sexual relationships but culturally lack the bargaining power to negotiate condom use, by itself, undermines the effect of self-risk perception. Studies done in southern African countries revealed that females have low condom bargaining power and generally submit to the choice of the males on whether or not a condom should be used (Andersson, Ho-Foster, Mitchell, Scheeper, & Goldstein, 2007; Dunkle et al., 2004).

Correct and consistent condom use is the most effective way to reduce exposure to HIV and other sexually transmitted diseases among sexually-active individuals (Bendavid & Bhattacharya, 2009). In this sample, majority of the participants used condoms consistently (68.74%) compared to non-consistent users (31.26%). The high percentage of consistent condom use observed in this study may be a reflection of PEPFAR’s HIV intervention program in Africa. Part of PEPFAR’s HIV intervention mission in Africa is to assist with reducing the vulnerability to HIV among military and civilian population. In agreement with this, a Nigerian military study also reported that about 50% of the study participants in an HIV knowledge study demonstrated positive condom use attitudes (Essien et al., 2005).

Another interesting finding in this research is that those who reported being HIV positive are more likely to use condoms than those who did not perceive themselves as likely to have HIV. This finding comport with the result of several research that reported that knowing one's HIV status can lead to a reduction in high-risk sexual behavior (Kamb et al., 1998; Marks, Crepaz, Senterfitt, & Janssen, 2005).

Lower age was associated with increased condom use. A possible explanation for this is that younger individuals are more likely to be exposed to STI/HIV/AIDS prevention programs in school while older adults have left school before HIV prevention programs were incorporated into the national school curriculum. In the past years, condom use has risen tremendously, especially among younger people (Beksinska, Smith, & Mantell, 2012;
UNAIDS, 2013a). Also, this subpopulation is likely to have been exposed to encouragement and the building of new skills than older adults. The decline in condom use with increasing age is consistent with several research study of condom use in Africa (Exavery et al., 2012; Maticka-Tyndale, 2012).

In a study in which DHS survey was analyzed, the researcher found out that marital status was the strongest predictor of condom use in a Zimbabwean population. (Adetunji, 2000) Marital status was significantly associated with the condom use in the bivariate and multivariate analysis in this study. The lower consistency of condom use among those who are married relative to those who are single is probable because once a marital relationship is established between individuals, fidelity and monogamy is usually expected and condom use falls. A myriad of African studies yielded the same result. A wide range of resistance to condom use in long term and stable relationships was observed because of the association of condom use with illicit sexual practices as well as lack of trust (Jewkes, Dunkle, Nduna, & Shai, 2010). Sub-Saharan African families typically desire to have large families and thus the use of prolonged condom use may hinder the actualization of that goal (Morroni, Tibazarwa, & Myer, 2006).

Condom use was increasing as the number of sexual partner increases. These findings were in agreement with several studies done in Sub-Saharan Africa and other international settings. (Chimbindi, McGrath, Herbst, Tint, & Newell, 2010; ICF International, 2012; Uganda Bureau of Statistics and ICF International Inc., 2012; Yotebieng, Mitchell, & Adimora, 2009).

**STRENGTHS**

A key strengths of this study is the use of rigorous data collection procedures. The use of computer assisted self-interview ensured maximum privacy were accorded to participants of the study. Another strength of the study is that it adds to the inadequate research conducted among Sub-Saharan African military population. Therefore, in order to effectively tailor intervention and address high HIV prevalence disparity among this population, more research must be conducted.
LIMITATIONS

This study has limitations that must be pointed out. It relied on self-reported HIV risk behaviors, which can be affected by social desirability bias. This especially could be a problem with the outcome variable (condom use). Under-reporting of condom use among populations where social norms reject condom use may occur, whereas over-reporting may occur among populations where social norms positively promote condom use. Another limitation is that original study was cross-sectional in nature: therefore, causal relationships cannot be readily established. Also, the data set might not be representative of the diversity of Sub-Saharan Africa. Sub-Saharan African countries are different from each other culturally, politically and socially. Geographic national boundaries does not necessarily enclose the same ethnic and cultural groups neither do they separate dissimilar groups. Sub-Saharan African national boundaries population in reality reflect the patterns and priorities of colonial rule.

CONCLUSION

Analyzing the reason why people fail to take adequate measures to protect themselves against HIV/AIDS infection is of key importance for the drive to reduce new infections. The results suggest that the relationship between condom use and HIV risk perception is more complex than often thought, in ways that should have consequences for the design of public policies to combat further spread of HIV. Overall, the study indicated that there was no association between HIV perception risk and condom use. Thus, the primary hypothesis and secondary hypotheses were not supported. However, an association was found between positive HIV status and condom use, after controlling for marital status and number of sexual partners in the multivariate analysis.

IMPLICATION FOR INTERVENTION

The results of this study have important implications for future intervention programs. Given the national security implication of increased burden of HIV among the military, interventions targeting married military personnel as well as younger individuals, those with more than 1 partner should be scaled up. The military HIV control program needs to expand their efforts in promoting condom use in these subgroups. The results of the study also
highlight the need for the continuous promotion of risk-reduction behavior among those who are living with HIV.

Since, these military personnel live and communicate freely with the civilian population, they represent a potential bridging group for disseminating HIV into the larger population. Although, HIV risk perception was not associated with condom use in this study, targeted intervention programs for the military, taking the variables associated with the outcome measures into account could help to minimize the consequences of the epidemic.

**FUTURE DIRECTION**

While the primary hypotheses were not supported, there is a plethora of literature that support the relationship between HIV risk perception and condom use in other populations. I will reassess the same relationship and stratify across sex. It is important that missing values are addressed using an approach other than the one used in this study like regression imputation to fill in the missing values with a predicted value. This will preserve the variables with missing data thereby maintaining sample size, reducing variability, uncertainty and thus improving power. A different methodology that will increase response rate and get more complete data should be employed. Finally, it may be interesting to observe a different association, one that places HIV perception risk as the outcome variable and all other variables as possible predictors. This would be valuable in providing insights into the factors associated with perceived risk of HIV.
REFERENCES


APPENDIX

EXCERPTS FROM SURVEY USED IN THE 2013 SEROPREVALENCE AND BEHAVIORAL EPIDEMIOLOGY RISK SURVEY

[810.] What are the chances that you yourself may acquire HIV?
0 1 Not at all likely
0 2 Somewhat likely
0 3 Highly likely
0 77 Don’t Know/Not sure
0 98 Already HIV positive
0 99 REFUSED

[307.] In the past 3 months, how often did you use a condom when you had sex?
0 1 Always (100% of the time)
0 2 Almost always (75-99% of the time)
0 3 Sometimes (25-74% of the time)
0 4 Rarely/Never (0-24% of the time)
0 5 I did not have sex during the past 3 months
0 99 REFUSED

101.] What is your age (in years)? (Estimate your best answer)
Enter the number of years in the space provided, using the numbers on your keyboard. To refuse, enter 999. [RANGE 18-98,999]

[104.] What is your current marital status? By “married” we mean by ceremonies that took place in a church, court of law, or in the village by a traditional leader.
0 1 Single, never married and not living with a partner
0 2 Single, living with a partner when not in barracks
0 3 Married
0 4 Polygamous marriage
0 5 Widowed
0 6 Divorced/Separated
0 99 REFUSED

[202.] Approximately how many sexual partners have you had in your lifetime, including any current partners?

If you do not know how many partners, enter 777.
To refuse, enter 999.

[Range 0-776,777,999]

[102.] What is the highest education level that you have completed?

☐ 1 ............Primary
☐ 2 ............Secondary
☐ 3 ............Vocational training (not college/university)
☐ 4 ............College/University
☐ 99 ............REFUSED

[208.] Have you ever had sex with more than one partner in the same week?

☐ 1 ............Yes
☐ 2 ............No
☐ 99 ............REFUSED

[List]

[Module Section 8. HIV Knowledge]

[801.] Can the risk of HIV transmission be reduced by having sex with only one faithful, uninfected partner?

0 1 Yes
0 2 No
0 77 Don’t Know
0 99 REFUSED

QxQ:
By “faithful,” we mean being faithful to one sex partner without HIV, who is also faithful to only you.

[List]

[802.] Can a person get HIV from mosquito bites?

0 1 Yes
0 2 No
0 77 Don’t Know
0 99 REFUSED

QxQ:
By this, we mean can a mosquito transmit the HIV virus?

[List]

[803.] Can the risk of HIV transmission be reduced by using condoms?
Can a person get HIV by sharing a meal with someone who is infected? By “sharing a meal,” we mean sharing a dish of food.

0 1 Yes
0 2 No
0 77 Don’t Know
0 99 REFUSED

QxQ: By “sharing a meal” we mean sharing communal food or eating from the same plate of food.

Can a healthy-looking person have HIV?

0 1 Yes
0 2 No
0 77 Don’t Know
0 99 REFUSED

QxQ: By “healthy-looking,” we mean someone who appears to have no major health problems or illnesses.

Do you think HIV can be cured?

0 1 Yes
0 2 No
0 77 Don’t Know
0 99 REFUSED

IF {F01A806} = “2” OR {F01A806} = “99” OR {F01A806} = “77” THEN GOTO F01A808;