Determinants of self-perceived risk of HIV infection: population-based observations in Zambia

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LIST OF ABBREVIATIONS

AIDS	Acquired Immune-deficiency Syndrome
ARV	Anti-retroviral
HIV	Human Immune-deficiency Virus
NAC	National HIV/AIDS/STD/TB council
PLWHA	People Living With HIV and AIDS
PMTCT	Prevention of Mother to Child Transmission
STI	Sexually Transmitted Infections
UNZA	University of Zambia
UiB	University of Bergen
VCT	Voluntary Counseling and Testing
WHO	World Health Organization

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Dedication

I would like to dedicate my thesis to my mother, Grace Mwangala, my brother Sean Mwangala and my late father, Henry Mwangala.

ABSTRACT

Background

Perception of risk of HIV infection has been suggested to be an important area of study as it can be an assumed to be an indicator of one's understanding of susceptibility to HIV infection and a precursor to behavioral change, which could determine future decision making regarding risk taking. Studies that have examined perception of HIV risk and its determinants still remain limited.

Zambia is among the worst affected countries by the HIV pandemic in the sub-Sahara African region. The prevalence rate is 16.5% among adults aged 15-49 years and unprotected heterosexual intercourse is the main mode of transmission. The demographic health survey in 2002 showed that HIV prevalence is higher in the urban areas (23%) as compared to the rural areas (11%); and higher among women (17.8%) as compared to men (12.6%). Combating the spread of HIV in Zambia may require a deeper understanding of key issues that are driving the pandemic. The way people receive and process information on HIV and AIDS, how they perceive themselves at risk of HIV infection and what actions they take afterwards may be a key element to the effectiveness of the programmes that can be designed or improved to reduce the spread of the disease in the different sub-groups of populations in Zambia.

In this study, we set out to investigate the levels of and factors that influence self perception of risk of HIV infection among adults in populations with high HIV prevalence levels. More specifically aimed to investigate the influence of socio-demographic factors, health status indicators and sexual behaviour on self perception of HIV risk. We also intended to assess the assumed relationship between self perception of HIV risk with worry of being HIV infected, the intention to seek Voluntary Counseling and Testing (VCT) and the actual use the VCT service when offered.

Methods

The data was from a population based survey conducted in 2003 in selected urban and rural areas in Zambia. The survey aimed among other things to generate knowledge on HIV prevalence, distribution of patterns and trends in HIV prevalence over time and impact of HIV on mortality and fertility levels. Information on socio-demography, health status, sexual behaviour, perception

of risk of HIV infection and VCT was collected from both men and women. Saliva samples were collected from consenting respondents for anonymous linked HIV testing. This study on perception of risk was limited to analyses of information collected from men and women aged 15-49 years who were not aware of their own HIV status.

Logistic regression was used to assess the association between level of self-perceived HIV risk and HIV prevalence in rural and urban areas. Multiple linear regression models were used to examine factors associated with self perception of HIV risk, guided by a conceptual framework, which was developed based on previous research findings in this field. Background variables included age, sex, marital status, residence and level of education. Health status indicators included were self rated health, mental distress and HIV status, and the sexual behaviour indicators were number of sexual partners and STI experiences a year before the survey. Step-wise multiple linear regression modeling was used to assess the additive effects of the groups of variables. The association of self-perceived HIV risk with worry of being HIV infected, intention and use of VCT service as per the survey, were analyzed separately using bivariate correlations functions.

Results

The prevalence of HIV was 13.6% in the rural area and 18.0% in the urban areas, and only 13.6% of the respondents reported to know their HIV status. Fifty percent (50%) of the respondents rated themselves to be at no risk of HIV infection, while 17% to be at high/very high risk. The likelihood of being HIV infected for rural residents was about 1.8 times higher [95% CI 1.17 – 2.63] among those who perceived themselves at high/very high risk as compared to those who perceived themselves at no risk. The association was not significant among urban residents [AOR=1.3, 95%CI 0.97 – 1.78]. The overall positive predictive value of any risk was 20%, meaning that 20% of those who perceived themselves at risk were actually HIV infected.

The results of the multiple linear regression analysis showed that perception of risk did not vary by residence except for urban men after adjusting for confounders in the model. However, there were striking differences in age and sex. Perception of risk increased with age among the young people below 30 years of age and dropped with age among those aged above 30 years. The younger men appeared to perceive themselves at higher risk as compared to the young women,

indicating a sharp contrast when compared with the age-sex distribution of HIV prevalence which showed that women were 4 times more likely to be infected than men.

Being married was associated with a high perception of risk among women as compared to the single women whereas among married men, this association was negative and significant compared to the single men upon addition of other variables in the model. Level of education and mobility were positively associated with self-perceived HIV risk among men only; on the other hand, the effect of mobility was significant among both young men and women aged15-24 years.

Health status indicators measured as self rated health, HIV status and mental distress were associated with self-perceived HIV risk, with mental distress having the strongest effect and HIV status having the weakest effect. However among young people, the effect of HIV status was only significant among young women. Sexual behaviour indicators differed also by gender. Having many sexual partners was significantly associated with high self-perceived HIV risk among men though weaker and insignificant among young men aged 15-24 years. However, having experienced STI symptoms was significantly associated with self perception of risk among both men and women. Separate analyses showed that self-perceived HIV risk was strongly associated with worry about being HIV infected, intention to seek VCT and actual use of VCT were associated with self perception of HIV risk for both men and women.

Conclusion

About 50% of the respondents perceived themselves at risk of HIV infection, whereas the HIV prevalence in the study population was 16.1%. The association between HIV status and perception of risk was relatively low with a positive predictive value of 20% i.e. only 20% of those who perceived themselves at any risk were actually HIV infected. However, these discrepancies in perception of risk and actual risk are not surprising due to the fact that infectiousness of HIV is very low: the probability of being infected by HIV per risk exposure is < 0.001. Perceiving oneself at risk of HIV infection was strongly associated with worry of being HIV infected, mental distress and the actual use of the HIV testing services offered to them as part of the survey, indicating that HIV is a big burden in this high HIV prevalence setting and perception of risk is important in health decision making. Perception of risk was also associated with deteriorating health and past risky sexual behaviour. Strong gender differences exist in the

population. There is need for the empowerment of women, so that they can have negotiating skills for safe sex. Improvement of education, especially access to basic education is very important for both men and women as it provides well-informed knowledge, confers skills necessary for assimilating health promotion information on HIV & AIDS which in turn is linked to risk reduction and having accurate and correct perception of risk of HIV infection. The study on self perception of risk is a complex process where individuals are to handle conflicting information.

1.0 INTRODUCTION

The Human Immunodeficiency Virus (HIV), the virus that causes Acquired Immune-deficiency syndrome (AIDS) is among the world's most devastating pandemic in history and has continued to cause disease and death since the early 1980's. It continues to be a challenge to gains in development, millions of people being robbed of their good health and lives, resulting in social and economic security deficiencies and the widening of the gap between rich and poor. The main modes of HIV transmission worldwide include unprotected sexual intercourse, mother to child transmission and intravenous drug use, thereby affecting various groups of people within populations and calling for implementation of multiple strategies to control the pandemic (UNAIDS/WHO, 2006; 2007). As of 2007, the estimated number of people living with HIV globally is 33.2 million of which 30.8 million are adults, 15.4 million are women and 2.5 million are children below the age of 15. It has been estimated that 2.5 million people became newly infected and more than 2 million people including 330,000 children died of AIDS and related illnesses in 2007. 95% of people living with HIV live in the low and middle income countries (UNAIDS/WHO, 2007).

In many regions of the world, young people aged 15-24 years are the most affected by HIV accounting for about 50% of new infections (UNAIDS/WHO report, 2006; 2007). Promising developments have been seen in recent years in efforts to address the HIV and AIDS pandemic globally, including increased access to effective anti-retroviral treatment (ART) and preventive programmes. However, estimates of annual number of new infections continue to vary from region to region. In south and south East Asia, the estimated annual number of new HIV infections decreased from 450,000 in 2001 to 340,000 in 2007 and in Eastern Europe from 230,000 in 2001 to 150,000 in 2007. On the other hand, East Asia saw an increase of newly infected adults and children to about 92,000 in 2007 as compared to 77,000 in 2001. Oceania also had an increase in estimate of new infections from 3,800 in 2001 to 14,000 in 2007. However in the Caribbean, Latin America, the middle east and north Africa, north America and western Europe, the number of new infections have remained approximately stable for many years (UNAIDS/WHO report, 2007).

Sub-Saharan Africa continues to be the region most affected by the pandemic. More than two thirds (68%) of people living with HIV and AIDS (PLWHA) including adults and children

globally live in sub-Sahara Africa, with its epicenter in southern Africa. About 76% of AIDS deaths in 2007 occurred in this region, clearly showing the unmet need for scaled up interventions to control the pandemic. However, prevalence of HIV varies from country to country across the region with some reaching as high as above 30% such as Swaziland with HIV prevalence of 33.4% and some as low as 0.9% in Senegal, between 5-7% in Kenya and Uganda respectively as of the year 2006. Other countries in this region have HIV prevalences of between 10% and 25% including Botswana, Malawi, South Africa, Zimbabwe and Zambia (UNAIDS/WHO report, 2007).

1.1 Background to HIV in Zambia

Zambia is a landlocked country located in the south – central part of the sub-Saharan region. She gained independence on 24th October 1964 from British colonial rule. Since independence to date, Zambia's political trend has been from one-party regime to multi-party democracy. The country is made up of 9 provinces and 72 districts. Zambia's population is currently at about 11.9 million, of which half is made of youth or children below the age of fifteen. The annual population growth rate is about 2%, while the total fertility rate is 5.1 per woman (CSO Census, 2000). About a third of the Zambian population lives in the urban areas, which mainly include Lusaka, the capital city and industrial towns situated on the copper-belt province and along the main line of rail. The Gross Domestic Product is currently at about $490, mainly from copper sales, placing the country among the poorest countries in the world (AVERT 2007). More than two thirds of the population lives below the poverty line. Life expectancy has reduced to about 37 years from about 51 years in the 1980s, while infant and child mortality rates have continued to rise mainly due to the HIV pandemic (Dzekedzeke & Fylkesnes, 2006).

Zambia's first reported AIDS diagnosis in 1984 was followed by a rapid rise in HIV prevalence. The country is currently experiencing the economic, social and health impacts of a mature HIV epidemic, with a current HIV prevalence of 16.5% among adults aged 15-49 years. The most affected age group is between the ages 15-30 years of age. Studies on the impact of HIV on adult mortality have suggested that the HIV epidemic in Zambia was probably already huge enough to significantly influence adult mortality as early as the late 1960s (Dzekedzeke & Fylkesnes, 2006). In the first decade after HIV was discovered, estimation of HIV prevalence was based only on data obtained from population sub-groups such as pregnant women, STI clinic patients and blood

donors. The first population based survey with HIV testing was conducted in 1995 and recorded an HIV prevalence of 26% among respondents aged 15-39 years in Chelstone, an urban area, and 16.4% in rural Kapiri Mposhi, which matched well with antenatal clinic (ANC) data from the same areas: 23.9% and 12.5% respectively in 1994 (Fylkesnes et al, 1998). Repeated surveys in the same geographic areas were conducted in 1999 and 2003. The demographic health survey (DHS) conducted in 2000/2001 was the only national health survey that included HIV testing, reporting a prevalence of 15.6%: 17.8% among women and 12.6% among men; 10.8% in rural areas and 23.2% in the urban areas. Geographical estimates of HIV prevalence rates vary with ranges from 8% in Northern Province to 22% in Lusaka province (Dzekedzeke & Fylkesnes, 2006).

The first major political response to the HIV epidemic in Zambia was the establishment of the National AIDS Prevention and Control Program and the National Aids Surveillance committee in 1986. An emergency plan was thereafter launched in 1987 to ensure safety of blood and blood product supplies. The first mid-term plan (1988-92) coordinators were appointed at provincial and district level. Later on, the second mid-term plan (1993-98) acknowledged the limitations of the former plan which were attributed to a lack of inter-sectoral coordination and therefore moved toward an expanded multi-sectoral integration of AIDS, STD, TB and Leprosy programmes (NASTLP) involving all ministries, public institutions, the private sector, churches and civil society. These steps included increased promotion and distribution of condoms, mass media campaigns focused on reducing HIV transmission to women, youth and children, awareness and education objectives in school curricula, work place programs and effective diagnosis of STIs, blood screening, and strengthened health service including VCT. The Prevention of Mother to Child Transmission (PMTCT) initiative was launched in 1999 and later expanded in 2004 (NAC, 2000).

The health care system in Zambia was decentralized in the early 1990s in an effort to increase local control over health services and shift resources towards primary health care. However, many districts lacked enough competent personnel to implement and integrate all the health policies efficiently, which eventually affected the functioning of the NASTLP for many years (Nanda, 1998).

The National HIV/AIDS/STD/TB council (NAC) was established in 2000 and became operational in 2002. It replaced the NASTLP in an effort to give the coordinating body more authority, after the conclusion that the previous body lacked high-level political leadership, evaluation mechanism and strategic management. The main function of NAC is to coordinate all national initiatives in the fight against HIV. The council comprises of representatives from the government, non-governmental organizations (NGOs), religious and traditional leaders, media, youth, the private sector and people living with HIV and AIDS (PLWHA) (NAC, 2000).

ARV treatment provision was initiated at two sites in Lusaka and Ndola in 2002, but only covered 0.1% of people with advanced HIV infection (Ministry of Finance and National planning, 2004). In 2005, the provision of free ARV treatment was introduced for all who needed it and by December 2006, 35% of those who were in need of treatment received it (UNAIDS/WHO, 2007). Other programs that have been put in place in response to the HIV epidemic include a social welfare scheme for orphans and vulnerable children and also support for widows by churches. NGOs and the community play a role in the fight against HIV and AIDS, though coverage is very limited. Home based care programs only reach less than 20% of people living with HIV and AIDS (Garbus L, 2003).

Recently, changes in sexual behaviour and HIV prevalence have been reported. The sexual behavior survey that was conducted in 2000 reported a marked delay in the onset of sexual activity among both young men and women and also a decline in the proportion of older adults who engage in sexual activity other than their regular partners (ZSBS, 2000). The repeated population based surveys from 1995 to 2003 revealed a decline in HIV prevalence among the higher educated urban young people and has been attributed to changes in sexual behavior among these groups, which included having fewer sexual partners, increased condom use and delayed child bearing among young women (Michelo et al, 2006; Sandoy et al, 2007). These findings are a reverse of earlier findings at the start of the HIV epidemic, which showed that HIV affected the highly educated groups the most (Fylkesnes et al, 1997).

The declines in risky sexual behaviour and HIV prevalence in particular sub-groups is promising, though Zambia still suffers from an extensive HIV epidemic with high incidence rates. The strengthening of prevention efforts is therefore of critical importance, to prevent more infections.

2.0 Study justification

The disturbing statistics on HIV incidence continues to raise concern on the effectiveness of the existing preventive and control programs. HIV prevention programs and strategies largely target HIV awareness and behavioral change, yet barriers still remain to the successful implementation of such strategies at individual level. Combating the spread of HIV requires a deeper understanding of key issues that drive the pandemic. It is essential therefore to give consideration to the reality of what is happening on the ground in terms of risk or susceptibility to HIV infection (Bryon et al, 2006).

Individual perception of risk of HIV infection has been identified by previous studies including health behaviour model designers as an element that could be among the key channels to HIV prevention at individual level. It is an important area to study as it is an indicator of perceived susceptibility to infection, a measure of an individual's understanding of transmission of HIV and can be assumed to be a precursor to behavioral change which could determine future infection or prevention (Sheppard et al 2002).

Studies that have examined perception of risk of HIV infection remain limited in Zambia. However, separate studies in Zambia and Tanzania have identified self-perceived risk of HIV infection as one of the predictors of intention to seek VCT services (Fylkesnes & Siziya, 2004; Kakoko et al, 2006), indicating the potential importance of perception of risk in HIV prevention strategies. Accordingly, more focused attention is required on how people actually perceive their risk of HIV and what they are doing to avoid infection. To achieve this, it is necessary to first identify the factors that underlie individual perceptions and susceptibility to infection. In this way its importance would be realized so as to facilitate the design of intervention strategies for the different sub-groups of people.

3.0 Background to the study on perception of risk of HIV infection

Regarding issues concerning disease and health, the perception of risk of getting infected or getting ill is considered important in explaining what factors motivate people to seek medical care or why people take up health related behavior (Prohaska et al, 1990). Perception of risk is the most prominent factor in the leading health behavior models including the theory of reasoned action (Ajzen & Fishbein, 1980), the health belief model (Janz & Becker, 1984) and the theory of planned behavior (Ajzen, 1991), which have been employed in many prevention and control strategies including those designed for HIV (Prohaska et al, 1990). Even though researchers identify and acknowledge the importance of understanding perception of risk as an element in both intervention and theory, they have not yet fully explored what factors make people to perceive themselves at risk (Prohaska et al, 1990). The health belief model for example identifies behavioral change and uptake of health services as closely linked to perceived risk, but what accounts for origin or difference in perceptions or calculations of risk is not explained. Similarly, HIV-related research have been exploring the outcome of perceived risk of HIV infection and the processes by which people make decisions and choices, but studies on determinants of self-perceived risk of HIV infection are few (Cleary et al, 1986).

In every day use, risk is often used interchangeably with the possibility of suffering harm, probable loss, threat or hazard. Risk perception is an important factor in every human decision making process (Holton, 2004). It is subjective as what one individual finds hazardous, another may not. It can be viewed as the way in which people feel threatened by circumstance and the opinions or ideas they develop by association with the threat or hazard. Risk perception is centered on past experience, cultural values and specialist training in an area or field of expertise to which the threat or hazard relates (Greene, 2000). The concept 'risk' is defined differently according to discipline or context. An economist would define risk in terms of economic costs and benefits that hazards present for the well-being of people. On the other hand psychologists define risk as an element of uncertainty that could partially influence perceptions people have and associated behavior that follows (Prohaska et al, 1990). In the context of HIV, it is an event that could be associated with a lot of uncertainty from the time of exposure the first time to actual infection diagnosis (Becker and Joseph, 1988). Uncertainty could continue even after the uptake of preventive practices as the period of latency of HIV from time of infection to actual development of signs and symptoms is usually long (Medley et al, 1987; CDC, 1997). Therefore,

risk of HIV infection in a broad sense can be assumed to be the probability of a future event in which the certainty of a particular outcome is not known (Prohaska et al, 1990). However little is known on how the lay person defines risk in relation to HIV infection.

It is known that for individuals to accurately estimate their risk of infection, they need to first identify a risk and a standard against which to assess or measure their chance of being affected by a particular event or exposure (Clarke, 1988). In the context of HIV, modes of transmission of the virus and associated risk factors are well known and have been well documented (WHO/CDC, 2005). According to the Zambia sexual behaviour survey conducted in 2005, awareness of HIV and AIDS has become universal in both urban and rural areas. About 99% of men and 98% of women have heard of HIV and AIDS: 94% of men and 91% of women knew that HIV infection could be avoided and about 93% of men and 89% of women knew that a healthy looking person could have HIV (ZSBS, 2005). Therefore HIV ignorance is no longer a major issue in the Zambian setting. However, it is not known how much individuals use facts or information to correctly assess or calculate their own risk for HIV infection (Prohaska et al, 1990).

Health education campaigns related to HIV are based on the assumption that educating people on transmission and risks of HIV would encourage reduction in high risk behavior (Prohaska et al, 1990). However previous studies have shown that knowledge of facts alone, with regard to HIV and AIDS does not seem to have much of an influence on behavioral change. Some studies have suggested that there is a very weak association between sexual education or knowledge and practicing safe sex (Macintyre et al, 2001; Sheppard et al, 2002). But if factual knowledge of HIV has little or no association with practice of safe sex and behavioral change, what does? In an attempt to answer this question, researchers have begun to explore the stage that comes between knowledge and action, which is perception of individual risk (Prohaska et al, 1990). Evidence based on HIV prevention efforts suggests that increased perception of risk of HIV infection does eventually result in behavioral change, although little is known on how long the effects are sustained over time (Becker & Joseph, 1988).

People respond differently to the HIV epidemic and often do not respond rationally, despite having factual knowledge on HIV and AIDS (Prohaska et al, 1990). People tend to either overestimate or underestimate their perception of risk of HIV infection while others tend to

stigmatize or ignore the reality of the disease. Low perception of risk of HIV infection in relatively high HIV prevalence settings has been reported. A study in Ethiopia found that despite having good and correct knowledge of HIV transmission, only 17% of the men and 2% of the women who admitted having been involved in risky activities reported that they were at risk of HIV infection (Sahlu et al, 1999). In Thailand, young Thai men reported they had a lot of fears of getting infected with HIV, and yet they had low perception of their own risk of acquiring the disease (Sweat et al, 1995). In contrast, a study in Gambia which has a low HIV prevalence found that young adults overestimated their risk of HIV infection. The researchers suggested that the overestimation of risk of HIV infection could have been due to intense and overemphasized public health media and education (Macintyre et al, 2003; Cleary et al, 1986).

A part of the cognitive approach called Optimistic Bias theory suggests that many people think of AIDS, cancer and other life-threatening conditions as 'something that cannot happen to them' which eventually leads to many of them underestimating their risk in comparison with the actual risk (Macintyre et al, 2003). A study in Mozambique reported that 27% of women and 80% of men who considered themselves to be at no risk or small risk of contracting HIV were actually at moderate or high risk (Prata et al, 2006). The determinants of the optimistic bias towards underestimation of risk of HIV infection would lead to the difficulty in realizing that an illness that may affect an individual many years later may need to be prevented today, and therefore it is not taken seriously (Macintyre et al, 2003). On the other hand, some people tend to adopt an attitude that is fatal toward the HIV epidemic where they feel HIV infection is inevitable and do not see the point in changing their behaviour (Sheppard et al, 1990). Therefore, in countries with very high HIV prevalence it is important that a balance must be reached where people develop realistic ideas about their own personal risk perceptions of infection and make informed decisions of adopting behavioral change (Sheppard et al, 2002).

The belief that contracting HIV is a punishment for immoral behavior still persists (Prohaska et al, 1990). HIV and AIDS has great stigma surrounding it. Stigma is related to shame, fear of dying, homosexuality, prostitution and misbehavior. Homosexuality in African country settings is a taboo, while prostitution is associated with immorality and poverty (Macintyre et al, 2003). Some people therefore have low perception of their own risk of infection due to the fact that they

do not identify with the image of people who are HIV infected. People tend to avoid admitting risk for an event associated with shame or breach in their moral conduct (Prohaska et al, 1990).

The study of perception of risk of HIV infection is complex as it is difficult to differentiate between perceived risk, actual risk and associated subjectivity (Sheppard et al, 2002). Feelings of personal vulnerability to HIV infection are subjective and vary with context and time (Akwara et al, 2003). For example, the experience of death or illness of someone with AIDS may increase the subjective perception of risk of infection among members of the family or community despite the fact that some may actually be at very low risk (Sheppard et al, 2002). In contrast, a study in Zambia reported that even though young adults that were interviewed knew someone who was infected with HIV, they did not think they were at any risk of getting infected (Magnani et al, 2001). In addition, where deaths from AIDS are hidden or not common, perceived risk of infection may be much lower than is the actual case (Sheppard et al, 2002).

People therefore use many ideas that are based on knowledge acquired through experiences, facts, thought processes, social and cultural factors to choose among risk sources in a vast world of uncertainty to assess their own risk of HIV infection (Prohaska et al, 1990). Due to the many factors that could influence people's perception of risk, variation could therefore exist between actual risk and what people perceive to be their risk (Prohaska et al, 1990).

3.1 Conceptual framework

A conceptual framework was developed to study self perception of risk and is illustrated in Figure 1. The model is based on findings from previous studies and contextual assumptions. This framework assumes that underlying and intermediate factors may directly or indirectly influence self perception of risk of HIV infection.

Age is assumed to influence how a person perceives their own risk of HIV infection. It is suggested that young adults are slow to adopt safe sexual practices due to the belief that AIDS is a disease that could not affect them (Sheppard et al, 2002). A study in Kenya suggested that individuals, particularly young people often felt invulnerable to HIV infection. Their view was that 'AIDS was a distant, rather than an immediate threat: a disease that affects other people' (Bauni & Jarabi, 2000). The period of adolescence includes rapid physical, psychological and

social growth and development including sexual desires and the start of sexual activity that is usually coupled with limited knowledge which in turn compromises healthy decisions and choices (Ferguson, 1988). Therefore, adolescents and young adults are at increased risk of HIV infection as they often engage in unprotected sexual intercourse (Sheppard et al, 2002). A study in Kenya found an association between age and risky behaviour which was similar for both men and women, showing lower odds for older men and women compared to the young people (Akwara et al, 2003). In Ghana, the age pattern of self-perceived risk of HIV infection showed that men aged 20-24 years and women aged 30-34 years reported higher odds of high perception of risk and the researchers suggested that the reason for this was that these age groups could have been at the peak of their sexuality as compared to older age groups (Sheppard et al, 2002).

Marital status and sex influences perception of risk of HIV infection: whereas unmarried women have more ability to negotiate for safer sex, married women face added challenges for negotiating for protection as they fear being labeled disrespectful towards their husbands or being suspected of being promiscuous by their spouses which may lead to unwanted consequences such as separation or divorce. Usually, married women would settle for unprotected sex even when they know their spouses have extra-marital relationships thereby increasing actual of risk of HIV infection (Blanc et al, 1996, Maharaj et al., 2004). A national survey in Tanzania and demographic health surveys conducted in Ghana and Uganda revealed that about two-thirds of the married women in the studies perceived their greatest risk of HIV infection to be due to the infidelity of their spouses, whereas men's risk perception of HIV infection was based on their own risky behaviour (Sheppard et al, 2002). Within the marriage context, unless all members of a polygamous marriage are faithful, the practice of polygamy among some African tribes poses a highly potential risk factor for HIV transmission. Among many tribes that practice polygamy, it is believed that a man's wealth lies in the number of wives and children that he has. In this kind of union, women have very little control over sexuality of their husbands and are at risk of contracting the virus (Sheppard et al, 2003) as well as having a higher perception of risk.

Residence is assumed to be associated with level of perception of risk of HIV infection, though findings are conflicting. In Uganda and Kenya, residence in urban areas had associated increase in odds of high HIV risk perception for both men and women, while in Ghana there was no association between residence and risk perception (Akwara et al, 2003; Sheppard et al, 2002).

The studies in Uganda and Kenya showed that people who live in regions or residences with high HIV prevalences with associated morbidity and mortality tend to have higher risk perceptions of HIV infection as compared to people living in the regions with lower HIV prevalence (Akwara et al, 2003; Sheppard et al, 2002). Region of residence can determine level of access to education, information and health services related to HIV and AIDS. Therefore the urban-rural difference in perception of risk of HIV infection may be influenced by better access to education and media in urban areas and thereby result in a more accurate perception of risk of HIV infection (Sheppard et al, 2002).

Level of formal education has been suggested to play an important role in risk perception of HIV infection since education is likely to be associated with better knowledge and accurate perception of risk of infection (Sheppard et al, 2002). However, studies on the association between education level and perception of risk remain inconclusive. A study in Rio de Janeiro on perception of vulnerability to HIV in a cohort of homosexual and bisexual men found a positive association between higher levels of education and higher perception of risk of infection (Vieira de Souza et al, 1989). Similarly, in Ghana, a significant association was found more among women than among men. Perception of risk of HIV infection increased with education; those with no education reported the lowest perception of risk as compared to those who had attended formal schooling which included primary, secondary and tertiary levels and the association in the group with formal schooling grew stronger with increasing level of schooling. On the other hand, in Uganda, the reverse was true for men. As the level of education increased, the odds for risk perception decreased (Sheppard et al, 2002).

Socio-economic status measured as household wealth has been revealed to have an impact on self perceived risk of HIV infection and has been linked to gender and education level. Studies conducted in Kenya, Ghana and Uganda showed that although both men and women of middle or high socio-economic status showed lower perception of risk of HIV infection, a more substantial association was seen among women than among men (Akwara et al, 2003; Sheppard et al, 2002).

The level of mobility of individuals has been found to have an association with risky sexual behavior, risk of HIV infection and may be assumed to have an influence on perception of risk of HIV infection. A study in China found that high mobility was associated positively with high

risky sexual behavior and increased risk of STD or HIV infection (Xiaoming et al, 2004). A study in Uganda found that in the urban areas where unmarried men and married men whose wives lived far away in the rural areas engaged in commercial sex and had increased chances of HIV infection (Sheppard et al, 2002). Similarly, a study in Cambodia on HIV related risk behaviors and effects of mobility have shown that mobility increased the likelihood of casual sex which involved sex with both female sex workers and non commercial sex among men who traveled away from home for work for more than one month (Sopheab & Fylkesnes, 2006).

Religion could influence attitudes to HIV and perception of risk. A study in Kenya found that people who were religious usually considered HIV and AIDS to be a disease that affected those who had sinned against God. Therefore, the religious people perceived their risk of HIV infection to be low (Nzioka, 1996). Further, the denomination a person belongs to may also have an influence on how they perceive their risk of HIV infection. A study in Ghana and Uganda showed that men and women who belonged to the catholic faith had a higher perception of risk of infection as compared to people belonging to the protestant denominations. Collectively, people belonging to these groups of denominations had a higher perception of risk as compared to people who did not belong to any religion (Sheppard et al, 2002).

At cultural and ethnic level, perception of risk of HIV infection can be influenced through specific sexual beliefs, norms and practices. Ideas on gender help to shape an individual's identity and may therefore have a strong influence on a man's or woman's role in sexual decision making (Akwara et al 2003). Social norms for example may define a woman as good if she is passive in sexual encounters or ignorant of sex whereas a real man may be defined as one who is sexually experienced, possibly with several partners (Akwara et al, 2003). The weak economic position of women ensures that they remain in vulnerable positions in relationships with men, which would lead them to engaging in risky sex (Family Health International, 1999). Ethnicity may influence self perceived risk through cultural beliefs and practices (Akwara et al, 2003). For instance the practice of levirate marriage where a widow of a dead man re-married one of his brothers is still being practiced in some parts of Sub-Saharan Africa. In Kenya and Zambia among the Luo and Tonga tribes respectively, there is a belief in sexual cleansing of the widow after death of her husband where a widow has sexual intercourse with a male relative of the deceased to free her of her husband's ghost (Kenya et al, 1998; Malungo, 2001). The pressure to

comply with cultural beliefs and practices may override concerns about HIV infection and prevention and may have an influence on perception of risk among individuals practicing them.

Exposure to accurate levels of HIV and AIDS information through the media, health education and access to health services may lead to high levels of awareness which can in turn influence self perceived risk of HIV infection. It has been argued that people's perception of risk may depend on how much they believe in the accuracy of the information they receive (Stallings, 1990). A study in Ghana and Uganda showed that those who had heard of AIDS through a reliable source such as the media through radio or television had increased odds of a high HIV perception of risk. A report by UNAIDS suggests that general knowledge on HIV is no longer important in HIV prevention but accurate knowledge on how it is transmitted is important (UNAIDS, 2002). However, other studies have found that increased exposure to media, greater belief in the accuracy of the media as the source of information about HIV and AIDS, or knowledge of facts about transmission do not have an effect on people's perception of risk (Prohaska et al, 1990).

ARV treatment provision, as an HIV and AIDS control effort that has been implemented, has been very beneficial to many HIV positive people since their introduction. By suppressing the virus itself, this treatment can revive a person's immune system and they are able to live more healthy and productive lives for many years. However, it has been seen that ARV therapy may have an impact on sexual behavior and perception of risk of HIV infection. A previous study conducted in Uganda has shown that availability of ARV therapy tends to alter people's perception of risk of HIV infection as AIDS is viewed as a manageable disease and not a threat and people on the treatment tend to practice safe sex less frequently (Uganda AIDS commission, 2005).

The willingness or intention to use VCT services has been found to be associated with self perceived risk of HIV infection. The association may operate in a two-way direction. The demographic health survey conducted in 2001 – 2002 indicated that only 14% of adults have been for counseling services, been tested and know their serostatus (ZDHS, 2001; 2002). A previous study conducted in Zambia has shown that self perceived risk of HIV infection among young people and self rated health among older people were some of the main factors that

influenced people's acceptability of Voluntary Counseling and Testing (Fylkesnes & Siziya, 2004). Results of a study in Tanzania on prediction of intended use of VCT services among Tanzanian teachers using the theory of planned behavior identified perceived risk of HIV infection among other factors as a predictor of intention to use VCT services (Kakoko et al, 2006).

Self rated health has been documented to have a negative association with self perceived risk of HIV infection (Siziya & Fylkesnes, 2005). This association could operate in a two-way direction. 'Generally, the experience of illness or disease and deteriorating health has a strong impact on self rated health. Poor self rated health has been found to be an indicator for declining health status and also to tap on disease and illness experience directly related to HIV infection'. HIV infected individuals who have altered immune function are at increased risk for opportunistic infections. Most common opportunistic infections include bacterial pneumonia, toxoplasma encephalitis, tuberculosis, malaria and STI's such as genital herpes and cervical cancer (CDC, 1997). In a highly endemic country like Zambia, the experience of HIV related illnesses would have a direct association with poor self rated health and high perception of risk of HIV infection (Siziya & Fylkesnes, 2005). In addition, the excessive level of worry of HIV infection and fear of AIDS may have a strong positive association with high perception of risk of HIV infection (Prohaska et al, 1990). Most people's worries of HIV infection are irrational and these may in turn overestimate perception of risk.

Mental distress has been found to be positively associated with self perceived risk of HIV infection through the direct association with HIV infection. A previous study conducted in Zambia found that people who are mentally distressed seemed to have a high self perception of risk as compared to those who were not mentally distressed. Mental distress was also associated with self rated health among the older age groups (Chipimo, 2007).

The association between HIV status and perception of risk of HIV infection has not yet been fully explored. It can be assumed that individuals who are not aware of their HIV status may differ in their perception of risk depending on many factors including their sexual behavior, as an initiation of exposure and their perception of deteriorating health as indicated by self rated health and mental distress.

Risky sexual behavior has been observed to have a strong influence on self perceived risk of HIV infection and the association can operate in a two-way direction. Risky sexual behaviour would include early age of first sexual intercourse, having had many sexual partners in a lifetime, STI experiences or non-use of condoms (Akwara et al., 2003). For instance, unless first sexual intercourse is the beginning of a mutual relationship with one steady partner, early age at first sexual intercourse is associated with a long period of exposure to sexual activity, a higher chance of accumulating many sexual partners and increased chances of contracting STIs and HIV (Konings et al, 1994). A reciprocal association between perception of risk of HIV infection and risky sexual behavior is likely. It has been observed in a previous study that people who perceived their risk of HIV infection to be high were more likely to use condoms during sexual intercourse as compared to those who perceived their risk to be low (Montgomery et al, 1989). On the contrary, a study in Thailand has suggested that people with high perception of risk were less likely to use condoms during sexual intercourse (Havanon, 1992).

4.0 OBJECTIVES

The main aim of the study is to contribute towards improved HIV preventive efforts through the generation of knowledge on factors affecting self-perceived risk of HIV infection among adults.

Main objective

To identify and investigate levels of and factors that influence self-perceived risk of HIV infection among adults in populations of high HIV prevalence levels who are not aware of their HIV status.

Specific objectives

- To examine the level of self-perceived HIV risk and the socio-demographic distribution.
- To investigate the relationship between self perception of risk of HIV infection and health status indicators.
- To investigate the association between self perception of risk of HIV infection and risky sexual behavior.
- To investigate the relationship between self-perceived risk of HIV infection, worry of being HIV infected and their impact on intention and use of Voluntary HIV Counseling and Testing when offered to them as part of the survey.

5.0 STUDY DESIGN AND METHODOLOGY

Overview

The data used in the present study stem from a population-based HIV survey that was conducted in 2003. This survey is part of the Zambian national HIV epidemiological survey system comprising repeated HIV population-based surveys measuring HIV infection and risk factors concomitantly, repeated HIV surveys among antenatal clinic attendees (ANC-based data), and population-based surveys measuring changes in sexual behaviors' over time. The population-based survey in 2003 was a follow up of previous surveys and was mainly intended to generate knowledge on: i) HIV prevalence patterns and trends over time in different sub-population groups as part of the national monitoring and evaluation system related to HIV interventions; ii) the representativeness of ANC-based HIV trend data (being the main national system for HIV trend analysis); iii) the impact of HIV on adult mortality and fertility; iv) factors affecting self-perception of risk of HIV infection and help seeking.

Sampling

The survey in 2003 was conducted in two communities: a rural part of Kapiri Mposhi district which is located in the central province of Zambia and an urban community called Chelstone suburb located in Lusaka, the capital city of Zambia (Fylkesnes et al, 1998; Michelo et al, 2006). This was the third time the survey was conducted in the same geographic areas using an open cohort design. The first and second surveys were conducted in 1995 and 1999 respectively. The survey was based on stratified random cluster sampling using mapping systems established by

the Central Statistics office (C.S.O). The mapping system divides the country into Census Standard Areas (C.S.A) which are further divided into standard enumeration areas. Probability proportional to size (PPS) using number of households in each area as a measure of size was the sampling design used to select clusters. A total of 20 clusters (10 in the rural area and 10 in the urban area) were selected.

Interviews

Interviews using structured questionnaires were conducted with available and consenting eligible respondents aged 15 years and older. Information on matters pertaining to socio-demography (social and marital status), health, education, sexual behavior (number of sexual partners, risk behavior, use of condoms), knowledge, attitudes and perceptions regarding HIV/AIDS and VCT for both men and women were obtained. More details about the methods used have been published elsewhere (Michelo et al, 2006).

Laboratory investigations

Saliva samples were collected from consenting respondents from each site and sent to the national reference laboratory, the Virology Laboratory, based at the University Teaching Hospital in Lusaka, Zambia for HIV testing. The Bionor HIV 1 & 2 testing kit (BIONOR AS Skien, Norway) was the testing kit used for the HIV testing.

Sample population description

Sample population comprised of all adults (men and women) aged 15-49 years who answered the survey questionnaires, who had provided a saliva sample for which a valid HIV test result was available and who were not aware of their own HIV status for both the rural and urban areas. Information from 3833 respondents was analyzed in this study.

Measuring self perception of risk of HIV infection

Information on self perceived risk of HIV infection was based on the following questions:
In your situation, do you think you are at risk of getting (catching) HIV?
Would you say that: 1. you are at no risk 2. At moderate risk 3. At high risk 4. Very high risk

5.1 Ethical consideration

The study received ethical clearance from the Research Ethics Committee of the University of Zambia. Written consent was obtained from the participants. Participants in the survey were informed that the HIV testing was exclusively for research purposes and would be handled anonymously. Those who were interested to know their HIV results were offered counseling by VCT counselors and were tested after collection of a blood sample under the VCT national program. Participants in the study were informed of their right to refuse to participate and that the information provided would be kept confidential.

5.2 Operational definition of terms and concepts

Self-perception: In this context refers to an intuitive understanding and insight an individual may have about their own risk of HIV infection, which may be dependent on many factors.

Risk: In a simple context, means the possibility of suffering harm. In this context risk refers to the judgment made by an individual regarding their own chance (risk) of being HIV infected.

HIV: Refers to the Human immune-deficiency virus, the virus that leads to a condition called acquired immune-deficiency syndrome (AIDS). For the purpose of the study, HIV infection was determined by testing saliva samples collected from all consenting study participants.

Determinant: In this study refers to a factor that influences the nature of the outcome, which is self perception of risk of HIV infection (here measured as an association).

6.0 DATA ANALYSIS

Analysis of data was done using Statistical Package for Social Sciences, SPSS version 15 for windows for overall and trends analysis, while taking into account the cluster effect among the SEA in the regression analysis, with the use of the complex samples function.

Age was categorized into five groups with a lower limit of 15yrs and upper limit of 49yrs. Respondents who were above 49yrs were excluded as the group was too small and did not add much difference to the analysis. Marital status was categorized into three groups as single (those who were single and never married and the single but engaged), married (those who were married and those living as married) and those who were divorced, separated or widowed were put together in one group. However in the analysis for the young people aged 15-24 years, the divorced, separated or widowed group was excluded as it was too small and did not add much difference to the analysis. Residence was dichotomized as rural and urban. Education level was categorized into five groups: those who had never been to school or had at least attained lower primary school level (never/grade 1-4), upper primary school level (grade 5-7), junior secondary level (grade 8-9), senior secondary level (grade 10-12) and higher (more than 13yrs of school). Mobility was categorized into three groups: those who had never traveled (never), those who traveled seldom or sometimes (sometimes) and those who traveled often or very often (often).

Responses to self rated health were dichotomized into two groups as poor self rated health (combined as fair, poor and very poor) and good self rated health (combined as good and excellent). HIV status was categorized as negative and positive. Mental distress was measured based on a self reporting questionnaire with 10 questions (SRQ-10) and the responses were dichotomized into two groups: 'high score or above cut off point' for those scoring 4 and above on the SRQ-10 designated as probable cases and 'low score or below cut off point' for those scoring 0-3 designated as non-probable cases. Sexual behavior was assessed by number of sexual partners and self report of STI experience in the past year before the survey. Number of partners was dichotomized as having less than two partners (<2) and having two or more partners (≥2); and self report of STI was dichotomized as 'yes' (those who reported STD) or 'no' (those who did not report STD). Worry of being HIV infected was categorized into three groups: those who are never worried (never), seldom or sometimes worried (sometimes) and those who are always worried (always). The intention to seek VCT was dichotomized as 'yes' (those who intended to seek VCT) and 'no' (those did not intend to seek VCT). The use of VCT services was based on respondents who accepted the offer to be counseled and tested at home as part of the survey.

Application of regression models to self perceived risk of HIV infection analysis

Multiple linear regression analysis was used to examine the factors associated with self-perceived HIV risk. The conceptual framework presented earlier and illustrated in figure 1 guided the inclusion of the following variables in the model:

Variables used in regression models

Dependent variable	Independent variables	Codes (predictor)
Self perceived risk 1=no risk 2=moderate risk 3=high risk 4=very high risk	Age in years (age-groups)	15-19, 20-24, 25-29,30-39, 40-49
	Sex	1=male, 2=female
	Marital status (Dichotomous variable with single as reference)	1=single, 2=married, 3=divorced/separated/widowed
	Residence	1=rural, 2=urban
	Education level	1=never/grade 1-4, 2=grade 5-7, 3=grade 8-9 4=grade 10-12, 5=higher
	Mobility	1=never, 2=sometimes, 3=often (often & very often)
	Self rated health	1=poor (very poor/ poor/fair) 2=good (good/excellent)
	HIV status	1=positive, 0=negative
	Mental distress (Based on 10 questions: self reporting questionnaire, SRQ-10)	0=below cut-off point 1=above cut-off point (assumed to be a clinical case)
	Number of sexual partners in the past 12 months	1=less than 2 partners (<2) 2=more than or equal to 2 (≥2)
	Self-reported STI (Experience in the past 12 months)	1=yes (STD report) 2=no (no STD report)

The regression analyses were performed step-wise. Bivariate associations were presented first and then the associations were presented in the following three steps: 1) only socio-demographic characteristics included; 2) health status indicators added in addition to the variables in step 1; 3) sexual behaviour indicators in addition to the variables in step 2. Standardized regression coefficients were given together with the p-values. This means that the estimate was based on an analysis where variables had been standardized so that they had variances of 1 in order to be able to judge which of the independent variables had a greater effect on the dependent variable (when the variables are measured in different units of measurement). Standardized coefficients measure the change in the dependent variable for a change of one standard deviation in an independent variable. The ordinary un-standardized coefficients give the expected change in a dependent variable with a change of one unit in the independent variable.

Logistic regression analysis was also used in the analysis of the association between HIV status and self-perceived HIV risk with HIV as the dependent variable and self perception of risk handled as a categorical variable and adjusted for age (age-groups as categorical variable). Furthermore, logistic regression was also used in certain cases for illustrating alternative ways of measuring the associations, i.e. self-perception of risk handled as a dichotomous variable with a cut-off point either as high/very high versus no/some risk; or some/high risk versus no risk.

Interactions were identified between sex and marital status, education attainment, mobility and number of sexual partners. All analyses therefore were stratified by sex.

A separate analysis was performed using the bivariate correlations function to assess the associations between self-perceived HIV risk and the following variables: worry about being HIV infected measured as HIV worry, intention to seek VCT measured as VCT intention and the actual use of VCT services when offered according to the survey (VCT was offered to all who intended to do so). Pearson correlation coefficients (r) were given for each association in figure 5. Pearson correlation coefficients can range from -1 to +1 (+/- signs showing direction of association and the value e.g. 1 showing the strength of association).

7.0 RESULTS

Participation and distribution

A total of 6791 individuals were invited to participate in the population based survey conducted in 2003. Of these, 2705 were rural residents (1301 men, 1404 women) and 4086 were urban residents (1861 men, 2225 women). Non-participation was due to absence (19.8%), interview refusals (3.4%) or refusal to give saliva sample for HIV testing (6.6%). Absence was higher among males (25% rural and 28.3% urban respectively) than among women (11.8% rural and 14% urban respectively). A total of 4751 respondents aged 15-59 years participated in the survey. Further details about participation have been published elsewhere (Michelo et al, 2006).

General characteristics of the sample

Table 1 shows the general background characteristics of participants by residence. This group was comprised of 4466 respondents aged 15-49 years who answered the survey questionnaire and who had provided a saliva sample for which a valid test result was available. Of the total, 42% lived in rural areas while 58% lived in urban areas. The proportion of men was 43.8% and 40.2% in rural and urban areas respectively while that of women was 56.2% and 59.8% in rural and urban residence respectively. The proportion of the married differed substantially by residence, i.e. 65.4% in rural areas versus 32.7% in the urban population. The proportion of separated, divorced or widowed did not differ by residence. There was also a marked difference in education attainment by residence: the proportion of respondents who had attained senior secondary level (grade 10-12) and higher level was substantially higher in urban areas (63.9%) as compared to the rural areas (15.4%). There were minor differences in mobility levels by residence. The prevalence of HIV was 13.6% in rural and 18.0% in urban areas and only 13.6% of respondents reported to know their HIV status.

Self perception of risk and associated factors

Table 2 shows the distribution of self-perceived HIV risk and the association with HIV prevalence. About 50% of the respondents reported not to be at risk of being HIV infected while 17% reported to be at high or very high risk. Perception levels did not differ by residence and sex. There was a general tendency that HIV infected persons were more likely to perceive themselves at high risk of HIV infection. The likelihood of being HIV infected for rural participants was 1.8 times higher [95% CI 1.17 - 2.63] among those who perceived themselves at high/very high risk compared to those who perceived themselves at no risk. In the urban populations, this association was somewhat less strong

and not statistically significant [AOR=1.3, 95%CI 0.97 – 1.78]. The overall positive predictive value of any risk versus no risk was 20% i.e. 20% of those who perceived themselves at risk were actually infected. In comparison, the negative predictive value of no risk versus any risk was 88%, i.e. meaning 88% of those who perceived themselves at no risk were not infected.

Figure 2 shows the proportion of respondents perceiving themselves at high risk of HIV infection by age and sex. The relationship is consistent by sex, showing the proportion with high self- perceived HIV risk to increase with age among the younger respondents below 30 years and a drop among those aged 30 years and older. Younger men appeared to judge their HIV risk somewhat higher than the younger women, and this is in sharp contrast to the age-sex distribution of HIV prevalence illustrated in figure 3 showing young women to be 4 times more likely to be infected than young men.

Tables 3 and 4 show the linear regression analysis of self perceived risk stratified by sex. Self perception of risk did not vary by residence except for urban men after adjusting for confounders in the model. There were striking gender differences in the association between the other socio-demographic variables in the model. Being married was negatively associated with self perceived HIV risk among men compared to the single men. On the contrary, women were substantially more likely to perceive their risk of being HIV infected higher when married compared to the single women. Furthermore, the negative association among men was strengthened when other variables in the model were added as compared to the single, while that of the women was reduced. Secondly, the association between level of education and self perception of risk was positive and significant among men only. Thirdly, traveling often away from home for long periods was positively associated with higher perception of risk among men whereas for women, the association was not significant.

All indicators of health status were associated with self perceived risk. Among these, HIV status appeared with the weakest association and the statistical significance disappeared when the socio-demographic and other variables were included in the model. Both the other two health status indicators were associated with risk perception and among these, mental distress appeared as clearly the strongest. The bivariate standardized regression coefficient for mental distress was 0.161 and the un-standardized regression coefficient of 0.40, i.e. the group with mental distress scored 0.4 units (a total of 4 units) higher risk perception than the group with no mental distress. The alternative way of measuring the same association was by performing a logistic regression using high/very high risk versus no/some risk as the dependent variable, as an example it showed mentally distressed women

with a 2.5 times higher likelihood of rating their risk as high/very high compared to those who were not mentally distressed.

The association between sexual behavior indicators and self perception of risk differed by gender. A significant association was seen among men who have two or more partners as compared to those with less than two partners, whereas among women this association was weak and not significant. However having experienced STI symptoms was significantly associated with perceived risk among both men and women.

Tables 5 and 6 show the analysis repeated among the young people aged 15-24 years stratified by sex. Here age was included as single years. When compared with the findings in tables 4 and 5, mostly a similar pattern of associations was revealed. There was a marked difference between young men and women in the association between HIV status and risk perception, however revealing a much stronger association among women than men (see figure 3 as an illustration of this same phenomenon). Furthermore, a weak association was seen among young married women whereas among young men the association was not significant. However, self perception of risk increased with increased level of mobility among both young men and women.

The explained variance (R^2) was generally low (less that 10%) in all performed analyses. But it tended to be somewhat higher among men than women.

Relationship between self perceived HIV risk, HIV worry and intention to seek VCT

Figures 4 and 5 shows separate analyses of the relationship between self perceived high risk of HIV infection with worry of HIV infection and the intention to seek VCT. There was a strong association between self-perceived HIV risk and worry about actually being infected (Pearson correlation coefficient was 0.36), suggesting a possibility of a strong effect of perceived risk on worries. This is also illustrated in figure 4. Furthermore, self perception of risk had an influence on the intention to seek VCT with a Pearson correlation coefficient of 0.14. Finally, there was a very high association between VCT intention and actual use of VCT offered in the survey with a Pearson bivariate coefficient of 0.79 (figure 5).

8.0 DISCUSSION

Self-perceived risk of HIV infection was investigated in a representative sample of men and women aged 15 – 49 years in selected rural and urban populations in Zambia. The prevalence of HIV was 13.6% and 18.0% in rural and urban areas respectively (Michelo et al, 2006). The majority of the respondents (86.4%) were not aware of their own HIV status, on which the analysis was based; the design here was to limit the analysis to those who were not aware of their status since awareness of own status would have affected risk perception differently in those testing positive versus negative. Fifty percent (50%) of the respondents perceived themselves to be at risk of HIV infection to some extent and 17% to be at high or very high risk. The strong association between perception of risk, mental distress and worry about actually being infected indicates risk perception to be a big burden for a high proportion of the population in this high prevalence setting. In addition, many misconceptions about risk of HIV transmission still exist in the community. It was reported in a previous sexual behaviour survey that despite almost all people knowing that HIV & AIDS exists (99% men and 98% women), 8.8% of the adults were not aware that it could be avoided, a quarter think they can get infected by a mosquito bite, 22% think they can be infected through witchcraft and 18% believe that sharing a meal with a person who is infected could lead to infection (ZSBS, 2005). These misconceptions could be contributing to the high proportion of people perceiving themselves at risk of HIV infection.

The association between HIV status and perception of risk was relatively low, however with a positive predictive value of 20% i.e. only 20% of those who perceived themselves at any risk were actually HIV infected. It is not surprising to have this discrepancy between perception of risk and actual infection since infectiousness of HIV is very low, i.e. about <0.001 per risk exposure. The level of self-perceived HIV risk did not differ by gender and residence, but there were some clear gender differences with regards to the determinants of risk perception. First, married women appeared to have a higher perception of risk compared to single women while the inverse association was revealed for married men. Secondly, mobility and number of sexual partners in the past year seemed to affect self-perception of HIV risk among men only. Thirdly, educational attainment, used as an indicator of socio-economic position, was positively associated with self-perception of risk among men only. In contrast to the weak effect of HIV status, the two other health status indicators appeared to be more strongly associated with self-perception of risk, particularly mental distress. Having experienced an STI affected perception of

HIV risk for both men and women. Finally, HIV worry and intention to seek VCT were highly associated with self-perceived HIV risk.

Age appeared to be positively associated with self-perceived HIV risk among the younger people aged 15 – 25 years and dropped after the age of 30 years. These findings were consistent with findings from previous studies (Sheppard et al, 2002) suggesting that the age-sex pattern of self perceived risk of HIV infection may be due to the fact that risk assessment increases with age as exposure to risk increases and young people may be at the peak of their sexual activity whereas the older generations may not perceive themselves at high risk due to avoidance strategies and reduced sexual activities. The age-specific pattern of risk perception was also similar to the age-sex pattern of HIV infection. However, there was a sharp gender difference in this regard. Younger men perceived their risk much higher than women, contrasting the age-sex distribution of HIV prevalence where young women are found to be 4 times more likely to be infected than young men. This phenomenon was also picked by the very low association between HIV status and self- perceived HIV risk among young men in particular. This difference might partly be explained by gender differences in sexual linkages, e.g. women have sex with men at a higher age and the higher prevalence, the higher the efficiency of infection per exposure for women compared to men (Michelo et al, 2006; Sandoy et al, 2007).

Regarding marital status, the findings in this study confirm findings of previous studies (Sheppard et al, 2002). It would appear that married women may feel high vulnerability to HIV infection due to the fact that they may be in subordinate positions in marriages and are unable to refuse sex or negotiate for safe sex even when they suspect their spouses of having extra-marital affairs as it brings about issues of suspicion of infidelity within the relationship. On the other hand married men's perception may be lower due to the fact that they may feel protected in marriage as it is not usual for a married woman to have extra-marital affairs in the Zambian traditional context, which is quite strict on women. Men's perceptions therefore generally may be due to their own behavior than that of their spouses. This is in agreement with the well documented imbalance in status and power between men and women in the populations studied. There is need for the empowerment of women, so that they can have negotiating skills for safe sex.

In this investigation, educational attainment was used to capture the socio-economic status differences. Previous studies have shown level of education to be associated with perception of risk of HIV infection (Sheppard et al, 2002). Education may play an important role in risk assessment as increased education may affect the level of information and accuracy of risk perceptions. Several studies from Zambia have shown a very positive effect of educational attainment on reduction over time of risk behaviors and transmission (Michelo et al, 2006; Sandoy et al, 2007). In the early stages of HIV epidemic, HIV infection was highest among the highest educated groups, but this association was reversed during the 1990s due to the sharp reduction in risk taking among the higher educated groups whereas limited changes among groups with low education. Perception of risk increased with education in men, but the difference was not significant among women. This study also revealed very strong inequities in the distribution of education by gender and residence. Improved access to education to improve educational attainment of a population should be considered on the basis of these findings and also due to impact of education on reduction of risk behaviour among the higher educated groups.

Self rated health, mental distress and HIV status measured as health status indicators were all associated with self perceived risk of HIV infection. Previous studies have shown that poor self rated health and mental distress were associated with perception of risk linked to HIV infection (Fylkesnes & Siziya, 2005; Chipimo, 2007). As compared to HIV status, mental distress and poor self rated health appeared to have a much stronger effect. A possible interpretation of this is that poor self rated health and mental distress were capturing the effect of HIV either directly as biological, or indirectly as psychological, through the general deterioration of health (self rated health) or mental distress, and thereby weakening the effect of HIV status which could have been operating through the two variables. The effect of HIV status was also reduced by the addition of risky sexual behavior indicators. These findings need to be followed up by further studies to try and sort out what could be the more biological versus other effects of HIV infection on self-perceived HIV risk.

The positive association between self-perceived HIV risk and risky sexual behavior measured as either having two or more sexual partners or an STI self report was consistent with findings from previous studies (Akwara et al, 2003). Since this was a cross sectional study, it is difficult to say whether perception of risk was based on previous sexual behavior or whether sexual behavior

was based on perception of risk. The association between having many sexual partners and risk perception was significant among men only however, showing an important effect of having many sexual partners among men. On the other hand, previous studies (Sheppard et al, 2002; Sandoy et al, 2007) have shown that women usually are less likely to report risky behavior, when infact they are engaged in risky behavior, thereby providing a possible interpretation as to why the association of having many sexual partners and self perception of risk was not significant among women.

Mobility has in previous studies been found to be highly associated with risky sexual behaviour among men (Sheppard et al, 2002; Sopheab & Fylkesnes, 2006). In this investigation, self perception of risk among men appeared to be highly influenced by mobility, thereby supporting the earlier findings, suggesting that men usually travel more often away from home for long periods of time than women due to the kind of positions that they have, a situation highly risky in engaging in risky sexual behaviour which would include casual sex with commercial sex workers or non-commercial sex workers. This would therefore give a possible explanation as to why men who travel a lot away from home have a higher perception of risk.

This study further investigated the impact of self perceived risk on health behaviour decisions by linking the association with worry of being HIV infected and intention to seek VCT. Self perception of risk was strongly positively associated with both worry of HIV infection and intention or readiness to seek VCT thereby supporting findings from previous studies (Prohaska et al, 1990; Fylkesnes & Siziya, 2004; Kakoko et al, 2006). Self perception of risk can therefore be assumed to lead to the readiness to seek VCT decision, which coupled with risk-reduction behavior, would lead to the actual use of the VCT service as seen by the high positive correlation. These findings also seem to correspond with health behaviour models such as the health belief model and the theory of planned behavior which are used to study health behaviour and the uptake of health services. However, the actual use of the VCT service is a challenge: Previous studies have shown that whereas willingness to seek VCT among populations is high, the actual uptake of the service is low due to many barriers (Fylkesnes et al, 1999). In addition, the kind of VCT service being provided may play an important role in uptake. Previous findings based on a population based survey conducted in 1995 in Zambia have shown that when the people who stated willingness to be tested were randomized to two groups i.e. one group offered counseling

and delivery of results at home and the other group given vouchers for the local VCT clinic, 55% of the first group had accepted testing and received the results whereas only 12% of the second group had done the test, indicating that there are strong barriers to VCT offered at clinic as compared to home (Fylkesnes & Siziya, 2004). This therefore may also point to the fact that health behavior decision making is a complex issue which is influenced by many factors. The review of the VCT service, its quality of service and barriers, so as to make it more inviting and acceptable for the people, both the young and the older, could be the starting point to these challenges. It can be assumed that an increased uptake of VCT would contribute to the HIV prevention and control efforts in that more people would know their HIV status and would make informed choices of their future, as a result of knowing and counseling effects combined. Further research needs to be directed on the effect of VCT on risk behaviour and subsequent life events as no studies have explored this in Zambia.

Non-participation may have been one of the possible sources of bias in the prevalence estimates and associations in this investigation. In the survey, refusal to participate was low as compared to the non-participation due to absence which was relatively high among men. The 2003 population based survey was a follow-up of two surveys that were conducted in the same geographic areas in 1995 and 1999 respectively. Previous publications that have investigated HIV prevalence trends using data from these repeated surveys have reported marked HIV declines since 1995, and the authors did not find any substantial bias due to non-response. In this investigation, the extent to which non-response may have biased measurement of self perceived risk of HIV infection and the associations is of concern. Non-response due to absence may have limited the influence depending on whether the non-responders perceived themselves at risk or not at risk. Under-reporting may have been another source of bias among the women especially with regard to sexual behavior. Previous studies have reported that women usually are reluctant to admit their sexual experiences or that they are sexually active when they actually are. This therefore might have under-estimated the association of sexual behaviour indicators with self perceived risk. However, the opportunities were limited to assess the direction and magnitude of these types of biases.

This was a cross-sectional design which could only assess associations. However the associations revealed in cross-sectional data have very often provided reliable indications of actual effects, i.e.

in agreement with longitudinal studies. Perceptions are likely to change over time with changes in people's exposure to HIV & AIDS information and related situations. A more optimal design would have been a cohort design to observe a group of people and measure self perceived risk of HIV infection over a period of time and eventually assess its impact on behavioral change. Furthermore, the findings in this study need to be followed up by further study on self perceived risk of HIV infection in the era of anti-retroviral therapy since such treatment practically was not available in these populations in 2003.

9.0 CONCLUSION

About 50% of the respondents perceived themselves at risk of HIV infection, whereas the HIV prevalence in the study population was 16.1%. The association between HIV status and perception of risk was relatively low with a positive predictive value of 20% i.e. only 20% of those who perceived themselves at any risk were actually HIV infected. However, these discrepancies in perception of risk and actual risk are not surprising due to the fact that infectiousness of HIV is very low: the probability of being infected by HIV per risk exposure is < 0.001. Perceiving oneself at risk of HIV infection was strongly associated with worry of being HIV infected, mental distress and the actual use of the HIV testing services offered to them as part of the survey, indicating that HIV is a big burden in this high HIV prevalence setting and perception of risk is important in health decision making. Perception of risk was also associated with deteriorating health and past risky sexual behaviour. Strong gender differences exist in the population. There is need for the empowerment of women, so that they can have negotiating skills for safe sex. Improvement of education, especially access to basic education is very important for both men and women as it provides well-informed knowledge, confers skills necessary for assimilating health promotion information on HIV & AIDS which in turn is linked to risk reduction and having accurate and correct perception of risk of HIV infection. Self perception of risk is a complex process where individuals are to handle conflicting information. There is therefore a need for qualitative study approaches, in order to have a deeper understanding of self perception of risk in different sub-groups of people and how it leads to risk-reduction strategies.

10.0 RECOMMENDATIONS OF THE STUDY

- More interventions are needed to reduce misconceptions of risk in the population.
- Further investigations are needed to develop a better understanding of how people perceive their risk of HIV infection, using qualitative approaches. This may lead to a deeper understanding of how people of different sub-groups define risk in relation to HIV infection and how risk perceptions lead to risk-aversion strategies.
- There is need for strengthening of the VCT service, to make it more acceptable to the people and encourage more people to get tested and to know their own status. This survey offered home-based VCT resulting in a very high acceptability.
- Further research is required on self perception of HIV risk and impact of anti-retroviral therapy provision.
- This study has indicated the importance of basic education for all which could lead to accurate perceptions of risk and effect on risk reduction strategies.
- The gender differences observed in this investigation suggest:
    - The need to empower women socially and economically and consequently achieve equal status by utilizing gender sensitive interventions.
    - The need to focus resources and intervention strategies towards women to increase their safe sex negotiation.
    - The need for men to be involved more in the intervention strategies as their behaviors are putting their partners at risk.

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Table 1: Proportion of participants by background characteristics and residence

	RURAL		URBAN		TOTAL	
Characteristic	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
Age						
15-19	369	19.7	745	28.8	1114	24.9
20-24	396	21.1	718	27.7	1114	24.9
25-29	334	17.8	446	17.2	780	17.5
30-39	491	26.2	454	17.5	945	21.2
40-49	287	15.3	226	8.7	513	11.5
Sex						
Male	822	43.8	1042	40.2	1864	41.7
Female	1055	56.2	1547	59.8	2602	58.3
Marital status						
Single	505	27.0	1564	60.6	2069	46.5
Married	1221	65.4	844	32.7	2065	46.4
Divorced/widowed/ separated	142	7.6	171	6.6	313	7.0
Education level						
Never/grade 1-4	523	28.0	93	3.6	616	13.8
Grade 5-7	755	40.4	362	14.0	1117	25.1
Grade 8-9	305	16.3	478	18.5	783	17.6
Grade 10-12	183	9.8	1014	39.3	1197	26.9
Higher	105	5.6	636	24.6	741	16.6
Mobility						
Never	908	48.6	1281	49.7	2189	49.2
Sometimes	757	40.5	927	36.0	1684	37.9
Often	205	11.0	370	14.4	575	12.9
HIV status						
negative	1621	86.4	2122	82.0	3743	83.9
positive	256	13.6	467	18.0	723	16.1
Knowledge of own HIV status						
Know own status	155	8.3	448	17.4	603	13.6
Do not know status	1706	91.7	2127	82.6	3833	86.4

Table 2: The association between HIV prevalence (%) and self-perceived risk of HIV infection

	RURAL			URBAN		
	N	**HIV+ve %**	**AOR (95% CI)**	**N**	**HIV+ve%**	**AOR (95% CI)**
Risk 1 no	840	9.3	1	1063	14.5	1
2 low	549	16.9	1.7 [1.11 – 2.53]	716	22.5	1.2 [0.93 – 1.53]
3 high	317	17.0	1.8 [1.17 – 2.63]	348	20.7	1.3 [0.97 – 1.78]

*High risk: proportion rating their risk as high or very high
*Adjusted odds ratios (AOR): Adjusted for age using 5 age-groups

Table 3: Factors associated with self perceived risk of HIV infection among men (15-49yrs)

	N	%	Univariate beta	Univariate pvalue	Step 1 Beta	Step 1 pvalue	Step 2 beta	Step 2 pvalue	Step 3 beta	Step 3 pvalue
Socio-demographic factors										
Age										
15-19	440	26.9	0		0		0		0	
20-24	406	24.9	0.156	0.000	0.150	0.000	0.128	0.000	0.135	0.000
25-29	255	15.6	0.131	0.001	0.158	0.001	0.141	0.002	0.141	0.017
30-39	359	22.0	0.106	0.000	0.146	0.000	0.120	0.000	0.142	0.001
40-49	173	10.6	0.053	0.091	0.083	0.072	0.055	0.206	0.078	0.108
Marital status										
Single	938	57.7	0		0		0		0	
Married	634	39.0	-0.007	0.796	-0.090	0.026	-0.102	0.007	-0.152	0.001
Divorced/separated/widowed	54	3.3	0.049	0.034	0.021	0.428	0.002	0.948	-0.021	0.494
Residence										
Rural	742	45.4	0		0		0		0	
Urban	891	54.6	-0.008	0.760	-0.049	0.094	-0.058	0.047	-0.061	0.040
Education attainment										
Never/grade 1-4	179	11.0	0		0		0		0	
Grade 5-7	370	22.7	0.060	0.172	0.059	0.197	0.057	0.234	0.041	0.406
Grade 8-9	300	18.4	0.044	0.231	0.065	0.104	0.059	0.121	0.057	0.138
Grade 10-12	495	30.3	0.086	0.019	0.106	0.016	0.119	0.007	0.095	0.037
Higher	288	17.6	0.100	0.026	0.074	0.124	0.095	0.047	0.082	0.142
Mobility										
Never	740	45.4	0		0		0		0	
Sometimes	627	38.4	0.040	0.161	0.020	0.479	0.024	0.385	0.021	0.522
Often	264	16.2	0.131	0.001	0.109	0.003	0.093	0.009	0.070	0.075
Health status indicators										
Self rated health										
Good	1360	83.7	0				0		0	
Poor	265	16.3	0.121	0.000			0.076	0.005	0.074	0.027
HIV status										
Negative	1433	87.8	0				0		0	
positive	200	12.2	0.078	0.000			0.052	0.016	0.036	0.069
Mental distress										
Low score	1451	89.0	0				0		0	
High score	179	11.0	0.157	0.000			0.128	0.001	0.127	0.002
sexual behavior indicators										
1. number of sexual partners										
<2 partners	961	74.6	0						0	
≥2 partners	327	25.4	0.149	0.000					0.117	0.001
2. STI self report										
No	1584	97.1	0						0	
Yes	47	2.9	0.134	0.000					0.087	0.006
R^2					0.042		0.071		0.096	

Variables in the model

Step 1: socio-demographic factors
Step 2: health status indicators
Step 3: sexual behaviour indicators
Results are standardized regression coefficients and explained variances (R^2) from a multiple linear regression analysis

Table 4: Factors associated with self perceived risk of HIV infection among women (15-49yrs)

	N	%	Univariate beta	Univariate pvalue	Step 1 Beta	Step 1 pvalue	Step 2 beta	Step 2 pvalue	Step 3 beta	Step 3 pvalue
Socio-demographic factors										
Age										
15-19	611	27.8	0		0		0		0	
20-24	528	24.0	0.118	0.001	0.098	0.006	0.085	0.012	0.069	0.142
25-29	363	16.5	0.178	0.000	0.141	0.000	0.112	0.001	0.099	0.029
30-39	435	19.8	0.146	0.000	0.099	0.005	0.077	0.021	0.063	0.222
40-49	263	12.0	0.100	0.001	0.061	0.035	0.041	0.163	0.031	0.508
Marital status										
Single	884	40.2	0		0		0		0	
Married	1099	50.0	0.138	0.000	0.086	0.008	0.087	0.008	0.031	0.290
Divorced/separated/widowed	215	9.8	0.078	0.035	0.035	0.306	0.019	0.620	-0.006	0.897
Residence										
Rural	964	43.8	0		0		0		0	
Urban	1236	56.2	-0.016	0.586	0.014	0.523	-0.001	0.974	0.023	0.410
Education attainment										
Never/grade 1-4	385	17.5	0		0		0		0	
Grade 5-7	637	29.0	0.014	0.651	0.016	0.613	0.023	0.500	0.023	0.489
Grade 8-9	404	18.4	0.036	0.240	0.052	0.050	0.063	0.019	0.065	0.006
Grade 10-12	523	23.8	-0.009	0.789	0.029	0.277	0.037	0.138	0.030	0.265
Higher	249	11.3	0.019	0.513	0.002	0.920	0.024	0.255	0.004	0.858
Mobility										
Never	1174	53.5	0		0		0		0	
Sometimes	822	37.5	0.041	0.046	0.038	0.054	0.031	0.182	0.015	0.481
Often	198	9.0	0.030	0.201	0.029	0.225	0.019	0.440	0.013	0.675
Health status indicators										
Self rated health										
Good	1783	81.3	0				0		0	
Poor	409	18.7	0.098	0.000			0.050	0.022	0.051	0.031
HIV status										
Negative	1788	81.3	0				0		0	
positive	412	18.7	0.085	0.000			0.040	0.062	0.021	0.394
Mental distress										
Low score	1871	85.9	0				0		0	
High score	308	14.1	0.161	0.000			0.143	0.000	0.149	0.000
Sexual behavior indicators										
1. number of sexual partners										
<2 partners	1610	94.9	0						0	
≥2 partners	87	5.1	0.024	0.327					0.006	0.817
2. STI self report										
No	2161	98.3	0						0	
Yes	37	1.7	0.089	0.002					0.063	0.093
R^2					0.027		0.062		0.049	

Variables in the model

Step 1: socio-demographic factors
Step 2: health status indicators
Step 3: sexual behavior indicators
Results are standardized regression coefficients and explained variances (R^2) from a multiple linear regression analysis

Table 5: Factors associated with self perceived risk of HIV infection among young men (15-24yrs)

	N	%	Univariate beta	Univariate pvalue	Step 1 Beta	Step 1 pvalue	Step 2 beta	Step 2 pvalue	Step 3 beta	Step 3 pvalue
Socio-demographic factors										
Marital status										
Single	744	92.0	0		0		0		0	
Married	64	7.6	0.033	0.268	-0.006	0.878	-0.023	0.544	-0.066	0.145
Residence										
Rural	291	34.4	0		0		0		0	
Urban	555	65.6	0.024	0.462	-0.007	0.861	-0.017	0.671	-0.038	0.456
Education attainment										
Never/grade 1-4	75	8.9	0		0		0		0	
Grade 5-7	163	19.3	0.094	0.089	0.103	0.087	0.104	0.086	0.088	0.183
Grade 8-9	170	20.1	-0.015	0.718	0.014	0.727	0.011	0.783	-0.023	0.641
Grade 10-12	364	43.1	0.157	0.001	0.151	0.006	0.160	0.006	0.154	0.022
Higher	73	8.6	0.156	0.000	0.099	0.036	0.104	0.024	0.078	0.157
Mobility										
Never	414	49.0	0		0		0		0	
Sometimes	321	38.0	0.030	0.447	-0.006	0.872	0.006	0.892	0.018	0.755
Often	110	13.0	0.139	0.003	0.083	0.079	0.077	0.101	0.054	0.292
Health status indicators										
Self rated health										
Good	733	87.1	0				0		0	
Poor	109	12.9	0.129	0.001			0.083	0.016	0.095	0.104
HIV status										
Negative	818	96.7	0				0		0	
positive	28	3.3	0.047	0.122			0.036	0.203	0.029	0.578
Mental distress										
Low score	770	91.1	0				0		0	
High score	75	8.9	0.133	0.003			0.102	0.015	0.124	0.006
Sexual behavior indicators										
1. number of sexual partners										
<2 partners	371	71.5	0						0	
≥2 partners	148	28.5	0.074	0.011					0.043	0.209
2. STI self report										
No	824	97.5	0						0	
Yes	21	2.5	0.142	0.000					0.104	0.004
R^2					0.067		0.087		0.100	

Variables in the model

Step 1: socio-demographic factors
Step 2: health status indicators
Step 3: sexual behavior indicators
***All steps 1-3 are adjusted for age in single years**
Results are standardized regression coefficients and explained variances (R^2) from a multiple linear regression analysis

Table 6: Factors associated with self perceived risk of HIV infection among young women (15-24yrs)

	N	%	Univariate beta	Univariate pvalue	Step 1 Beta	Step 1 pvalue	Step 2 beta	Step 2 pvalue	Step 3 beta	Step 3 pvalue
Socio-demographic factors										
Marital status										
Single	790	69.4	0		0		0		0	
Married	315	27.7	0.099	0.009	0.062	0.042	0.058	0.048	-0.014	0.946
Residence										
Rural	433	38.0	0		0		0		0	
Urban	706	62.0	-0.015	0.653	0.019	0.429	-0.001	0.867	0.046	0.233
Education attainment										
Never/grade 1-4	176	15.5	0		0		0		0	
Grade 5-7	298	26.2	0.074	0.124	0.084	0.102	0.082	0.125	0.095	0.171
Grade 8-9	218	19.2	0.058	0.267	0.077	0.084	0.083	0.081	0.076	0.133
Grade 10-12	356	31.3	0.015	0.758	0.020	0.598	0.031	0.377	-0.030	0.730
Higher	90	7.9	0.074	0.026	0.040	0.289	0.053	0.096	0.020	0.695
Mobility										
Never	634	55.8	0		0		0		0	
Sometimes	402	35.4	0.040	0.195	0.037	0.232	0.025	0.444	-0.002	0.965
Often	101	8.9	0.065	0.038	0.064	0.055	0.059	0.071	0.062	0.245
Health status indicators										
Self rated health										
Good	980	86.3	0				0		0	
Poor	155	13.7	0.096	0.005			0.072	0.045	0.076	0.126
HIV status										
Negative	1026	90.1	0				0		0	
positive	113	9.9	0.099	0.002			0.074	0.003	0.086	0.037
Mental distress										
Low score	990	87.8	0				0		0	
High score	138	12.2	0.111	0.011			0.096	0.010	0.087	0.052
Sexual behavior indicators										
1. number of sexual partners										
<2 partners	625	93.3	0						0	
≥2 partners	45	6.7	0.033	0.179					0.011	0.936
2. STI self report										
No	1120	98.4	0						0	
Yes	18	1.6	0.089	0.006					0.071	0.123
R^2					0.035		0.057		0.059	

Variables in the model

Step 1: socio-demographic factors
Step 2: health status indicators
Step 3: sexual behavior indicators
***All steps 1-3 are adjusted for age in single years**
Results are standardized regression coefficients and explained variances (R^2) from a multiple linear regression analysis

13.0 LIST OF FIGURES

Figure 1 Conceptual framework

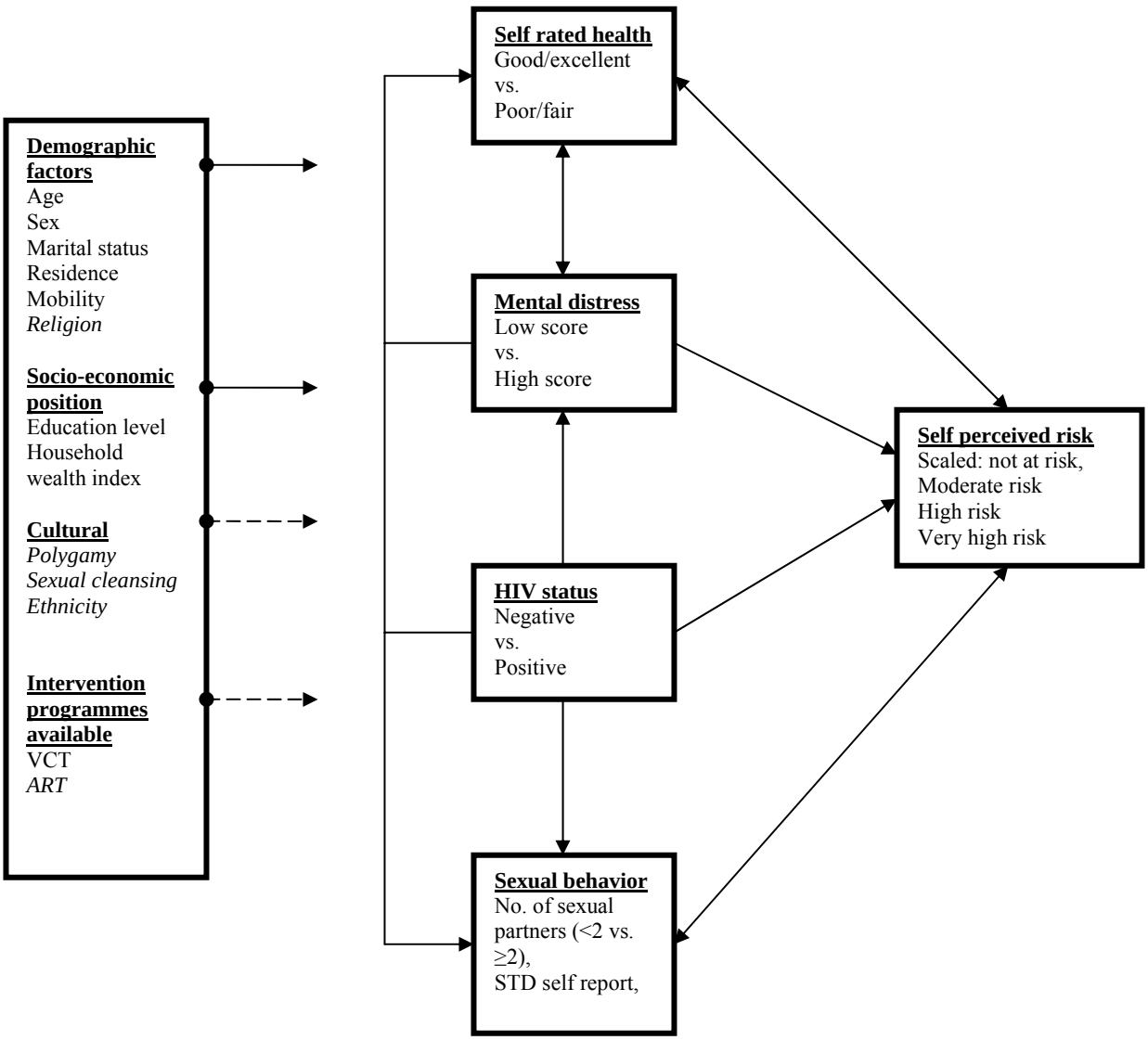
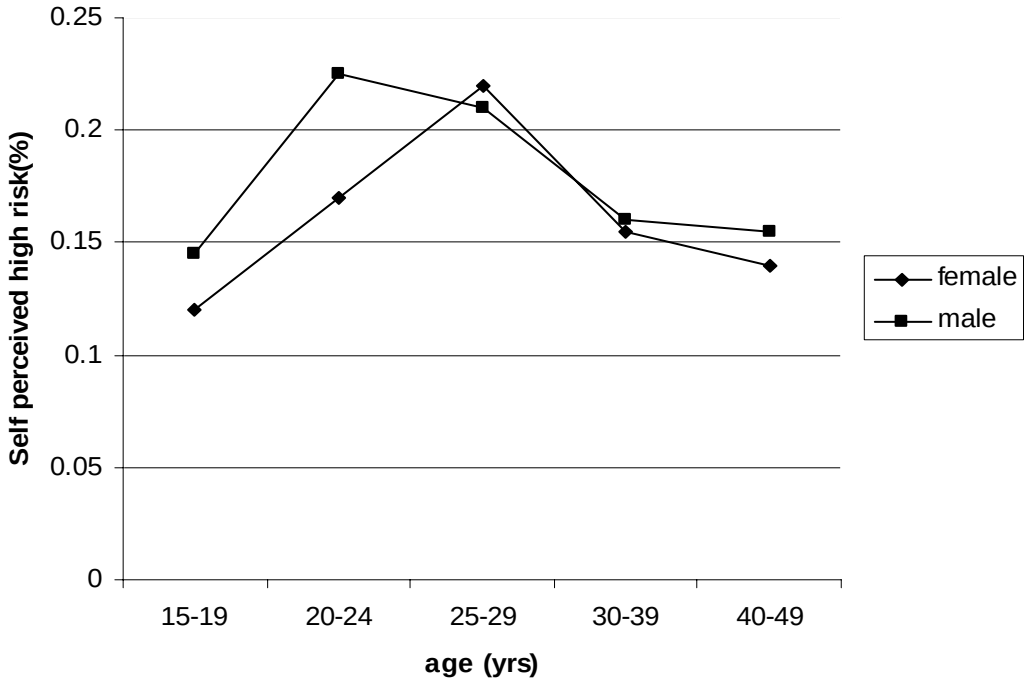


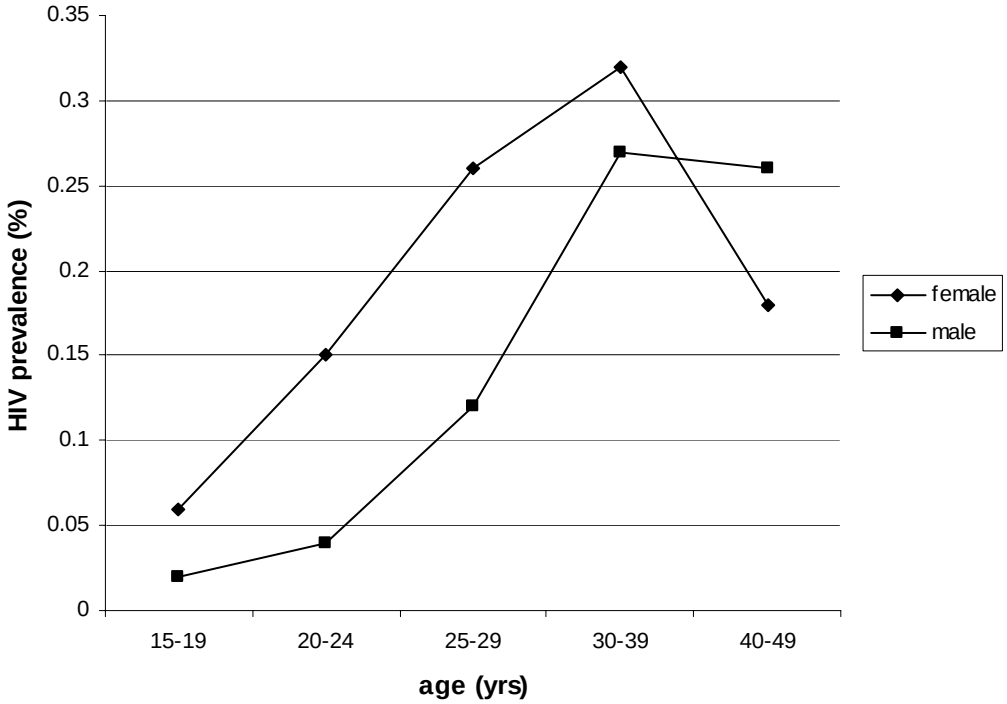
Fig. 1. Conceptual framework for the study on Determinants of self perceived risk of HIV infection among adults in Zambia. The solid lines represent associations that are examined in this study; the factors in italics and the dotted lines represent possible associations, but not examined in this study.

Figure 2 Age and sex distribution of high self perceived risk of HIV infection



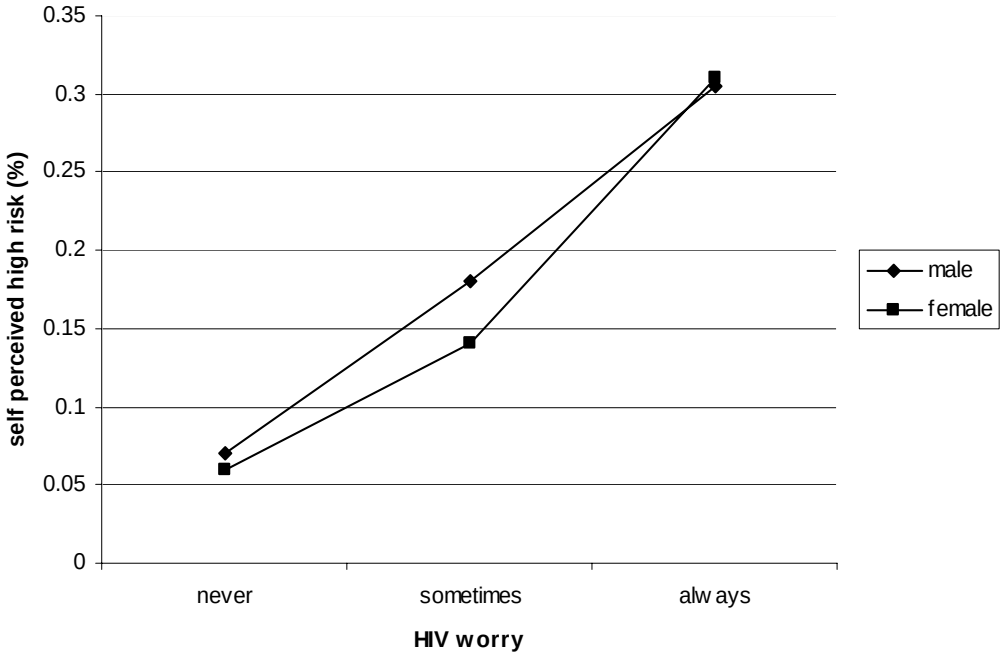
* High risk: proportion rating their risk as high or very high

Figure 3 Age and sex specific HIV prevalence pattern



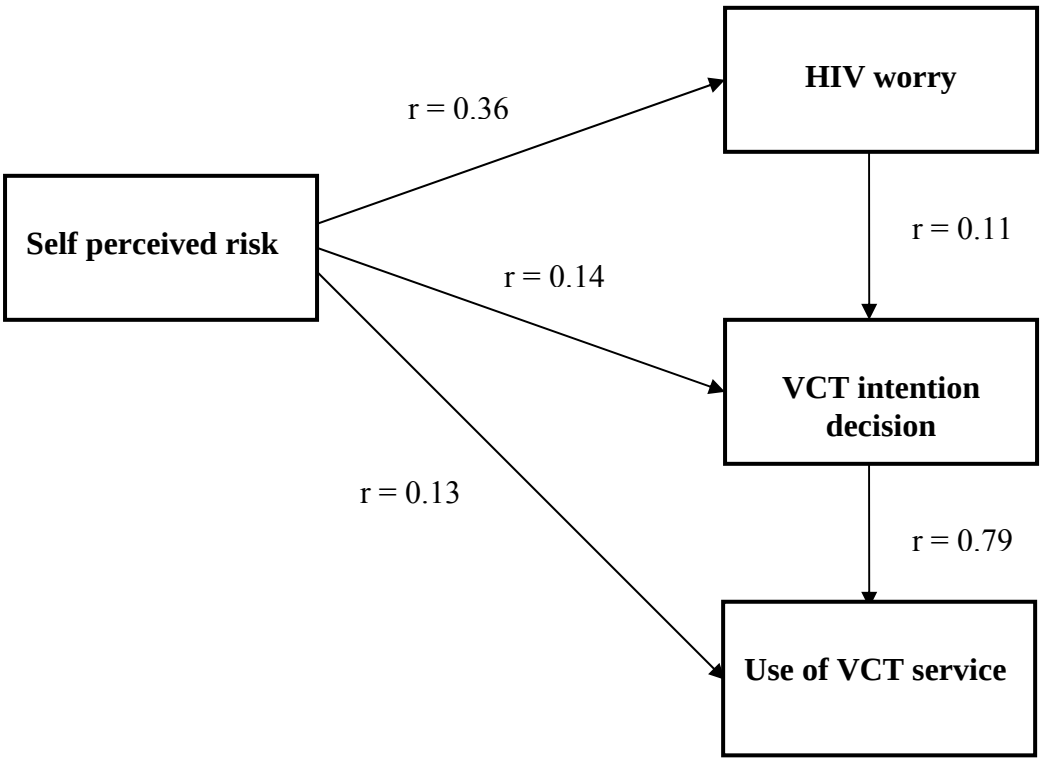
*Derived from the same data set used in the study of self perception of HIV risk

Figure 4 Self-perceived risk of HIV infection and HIV worry



*High risk: proportion rating their risk as high or very high

Figure 5 Relationship between self perceived risk, HIV worry and VCT intention



*r = Pearson correlation coefficient

APPENDIX I: ZAMCORE 2003 EPI QUESTIONNAIRE

1. Cluster identification:

☐☐ ☐ ☐

CSA SEA Rural/Urban

2. Housing identification:

☐☐☐ ☐ ☐

Building Unit Household

3. Personal number: ☐☐

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4. AGE ☐☐

5. SEX (Male=1, Female=2) ☐

6. What is your mother Language?
(1=Bemba, 2= Kaonde, 3=Lozi, 4=Lunda, 5=Luvale, 6=Nyanja, 7=Tonga, 8=other) ☐

7. For how long have you been living continuously in this household? ☐☐
(if less than 1 year, code 0, else years)

8. Just before you moved here, did you live in a 1=Village, or 2=Lusaka, or 3=other city or town? ☐

9. Marital status: Are you now
(1)Single, never married, (2) Single but engaged, (3) Living as married, (4) Married, (5)Widowed, (6) Separated/div. ☐

<u>If single, never married, skip to Q 14</u>

10. For how long have you been married to this person? ☐☐
(if less than 1 year, code 0, else years)

11. How old is this person (spouse)? ☐☐

12. How old were you when you first got married? ☐☐

13. Now think back to the past. Apart from this spouse, how many have you been married to/living with in your whole life? ☐

14. For how many years did you go to school? ☐☐

15. What is your highest level of education completed? (1=Never attended, 2=Grade 1-4, 3=Grade 5-7, 4=Grade 8-9, 5=Grade 10-12, 6=Higher) ☐

16. Are you still in school? ☐

<u>Score for all yes/no Qs: Yes=1, No=2</u>

17. Are you employed at present? ☐
(1=Unemployed, 2=Unpaid family worker, 3=Self employed, 4=Employee, 5=Employer)

Does your household have

18. Electricity? ☐

19. A radio? ☐

20. A refrigerator? ☐

21. A bicycle? ☐

22. A plough? ☐

23. A donkey? ☐

24. What is your religion? ☐
(1=None, 2=Catholic, 3=Liberal protestant, 4=Strict protestant, 5=Muslim, 6=other)

25. Have you during the past years been on regular trips where you have to stay away from home for several days or more? (1=Never, 2=Sometimes, 3=Often, 4=Very often) ☐

26. How would you say your health is at the moment? Is it (1 =) Very poor, (2 =) Poor, (3 =) Fair, (4=) Good, (5 =) Excellent ☐

<u>During the last one year, how many times did you visit</u>

27. A traditional healer? ☐☐

28. A spiritual healer? ☐☐

29. Private doctor/clinic? ☐☐

30. The local health centre? ☐☐

31. The hospital? ☐☐

32. How many times were you admitted in hospital during the last one year? ☐☐

33. If ever admitted in hospital, did you ever receive blood (transfusion)? ☐

34. Are you on any type of medication? ☐

(1=No, 2=Traditional, 3=Professional)

During the last one-year, did you suffer from

35. Malaria ☐

36. TB ☐

37. Any STD (sexually transmitted disease) ☐

Now I will ask you some few questions related to certain pains and problems, that might have bothered you the last 30 days. If you think the question applies to you and you have had the problem in the last 30 days, answer Yes. If not, answer No.

(Codes: Yes=1, No=2, Don't know=3)

38. Do you sleep badly? ☐

39. Do you cry more than usual? ☐

40. Do you find it difficult to enjoy your daily activities? ☐

41. Do you find it difficult to make decisions? ☐

42. Is your daily life suffering? ☐

43. Are you unable to play a useful part in life? ☐

44. Has the thought of ending your life been on your mind? ☐

45. Do you feel tired all the time? ☐

46. Do you often have headaches? ☐

47. Is your digestion poor? ☐

<u>Do you agree or disagree with the following statements?:</u> (Read and obtain a response for each statement: Code 1 when Agreeing, 2 when Disagreeing).

48. Condoms are safe preventing HIV/AIDS ☐

49. Most women don't like men to use condoms ☐

50. Condoms are embarrassing to obtain ☐

51. Using condoms shows responsibility ☐

52. Most men do not like using condoms ☐

53. Condoms are too expensive ☐

54. Using condoms is against my religion ☐

55. Have you ever had sexual relations? ☐

<u>If no, skip to Q 67</u>

56. At what age did you first have sex? ☐☐

57. Have you had sex the last 12 months? ☐

58. Have you ever used a condom? ☐

59. Did you use a condom last time you had sex? ☐

60. Is it easy to get a condom when needed? ☐

61. Did you have a regular sex partner during the last 12 months? ☐

62. Did you have sex with anyone else apart from your regular sex partner last year? ☐

63. If yes on Q62: Approximately how old was the last casual sex partner? ☐☐

64. Did you use a condom when you last had sex with a casual partner? ☐

65. With how many different people have you had sex in the last 12 months? (include spouse) ☐☐

66. How many different people have you had sex with in your life? ☐☐

67. Have you ever contracted any STD? ☐

If no, skip to Q 69

68. Did you tell your partner? ☐

Do you agree or disagree with the following statements: (Read and obtain a response for each statement, code 1 when Agreeing, 2 when Disagreeing)

69. I have less sexual partners at present compared to some years ago ☐

70. My friends have not changed their sexual behaviour despite the AIDS risk ☐

71. Some years ago I did not use condoms ☐

72. Most of my friends never use condoms ☐

73. I always use a condom nowadays ☐

74. In your situation, do you think that you are at risk of getting (catching) HIV? Would you say that

1= You are not at risk, or
2= the risk is moderate, or
3= the risk is high, or
4= the risk is very high ☐

75. How worried are you about actually being infected by HIV/AIDS?

1= Always worried, or
2= Sometimes worried, or
3= Seldom worried, or
4= Never worried ☐

Now I will ask you some hypothetical questions

76. If a member of your family became sick with the HIV/AIDS virus, would you be willing to care for him or her in your household? ☐

77. If you knew that a shopkeeper or food seller had the HIV/AIDS virus, would you buy fresh vegetables from him? ☐

78. If a female teacher has the HIV/AIDS virus but is not sick, should she be allowed to continue teaching in school? ☐

79. If a member of your family became infected with the AIDS virus, would you want it to remain a secret? ☐

MALES ONLY:

80. Have you been circumcised? ☐

81. How many wives do you have? ☐

FEMALES ONLY:

82. Have you ever given birth? ☐

83. Are you pregnant at present? ☐

If not given birth, skip to 91

84. How many have you given birth to all in all? ☐☐

85. How long is it since you last gave birth? ☐☐
(if less than 1 year, code 0, else years)

86. Do you want another child? ☐

87. How did the last pregnancy end?
(1=live, 2=still, 3=abortion) ☐

88. Did you visit any antenatal care services during last pregnancy?
1= No; 2= Yes, traditional practitioner or midwife
3= Yes, clinic/hospital
4= Yes, Private clinic ☐

89. Have any of your children died before the age of one?
Code the number, if none, score 0. ☐

90. Have any of your children died before the age of 5?
Code the number, if none score 0. ☐

91. Do you use any of the following contraceptive methods currently?
(mention all)
1=Pill; 2=Injections; 3=IUD; 4=Condom; 5=Natural; 6=Traditional; 7=Any other; 8=None ☐

92. Have you ever used a condom as your contraceptive method? ☐

93. Does your husband have other wives? ☐

94. Do you often use traditional agents like herbs or other agents for self-treatment when experiencing vaginal discharge or itching?
(1=Most often, 2=Sometimes, 3=Never) ☐

95. Do you often use traditional agents like herbs or a cloth before having sex?
(1=most often, 2=sometimes, 3=never) ☐

96. Is your usual (regular) male partner circumcised?
Yes=1,No=2, don't know=3 ☐

Do you agree or disagree with the following statement: 1=agree, 2=disagree

97. If my husband had a STD, I could either refuse to have sex with him or I would get him to use a condom? ☐

ALL RESPONDENTS
Inform on saliva samples; anonymity, consent; and on the voluntary option of being counselled and tested

98. Have you ever been HIV tested? ☐

99. If tested: Did you receive the test result? ☐

100. Would you like us to arrange for you to be HIV tested? ☐

101. Attendance
1=Completed (both interview and saliva)
2=Refused saliva
3=Refused interview
4=Refused both interview and saliva
5=Not found ☐

102. Number of interviewer ☐

103. Date: day:..... /month...../year.....

Appendix II: Survey Consent form

1 - Why are we giving you this form?

We are giving you this form, telling you what it means and giving you the chance to ask questions about a study. Then you can decide if you would like to take part in this study that is trying to find many issues regarding the HIV epidemic in our country.

2 - Who is carrying out this study?

The Government of the Republic of Zambia through Central Statistical Office and the University of Zambia, Department of community Medicine. The persons responsible from these institutions are Kumbutso Dzekedzeke, Seta Siziya, Charles Michelo and Knut Fylkesnes.

The study is being done under the auspices of the Norwegian government through the Research Council (NUFU) of the University of Bergen, Centre for International Health.

The official name of the study is *Population Based Survey on HIV in Chelstone & Kapiri Mposhi.*

3 - Background Information

You are being asked to take part in a research study because you live in Chelstone or Kapiri Mposhi. We would like to know the extent of the HIV problem in our communities and we can only do so by working with people like you. This is made possible if you agree to participate. By participating we will be able to get the information that we need in order to make relevant policies and interventions for this problem. On the other hand if we do not know the extent of the problem in the community, it is very difficult to plan for effective policies and interventions. In view of this you will also be asked to take a test unlinked to your name but with the sole purpose of knowing how big or small the HIV problem is in Zambia.

We believe this is very vital information to all of us and you would help by participating in this study.

4 - What Happens In This Research Study?

You will be interviewed and tested for HIV by examining your saliva. Several other things will also take place:

Before the interview, we will list all members of your household so that we know who is there and who is eligible to participate in the survey. Those below the age of 15 will not be eligible to participate.

Then eligible people within your household will be interviewed. You will be asked about a wide range of issues. In addition you will be provided counselling service at a place of your preference, choosing between either your home or at the clinic. Since an HIV test will be

necessary in this study, this process will help you to understand the need to take an HIV test. Therefore you will also undergo pre and post test-counselling sessions for HIV. If you do not agree to have your HIV test done you will not be discriminated against in any way in the provision of your health services.

Once all this has been done and you consent, you will be interviewed and tested for HIV. If you would like to know the results of the HIV test, please let the interviewer know so that arrangements will be made to give them to you.

At the end of the study, we hope to gather enough information regarding HIV so that relevant policies and interventions are advised.

5 - Possible Problems

We believe that the processes being used to test for HIV in you will not be harmful. The saliva tests that will be done to you are done elsewhere and have never been found harmful. However if we notice anything peculiar to you after taking the saliva specimen, we will let you know so that it helps you on whether you want to continue taking part or not.

6 - Benefits

You may not benefit from participating in this study. However we find that you have any medical problem, we will offer immediate referral to nearest health centre for treatment. We may be able to handle general ailments through our medical staff with us on the survey.

7 - Your Rights to Participate, Not Participate, or to Withdraw from the Study

Taking part in this study is voluntary. You do not need to take part in this study - it is up to you. You may choose to either or not participate. If you want to take part in the study, you can later change your mind and stop participating in the study. You are not obliged to give reasons but if you give reasons they will be treated with utmost confidence because they are very useful to us. You will suffer no penalty and lose no benefits that you may be entitled to if you do not take part in this study. Your present or future medical care in Chelstone or Kapiri Mposhi will be the same whether or not you take part in the study.

8 - Confidentiality

Your name will never be made public by the investigators. The medical record will be treated the same as all medical records at the health centres. A code number that makes it very difficult for anyone to identify you will identify the research information gathered during this study from you. All information will be stored in a secure place. Information from this study may be used for research purposes and may be published; however, your name will not be made public by the

investigators**.** It is possible that, after the study is over, we may want to look again at the laboratory and interview record data collected during this study to help us answer another question. If this happens, still your name will not be made public by the investigators.

9 - Payment for A Research Related Injury:

In the event that a problem results from a study-related procedure, either Dr. S. Siziya, Mr K. Dzekedzeke or Dr C. Michelo in LUSAKA should be notified, and you will be provided with free medical care at the Health Centre for the treatment of this complication.

10 -Consent Formalities

10.1 Participant

I_____ (participant's name, signature or thumb-print) have been informed about the Population Based Survey on HIV. I will provide saliva samples for analysis and will participate fully up to the best of my ability. A copy of this form signed by me and one of the study investigators is being given to me.

Signature_____

Date_____

10.2 Interviewer

I have explained this research study to the subject. I am available to answer any questions now or in the future regarding the study and the subject's rights. The project administrator Dr. Seta Siziya can be reached at Department of Community Medicine, School of Medicine, UNZA on at the following telephone numbers: 260-1-254414. You can also contact Dr. Charles Michelo on the following telephone numbers: 260-1-261987, 260-096-754920.

Signature of Investigators & Printed Names Date of signature

Date_____