A COMPARISON OF SEXUAL RISK BEHAVIOUR BETWEEEN HIV POSITIVE AND HIV NEGATIVE MEN IN GAUTENG AND THE WESTERN CAPE

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DECLARATION

I, Hloniphile Innocentia Mabuza declare that this Research Report is my own work. It is being submitted for the degree of Master of Science in Epidemiology (in the field of Infectious Diseases) in the University of the Witwatersrand, Johannesburg. No prior submissions of this material have been made for any degree or examination at this or any other university.

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ABSTRACT

Background

South Africa continues to grapple with the HIV/AIDS epidemic almost 30 years since the disease was first described. South Africa has 6.4 million people living with HIV thereby contributing 17% to the global burden of HIV/AIDs even though it makes up 0.7% of the world population translating to an HIV prevalence of 10.6% in the general population. . Multiple concurrent sexual partnerships (MCP) and inconsistent condom use are notably the major contributors to the spread or transmission of HIV in South Africa. The South African government has allocated massive financial resources to support HIV/AIDS interventions, however, the epidemic continues to amplify in South Africa and there is a growing need for targeted HIV prevention interventions which will address behaviour change.

Objectives

The objectives of the study were to determine the differences in sexual risk behaviour between self-identified HIV positive and HIV negative men and identify factors associated with sexual risk behaviour.

Methodology

This was secondary data analysis of a cross sectional design study called "Risk Perceptions of HIV Positive Men" and it was conducted in clinics from Soweto, Cape Town and the Cape Winelands from October 2010 to July 2011. The sample size was 451 and the study population comprised self-identified HIV positive and negative men between ages 18 - 60 years. Proportion of consistent condom use (CCU) and multiple concurrent partnerships (MCP) were calculated

and difference between those self-identified HIV positive and negative were determined using Chi-square tests. Factors associated with MCP and CCU between the two groups was determined using univariable and multivariable logistic regression

Results

We analysed data for 451 men with a mean age of 39 years (std. dev. 11.30). Out of the 451 men 311 (69%) identified themselves as HIV positive and there was a statistical significant difference in baseline characteristics between HIV positive and HIV negative men (age, race, relationship status, employment status, education level, religion, area of residence, age at sexual debut, condom use at first sex, sexual orientation and circumcision status). HIV positive men were four times more likely to have used condoms consistently in the last six months compared to HIV negative men (AOR=3.72, CI: 1.95-7.11), however, HIV positive men were also four times more likely to have had Multiple Concurrent Partnerships in the last 12 months compared to HIV negative men (AOR=4.60, CI: 2.09- 10.12) . Other factors associated with sexual risk behaviour were; relationship status, age group, race, age at sexual debut, alcohol frequency, sexual orientation and perceptions about undetectable viral load reducing HIV transmission risk.

Conclusion and recommendation

There is a difference in sexual risk behaviour between men who identified themselves as HIV positive and those who identified themselves as HIV negative. Men who identified themselves as HIV negative were less likely to have used condoms consistently in the last six months. Though the HIV positive men are using condoms consistently they have multiple concurrent partners. There is need to strengthen post HIV test counselling coupled with targeted messages for both HIV positive and HIV negative men.

DEDICATION

In Memory of My Beloved Mother

Tsiwani Esther Mabuza (LaVilakati)

24.07.1936 - 19.07.2012

ACKNOWLEDGEMENTS

I would like to thank my two supervisors, Dr Charles Chasela and Mr Geoffrey Jobson for their tireless effort, guidance and advice while compiling this research report; all my lecturers from the University of the Witwatersrand school of Public Health especially Mr Peter Nyasulu and my classmates for moral support. Angie Zwane and Busi Ngoyi, your support did not go unnoticed, thank you. I would also like to thank my dear son, Nkosisihlelele Hlatshwayo for his understanding when I spent most of my evenings and weekends on my school work; my father, Mr. William Mabuza and the rest of my family for their encouragement.

Lastly, I would not have achieved this without the help of God, the Almighty.

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Abbreviations

ABC	Abstain Be Faithful and Condomise
AIDS	Acquired Immune Deficiency Syndrome
AOR	Adjusted Odds Ratio
ARV	Antiretroviral
CI	Confidence Interval
HCT	HIV Counselling and Testing
HIV	Human Immunodeficiency Virus
MCP	Multiple Concurrent Partnerships
MSM	Men who have Sex with Men
OR	Odds Ratio
PHC	Primary Health Care
PHRU	Perinatal HIV Research Unit
UAI	Unprotected Anal Intercourse
USA	United States of America

Definition of terms

Confidence Interval: A confidence interval gives a range of values, calculated from a set of sample data, which is likely to include an unknown population parameter.

Consistent Condom Use: This is a categorical variable and is defined as "always" using condoms during sexual intercourse in the last six months.

Risky Sexual Behaviour: This is an action that promotes increased risk of a negative health outcome like acquiring or transmitting HIV. It includes having sexual contact without using a condom and having more than one sexual partner at the same time.

STATA: It is a general purpose software package created in 1985 by Stata Corp. It is used by many business and academic institutions around the world. Most of its users work in research, especially in the fields of economics, sociology, political science, biomedicine and epidemiology. Its capabilities include data management, statistical analysis, graphics, simulations and custom programming.

Multiple Concurrent Partnerships: This is a categorical variable and is defined as having more than one sexual partner at the same time in the last 12 months.

CHAPTER 1. INTRODUCTION

1.1 Introduction

This chapter provides a background to the study. It discusses data related to risky sexual behaviour, based on published literature, statement of the problem, aims and objectives of the study

1.2 Background

Risky sexual behaviour is the key driver of the HIV epidemic globally and much attention has been dedicated to addressing sexual behaviour change in an effort to reduce HIV transmission. Sexual behaviour change strategies have mainly centred around abstinence, faithfulness and condom use, but still by the end of 2010 an estimated 34 million people were living with HIV worldwide with 2.7 million of these being new infections(1). South Africa has 6.4 million people living with HIV thereby contributing 17% to the global burden of HIV/AIDs even though it makes up 0.7% of the world population(2).The prevalence of HIV in the general population of South Africa is currently 10.6%(3) with the 15-49 year age group bearing the greatest brunt of the disease and women disproportionately affected more than men. In South Africa in the year 2011 alone, Statistics SA estimated 316 900 new HIV infections in those 15 years and older and 63 600 new infections among children 0 to 14 years (3) translating to over 1000 new infections per day. Risky sexual behaviour is defined in the context of multiple concurrent partnerships and consistent condom use and these are the major drivers of HIV in South Africa(4). In April 2010 President Jacob Zuma launched a national HIV counselling and testing (HCT) campaign to test 15 million people and screen them for TB by June 2011. From this campaign approximately 14million people underwent HCT and 2 million were reported

positive for HIV leaving 12 million HIV free(5). HIV counselling and testing is an involved process with a lot of emotional and psychological strain. The expectation is that once a person goes through this process, sexual behaviour modification will happen regardless of the outcome of the result. Other literature says HCT is a potential inhibitor to positive behaviour change for those who test HIV negative especially where counselling is not of high quality and often rushed(6, 7).The question therefore is, are there any differences in sexual risk behaviour between HIV positive men and HIV negative men?

1.3 Problem Statement

The Government of South Africa with the support of multilaterals, bilateral and private partnerships has allocated massive financial resources to support HIV/AIDS interventions, from behaviour change to biomedical interventions. Posters bearing behaviour change messages decorate the streets of urban and rural towns "Abstain, be Faithful and Condomize (ABC)" and politicians are singing the same tune "Get tested and know your status". However, the epidemic continues to amplify in South Africa and there is a growing need for targeted HIV prevention interventions. Multiple sexual partnerships, inconsistent and incorrect use of condoms are still the major contributors to the transmission of HIV in South Africa (4) and there are studies that have shown that such behaviour is considered normal in South Africa(8).

1.4 Justification for the Study

Data on the predictors of sexual behaviour in HIV positive men are well documented especially in the US, but these are biased towards Men who have Sex with Men (MSM). Whilst such studies offer valuable information in terms of targeted interventions, their applicability to the South African setting where HIV is a generalized epidemic, may be limited. Data on sexual risk behaviour among HIV positive vs. HIV negative men are generally lacking and South Africa is no exception. This particular study offers an opportunity to look at sexual behaviour among the two groups of men (positive vs. negative) and will hopefully offer information which can be used to guide the design of targeted sexual risk reduction messages/interventions thereby contributing to the reduction of HIV transmission in South Africa.

1.5 Literature Review

In a quest to avert new HIV transmissions, advances have been made in medicine and these have resulted in the introduction of several biomedical interventions. However such interventions alone will not prevent new HIV transmissions, a combination of biomedical and behavioural interventions is needed which will work best if they are targeted at the most appropriate populations(9).

1.5.1 Multiple Concurrent Partnerships

Multiple concurrent sexual partnerships (MCP) are notably the major contributor to the spread or transmission of HIV in South Africa(4). Such behaviour is considered normal in many circles in South Africa and this practice is highly endorsed by male peers(8). In 2008, South

Africa saw an increase among males who reported having more than one sexual partner in the past 12 months from 23.0% in 2002 to 30.8%(4). In a study conducted on Sub-Saharan Africa it was shown that 20% of men who had ever had sex, had had multiple partners in the past 12 months, compared with less than 10% of young women(10). In contrast developed countries who experience low rates of HIV report higher rates of multiple partnerships than their counterparts in developing countries and generally men report more multiple partnerships than women, but in some industrialised countries women have caught up with men in this regard(11). This raises the question, how is it that developed countries are able to keep their HIV rates low despite having multiple partnerships?

1.5.2 Consistent Condom Use

Evidence from Sub-Saharan Africa and Latin America suggests that condom use at last sexual intercourse has increased among adolescents in recent times(11), but this is generally higher in developed countries compared to developing countries, especially in women. In South Africa in particular, for adults 15 years and above, the overall proportion of people who reported using condoms at last sexual encounter more than doubled from 27.3% in 2002 to 62.4% in 2008(4). Whilst there is compelling evidence of condom use in South Africa (10), there is also evidence that condom use is frequently incorrect and inconsistent and multiple sexual partnerships are on the increase (10) which could explain the modest decline in HIV incidence in this country.

1.5.3 Knowledge of HIV Status and Behaviour Change

It is said that awareness and knowledge about HIV and AIDS does not necessarily translate to behaviour change. This was partially confirmed by a study conducted in Nigeria on preclinical

medical students which showed that even though knowledge and awareness about HIV and AIDS was high among this group, certain risk behaviour like no consistent use of condom during sexual intercourse still persisted (12). In contrast, a study among South African stable HIV-discordant couples showed that unprotected sex declined after HIV-positive diagnosis and declined further after awareness of HIV discordance (13).

One country that at some point managed to reduce its HIV incidence and prevalence to some extent is Uganda. The "zero grazing" strategy (fidelity and partner reduction) adopted in Uganda was one of the successful prevention campaigns targeting faithfulness and partner reduction(14). In the 1990s Uganda saw a rapid reduction in HIV transmission and prevalence and this has been shown to be due to fewer premarital and non-marital sexual partners and more condom use during sex with these partners(15). Some may argue that the decline in incidence and prevalence could be related to epidemic maturity and mortality since that was during the pre ARV era in Africa. Evidence from Uganda suggests that a reduction of casual sex across the whole population reduced the size of high-risk sexual networks and the efficiency of HIV transmission(16). This demonstrates that sexual behaviour modification alone can result in decrease in HIV incidence.

There are conflicting results with regards to determinants of sexual risk behaviour in HIV positive individuals. Aidala et al in 2006, found that the predictors of sexual behaviour varied by gender, sexual orientation and other factors such as partner relations, housing status, and whether or not one was engaged in transactional sex etc.(17)**.** A study in Montreal, Canada on

the determinants of condom use in HIV positive MSM found that age, occupation, whether the person was living with a partner or not, alcohol use, intravenous drug use, quality of life, social support and time from HIV diagnosis were not related to condom use. On the other hand, all the cognitive variables measured as well as the use of sex enhancing drugs were significantly related to condom use. The cognitive variables measured were guided by an extended version of the theory of planned behavior. Results indicated that past behavior (odds ratio [OR] = 9.75; 95% confidence interval [CI]: 4.48–21.26), intention (OR = 3.13; 95% CI: 1.25–7.81), self-efficacy (OR = 3.62; 95% CI: 1.40–9.37) and use of sex drugs (OR = 0.16; 95% CI: 0.06–0.45) contributed to the prediction of 100% condom use. Self-efficacy also interacted with intention as a significant moderator of the intention–behavior relationship (OR = 20.96; 95% CI: 2.90–151.51) (16). One study found that Bisexual men have unprotected sex more often with their female partners than with their male partners (18) and this is possibly related to perceived risk of exposure to HIV.

There is documented gender disparity in sexual risk behaviour. Whilst men are more likely than women to have multiple partners they are less likely to consider themselves at risk of HIV infection(19) therefore might not see the need to use condoms during sexual intercourse.

Condom use at sexual debut and talking with one's first sexual partner about condoms were found to be the most significant predictors of condom use at last intercourse in one study conducted in South Africa(20). These findings were corroborated by similar findings in Croatia (a country in its infancy in terms of HIV infection) where condom use at first intercourse and positive attitudes towards its use were also shown to be the most robust predictors of condom use at last intercourse(21). HIV-positive men are equally as likely as

HIV-negative men to have unprotected sex with HIV-negative/unknown non-main male and non-main female partners(17). Another factor shown to be associated with sexual risk behaviour is non-disclosure of status among HIV positive men and women in South Africa(22). In a study on sexually active HIV infected men and women in an urban PHC clinic in South Africa, the use of antiretroviral treatment was found to be associated with decreased sexual risk behaviour including unprotected sex(23). A meta-analysis on sexual behaviour of HIV patients on ART in Sub Saharan Africa confirmed these findings(24). In the US on the other hand, belief that an undetectable viral load reduces infectiousness has been shown to be associated with insertive and receptive unprotected anal intercourse (UAI) with HIV negative or unknown status partners among MSM(25).

1.5.4 Summary

In conclusion, data on sexual risk behaviour in HIV positive men are well documented globally especially in the US, however, these are biased towards MSM. Whilst such studies offer valuable information in terms of targeted interventions, their applicability to the South African setting where HIV is a generalized epidemic, may be limited. In South Africa, a few studies have been conducted to compare sexual risk behaviour between HIV positive and HIV negative men. Hence this research report to compare sexual risk behaviour among HIV positive men vs. HIV negative men and explore the predictors of such behaviour.

1.6 Research Question

Are there differences in sexual risk behaviour between HIV positive and HIV negative men?

1.7 Aims and Objectives of the Study

1.7.1 Study Aim

The aim of the study was to determine differences in sexual risk behaviour and identify factors associated with such behaviour in HIV positive and HIV negative men in order to contribute to sexual risk behaviour modification so to reduce the transmission or incidence of HIV in South Africa

1.7.2 Study Objectives

- To determine the differences in sexual risk behaviour between self-identified HIV positive and HIV negative men attending PHRU supported PHC clinics in Gauteng and Western Cape between October 2010 to July 2011

- To identify factors associated with sexual risk behaviour in self-identified HIV positive and negative men attending PHRU supported PHC clinics in Gauteng and Western Cape between October 2010 to July 2011

CHAPTER 2. METHODOLOGY

2.1 Introduction

This chapter provides a brief description of the primary study and the methodology used for secondary data analysis; including the study design, selection of study sites, study setting, sampling strategy, and methods for measuring study outcomes, data analysis, data management and ethical considerations.

2.2 Primary Study: Risk Perceptions of HIV Positive Men

The primary study was conducted from October 2010 to July 2011. The study design was a cross sectional design and it was conducted in urban and rural areas of South Africa where ANOVA Health Institute operated: Soweto in Gauteng, Cape Town and the Cape Winelands in the Western Cape. The primary objective of the study was to investigate HIV-positive men's attitudes, aspirations, understanding of HIV-risk and sexual behaviour in order to inform and improve HIV-prevention messages. Secondary objectives included investigating HIV positive men's sexuality, sexual partnerships, understanding of HIV transmission, perception of behaviour risk of HIV transmission, personal risk behaviours past and current, negotiating safer sex, issues around disclosure, stigma and discrimination, masculinity, manhood, families, fatherhood and fertility (desires, outcomes and expectations). A total of 451 men attending PHC clinics were reached during the study through self-reported questionnaires and convenience sampling was used to select subjects. To deal with issues of

stigma and disclosure the participating clinics did not consent to the questionnaire being administered to HIV positive men only, so HIV negative men were also reached.

2.3 Study Design

This is a secondary data analysis of a cross sectional design study. This design was the most appropriate because data on exposure and outcome variables were collected at the same time during the primary study. The primary study is described in 2.2.

2.3.1 Selection of Study Sites

This was secondary data analysis so there was no selection of study sites.

2.3.2 Study Setting

The setting for the primary study is described in 2.2.

2.4 Methods for measuring Outcome and Exposure Variables

Outcome variables

The outcome measurement for this study was sexual risk behaviour and it was measured using two outcome variables; Consistent Condom Use (CCU) and Multiple Concurrent Partners (MCP). These were defined as follows:

- **Consistent Condom Use** – This is a categorical variable and is defined as reporting 'always' using condoms during sexual intercourse in the last 6 months.

- **Multiple Concurrent Partners** - This is a categorical variable and is defined as having more than one sexual partner at the same time in the last 12 months.

2.5 Exposure Variables

2.5.1 Main Exposure Variable

HIV status; this was the main exposure variable and was based on self-reporting since no HIV testing was conducted as part of the primary study.

2.5.2 Other Explanatory Variables/Predictors

These included relationship status, age group, race, residence, level of education, religion, employment status, age at sexual debut, condom use at first sex, disclosure of HIV status to partner, duration away from home, alcohol frequency, sexual orientation, desire for children, circumcision status, sex of partner, partner HIV status, perception of HIV transmission risk with undetectable viral load, CD4 count and currently on ART (the last two variables were also self - reported for the HIV positive participants only). These explanatory variables were chosen based on the literature as well as availability of data on them from the primary study.

2.6 Data Analysis and Management

Data for analysis was retrieved from the data set provided by the primary researchers from ANOVA Health Institute. The data set was received and analysed using STATA 12 version(26). The data was then subjected to cleaning to take care of extreme, illegal and inconsistent values. Renaming and recoding of variables was done to generate new variables as required. Numerical variables were categorized for ease of analysis and for public health

application purposes. The choice of statistical methods was determined by the objective of the study and the nature of the outcome.

2.7 Missing Values/Data

During the analysis it was found that there were data missing. To deal with missing data a missing category was created. The missing category was included to improve the power of the study thereby improving the effective sample size. On the basis of the effective sample size, the results were reported with missing data included in the analysis (see appendix for results excluding missing data).

2.8 Descriptive Statistics

The mean and standard deviation were used to describe continuous variables. In the description of categorical variables, proportions were used. The prevalence of condom use and multiple concurrent partners was determined among the HIV positive and the HIV negative. Summary statistics was presented in tables and graphs.

2.9 Inferential Statistics

Chi-squared test was used to determine the differences in sexual risk behaviour between HIV positive men and HIV negative men and the Fisher's Exact was used where expected cell frequencies were 5 or less. Factors associated with sexual risk behaviour were determined using ordinary logistic regression. This type of regression technique was appropriate because

the outcomes used to measure sexual risk behaviour were binary (consistent condom use and multiple concurrent partners). Using forward selection a multivariable logistic regression model with the best fit was built and this was used to adjust for the following possible confounders; age group, race, residence, relationship status, level of education, religion, employment status, duration away from home, alcohol use frequency, circumcision status, age at sexual debut, condom use at sexual debut, fertility, currently on ART and perception of HIV transmission risk with undetectable viral load. All variables found to be significant in the univariable model i.e. p values of 0.2 or less as well as variables known to be associated with sexual risk behaviour from the literature were included in the multivariable logistic regression model. From this model the adjusted odds ratios were computed. Those factors found to be significant (p value less than 0.05) in the multivariable model were reported as factors associated with sexual risk behaviour in the study population. Effect modification was assessed using the interaction term and from the analysis the interaction term did not contribute significantly to the fit of the model hence we assumed that there was no interaction so the proportional odds model was appropriate.

2.10 Ethical Consideration

A Memorandum of Understanding between ANOVA Health Institute and Hloniphile Mabuza (the PI) was signed before the dataset was released for analysis. Ethical clearance was granted by the Human Research Ethics Committee from the University of the Witwatersrand which is **M121120** as attached in appendix 1. All information relating to study participants was kept in a password protected computer accessible only to the principal investigator. Individual

participants were identified with assigned unique identifiers and not their given names to maintain anonymity.

CHAPTER 3. RESULTS

3.1 Introduction

In this chapter, results of the study are presented starting with characteristics of the study participants, description of study participants based on the main exposure (HIV status) and lastly complex inferential statistical results.

3.2 Descriptive Statistics

3.2.1 Characteristics of the Study Participants

Data from 451 male participants was analysed. These were men who visited PHC clinics in Soweto, Cape Town and Wine-lands between October 2010 and July 2011. Of the 451 men, 311(69%) identified themselves as HIV positive and 140 (31%) as HIV negative. The HIV status was self-reported; HIV tests were not conducted as part of the primary study. The mean age was 39 years (std. dev. 11.30). 87% of the study participants did not go past Matric, only 2% had a university degree and 5% had achieved diplomas, and the rest did not respond to this question. The vast majority of the study participants were from the black population, 391 (87%) followed by coloured population, 45 (10%) and the other races combined only made up 2% with the remaining 1% unidentified. Eighty five percent (421) of the respondents were from urban areas and 7% (31) were from rural areas. With regards to relationship status, 165 (37%) of the men were single, 102 (23%) were married, 103 (23%) were co-habiting with partner, 4 (1%) were divorced and 6(1%) were widowed and the rest were unidentified. Out of the 451 men, half were unemployed (50%), 1% were in school and another 1% were attending

university/college, 24% were in full time employment, 17% were involved in casual work and 4% were self-employed. With regards to sexual orientation; 386 (86%) reported being heterosexual, 17(4%) homosexual and <1% were bisexual and the rest unclassified.

3.2.2 Description of Study Participants by HIV status

Table 3.1 below shows bivariate analysis of explanatory variables by HIV status for the study participants. The demographic and behavioural characteristics of the two groups of men (HIV negative and positive) were not similar. Chi square and Fisher's Exact tests was used to determine if the two groups were similar at baseline or not. On the entire baseline characteristics investigated, all the p values were significant indicating that the two groups were indeed not similar at baseline. This is expected since no randomization took place during sampling instead convenience sampling was used.

Table 3.1: Bivariate Analysis of Explanatory variables by HIV Status for Gauteng and Western Cape Men

	HIV Status		
Variable	**Negative N (Col %)**	**Positive N (Col %)**	**P-value**
Demographic Factors			
Relationship Status			
Single	77(55.00)	88(28.30)	
Married	30(21.43)	72(23.15)	
Living with partner	20(14.29)	83(26.69)	
More than one partner	1(0.71)	4(1.29)	<0.001
Divorced not remarried	1(0.71)	3(0.96)	
Widowed	1(0.71)	5(1.61)	
Other	3(2.14)	44(14.15)	
Missing	7(5.00)	12(3.86)	
Area of residence			
Urban	108(77.14)	277(89.07)	<0.001
Rural	20(14.29)	11(3.54)	
Missing	12(8.57)	23(7.40)	
Mean Age (years)	33 (SD: 12.52)	41 (SD: 9.87)	<0.001
Education Level			
Primary	28(20.00)	66(21.22)	
Secondary	21(15.00)	124(39.87)	
Matric	65(46.43)	87(27.97)	<0.001
Tertiary	12(8.57)	17(5.47)	
Missing	14(10.00)	17(5.47)	
Employment status			
Unemployed	50(37.71)	109(35.05)	
Job seeking	29(20.71)	38(12.22)	
At school	6(4.29)	6(1.93)	
Self employed	4(2.86)	13(4.18)	0.071
Employed fulltime	32(22.86)	73(23.47)	
Employed Part time	16(11.43)	59(18.97)	
Missing	3(2.14)	13(4.18)	
Race			
Black	94(67.14)	297(95.50)	
Coloured	38(27.14)	7(2.25)	<0.001**
Other	6(4.29)	4(1.29)	
Missing	2(1.43)	3(0.96)	
Religion			

None	19(13.57)	121(38.91)	
Christian	84(60.00)	158(50.80)	<0.001**
Other	34(24.29)	30(9.65)	
Missing	3(2.14)	2(0.64)	
Behavioural Factors			
Age at Sex Debut			
<15	37(26.43)	81(26.05)	
15-19	56(40.00)	177(56.91)	<0.001
20+	24(17.14)	50(16.08)	
Missing	23(16.43)	3(0.96)	
Condom Use at First Sex			
No	98(70.00)	293(94.21)	<0.001
Yes	30(21.43)	9(2.89)	
Missing	12(8.57)	9(2.89)	
Sex Orientation			
Heterosexual	118(84.29)	268(86.17)	
Homosexual	4(2.86)	13(4.18)	0.024**
Other	6(4.29)	1(0.32)	
Missing	12(8.57)	29(9.32)	
Circumcision			
No	86(61.43)	191(61.41)	
Yes	37(26.43)	104(33.44)	0.019
Missing	17(12.14)	16(5.14)	

**Fischer's Exact test used because expected frequencies in some cells were 5 or less

Description of Study Participants by outcome variables (CCU and MCP)

The two figures below (figures 3.1 and 3.2) show the distribution of consistent condom use and multiple concurrent partners in the two groups. Of the 264 HIV positive men who responded to the question, 53% (141) reported consistent condom use in the last six months compared to 18% (23) among the HIV negative. Fifty eight percent (179) of HIV positive men reported having ever had multiple concurrent partnerships in the last 12 months compared to 26% (36) of HIV negative men.

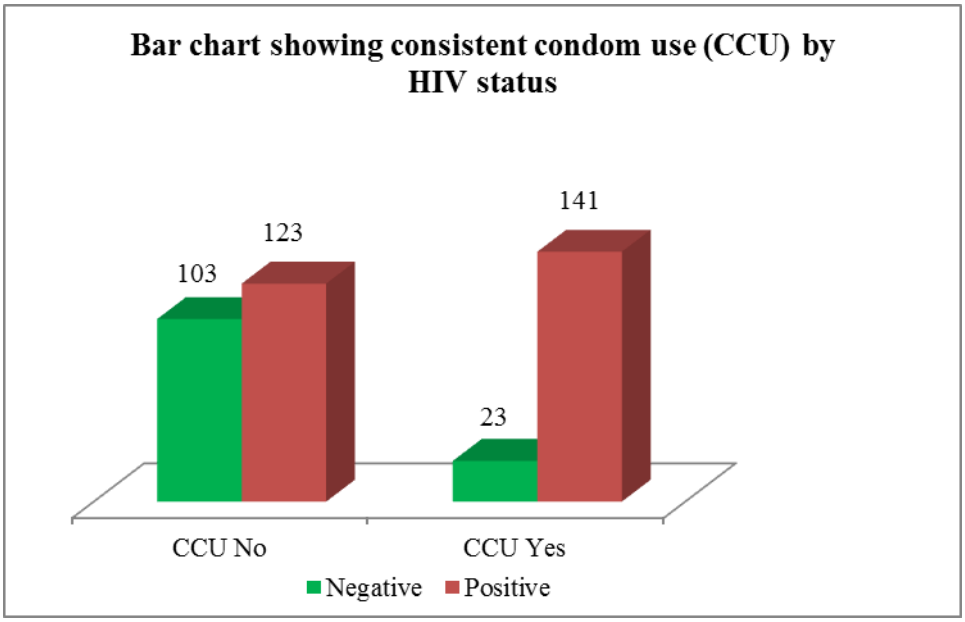

Figure 3.1: Bar Chart Showing Consistent Condom Use by HIV Status
P value <0.001

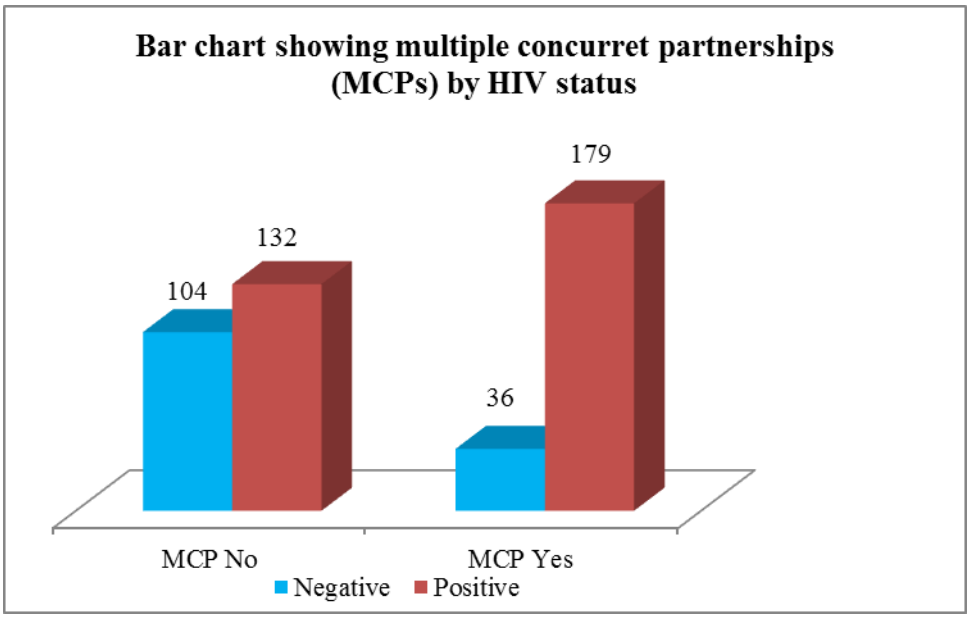

Figure 3.2: Bar Chart Showing Multiple Concurrent Partenships by HIV Status
P value <0.001

3.2.3 Factors Associated with Multiple Concurrent Partners (MCP)

Table 3.2 below shows results from univariable and multivariable logistic regression analysis for multiple concurrent partners. For ease of analysis the factors were divided into demographic, behavioural and clinical.

In this study HIV status was the main exposure variable. From univariable analysis, HIV positive men were four times more likely to have had MCPs in the last 12 months compared to HIV negative men (OR=3.92, CI: 2.52-6.09). There was also evidence of an association between the following factors and multiple concurrent partners in the univariable analysis:

3.2.4 Demographic Factors

Relationship Status

Men in co-habiting and married relationships were more likely to have multiple concurrent partners compared to single men (OR=2.23, CI: 1.35-3.68 and OR=1.73 CI: 1.05-2.85 respectively). Widowed men were also found to be more likely to have MCPs compared to single men, however this was not statistically significant (OR=3.59 CI: 0.64-20.21).

Area of Residence

Men who reside in rural areas were less likely to have MCPs compared to their urban counterparts (OR= 0.30, CI: 0.13-0.71).

Age Group

Compared to men younger than 25 years, men aged between 26 and 35 years were found to be almost twice as likely to have MCPs (OR= 1.88, CI: 0.97-3.63, p=0.062), however, this is marginally significant and the other age groups were found not be statistically significant.

Education Level

Highest level of education was another factor found to be marginally associated with MCP, where men with secondary education as their highest level of education were 1.6 times more likely to have MCPs compared to those with primary education only (OR=1.64, CI: 0.97-2.76, p=0.065). The analysis also showed that men with tertiary education were twice as likely to have MCPs compared to the reference group, however this was also marginally significant (OR=2.12, CI: 0.90-4.97, p=0.085).

Race

Being a coloured man meant that one was less likely to have MCPs (OR= 0.15, CI: 0.06-0.35

Religion

Belonging to some form of religion was protective against MCPs. The analysis revealed that Christians as well as men affiliated with other religions were less likely to have MCPs compared to men with no religious affiliation at all (OR= 0.46, CI: 0.30-0.70 and OR=0.34, CI 0.18-0.63) respectively.

3.2.5 Behavioural Factors

Age at first Sex

Initiating sexual intercourse at the age of 15 years and above was found to be protective against MCPs. Men whose age at sexual debut ranged between 15-19 years and 20 years and older were found to be less likely to have MCPs compared to men whose age at sexual debut was <15 years (OR=0.44, CI: 0.28-0.69 and OR=0.32, CI: 0.18-0.59) respectively.

Condom Use at First Sex

Men who used a condom at their first sexual encounter were found to be less likely to have MCPs compared to those who did not use a condom at sexual debut (OR=0.30, CI: 0.14-0.65).

Alcohol Frequency

Men who drank alcohol were more likely to have MCPs compared to those who reported never drinking alcohol and the odds of having MCPs generally increased with increase in frequency of alcohol consumption. Men who drank alcohol once a month had 1.35 times higher odds of reporting MCPs (CI: 0.79-2.32), however this was not statistically significant. Those men who reported an alcohol consumption frequency of 2-4 times a month and 2-3 times a week had 2.20 and 2.04 times higher odds of reporting MCPs (CI: 1.34-3.61 and CI: 1.12-3.70) respectively than men who never drank alcohol, and this was statistically

significant. Men who consumed alcohol 4 or more times a week and those who consumed alcohol daily had the same odds ratio of 2.31 (CI:0.63-8.4 and CI: 0.38-14.18) respectively however this was not statically significant.

3.2.6 Clinical Factors

Partner HIV Status

Men whose partners were HIV positive were slightly more likely to have MCPs compared to those who partners were HIV negative (OR=1.76, CI: 1.14-2.72).

Perception of HIV Transmission Risk with Undetectable Viral Load

Men's perception of HIV transmission risk with undetectable viral load was found to be associated with having MCPs. Generally men who agree that an undetectable viral load reduces HIV transmission risk were less likely to have MCPs with the odds of having MCPs decreasing from agree to strongly agree (0.42, CI: 0.19-0.89 and OR=0.39, CI: 0.13-1.19) however the latter was not significant. Those men who did not know whether undetectable viral load was associated with reduced HIV transmission were also found to be less likely to have MCPs.

Multivariable analysis showed that HIV positive men had higher adjusted odds of having MCPs compared to HIV negative men (AOR= 4.60, CI: 2.09-10.12). HIV positive men were four times more likely to have MCPs compared to HIV negative. Other factors found to be associated with MCPs were; relationship status (married men and widowed men were more likely to have had MCPs in last 12 months compared to single men; AOR= 3.03, CI: 1.55-5.92 and AOR= 8.98, CI: 0.94-85.87 respectively) even though the latter was not significant, age

group (36-45 and 46-55 year age groups compared to <25: AOR= 0.32, CI: 0.12-0.84 and AOR= 0.37, CI: 0.14-1.00 respectively), race (coloured men compared to black men: AOR= 0.22, CI: 0.07- 0.67), age at sexual debut (15-19 years and >=20 years of age at first sex were less likely to have MCPs compared to <15 of age at sexual debut: AOR= 0.43, CI: 0.24-0.75 and AOR= 0.33, CI: 0.16-0.69 respectively), alcohol frequency (men who drink alcohol 2-4 times a months and those who drink 2-3 times a week were more likely to have MCPs compared to the group that never takes alcohol: AOR= 2.10, CI: 1.14-3.86 and AOR= 2.54, CI: 1.23-5.25 respectively), sexual orientation (men who describe their sexual orientation as neither homosexual nor heterosexual were more likely to have MCPs compared to heterosexual men: AOR= 5.64, CI: 1.01-31.45) and perceptions about undetectable viral load reducing HIV transmission risk (those who agree and those who don't know that HIV transmission risk is reduced with undetectable viral loads compared to those who strongly disagree; AOR= 1.77, CI: 1.01-3.09 and AOR= 0.28, CI: 0.11-0.73 respectively).

Factors found not to be associated with MCPs were; education level, employment status, consistent condom use, disclosure of HIV status to spouse, desire for children, duration away from home, circumcision, partners HIV status, CD4 count and currently on ART (the latter two were restricted to HIV positive men only).

Table 3.2: Univariable and multivariable logistic regression analysis for MCPs (Missing data included) N=451

	Univariable Analysis			Multivariable Analysis		
Variable	**OR**	**95% CI**	**P-value**	**AOR**	**95% CI**	**P-value**
Demographic Factors						
Relationship Status			**0.0003***			
Single	Reference			Reference		
Married	1.73	1.05-2.85	0.033*	3.03	1.55-5.92	0.001*
Living with partner	2.23	1.35-3.68	0.002*	1.81	0.99-3.32	0.055
More than one partner	1.00	***	***	1.00	***	***
Divorced not remarried	0.60	0.06-5.89	0.660	0.48	0.03-7.42	0.601
Widowed	3.59	0.64-20.21	0.147	8.98	0.94-85.87	0.057
Other	4.23	2.10-8.54	<0.001*	2.13	0.92-4.93	0.079
Missing	0.83	0.30-2.30	0.719	0.52	0.16-1.75	0.294
Urban Rural			**0.011***			
Urban	Reference			Reference		
Rural	0.30	0.13-0.71	0.006*	0.46	0.17-1.23	0.122
Missing	1.09	0.54-2.17	0.814	1.47	0.65-3.29	0.355
Age Group			**0.217**			
13-25	Reference			Reference		
26-35	1.88	0.97-3.63	0.062	0.78	0.33-1.85	0.574
36-45	1.13	0.58-2.19	0.729	0.32	0.12-0.84	0.021*
46-55	1.38	0.70-2.76	0.354	0.37	0.14-1.00	0.050
55+	1.00	0.40-2.52	1.000	0.40	0.11-1.42	0.157
Missing	2.25	0.56-9.00	0.251	2.20	0.42-11.51	0.351
Education Level			**0.014***			
Primary	Reference			Reference		
Secondary	1.64	0.97-2.76	0.065	1.27	0.68-2.36	0.457
Matric	0.99	0.59-1.67	0.976	0.71	0.36-1.38	0.314
Tertiary	2.12	0.90-4.97	0.085	1.91	0.67-5.46	0.229
Missing	0.53	0.22-1.27	0.154	0.54	0.19-1.58	0.262
Employment			**0.035***			
Unemployed	Reference			Reference		
Job seeking	1.34	0.76-2.38	0.312	1.48	0.72-3.03	0.286
At school	0.26	0.06-1.23	0.089	0.21	0.04-1.24	0.085
Self employed	1.86	0.67-5.14	0.230	1.16	0.33-4.10	0.821
Employed full time	1.38	0.84-2.27	0.201	1.17	0.62-2.23	0.625
Employed part time	1.66	0.95-2.89	0.073	0.82	0.42-1.63	0.574
Missing	0.43	0.13-1.41	0.164	0.43	0.12-1.58	0.205
Race			**<0.001***			
Black	Reference			Reference		
Coloured	0.15	0.06-0.35	<0.001*	0.22	0.07-0.67	0.007*
Other	1.42	0.39-5.10	0.593	1.89	0.35-10.11	0.458
Missing	0.63	0.10-3.81	0.615	1.08	0.13-8.82	0.941
Religion			**0.0002***			
None	Reference			Reference		
Christian	0.46	0.30-0.70	<0.001*	0.65	0.41-1.02	0.063
Other	0.34	0.18-0.63	0.001*	0.56	0.29-1.10	0.094

Missing	0.15	0.02-1.40	0.096	0.26	0.02-2.99	0.279
Behavioural Factors						
Age at First Sex			**<0.001***			
<15	Reference			Reference		
15-19	0.44	0.28-0.69	<0.001*	0.43	0.24-0.75	0.003*
20+	0.32	0.18-0.59	<0.001*	0.33	0.16-0.69	0.003*
Missing	0.13	0.04-0.36	<0.001*	0.37	0.10-1.31	0.124
Condom Use at First Sex			**0.004***			
No	Reference			Reference		
Yes	0.30	0.14-0.65	0.002*	0.61	0.24-1.53	0.292
Missing	0.90	0.38-2.18	0.823	1.72	0.59-5.00	0.319
Consistent Condom Use			**0.199**			
No	Reference			Reference		
Yes	1.34	0.88-2.05	0.173	0.92	0.53-1.60	0.779
Missing	0.88	0.54-1.42	0.594	1.12	0.60-2.07	0.714
Disclosure to Spouse			**0.019***			
No	Reference			Reference		
Yes	1.91	0.31-11.71	0.485			
Missing	1.11	0.18-6.73	0.913			
Alcohol Frequency			**0.021***			
Never	Reference			Reference		
Once a month	1.35	0.79-2.32	0.269	1.41	0.74-2.69	0.300
2-4 times a month	2.20	1.34-3.61	0.002*	2.10	1.14-3.86	0.017*
2-3 times a week	2.04	1.12-3.70	0.020*	2.54	1.23-5.25	0.012*
4 or more times a week	2.31	0.63-8.48	0.206	3.95	0.55-28.20	0.171
Everyday	2.31	0.38-14.18	0.365	4.65	0.40-54.57	0.221
Missing	0.70	0.23-2.10	0.526	1.61	0.40-6.37	0.500
Sex Orientation			**0.042***			
Heterosexual	Reference			Reference		
Homosexual	1.93	0.70-5.33	0.204	2.73	0.74-10.12	0.133
Other	1.40	0.31-6.36	0.659	5.64	1.01-31.45	0.048*
Missing	0.44	0.22-0.88	0.020*	0.35	0.15-0.83	0.016*
Desire for Children			**0.0004***			
No	Reference			Reference		
Yes	0.82	0.54-1.24	0.348	0.96	0.56-1.63	0.880
Don't know	0.76	0.29-1.94	0.561	2.15	0.55-8.34	0.270
Missing	0.30	0.16-0.54	<0.001*	0.82	0.30-2.28	0.705
How Long Away from Home			**0.222**			
Less than a week	Reference			Reference		
1-2 weeks	1.56	0.71-3.40	0.266	1.15	0.45-2.99	0.768
2 weeks to a month	1.45	0.59-3.54	0.417	1.23	0.42-3.55	0.706
1-3 months	1.01	0.32-3.23	0.988	0.54	0.15-1.98	0.352
More than 3 months	0.56	0.23-1.35	0.197	0.65	0.23-1.81	0.407
Missing	1.35	0.79-2.32	0.268	0.85	0.43-1.66	0.628
Partner's sex			**0.073**			
Female	Reference			Reference		
Male	1.12	0.47-2.71	0.795			
Missing	0.51	0.28-0.93	0.028*			

Circumcision			**0.053***			
No	Reference			Reference		
Yes	1.42	0.95-2.14	0.091	1.25	0.76-2.05	0.379
Missing	0.59	0.28-1.26	0.175	0.96	0.38-2.45	0.936
Clinical Factors						
HIV status			**<0.001***			
HIV Negative	Reference			Reference		
HIV Positive	3.92	2.52-6.09	<0.001*	4.60	2.09-10.12	<0.001*
Partner's HIV Status						
HIV Negative	Reference		**0.057***	Reference		
HIV Positive	1.76	1.14-2.72	0.011*	0.76	0.43-1.33	0.335
Don't know	1.19	0.72-1.97	0.496	0.90	0.48-1.70	0.749
Missing	0.86	0.34-2.19	0.751	1.83	0.59-5.69	0.298
CD 4 Count			**<0.001***			
=<350	Reference			Reference		
>350	1.28	0.68-2.40	0.439			
Missing	1.00	***	***			
Undetectable Viral Load			**<0.001***			
Strongly disagree	Reference			Reference		
Disagree	1.68	1.04-2.71	0.032*	1.77	1.01-3.09	0.046*
Agree	0.42	0.19-0.89	0.025*	0.80	0.32-2.00	0.634
Strongly agree	0.39	0.13-1.19	0.100	0.44	0.12-1.66	0.227
Don't know	0.18	0.09-0.39	<0.001*	0.28	0.11-0.73	0.009*
Missing	0.39	0.20-0.75	0.005*	1.25	0.50-3.15	0.631
Currently on ART			**0.888**			
No	Reference			Reference		
Yes	1.08	0.41-2.82	0.872			
Missing	1.60	0.23-11.09	0.634			

OR=Odds Ratio, AOR= Adjusted Odds Ratio, * P-value significant at 5% significance level, missing data included in analysis, *** Components of the variable were excluded from the analysis

3.3 Factors Associated with Consistent Condom Use (CCU)

Table 3.3 shows results from the univariable and multivariable logistic regression analysis for consistent condom use. For ease of analysis the factors were divided into demographic, behavioural and clinical. In this study HIV status was the main exposure variable. From univariable analysis, HIV positive men were five times more likely to have used condoms consistently in the last six months compared to HIV negative men (OR=5.13, CI:3.07-8.57).

There was also evidence of an association between the following factors and consistent condom use in the univariable analysis:

3.3.1 Demographic Factors:

Relationship Status

Men who described their relationship status as other were more likely to use condoms consistently compared to single men (OR=3.35, CI: 1.65- 6.80). Men with more than one partner, divorced not remarried and widowed were also more likely to use condoms consistently (OR= 2.77, CI: 0.45-17.19, OR= 3.70, CI: 0.33-41.86, OR= 3.70, CI: 0.33-41.86 respectively) however this was not statistically significant.

Residence

Men who reside in rural areas were less likely to have had consistent condom use in the last six months compared to their urban counterparts (OR= 0.34, CI: 0.14-0.87).

Age Group

Compared to the under 25 year age group, men in the age groups 26-35, 36-45 and 46-55 were found to be more likely to use condoms consistently with the odds of CCU increasing with increase in age group (OR= 3.00, CI: 1.28-6.70, OR=4.21, CI: 1.79-9.93, OR=5.05, CI: 2.09-12.17 respectively) Beyond age 55, the odds of CCU begin to drop (OR= 1.80, CI: 0.56- 5.79), however this was not significant as shown by the CI.

Education Level

Men with Matric as their highest level of education were found to be less likely to use condoms consistently compared to those who only went as far as primary education

(OR=0.43, CI: 0.24-0.75). The other levels of education were not significantly associated with CCU.

Race

Coloured men were less likely to use condoms consistently compared to black men (OR=0.10, CI: 0.03-0.31).

3.3.2 Behavioural Factors

Alcohol Frequency

Men who take alcohol were less likely to use condoms consistently compared to those who don't drink alcohol, with those who drink once a month and those who drink 2-3 times a week showing statistically significant association with CCU (OR= 0.46, CI: 0.25-0.84 and OR= 0.35, CI: 0.18-0.69 respectively)

Desire for Children

Men who didn't know if they would like to have children in future were found to be less likely to use condoms consistently (OR=0.22, CI: 0.06-0.78)

3.3.3 Clinical factors

Partner HIV Status

Men with HIV positive partners were almost twice more likely to use condoms consistently compared to those with HIV negative partners (OR=1.83, CI: 1.14-2.93).

CD4 Count

This variable was restricted to HIV positive men only. The CD4 count was also found to be associated with CCU, where men with counts of above 350 were less likely to have used condoms consistently in the last six months compared to men with counts of 350 and below.

Perception of HIV transmission with undetectable Viral Load

Men's perception of HIV transmission risk with undetectable viral load was found to be associated with CCU. Men who agreed that an undetectable viral load reduces HIV transmission risk were less likely to have used condoms consistently in the last six months compared to those who strongly disagree with this (OR= 0.44, CI: 0.18-1.04) which is marginally significant.

From the Multivariable analysis it was found that HIV positive men still had a higher adjusted odds of reporting CCU compared to HIV negative men (AOR= 3.72, CI: 1.95- 7.11). Other factors also found to be associated with CCU in the final multivariable model were; relationship status (men who described their relationship status as other were more likely to have used condoms consistently in last six months compared to single men: AOR= 2.27, CI: 0.99-5.22), education level (men who went as far as Matric were less likely to have CCU compared to men who only went as far as primary school: AOR= 0.43, CI: 0.21-0.87), employment status (men in full-time employment compared to the unemployed : AOR= 2.09, CI: 1.04-4.21), race (coloured men compared to black men: AOR= 0.13, CI: 0.03-0.56), alcohol frequency (men who drink once a month, 2-3 times a month compared to men who don't drink: AOR= 0.37, CI: 0.18-0.76 and AOR= 0.33, CI: 0.15-0.72 respectively), and CD4

count (men with CD4 >350 compared to those with CD4=<350: AOR= 0.43, CI: 0.19-0.96) (this was restricted to HIV positive men only).

Factors found not to be associated with consistent condom use in the final model were; area of residence, age group, religion, age at first sex,, condom use at first sex, multiple concurrent partners, disclosure of HIV status to partner, desire for children, sexual orientation, duration away from home, circumcision, perceptions about HIV transmission risk with undetectable viral load and being currently on ART.

Table 3.3: Univariable and Multivariable Logistic Regression Analysis for Consistent Condom Use (Missing Data Included) N=390

	Univariable analysis			Multivariable analysis		
Variable	**OR**	**95% CI**	**P-value**	**AOR**	**95% CI**	**P-value**
Demographic Factors						
Relationship Status			**0.011***			
Single	Reference			Reference		
Married	1.58	0.91-2.74	0.104	1.23	0.62-2.45	0.557
Living with partner	1.15	0.67-1.98	0.610	0.67	0.34-1.31	0.245
More than one partner	2.77	0.45-17.19	0.274	2.16	0.27-17.13	0.464
Divorced not remarried	3.70	0.33-41.86	0.291	7.86	0.38-163.12	0.183
Widowed	3.70	0.33-41.86	0.291	7.79	0.42-143.65	0.167
Other	3.35	1.65-6.80	0.001*	2.27	0.99-5.22	0.053
Missing	0.46	0.12-1.72	0.250	0.20	0.04-1.06	0.059
Urban Rural			**0.047***			
Urban	Reference			Reference		
Rural	0.34	0.14-0.87	0.024*	0.68	0.20-2.28	0.532
Missing	0.78	0.38-1.61	0.505	0.89	0.37-2.14	0.789
Age Group			**0.0007***			
13-25	Reference			Reference		
26-35	3.00	1.28-6.70	0.011*	1.73	0.65-4.55	0.270
36-45	4.21	1.79-9.93	0.001*	2.08	0.74-5.85	0.166
46-55	5.05	2.09-12.17	<0.001*	2.42	0.83-7.09	0.107
55+	1.80	0.56-5.79	0.323	1.13	0.29-4.37	0.863
Missing	1.09	0.19-6.17	0.919	0.33	0.03-3.34	0.348
Education Level			**0.012***			
Primary	Reference			Reference		
Secondary	0.82	0.47-1.41	0.468	0.57	0.29-1.09	0.089
Matric	0.43	0.24-0.75	0.003*	0.43	0.21-0.87	0.019*
Tertiary	1.31	0.48-3.59	0.598	2.58	0.68-9.86	0.165
Missing	0.61	0.24-1.57	0.308	1.12	0.36-3.56	0.842
Employment			**0.180**			
Unemployed	Reference			Reference		
Job seeking	1.11	0.58-2.13	0.749	1.78	0.79-4.03	0.164
At school	0.18	0.02-1.48	0.111	0.26	0.03-2.51	0.245
Self employed	1.23	0.40-3.74	0.714	1.63	0.45-5.92	0.460
Employed full time	1.57	0.92-2.68	0.099	2.09	1.04-4.21	0.039*
Employed part time	1.51	0.85-2.69	0.163	1.85	0.90-3.80	0.093
Missing	1.03	0.32-3.30	0.966	0.90	0.21-3.80	0.888
Race			**<0.001***			
Black	Reference			Reference		
Coloured	0.10	0.03-0.31	<0.001*	0.13	0.03-0.56	0.006*
Other	1.00	***	***	1.00	***	***
Missing	1.00	***	***	1.00	***	***
Religion			**0.312**			
None	Reference			Reference		

Christian	0.71	0.52-1.11	0.129	0.99	0.57-1.70	0.957
Other	0.84	0.44-1.61	0.605	1.90	0.75-4.79	0.176
Missing	1.00	***	***	1.00	***	***
Behavioural Factors						
Age at First Sex			**0.001***			
<15	Reference			Reference		
15-19	1.12	0.70-1.79	0.638			
20+	0.80	0.41-1.56	0.514			
Missing	0.12	0.03-0.53	0.005*			
Condom use at First Sex			**0.331**			
No	Reference			Reference		
Yes	0.62	0.29-1.32	0.214	1.08	0.37-3.14	0.888
Missing	0.65	0.24-1.77	0.399	1.34	0.37-4.88	0.655
Multiple Concurrent Partnerships			**0.251**			
No	Reference			Reference		
Yes	1.42	0.94-2.14	0.097	0.71	0.41-1.21	0.204
Missing	1.23	0.41-3.67	0.716	1.97	0.49-7.93	0.338
Disclosure to Spouse			**0.002***			
No	Reference			Reference		
Yes	3.43	0.35-33.71	0.291	4.73	0.42-53.56	0.210
Missing	1.63	0.17-15.89	0.675	2.58	0.22-29.88	0.448
Alcohol Frequency			**0.001***			
Never	Reference			Reference		
Once a month	0.46	0.25-0.84	0.012*	0.37	0.18-0.76	0.007*
2-4 times a month	0.80	0.48-1.35	0.399	0.77	0.41-1.44	0.412
2-3 times a week	0.35	0.18-0.69	0.002*	0.33	0.15-0.72	0.005*
4 or more times a week	0.55	0.13-2.37	0.421	0.98	0.15-6.52	0.986
Everyday	1.00	-	-	1.00	-	-
Missing	0.13	0.03-0.59	0.008*	0.09	0.01-0.98	0.048*
Sex Orientation			**0.880**			
Heterosexual	Reference			Reference		
Homosexual	0.81	0.19-3.46	0.779			
Other	1.00	-	-			
Missing	1.15	0.58-2.28	0.686			
Desire for Children			**<0.001***			
No	Reference			Reference		
Yes	0.93	0.60-1.46	0.762	1.20	0.71-2.03	0.501
Don't know	0.22	0.06-0.78	0.020*	0.37	0.07-2.11	0.265
Missing	0.17	0.08-0.37	<0.001*	0.67	0.24-1.90	0.449
How Long Away from Home			**0.818**			
Less than a week	Reference			Reference		
1-2 weeks	1.20	0.54-2.69	0.656	0.59	0.22-1.54	0.278
2 weeks to a month	1.63	0.57-4.67	0.367	1.35	0.36-5.08	0.655
1-3 months	0.72	0.20-2.61	0.619	0.36	0.09-1.46	0.153
More than 3 months	0.94	0.38-2.31	0.894	1.50	0.50-4.54	0.474
Missing	1.27	0.71-2.25	0.418	0.87	0.43-1.75	0.689
Partner's Sex			**0.096**			

Female	Reference			Reference		
Male	0.25	0.05-1.13	0.071	0.34	0.04-3.19	0.344
Missing	1.16	0.65-2.09	0.618	1.92	0.92-4.03	0.084
Circumcision			**0.049***			
No	Reference			Reference		
Yes	1.34	0.86-2.08	0.199	1.42	0.84-2.40	0.196
Missing	0.46	0.19-1.11	0.082	0.83	0.28-2.41	0.729
Clinical Factors						
HIV Status			**<0.001***			
HIV Negative	Reference			Reference		
HIV Positive	5.13	3.07-8.57	<0.001*	3.72	1.95-7.11	<0.001*
Partner's HIV Status			**0.002***			
HIV Negative	Reference			Reference		
HIV Positive	1.83	1.14-2.93	0.012*	0.98	0.52-1.85	0.961
Don't know	1.22	0.70-2.11	0.480	0.65	0.31-1.33	0.235
Missing	0.15	0.02-1.16	0.069	0.19	0.02-1.74	0.143
Cd 4 Count			**0.090**			
=<350	Reference			Reference		
>350	0.47	0.23-0.94	0.032*	0.43	0.19-0.96	0.040*
Missing	1.04	0.23-4.75	0.961	1.69	0.30-9.51	0.550
Undetectable Viral Load			**0.0002***			
Strongly disagree	Reference			Reference		
Disagree	0.88	0.53-1.44	0.608	0.71	0.39-1.28	0.258
Agree	0.44	0.18-1.04	0.061	0.39	0.13-1.15	0.087
Strongly agree	0.46	0.15-1.43	0.178	0.78	0.20-3.04	0.724
Don't know	0.45	0.23-0.88	0.021*	0.72	0.31-1.70	0.454
Missing	0.19	0.08-0.44	<0.001*	0.66	0.23-1.95	0.458
Currently on ART			**0.731**			
No	Reference			Reference		
Yes	0.83	0.28-2.45	0.732			
Missing	1.00	***	***			

OR=Odds ratio, AOR= adjusted odds ratio, * P-value significant at 5% significance level, missing data included in analysis. *** Components of the variable were excluded from the analysis

CHAPTER 4. DISCUSSION

4.1 Introduction

The objectives of this research were to determine differences in sexual risk behaviour between HIV positive men and HIV negative men and identify factors associated with sexual risk behaviour in these men. In this chapter the findings of the research will be discussed in the context of currently existing literature.

4.2 Discussion

This study on sexual risk behaviour among men attending PHC clinics in Gauteng and Western Cape between October 2010 and July 2011 has shown that HIV status is a predictor of sexual risk behaviour in men. The outcome measures of sexual risk behaviour used in this research were multiple concurrent sexual partners (MCP) and consistent condom use (CCU). For the relationship between HIV status and multiple concurrent partners more HIV positive men reported having ever had MCPs in the last 12 months than HIV negative (58% and 26% respectively, p value <0.001) whilst on the outcome consistent condom use it was found that 82% of the HIV negatives reported not having used condoms consistently in the last six months compared to 46% among the HIV positive (p value <0.001).

From the multivariable analysis model, the findings revealed that HIV positive men were four times more likely to have had multiple concurrent sexual partners in the last 12 months (AOR=4.60) and were also four times more likely to use condoms consistently (AOR=3.72) compared to HIV negative men. Whilst HIV negative men were less likely to have MCPs,

they were also less likely to use condoms consistently. These findings are contrary to findings from other relatively similar studies. In a previous study conducted by Lauby et al on men who have sex with men and women (MSMW) it was shown that HIV-positive men were equally as likely as HIV-negative men to have unprotected intercourse with non-main male and non-main female partners perceived as HIV-negative or of unknown HIV status(17). The differences in study results could be explained by the differences in sexual orientation, where in our study the vast majority of men were heterosexual compared to the other study.

In South Africa, multiple concurrent sexual partnerships are notably a major contributor to the transmission of HIV (4) and coupled with this is the inconsistent use of condoms. One possible explanation for the higher CCU among the HIV positives compared to the negatives could be that following a positive HIV result, there is on-going counselling with a strong emphasis on condom use. HIV positives have sustained contact with health facilities where risk reduction messages are re-enforced over and over again. On the other hand experience has shown that post-test counselling following an HIV negative result is one that is often rushed and is not as detailed as the one following an HIV positive result. Post-test counselling messages for those who test positive are mainly geared towards preventing the transmission of HIV to other people, preventing re-infection and positive and healthy living, not much is said to those who test negative about how important it is to remain negative and prevent HIV acquisition. This approach to counselling has the potential to make the HIV positives appear as vectors of the disease and are therefore singularly expected to shoulder the responsibility to protect others (the HIV negatives) from the disease whilst the HIV negatives are seen as

victims. In order for us to reduce the incidence of HIV, post-test counselling messages need to stress that it is everyone's responsibility; the HIV negative have to ensure that they remain negative and the HIV positive have to ensure that they don't spread the virus to other people. Following an HIV negative result, people can easily become complacent and this can lower one's HIV risk perception thereby putting one at increased risk of HIV acquisition hence the finding that HIV negative were less likely to use condoms consistently compared to HIV positive men.

Fifty eight percent of HIV positive men were found to have ever had MCPs in the last 12 months compared to 26% of HIV negative men with an adjusted odds ratio of 4.60. This study did not go as far as exploring reasons why HIV positive and HIV negative men exhibit certain sexual risk behaviour. One possible explanation for this could be that the HIV positives use condoms consistently therefore this might promote "promiscuity" and there is evidence pointing towards this, however all that is anecdotal at the moment. It is possible that HIV negative men have fewer partners therefore will use condoms less consistently because of "perceived" reduced risk of HIV acquisition. However, when the relationship between MCPs and CCU and vice versa was investigated, no association was found between the two outcome measures of sexual risk behaviour.

For both groups in terms of other factors associated with MCPs the study showed that; relationship status, age group, race, age at sexual debut, alcohol frequency and perceptions about undetectable viral load reducing HIV transmission were significantly associated with

MCP. Being married is associated with increased odds of having MCPs and evidence shows that in South Africa MCPs are the drivers of the HIV epidemic. However, men in older age groups have decreased odds of having MCPs compared to those under 25 years, yet the older age groups is where one would expect to find the majority of married men. It is therefore very difficult to reconcile the findings in MCPs in the two variables. Delaying age at first sex is associated with decreased MCP risk and this is an important finding given that children are beginning to engage in sexual intercourse at a much younger age these days.

The frequency of alcohol consumption is associated with higher odds of MCPs, the more men drink alcohol, the higher the odds of having MCPs, and this evidence has been corroborated by earlier studies. In a cross-sectional population based survey in a rural community in Uganda with a generalized epidemic, it was found that the factors associated with concurrency amongst others were marital status, age at sexual debut (among men and women) and problem drinking (men only) (27). Interestingly, our study showed that knowledge about viral load and HIV transmission risk was associated with increased odds of having MCPs (those who agree that HIV transmission risk is reduced with undetectable viral loads compared to those who strongly disagree; AOR= 1.77, CI: 1.01-3.09 and AOR= 0.28, CI: 0.11-0.73 respectively). Men who didn't have knowledge about HIV transmission and viral load had decreased odds of having MCPs.

Regarding other factors associated with Consistent Condom Use (CCU) the final multivariable model showed the following; relationship status, education level, employment status, race,

alcohol frequency and CD4 count were all significantly associated with (restricted to the HIV positives only) CCU. A study conducted by Sunmola showed that men who used condoms for all sexual encounters were more likely to be single, had 12 - 18 years of schooling, worked as intermediate level staff (28).

In this study we found that single men were less likely to use condoms consistently (not significant for most categories), this is an unexpected finding because one would expect single men to practise safer sex as they are not in established relationships yet. Those with Matric (12 years of schooling) were less likely to use condoms consistently compared to men with primary school education (OR=0.43). Again this is unexpected, since one would expect that matriculants would be more knowledgeable about risky sexual behaviour compared to primary school graduates because of life skills orientation in the higher grades of schooling. Men in full time employment were more likely to use condoms consistently compared to the unemployed (OR=2.09). This finding possibly highlights the issue of access to condoms in South Africa, where those employed can afford to buy condoms hence are using them more compared to the unemployed who cannot afford to buy condoms.

Several studies have shown the association between frequency of alcohol use and condom use. This study also confirmed this association indicating a less likelihood of using condoms consistently the higher the frequency of alcohol consumption. In contrast one study conducted in South Africa showed that among people who drink, greater quantities of alcohol consumption predict greater sexual risks than does frequency of drinking (29).

Men who agree that an undetectable viral load reduces risk of HIV transmission were found to be less likely to use condoms consistently compared to those who disagree, however, this association was marginally significant (OR=0.39, CI: 0.13-1.15). This finding is in keeping with another study done in the USA on MSM whereby belief that an undetectable viral load reduces infectiousness was shown to be associated with unprotected insertive and receptive anal intercourse (25). In contrast to a study conducted in South Africa which found that condom use at sexual debut was one of the most significant predictors of condom use at last intercourse (20), this study comparing HIV negative and positive men found no association between condom use at sexual debut and CCU.

4.3 Possible Limitations of the Study

1. The primary study used convenience sampling to select study subjects therefore the results cannot be generalized to other populations of HIV positive and negative men.

2. The primary study was aimed at HIV positive men only hence there were more HIV positive men than HIV negative men who participated in the study.

3. Data collection was through a self-reported questionnaire and this raises issues of bias. Participants are likely to under report behaviour that might be socially unacceptable or considered to have a negative impact and over-report/exaggerate socially acceptable behaviour.

4. The primary study was a cross sectional design and by nature of this design, temporality is always difficult to establish hence one can never know which came first between the exposure and the outcome.

CHAPTER 5. CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter provides a conclusion to the study and also makes recommendations for policy makers and program managers

5.2 Conclusion

The results from this study demonstrate the stark differences in sexual risk behaviour between HIV positive and HIV negative men in Gauteng and Cape Town. HIV positive men were found to be four times more likely to have had MCPs in the last 12 months and were also four times more likely to have used condoms consistently in the last six months compared to their HIV negative counterparts. The expectation is that following an HIV status test, individuals will be more informed about how to modify sexual behaviour in order to prevent HIV transmission and acquisition, but this study demonstrates that there may be some gaps in our counselling messages. We see in this study that HIV negative men were less likely to have used condoms consistently in the last six months compared to the HIV positive, yet the former are the ones at risk of contracting of HIV. Could this be related to our behaviour change messages post HIV testing; where the focus has been on reducing HIV transmission vs. acquisition? This study also highlights the complex nature of sexual behaviour and the challenges confronting policy and program planners in the packaging of targeted behaviour change messages.

Whilst the use of condoms consistently has been promoted as an HIV prevention method for almost 30 years and the government provides condoms freely in this country, this study found that 82% of the HIV negative participants reported not having used condoms consistently in the last six months compared to 46% among the HIV positive participants (p values <0.001). On the other hand, partner HIV status was found not to be associated with consistent condom use or multiple concurrent sexual partners. This raises serious questions about our messaging, could it be that our messages are not effective or is it because the public is experiencing HIV message fatigue? This study being one of very few studies to have looked at sexual risk behaviour in HIV positive men and HIV negative men, offers valuable information into this problem in South Africa and more studies are needed to confirm these findings and to further investigate the possible explanations for such behaviour.

5.3 Recommendations

Based on the findings from the study, one can begin to appreciate the gaps that exist in our messaging during and after HIV testing, it is therefore recommended that another study be done to look into the quality of HIV post-test test counselling and follow-up. HIV negative individuals should be encouraged to test regularly to ensure that they remain negative because the tendency is for people to test once and if found to be negative then they assume a negative status for life, yet this is not case.

Behaviour change messages need to begin to address the gap noted in this study in order to ensure that HIV negative people remain negative. What has been found in women attending ANC is that, women who tested HIV negative early on in the pregnancy are later found to be HIV positive towards the end of the pregnancy. For example, it has been estimated that MTCT secondary to sero-conversion during pregnancy could account for more than 40% of all ongoing MTCT in Botswana (30) where repeat HIV testing during pregnancy is performed infrequently if a woman has had an earlier negative antepartum HIV test. This finding clearly exposes some gaps in the way we provide post-test counselling especially for the HIV negative. Our messages need to change from preventing HIV transmission to preventing HIV transmission and acquisition and in that way; both the HIV positive and the HIV negative have the responsibility to halt and even reverse the HIV incidence in this country. Some cultural norms need to be addressed especially around the subject of multiple concurrent partnerships, where previous studies have shown that such behaviour is a norm in some men circles. Men from the coloured race and other races were found to be less likely to have MCPs compared to black men; specific behaviour change messages for black men have to emphasize the role played by MCPs and the HIV networks in the transmission and acquisition of HIV.

This study also demonstrated that delaying sexual debut decreases MCP, so messages for those who have not started engaging in sex must include delaying age at first sexual encounter. It was long recognized that alcohol consumption is associated with risky sexual behaviour and this study confirms that. This study showed that the higher the alcohol consumption frequency, the higher the odds of having MCPs and the lower odds of CCU, therefore

behaviour change messages have to address this social ill as well. There is a need for multi-faceted HIV intervention strategies for reducing levels of alcohol abuse in general, and enhancing protective sexual behaviors among alcohol-using populations (31).

It is also recommended that a similar study be conducted on a larger sample size to attempt to answer the same research question as well investigate possible reasons for sexual risk behaviour among HIV positive and HIV negative men.

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APPENDICES

Appendix 1: Ethics Clearance Certificate from the Wits Human Research Ethics Committee

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
R14/49 Dr Hloniphile I Mabuza

CLEARANCE CERTIFICATE	M121120
PROJECT	Comparison of Sexual Risk Behaviour between HIV Positive Men andHIV Negative Men in Gauteng and the Western Cape
INVESTIGATORS	Dr Hloniphile I Mabuza,
DEPARTMENT	School of Public Health
DATE CONSIDERED	30/11/2012
DECISION OF THE COMMITTEE*	Approved unconditionally

Unless otherwise specified this ethical clearance is valid for 5 years and may be renewed upon application.

DATE 30/11/2012 CHAIRPERSON .....
(Professor PE Cleaton-Jones)

*Guidelines for written 'informed consent' attached where applicable
cc: Supervisor : Dr Charles Chasela

DECLARATION OF INVESTIGATOR(S)
To be completed in duplicate and ONE COPY returned to the Secretary at Room 10004, 10th Floor, Senate House, University.
I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. I agree to a completion of a yearly progress report.

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES...

Appendix 2: Univariable and Multivariable Logistic Regression Analysis – Multiple Concurrent Partnerships (Missing Data Excluded) N=348

	Univariable Analysis			Multivariable Analysis		
Variable	**OR**	**95% CI**	**P-value**	**AOR**	**95% CI**	**P-value**
Demographic factors						
Marital status						
Single	Reference			Reference		
Married	1.73	1.05-2.85	0.033*	2.17	1.14-4.16	0.019*
Living with partner	2.23	1.35-3.68	0.002*	1.96	1.04-3.71	0.037*
More than one partner	1.00	-	-	1.00	-	-
Divorced not remarried	0.60	0.06-5.89	0.660	0.48	0.03-7.63	0.606
Widowed	3.59	0.64-20.21	0.147	6.99	0.92-52.88	0.060
Other	4.23	2.10-8.54	<0.001*	2.18	0.91-5.20	0.079
Urban Rural						
Urban	Reference			Reference		
Rural	0.30	0.13-0.71	0.006*	0.39	0.12-1.26	0.116
Age Group						
13-25	Reference			Reference		
26-35	1.88	0.97-3.63	0.062	0.76	0.24-2.41	0.638
36-45	1.13	0.58-2.19	0.729	0.31	0.09-1.05	0.061
46-55	1.38	0.70-2.76	0.354	0.31	0.09-1.11	0.071
55+	1.00	0.40-2.52	1.000	0.44	0.10-1.98	0.284
Education Level						
Primary	Reference			Reference		
Secondary	1.64	0.97-2.76	0.065	1.00	0.49-2.05	0.999
Matric	0.99	0.59-1.67	0.976	0.59	0.25-1.37	0.220
Tertiary	2.12	0.90-4.97	0.085	1.17	0.32-4.30	0.810
Employment						
Unemployed	Reference			Reference		
Job seeking	1.34	0.76-2.38	0.312	1.43	0.64-3.21	0.385
At school	0.26	0.06-1.23	0.089	1.00	-	-
Self employed	1.86	0.67-5.14	0.230	0.79	0.23-2.78	0.715
Employed full time	1.38	0.84-2.27	0.201	0.86	0.43-1.73	0.671
Employed part time	1.66	0.95-2.89	0.073	0.77	0.37-1.58	0.471
Race						
Black	Reference			Reference		
Coloured	0.15	0.06-0.35	<0.001*	0.38	0.10-1.43	0.153
Other	1.42	0.39-5.10	0.593	1.00	-	-
Religion						
None	Reference			Reference		
Christian	0.46	0.30-0.70	<0.001*	0.80	0.45-1.41	0.436
Other	0.34	0.18-0.63	0.001*	0.57	0.23-1.39	0.217
Behavioural Factors						
Age at First Sex						
<15	Reference			Reference		
15-19	0.44	0.28-0.69	<0.001*	0.39	0.21-0.72	0.003*
20+	0.32	0.18-0.59	<0.001*	0.31	0.14-0.68	0.004*

Condom Use at First Sex						
No	Reference			Reference		
Yes	0.30	0.14-0.65	0.002*	0.56	0.20-1.55	0.263
Consistent Condom Use						
No	Reference			Reference		
Yes	1.34	0.88-2.05	0.173	0.82	0.43-1.53	0.529
Disclosure to Spouse						
No	Reference			Reference		
Yes	1.91	0.31-11.71	0.485			
Alcohol Frequency						
Never	Reference			Reference		
Once a month	1.35	0.79-2.32	0.269	1.20	0.60-2.41	0.601
2-4 times a month	2.20	1.34-3.61	0.002*	1.94	1.02-3.66	0.039*
2-3 times a week	2.04	1.12-3.70	0.020*	2.80	1.27-6.19	0.011*
4 or more times a week	2.31	0.63-8.48	0.206	4.04	0.57-28.45	0.161
Everyday	2.31	0.38-14.18	0.365	3.32	0.23-48.42	0.381
Sex Orientation						
Heterosexual	Reference			Reference		
Homosexual	1.93	0.70-5.33	0.204	1.98	0.34-11.47	0.445
Other	1.40	0.31-6.36	0.659	2.18	0.22-21.87	0.508
Desire for Children						
No	Reference			Reference		
Yes	0.82	0.54-1.24	0.348	0.94	0.52-1.70	0.842
Don't know	0.76	0.29-1.94	0.561	1.96	0.39-9.81	0.414
How Long Away from Home						
Less than a week	Reference			Reference		
1-2 weeks	1.56	0.71-3.40	0.266	2.00	0.59-6.71	0.263
2 weeks to a month	1.45	0.59-3.54	0.417	1.11	0.24-5.14	0.894
1-3 months	1.01	0.32-3.23	0.988	0.50	0.10-2.47	0.392
More than 3 months	0.56	0.23-1.35	0.197	0.80	0.23-2.85	0.735
Partner's Sex						
Female	Reference			Reference		
Male	1.12	0.47-2.71	0.795			
Circumcision						
No	Reference			Reference		
Yes	1.42	0.95-2.14	0.091	1.32	0.72-2.40	0.371
Clinical Factors						
HIV Status						
HIV Negative	Reference			Reference		
HIV Positive	3.92	2.52-6.09	<0.001*	2.29	1.12-4.69	0.024*
Partner's HIV Status						
HIV Negative	Reference			Reference		
HIV Positive	1.76	1.14-2.72	0.011*	0.74	0.41-1.35	0.335
Don't know	1.19	0.72-1.97	0.496	1.07	0.54-2.10	0.852
Cd 4 Count						

=<350	Reference			Reference		
>350	1.28	0.68-2.40	0.439			
Undetectable Viral Load						
Strongly disagree	Reference			Reference		
Disagree	1.68	1.04-2.71	0.032*	1.79	1.03-3.13	0.039*
Agree	0.42	0.19-0.89	0.025*	0.78	0.31-1.93	0.588
Strongly agree	0.39	0.13-1.19	0.100	0.56	0.16-2.02	0.379
Don’t know	0.18	0.09-0.39	<0.001*	0.21	0.08-0.56	0.002*
Currently on ART						
No	Reference			Reference		
Yes	1.08	0.41-2.82	0.872			

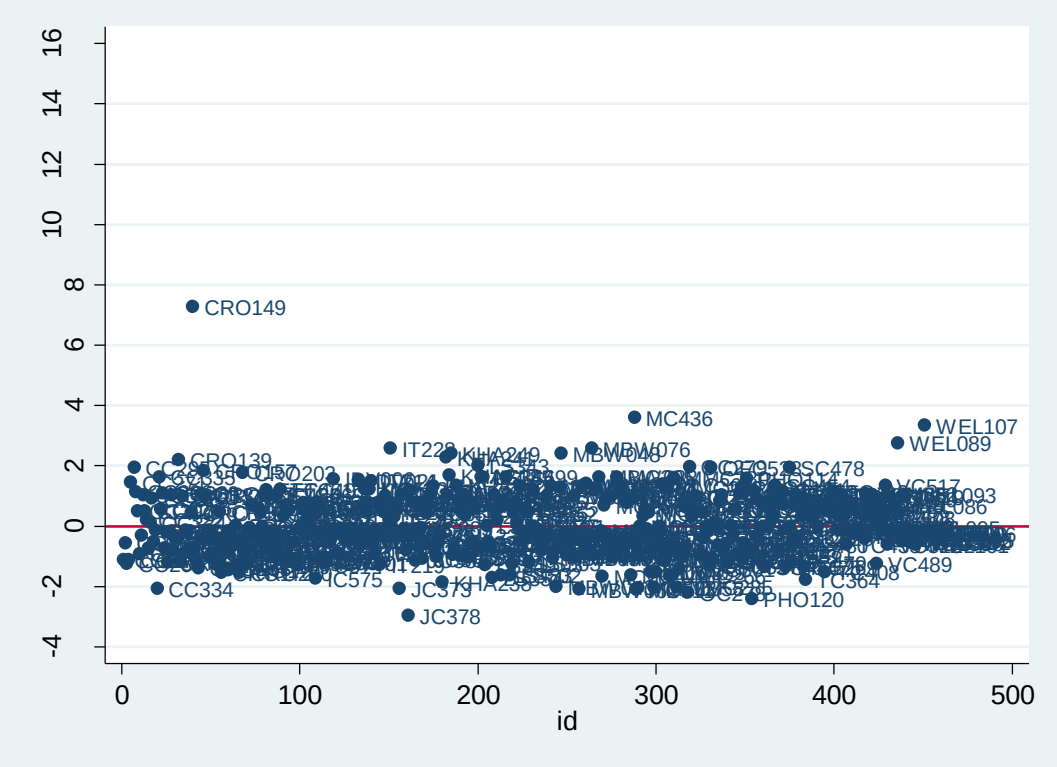
Appendix 3: Univariable and Multivariable Logistic Regression Analysis – Consistent Condom Use (Missing Data Excluded) N=323

	Univariable analysis			Multivariable analysis		
Variable	**OR**	**95% CI**	**P-value**	**AOR**	**95% CI**	**P-value**
Demographic Factors						
Marital Status						
Single	Reference			Reference		
Married	1.58	0.91-2.74	0.104	1.66	0.89-3.08	0.108
Living with partner	1.15	0.67-1.98	0.610	0.80	0.44-1.45	0.471
More than one partner	2.77	0.45-17.19	0.274	1.95	0.29-12.93	0.491
Divorced not remarried	3.70	0.33-41.86	0.291	7.38	0.30-183.97	0.223
Widowed	3.70	0.33-41.86	0.291	7.38	0.30-183.97	0.223
Other	3.35	1.65-6.80	0.001*	2.08	0.97-4.47	0.060
Urban Rural						
Urban	Reference			Reference		
Rural	0.34	0.14-0.87	0.024*	0.66	0.21-2.07	0.473
Age Group						
13-25	Reference			Reference		
26-35	3.00	1.28-6.70	0.011*	0.57	0.07-4.51	0.591
36-45	4.21	1.79-9.93	0.001*	0.72	0.09-5.81	0.762
46-55	5.05	2.09-12.17	<0.001*	0.80	0.10-6.57	0.832
55+	1.80	0.56-5.79	0.323	0.43	0.04-4.46	0.476
Education Level						
Primary	Reference			Reference		
Secondary	0.82	0.47-1.41	0.468	0.56	0.29-1.08	0.084
Matric	0.43	0.24-0.75	0.003*	0.47	0.23-0.95	0.034
Tertiary	1.31	0.48-3.59	0.598	2.17	0.60-7.86	0.236
Employment						
Unemployed	Reference			Reference		
Job seeking	1.11	0.58-2.13	0.749	1.70	0.77-3.74	0.188
At school	0.18	0.02-1.48	0.111	1.00	-	-
Self employed	1.23	0.40-3.74	0.714	2.03	0.52-7.88	0.307
Employed full time	1.57	0.92-2.68	0.099	1.91	0.99-3.67	0.023
Employed part time	1.51	0.85-2.69	0.163	1.77	0.87-3.62	0.116
Race						
Black	Reference			Reference		
Coloured	0.10	0.03-0.31	<0.001*	0.21	0.05-0.79	0.021*
Other	1.00	-	-	1.00	-	-
Religion						
None	Reference			Reference		
Christian	0.71	0.52-1.11	0.129	1.24	0.70-2.19	0.465
Other	0.84	0.44-1.61	0.605	2.44	0.87-6.82	0.090
Behavioural Factors						
Age at First Sex						
<15	Reference			Reference		
15-19	1.12	0.70-1.79	0.638			
20+	0.80	0.41-1.56	0.514			
Condom Use at First						

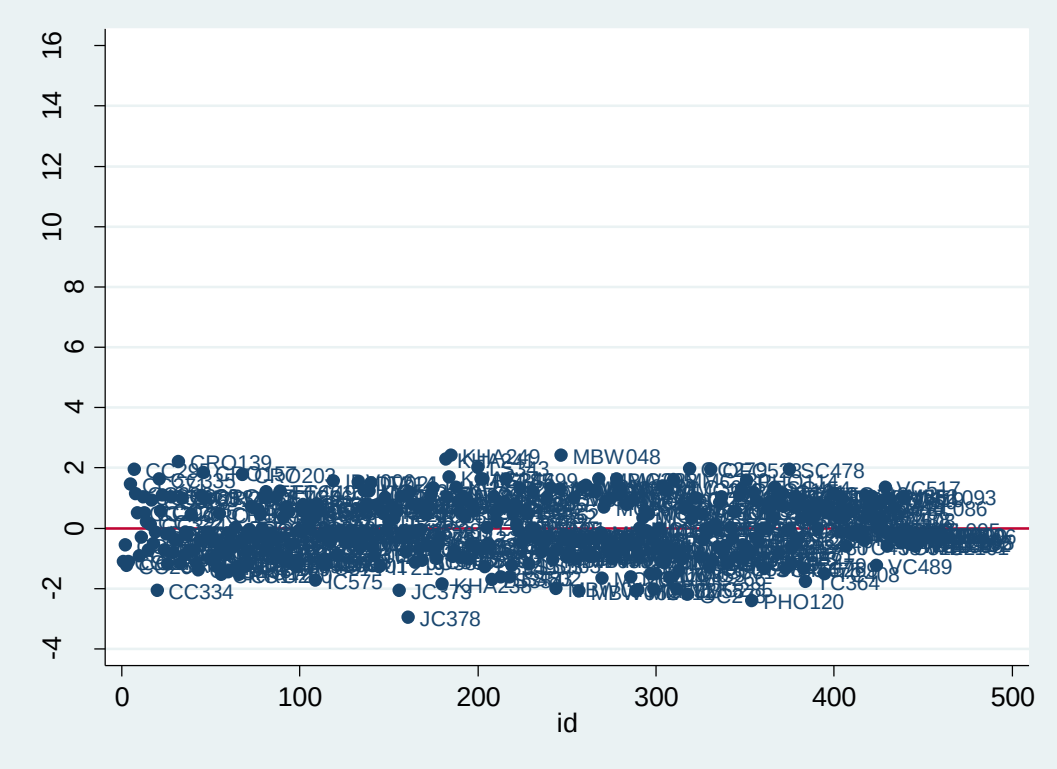
Sex						
No	Reference			Reference		
Yes	0.62	0.29-1.32	0.214	2.09	0.64-6.79	0.221
Multiple Concurrent Partnerships						
No	Reference			Reference		
Yes	1.42	0.94-2.14	0.097	0.87	0.50-1.52	0.632
Disclosure to Spouse						
No	Reference			Reference		
Yes	3.43	0.35-33.71	0.291	0.78	0.05-12.39	0.857
Alcohol Frequency						
Never	Reference			Reference		
Once a month	0.46	0.25-0.84	0.012*	0.46	0.22-0.97	0.042*
2-4 times a month	0.80	0.48-1.35	0.399	0.74	0.40-1.39	0.352
2-3 times a week	0.35	0.18-0.69	0.002*	0.33	0.15-0.71	0.005*
4 or more times a week	0.55	0.13-2.37	0.421	1.13	0.21-7.34	0.806
Everyday	1.00	-	-	1.00	-	-
Sex Orientation						
Heterosexual	Reference			Reference		
Homosexual	0.81	0.19-3.46	0.779			
Other	1.00	-	-			
Desire for Children						
No	Reference			Reference		
Yes	0.93	0.60-1.46	0.762	1.21	0.71-2.08	0.487
Don’t know	0.22	0.06-0.78	0.020*	0.17	0.02-1.58	0.119
How Long Away From Home						
Less than a week	Reference			Reference		
1-2 weeks	1.20	0.54-2.69	0.656	1.01	0.32-3.20	0.986
2 weeks to a month	1.63	0.57-4.67	0.367	0.73	0.17-3.17	0.672
1-3 months	0.72	0.20-2.61	0.619	0.42	0.09-2.05	0.285
More than 3 months	0.94	0.38-2.31	0.894	0.86	0.26-2.81	0.803
Partner’s Sex						
Female	Reference			Reference		
Male	0.25	0.05-1.13	0.071	0.38	0.04-3.65	0.401
Circumcision						
No	Reference			Reference		
Yes	1.34	0.86-2.08	0.199	1.18	0.69-2.03	0.551
Clinical Factors						
HIV status						
HIV Negative	Reference			Reference		
HIV Positive	5.13	3.07-8.57	<0.001*	3.86	2.03-7.35	<0.001*
Partner’s HIV status						
HIV Negative	Reference			Reference		
HIV Positive	1.83	1.14-2.93	0.012*	0.70	0.36-1.35	0.285
Don’t know	1.22	0.70-2.11	0.480	0.58	0.28-1.78	0.130
Cd 4 Count						
=<350	Reference			Reference		
>350	0.47	0.23-0.94	0.032*	0.61	0.26-1.44	0.257

Undetectable Viral Load						
Strongly disagree	Reference			Reference		
Disagree	0.88	0.53-1.44	0.608	0.89	0.50-1.61	0.709
Agree	0.44	0.18-1.04	0.061	0.41	0.13-1.24	0.113
Strongly agree	0.46	0.15-1.43	0.178	0.92	0.21-4.01	0.910
Don't know	0.45	0.23-0.88	0.021*	0.79	0.34-1.85	0.588
Currently on ART						
No	Reference			Reference		
Yes	0.83	0.28-2.45	0.732			

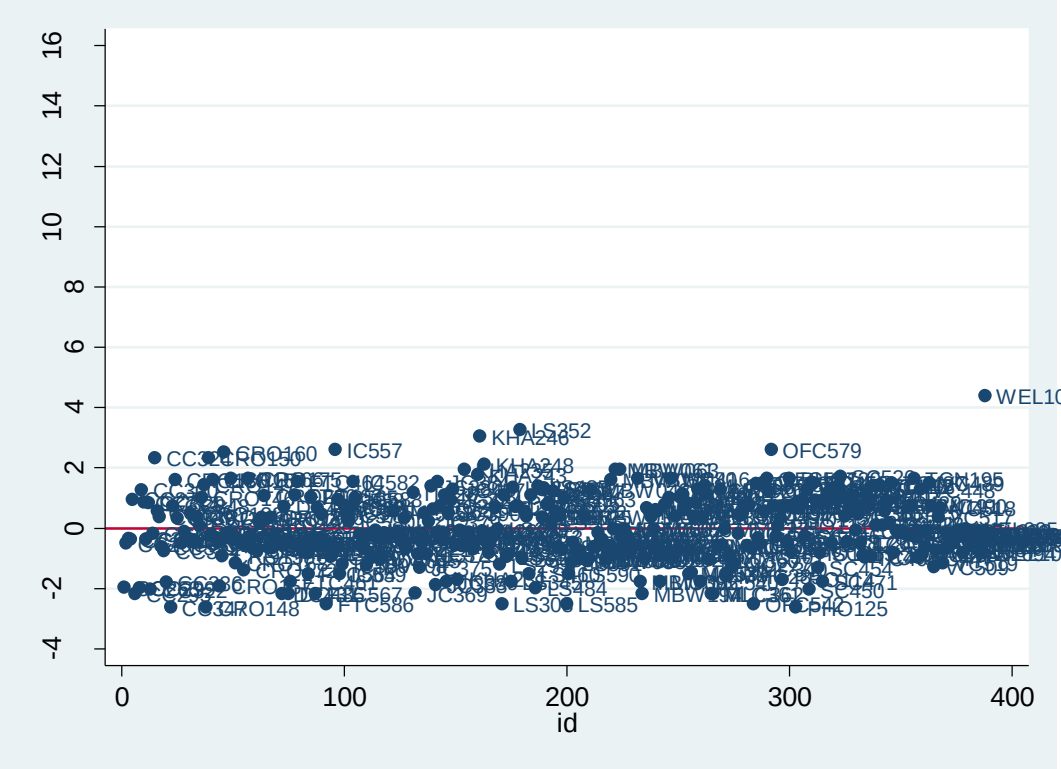
Appendix 4: Residuals with Outliers - Multiple Concurrent Partnerships



Appendix 5: Residuals without Outliers - Multiple Concurrent Partnerships



Appendix 6: Residuals with Outliers - Consistent Condom Use



Appendix 7: Residuals without Outliers Consistent Condom Use