

# Correlates of HIV infection among people visiting public HIV counseling and testing clinics in Mpumalanga, South Africa

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## Abstract

**Background:** HIV voluntary counselling and testing (VCT) reduces high-risk sexual behaviour. Factors associated with HIV infection in VCT clients have not been well characterized in South Africa.

**Objectives:** A case-control study was carried out to determine the association between socio-demographic and HIV risk variables and HIV infection among people visiting HIV counseling and testing centers in two districts in Mpumalanga province, South Africa. Cases (n=1093) and controls (n=1162) were compared by socio-demographics, exposure to substances, and risky behaviours that predispose them to HIV infection.

**Results:** In multivariable analysis, having children, having been diagnosed with a sexually transmitted infection (STI) in the past three months, not having had oral sex in the past three months, lack of condom use consistency in the past three months, and lack of HIV behavioural skills enactments were significantly associated with HIV positive status.

**Conclusion:** HIV risk behaviour was found to be a significant risk factor for HIV infection in the study population. There is urgent need for health education to bring about behavioural changes to reduce HIV infection in the community.

**Key words:** Clients, HIV counselling and testing centres, HIV status

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## Introduction

In 2009, the estimated prevalence of HIV was 17.8% (15-49 year olds) and 5.6 million were estimated to be living with HIV in South Africa.<sup>1</sup> Despite an increase in campaigns promoting HIV testing and increased availability of HIV counselling and testing (HCT) services in South Africa, the uptake of HCT remains low. According to the national population-based HIV survey in 2005, only 30.5% (27.6% men and 32.9% women) of those aged 15 years and above had ever had an HIV test.<sup>2</sup> HIV counselling and testing is seen as a key strategy for reducing the spread of HIV infection in South Africa.<sup>3</sup> One of the aims of the National Strategic Plan (NSP) on HIV and AIDS and Sexually Transmitted Infections (STIs) 2007-2011, is to increase the coverage of HCT and promote regular testing.<sup>3</sup>

Voluntary Counselling and Testing (VCT) is a national programme which allows an individual

the opportunity to undergo counselling, enabling him/her to make an informed choice about being tested for HIV. It also provides people with an opportunity to learn and accept their HIV serostatus in a confidential environment, with counselling and referral for ongoing emotional support and medical care.<sup>4</sup> HIV testing is a complex issue with important implications and consequences for the individual. Informing a person of his/her positive serostatus impacts on their quality of life and should be considered a major intervention. This can be carried out effectively by a trained counsellor with skills, and in a conducive environment.<sup>5</sup>

Various correlates of being HIV-positive from voluntary counselling and HIV testing centres have been identified: 1) socio-demographic factors such as age,<sup>6-8</sup> (younger age,<sup>9</sup> older age,<sup>10,11</sup>) female gender,<sup>7,11-13</sup> marital status, (being married,<sup>8,14</sup> being single,<sup>9,11</sup> widowed/older widowed women,<sup>6,11,13</sup>) poor or low education level,<sup>6,7,10,11,13,15</sup> lower income,<sup>9,13,15</sup> occupational/employment status,<sup>7,14</sup> 2) HIV risk behaviour including multiple sex partners,<sup>8,16</sup> lack of (consistent) condom use,<sup>7,11,15</sup> substance use (alcohol drinking),<sup>9</sup> use of alcohol before sex,<sup>8</sup> testing positive for HIV in the past,<sup>9</sup> intention to reduce their HIV risk behaviour,<sup>15</sup> 3) health status-HIV symptomatic,<sup>12,17</sup> and history of sexually transmitted infections (STI).<sup>7,11</sup> Furthermore, previous studies

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found differences in HIV prevalence of persons at HIV counselling and testing clinics, with HIV mostly higher in women<sup>7,11-15,18</sup>. One study found HIV higher in men than in women.<sup>6</sup> Reviews on studies conducted in the general population in sub-Saharan Africa have shown that alcohol use was associated with HIV risk behaviour and HIV infection.<sup>19,20</sup> Little information exists on various correlates (especially on socio-demographic factors, HIV risk behaviour, and health status) of being HIV-positive from HIV counselling and testing centres in South Africa.

This study was conducted to explore the association between HIV infection and socio-demographic and HIV risk variables among people visiting HIV counselling and testing clinics in Mpumalanga province, South Africa.

## **Methods**

### **Design**

A case-control study to determine the association between socio-demographic and HIV risk variables and HIV infection among people visiting HIV counselling and testing centers was conducted in two districts in Mpumalanga province, South Africa.

Both cases and controls were those people who visited those health institutions for HIV counselling and testing purposes during the study period. The classification of cases and controls was based on sero status of those people tested for HIV. Those people who were HIV sero positives were designated as cases and those who were HIV sero negatives were designated as controls. People who were 18 years and above, those who came for HIV counselling and testing, those who were HIV seropositives, and those who volunteered to participate in the study were considered as cases, while people who were 18 years and above, who came for HIV counselling and testing, and were HIV seronegatives and volunteered to participate in the study were considered as controls.

### **Sample and procedure**

#### **Participants and setting**

Consecutive clients receiving services at 13 HCT clinics in Gert Sibande District and 14 HCT clinics in Nkangala District, Mpumalanga, were referred by a lay counsellor in the clinic to an interviewer to complete an assessment interview, after post-test HIV counselling. The criterion for referral to the study was that the patient was 18 years old, and diagnosed HIV positive of every third person diagnosed HIV negative. Systematic sampling was used by including

every consecutive person diagnosed HIV positive and every third consecutive person diagnosed HIV negative. Sampling occurred throughout all hours of clinic operation over a five-month period. Patients who agreed to enroll in the study completed informed consent and were scheduled for a baseline assessment. This baseline assessment happened immediately after post-test counselling and was conducted by a trained field worker. Data were collected using structured questionnaires. Data collectors were external interviewers who were trained on the procedures. The designed questionnaire was translated first into the local languages (Zulu and Swati) and back translated to English to ensure its consistency. The questionnaires were pretested in similar settings two weeks before the actual data collection. The collected data were checked for completeness, accuracy, clarity and consistency by a supervisor and the principal investigator on a daily basis. Ethics approval for the study protocol was obtained from the Human Sciences Research Council (HSRC) Ethics committee, and approval was obtained from the Mpumalanga Health Department as well as the health authorities in the study sites. Informed consent was obtained from each participant.

### **Measures**

#### **HIV/AIDS knowledge test**

A 26-item test was used to assess HIV risk and prevention related knowledge. Items were adapted from a measure reported by Carey and Schroder<sup>21</sup> and reflected information about HIV transmission, condom use, and AIDS-related knowledge, items were responded to as Yes, No, or Don't Know. The AIDS knowledge test was scored for the number of correct responses, with Don't Know responses scored incorrect and possible range of scores 0–26 expressed as total correct responses. Cronbach alpha was 0.88 for this sample.

#### **HIV risk reduction intentions**

To assess motivation to reduce risks, participants responded to a seven-item scale assessing personal intentions to engage in risk reducing behaviours. Examples of items include "I will use a condom even if my partner does not want to" "I will use condoms," and "I will remind myself to use a condom during sex" anchored on 6-point scales ranging from 1 = I will definitely not do to 6 = I will do definitely. Theories of behaviour change postulate a close temporal relationship between intentions to change behaviour and changes in actual

behaviour.<sup>22</sup> The risk reduction intentions scale had a range of possible scores from 7 to 42. Cronbach alpha was 0.87 for this sample.

#### **HIV risk reduction confidence or self-efficacy**

Risk reduction confidence or self-efficacy was assessed with three stories and three risk reduction self-efficacy questions, e.g. "I will discuss safer sex with the partner in this situation." Each story had three response options (rated from 0=cannot do it to 10=certain I can do it). The number of risk reduction self-efficacy items was summed to form a composite score with a range of 9 to 90. Cronbach alpha was 0.94 for this sample.

#### **HIV behavioural skills enactments**

Participants reported their use of 14 behavioural strategies to reduce the risk for HIV and other STIs in the past three months. Specific behaviours were adapted from Bryan, Fisher, and Fisher<sup>23</sup> research on HIV prevention preparatory behaviours, and included retrospective reports of behaviours that facilitate condom use, e.g., "I have kept condoms nearby me," "I told a partner that we needed to use a condom," and "I got free condoms from a clinic or other agency." Each preparatory behaviour was responded to as Yes or No for having performed the act in the previous month. The number of preparatory behaviours was summed to form a composite score with a range of 0–14. Cronbach alpha was 0.92 for this sample.

#### **Sexual behaviours**

Participants responded to items assessing their number of male and female sexual partners and frequency of sexual behaviours in the previous three months, specifically vaginal and anal intercourse with and without condoms. A three-month retrospective period was selected because previous research has shown reliable reports of numbers of partners and sexual events over this time period.<sup>24</sup> Participants were instructed to think back over the past 90 days (three months) and estimate the number of sex partners and number of sexual occasions in which they practiced each behaviour.

#### **Alcohol use**

Alcohol use was assessed using the Alcohol Use Disorders Identification Test (AUDIT). The AUDIT is a measure of the prevalence of alcohol use.<sup>25</sup> The AUDIT is currently the only instrument specifically

designed to identify hazardous and harmful drinking.<sup>26</sup> Cronbach alpha for the AUDIT was 0.90 in this sample. Furthermore, an assessment of alcohol use using a cut-off score of eight for the AUDIT was made for hazardous or harmful drinking. Hazardous drinking is defined as a quantity or pattern of alcohol consumption that places clients at risk for adverse health events, while harmful drinking is defined as alcohol consumption that results in adverse events (e.g., physical or psychological harm).

#### **Data analysis**

HIV status was considered as the outcome or dependent variable, while socio-demographics, HIV knowledge, and HIV risk behaviors were considered as independent variables. Analysis was carried out using SPSS version 14 software. Proportions and percentages were used for description of the data as appropriate. Odds ratios with confidence intervals were computed to assess the presence and degree of association between HIV status and independent variables.

#### **Results**

##### **Sample characteristics**

Of the total population who had visited the study sites, 2310 were eligible for the study. Of these, 2 255 (97.6%) completed the interview. Among those, 1 093 (48.5%) were cases and 1 162 (51.5%) were controls. Men were 758 (33.6%) and women 1497 (66.4%). The HIV prevalence did not significantly differ between men and women (chi square=1.22,  $p=0.269$ ). Socio-demographic characteristics and HIV knowledge are presented in table 1.

The mean age of the cases was 33.2 (SD=10.4), years while that of the controls was 31.6 (SD=12.6) years. Almost two-thirds of the participants (60.6%) had educational level of Grade 9 or more and three quarters (74.0%) were unmarried: One-third (33.4%) was employed and 68.9% had children. Almost half of the participants (43.6%) knew people with HIV/AIDS and the HIV knowledge score was 18.9, with a range of 0 to 26 scores.

**Table 1: Sample characteristics: socio-demographics, and HIV knowledge by HIV status**

	HIV positives (n=1093)N (%) or M (SD)	HIV negatives (n=1162)N (%) or M (SD)	Total N=2255)N (%) or M (SD)
Gender			
Male	355 (46.8)	403 (53.2)	758 (33.6)
Female	738 (49.3)	759 (50.7)	1497 (66.4)
Age (in years)			
18-24	232 (21.5)	404 (36.3)	636 (29.0)
25-29	210 (19.5)	183 (16.4)	393 (17.9)
30-34	204 (18.9)	133 (11.9)	337 (15.4)
35-39	154 (14.3)	105 (9.4)	259 (11.8)
40-44	121 (11.2)	96 (8.6)	217 (9.9)
45-49	71 (6.6)	70 (6.3)	141 (6.4)
50 or more	85 (7.9)	122 (11.0)	207 (9.5)
Educational levels			
≤5 years	226 (21.0)	233 (20.3)	459 (20.7)
6-8 years	236 (22.0)	181 (15.8)	417 (18.8)
9-11 years	348 (32.4)	354 (30.8)	702 (31.6)
12 years of more	264 (24.6)	380 (33.1)	644 (29.0)
Population group			
Black African	1083 (98.9)	1143 (98.5)	2226 (98.7)
White	9 (0.8)	17 (1.5)	26 (1.2)
Indian or Asian or Coloured	3 (0.3)	0	3 (0.1)
Marital status			
Married	253 (23.2)	312 (27.0)	565 (25.1)
Not married	839 (76.8)	845 (73.0)	1684 (74.9)
Employment status			
Employed	357 (32.7)	395 (34.1)	752 (33.4)
Not employed	735 (67.3)	763 (65.9)	1498 (66.6)
Children status			
Has children	818 (74.8)	732 (63.3)	1550 (68.9)
Has no children	275 (25.2)	425 (36.7)	700 (31.1)
Number of children			
One	283 (33.1)	297 (38.4)	580 (35.6)
Two	263 (30.8)	183 (23.6)	446 (27.4)
Three	142 (16.6)	113 (14.6)	255 (15.7)
Four or more	167 (19.5)	181 (23.4)	348 (21.4)
How many people with HIV/AIDS have you known			
None	593 (54.5)	675 (58.2)	1268 (56.4)
1-2	256 (23.5)	271 (23.4)	527 (23.4)
3-5	127 (11.7)	119 (10.3)	246 (10.9)
6-10	32 (2.9)	29 (2.5)	61 (2.7)
11 or more	81 (7.4)	65 (5.6)	146 (6.5)
HIV/AIDS knowledge score (range 0-26)	19.1 (4.7)	18.7 (5.5)	18.9 (5.2)

The majority (81.8%) of the participants had had vaginal intercourse in the past three months, 7.7% had anal sex and 13.4% had oral sex in the past three months. Fifteen percent reported to have had two or more sexual partners in the three months. For 10.6% the last sexual partner was non-regular (casual

or one night), and 12.4% believed that their sexual partner also had sex with other partners (multiple sexual partners). One-third of the participants (34.4%) had consistently (90-100%) used a condom during vaginal sex in the past three months, while 18.4% had never used a condom. About half

(52.1%) indicated that they had used a condom at last sex, and among those who had anal and oral sex in the past three months 54.3% and 65% respectively had never used a condom. Thirty-nine percent of the participants indicated that they had met their last sexual partner on the street and 28.4% said that they knew their last sexual partner for days or weeks before having first sex. About three quarters of the participants had talked with their partner about condom use (71.3%) and about getting tested for HIV (74.0%).

Regarding alcohol and drug use, 13.4% engaged in hazardous or harmful alcohol use, 8% had used cannabis and 6.7% had used other drugs in the past, and 12.6% had used alcohol or drugs in the context of sex. A few of the participants (5.2%) were engaged in transactional sex in the past three months. The mean HIV behavioural risk reduction intentions were 33.6 (range 7-42), HIV risk reduction self-efficacy 72.2 (range 9-90) and HIV behavioural skills enactments 9.3 (range 0-14) (see table 2).

**Table 2: Sample characteristics: HIV risk behaviour by HIV status**

	HIV positives (n=1093)N (%) or M (SD)	HIV negatives (n=1162)N (%) or M (SD)	Total (N=2255) N (%) or M (SD)
Had vaginal sexual intercourse in the past 3 months	863 (82.0)	931 (81.6)	1794 (81.8)
Had anal sex in the past 3 months	51 (5.6)	93 (9.6)	144 (7.7)
Had oral sex in the past three months	86 (7.8)	163 (17.0)	249 (13.4)
Two or more sexual partners in the past 3 months	145 (16.6)	129 (13.7)	274 (15.1)
Last sexual partner was non-regular (casual or one night)	95 (13.1)	66 (8.3)	161 (10.6)
Last sexual partner has sex with other partners	112 (12.5)	119 (12.4)	231 (12.4)
Condom use during vaginal sex in the past three months			
Never	218 (21.2)	176 (15.8)	394 (18.4)
10-40% of the times	301 (29.3)	215 (19.3)	516 (24.1)
50-80% of the times	212 (20.6)	282 (25.4)	494 (23.1)
90-100% of the times	297 (28.9)	439 (39.5)	736 (34.4)
Condom use at last sex	416 (42.8)	556 (57.2)	972 (52.1)
Never used a condom when having anal sex in the past 3 months	40 (62.5)	30 (46.2)	70 (54.3)
Never used a condom when having oral sex in the past 3 months	68 (68.7)	86 (62.3)	154 (65.0)
Met last sexual partner on the street (vs. elsewhere)	388 (42.4)	348 (35.9)	736 (39.0)
Knew last sexual partner for days or weeks (vs. months or years) before having first sex	266 (29.5)	261 (27.3)	527 (28.4)
Partner talked about condoms	609 (66.6)	728 (75.8)	1337 (71.3)
Partner talked about getting tested	640 (69.9)	747 (77.9)	1387 (74.0)
Diagnosed with STI in past 3 months	287 (26.6)	148 (12.8)	435 (19.5)
Use alcohol or drugs before or while having last sex	123 (13.4)	113 (11.8)	236 (12.6)
Partner used alcohol or drugs before or while having last sex	153 (16.8)	128 (13.5)	281 (15.1)
Hazardous or harmful alcohol use (AUDIT score 8 or more)	153 (13.9)	151 (12.9)	304 (13.4)
Cannabis use in the past 3 months	70 (8.3)	69 (7.7)	139 (8.0)
Other drugs (Mandrax, Tik,...) in the past 3 month	60 (5.5)	55 (4.7)	115 (6.7)
Continuation of table 2			
Given someone money or drugs to have sex with you in the past three months	46 (4.3)	74 (6.5)	120 (5.4)
Have had sex with someone to get money and/or drugs in the past three months	41 (3.8)	70 (6.1)	111 (5.0)
HIV Behavioural risk reduction intentions (range 7-42)	33.4 (9.3)	33.8 (9.1)	33.6 (9.2)
HIV Risk reduction self-efficacy (range 9-90)	71.4 (23.7)	73.0 (23.2)	72.2 (23.4)
HIV Behavioural skills enactments (range 0-14)	8.8 (4.8)	9.9 (4.4)	9.3 (4.1)

### Correlates of HIV infection

The unmatched case-control analysis was done on 1,093 cases and 1,162 controls that completed the interview. Cases and controls were compared by various socio-demographic variables and HIV risk factors. Being older, lower formal education, being single, having children, knowing a higher number of PLHIV, having been diagnosed with a sexually transmitted infection (STI), having a non-regular sexual partner, lack of condom use, having met the last sexual partner on the street, lack of condom use and HIV testing communication, HIV behavioural skills enactments and transactional sex were significantly associated with HIV seropositivity in the bivariate analysis. On the other hand, gender, greater number of children, being unemployed, HIV

knowledge score, two or more sexual partners in the past three months, partner having multiple sexual partners, lack of condom use during oral sex, knew last sexual partner for days or weeks before having first sex, hazardous or harmful alcohol use, cannabis use, HIV behavioural risk reduction intentions, and HIV risk reduction self-efficacy were significantly associated with serum HIV positivity in the bivariate analysis.

In multivariable analysis, having children, having been diagnosed with an STI in the past three months, not having had oral sex in the past three months, lack of condom use consistency in the past three months, and lack of HIV behavioural skills enactments were significantly associated with HIV positive status (see table 3).

**Table 3: Logistic regression of determinants of HIV infection**

	Cr OR (95% CI)	P	Adj OR (95% CI) <sup>a,b</sup>	P
<b>Socio-demographics</b>				
Male vs. female	0.91 (0.76-1.08)	0.269	---	
Age	1.01 (1.01-1.02)	0.001	1.01 (0.99-1.02)	0.256
Years of formal education	0.94 (0.92-0.97)	0.000	0.98 (0.94-1.03)	0.482
Married vs. not married	0.82 (0.67-0.99)	0.038	0.83 (0.60-1.14)	0.248
Children vs. no children	1.73 (1.44-2.07)	0.000	1.46 (1.08-1.97)	0.013
Number of children	0.997 (0.92-1.09)	0.941	---	
Employed vs. unemployed	0.94 (0.79-1.12)	0.476	---	
<b>HIV knowledge and risk variables</b>				
HIV knowledge score	1.02 (1.00-1.03)	0.072	---	
Number of PLHIV known	1.09 (1.02-1.17)	0.018	1.10 (0.98-1.23)	0.094
Diagnosed with STI in past 3 months	2.46 (1.48-3.07)	0.000	3.56 (2.48-5.11)	0.000
Had vaginal sexual intercourse in the past 3 months	1.03 (0.83-1.28)	0.790	---	
Had anal sex in the past 3 months	0.56 (0.39-0.80)	0.001	0.88 (0.49-1.56)	0.649
Had oral sex in the past three months	0.52 (0.39-0.68)	0.000	0.56 (0.35-0.89)	0.013
Two or more sexual partners in the past 3 months	1.25 (0.97-1.62)	0.085	---	
Last sexual partner was non-regular (casual or one night)	1.66 (1.19-2.31)	0.003	1.46 (0.99-2.16)	0.055
Last sexual partner has sex with other partners	1.00 (0.76-1.32)	0.988	---	
Never used a condom when having anal sex in the past 3 months	1.94 (0.96-3.93)	0.064	---	
Never used a condom when having oral sex in the past 3 months	1.33 (0.77-2.29)	0.311	---	
Met last sexual partner on the street (vs. elsewhere)	1.31 (1.09-1.58)	0.004	1.24 (0.96-1.60)	0.101
Knew last sexual partner for days or weeks (vs. months or years) before having first sex	1.11 (0.91-1.36)	0.296	---	
Condom use consistency in past 3 months	0.78 (0.72-0.84)	0.000	0.93 (0.89-0.97)	0.000
Condom use at last sex	0.62 (0.52-0.75)	0.000	1.07 (0.75-1.53)	0.722
<u>Partner talked about condoms</u>	<u>0.63 (0.52-0.78)</u>	<u>0.000</u>	<u>0.82 (0.58-1.16)</u>	<u>0.262</u>

	Cr OR (95% CI)	P	Adj OR (95% CI) <sup>a,b</sup>	P
Partner talked about getting tested	0.66 (0.54-0.81)	0.000	0.86 (0.62-1.18)	0.345
Hazardous or harmful alcohol use (AUDIT score 8 or more)	1.09 (0.86-1.39)	0.473	---	
Cannabis use in past 3 months	1.08 (0.77-1.53)	0.652	---	
Other drugs (Mandrax, Tik, etc.)	1.21 (1.07-1.88)	0.094	---	---
HIV behavioural risk reduction intentions	1.00 (0.99-1.01)	0.384	---	
HIV risk reduction self-efficacy	1.00 (0.99-1.00)	0.095	---	
HIV behavioural skills enactments	0.95 (0.93-0.97)	0.000	0.95 (0.91-0.99)	0.009
Given someone money or drugs to have sex with you in the past three months	0.65 (0.44-0.94)	0.024	0.58 (0.19-1.79)	0.346
Have had sex with someone to get money and/or drugs in the past three months	0.61 (0.41-0.90)	0.014	0.71 (0.19-2.58)	0.597

<sup>a</sup>Using forward LR selection of variables

<sup>b</sup>Hosmer and Lemeshow Chi-square 9.572, df 8, 0.296; Cox and Snell R<sup>2</sup> 0.130; Nagelkerke R<sup>2</sup> 0.174

## Discussion

This study included a large sample (n=2 255) of predominantly women clients from 27 HIV counselling and testing clinics in a predominantly rural province, Mpumalanga, in South Africa. The analyses undertaken for this study examined socio-demographic and HIV risk behaviour variables of HCT clients and identified factors associated with the serostatus of clients. Generally, the study participants were sexually active and many engaged in a variety of HIV risk behaviours such as anal sex, multiple and casual sexual partners, and lack of (consistent) condom use.

The study found, in concordance with other studies that socio-demographic (being older,<sup>10,11</sup> lower formal education,<sup>6,7,10,11,13,15</sup> being single,<sup>9,11</sup> having children); HIV knowledge and risk behaviour variables (higher number of PLHIV known, having a non-regular sexual partner,<sup>8,16</sup> lack of (consistent) condom use,<sup>7,11,15</sup> having met the last sexual partner on the street, not having had oral sex in the past three months, lack of condom use and HIV testing communication, transactional sex,<sup>9</sup> lack of HIV behavioural skills enactments,<sup>15</sup> and health status (history of sexually transmitted infections<sup>7,11</sup>), were significantly associated with HIV positive status of HCT clients. The reason for the association between the higher number of women having been tested for HIV and having children with HIV positive status, may be that a common pathway of getting tested for HIV in public health facilities in South Africa is during antenatal care attendance of women.<sup>27</sup> Lack of condom use was identified as a major correlate

for HIV positive status among the HCT clients. Although condoms are freely available in public health facilities in South Africa and are widely promoted in mass media and other HIV prevention campaigns, more needs to be done to promote consistent condom use. Finally, the association found in this study between not having had oral sex in the past 3 months and HIV positive status is difficult to interpret and needs further investigation. It is possible that a number of HIV infected clients perceived themselves to be HIV positive prior to the confirmed HIV positive diagnosis and that this may have influenced their sexual behaviour in terms of reducing oral sex.

The study did not find gender differences in HIV prevalence of persons at HIV counselling and testing clinics, as found in some other studies.<sup>6,7,11-15,18</sup>

## Strength and limitations

The current study used 27 HCT clinics and a relatively large sample size. Limitations include the reliance on self-reports of sexual behaviour. There is a possibility of desirability bias in reporting unprotected sexual behaviour, especially after having received post-test HIV counselling. People may generally more likely under-report rather than over-report high HIV risk behaviours such as multiple sexual partners or the use of alcohol before sex. In that case, the associations will be stronger than those found in this study. In addition, some variables such as reasons and attitudes towards HIV testing<sup>6,9</sup> were not assessed

and should be included in future studies. Finally, this study sample is limited to a small number of HCT clinics in two specific districts and findings cannot be generalized to a larger area.

## Conclusion

HIV risk behaviour was found to be a significant risk factor for HIV infection in the study population. There is an urgent need for health education to bring about behavioural changes to reduce HIV infection in the community.

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