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Knowledge of HIV status and antiretroviral therapy use among sexually transmitted infections service attendees and the case for improving the integration of services in South Africa

A cross sectional study

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Abstract

We describe knowledge of human immunodeficiency virus (HIV) status, correct report of HIV status and antiretroviral therapy (ART) use among sexually transmitted infection (STI) service attendees in South Africa.

An anonymous questionnaire was administered and serological HIV testing done. Proportions of attendees reporting knowledge of HIV status and HIV status consistent with laboratory results and ART use (among HIV positives) were determined as were factors associated with knowledge and inconsistent report of HIV status.

Of 1054 attendees, 288 (27.3%) were HIV positive and 830 (78.8%) self-reported knowledge of HIV status. Not knowing one's HIV status was associated with male gender [adjusted Odds Ratio (aOR) 2.66 (95% confidence interval (CI) 1.70–4.18] medical circumcision [aOR 0.48 (95% CI 0.24–0.95)] and site [Gauteng Province (GP)-aOR 6.20 (95% CI 3.51–10.95), Eastern Cape (EC)-aOR 17.29 (95% CI 10.08– 29.66) versus Free State (FS)/Western Cape (WC) sites]. Of 219 HIV positive attendees with knowledge of HIV status, 136 (62.1%) self-reported being HIV positive, of whom 80 (58.8%) reported taking ARVs in the preceding 3 days. Inconsistent report of status was associated with males [aOR 2.26 (95%CI 1.05–4.87)], prior STI treatment [aOR 0.33 (95% CI 0.16–0.69)], recent HIV testing (6months) [aOR 3.20 (95% CI 1.62–6.36)] and site [GP-aOR 6.89 (95% 3.21–14.82), EC-aOR 5.08 (95% CI 2.15–11.64) versus FS/WC sites]. Knowledge of HIV status was lower than targeted. HIV testing and linkage to care services are essential in STI-related care and validation of self-reported indicators in this population maybe necessary.

Abbreviations: aOR = adjusted odds ratio, ART = antiretroviral therapy, DNA = deoxyribonucleic acid, EC = Eastern Cape, FS = Free State, GP = Gauteng Province, GUS = genital ulcer syndrome, HIV = human immunodeficiency virus, MUS = male urethritis syndrome, STI = sexually transmitted infection.

Keywords: antiretroviral therapy, HIV, sexually transmitted syndromes, testing

1. Introduction

Sexually transmitted infections (STIs) are a public health problem globally. STI service attendees represent a sub-group of the general population that maybe at higher risk of human immunodeficiency virus (HIV) infection. This is because both HIV infection and other STIs are largely sexually transmitted and interact with each other on many levels. Biologically, STIs may result in genital inflammation and higher viral loads and so

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facilitate the transmission of HIV from an infected partner to an uninfected partner.[1–3] On the other hand, HIV alters the natural history of some STIs with a tendency towards severe symptoms and slower resolution following treatment.[4–6] Acute HIV infection may present with genital symptoms making STI services a good platform to identify individuals with early HIV infection for rapid initiation on antiretroviral therapy.[7–9] Self-reported treatment for an STI in the preceding 12 months was associated with a 200% increased likelihood of recent HIV infection in a population-based survey in Kenya.[10] Sexual health services in the United Kingdom and elsewhere have been successfully used as a platform to identify high-risk individuals for pre-exposure prophylaxis and rapid initiation of antiretroviral therapy (ART) and this has contributed to declines in new HIV diagnoses.[11,12]

Socially, STIs are stigmatised and individuals seeking care have reported feeling judged and shamed for having an STI.[13–16] This perceived and enacted stigma may result in delays in seeking treatment and in lack of disclosure of STI infection to partners further facilitating onward transmission to sexual partners and on-going risk of HIV acquisition. STI service attendees living with HIV may experience this stigma in addition to HIV-related stigma which itself has been associated with lower rates of condom use and increase in multiple sexual partners.[13,17–19]

In South Africa, STIs are managed using the syndromic approach with STI services largely integrated into acute care at primary care level.[20] The syndromic approach is based on treating genital symptoms associated with common signs and symptoms, rather than a specific laboratory-identified causative pathogen. The current syndromic management guidelines which came into effect in 2015 recommend risk reduction counselling, referral for medical male circumcision, condom distribution, partner notification as well HIV testing and linkage to care in addition to syndrome- specific drug therapy. There is limited recent data in South Africa and sub-Saharan Africa on how well HIV interventions are integrated into STI services or on the burden of HIV infection, the knowledge of HIV status or coverage of ART among STI service attendees.[20] An assessment of the quality of STI services in the country showed that STI clinic attendees were not always offered HIV testing, condoms or referral for circumcision despite being at risk and these interventions being recommended practice.[21] In this assessment, 71% of STI standardised patient actors were offered an HIV test, with female less so compared to males. This assessment also found that only 6% of uncircumcised males were offered referral for circumcision.[21] We describe knowledge of HIV status and the potential yield of HIV testing among STI clinic attendees as well as the correct report among HIV positive service attendees at primary health care centres in South Africa. We discuss recommendations for HIV and STI integration in light of the findings.

2. Methods

2.1. Setting

The Centre for HIV and STIs at the National Institute for Communicable Diseases (NICD) has conducted sentinel site-based aetiological surveillance of STIs since 2004. The objective of this surveillance is to monitor the aetiological causes of the main STI syndromes-genital ulcer syndrome (GUS), male urethritis syndrome (MUS) and vaginal discharge syndrome (VDS)—as well as gonococcal antimicrobial resistance trends. This surveillance also validates the recommended treatment regimens and ensures that treatments included cover the most common causative STI pathogens for each syndrome. During the period January 1, 2017 to March 31, 2018, sentinel surveillance was conducted at 4 primary healthcare centres (PHCS) located in 4 provinces—Eastern Cape [(EC), February 2017–March 2018], Free State [(FS), June 2017–March 2018], Gauteng [(GP), January–December 2017], and Western Cape [(WC), June–December 2017]. The facilities were conveniently selected taking into account province where site was located in, the availability of space for surveillance officers (professional nurses by training) to work from and the MUS caseload—with clinics seeing more than 25 cases of MUS per month preferred for selection.

2.2. Design

This was a secondary cross-sectional analysis of data from male and female STI service attendees, 18 years or older presenting with VDS, MUS, or GUS and enrolled at the 4 STI sentinel surveillance sites.

2.3. Data collection

During the surveillance period, surveillance officers (professional nurses by training) were placed at the sentinel sites in order to enrol eligible STI service attendees. Following completion of eligibility assessment and informed consent procedures, consecutive eligible males and female were enrolled. Demographic and clinical information was collected using a surveillance officer-administered questionnaire. Demographic variables included in the questionnaire included age, gender and race while behavioural variables included condom use at last sexual encounter, having sexual intercourse with a non-regular sexual partner in the preceding 3 months and having sexual partners living outside the attendee's province or country in the preceding 3 months. Clinical variables were syndrome(s) diagnosed on the day of enrolment, treatment of STI syndromes in the preceding 12 months, non-resolution of STI symptoms in the preceding 3 months, referral from another STI treatment provider, knowledge of HIV status, date of most recent HIV status and the attendees' self-reported HIV status. Male attendees were also asked about ever being circumcised and if they were, whether or not they were circumcised medically. Participants were asked to provide genital specimens—vaginal smears and endocervical swabs for female participants, endourethral swabs for male attendees and ulcer swabs for all those presented with genital ulcers. All attendees were also asked to provide venous blood specimens for laboratory testing. Surveillance questionnaires were linked to laboratory specimens through a barcode with a unique identification number. No other participant identifying information was collected.

2.4. Laboratory procedures

Specimens were transported to the STI reference laboratory at NICD in Johannesburg. Deoxyribonucleic acid (DNA) was extracted from the genital swabs using 2 automated DNA extractors (X-tractor Gene and QIAxtractor platforms, Qiagen, Hilden, Germany). Swab-extracted DNA was tested using a validated in-house real-time multiplex PCR assay on the RotorGene platform (Qiagen, Hilden, Germany) to detect the presence of the following STI pathogens—*Neisseriae gonorrhoeae, Chlamydia trachomatis, Trichomonas vaginalis, Mycoplasma genitalium*— from MUS and VDS swab specimens- and *Treponema pallidum, Haemophilus ducreyi,* L1, L2, and L3

serovars of *Chlamydia trachomatis and Herpes* simplex virus type 1 and 2 from the genital ulcer swab specimens. HIV seropositivity was determined using 2 sequential rapid immunochromatographic assays (Unigold Trinity Biotech, Trinity Biotech PLC, Wicklow, Ireland; Alere Determine, Alere Medical Co. Ltd, Chiba, Japan).

2.5. Data management and analysis

Completed questionnaires were couriered to the data centre within the STI reference laboratory. Data were double entered into a study-specific Microsoft Access database. After cleaning, data were exported to Stata14.2 [Stata Corporation, College Station, Texas] for analysis. Medians and interquartile ranges for continuous data with proportions for categorical data were used to describe the STI attendees enrolled in terms of demographic, behavioural and clinical characteristics, overall and according to HIV status. The proportions of attendees who knew their HIV status, who had been tested for HIV in the preceding 6 months, who correctly self-reported their HIV status and where applicable reported ART use were determined as percentages. The yield of HIV testing was determined as the number of HIV positives as a proportion of all individuals who self-reported not knowing their HIV status OR self-reported being HIV negative with an unknown test date OR self-reported being HIV negative with an HIV test date older than 3 months from the date of enrolment. Univariable and multivariable logistic regression models were used to determine characteristics associated with 2 outcomes—not knowing one's HIV status among all STI service attendees and the inconsistent report of an HIV positive status among the HIV positive attendees who knew their HIV status. Not knowing one's HIV status was determined from a NO response to the question "do you know your HIV status" while inconsistent reporting of an HIV positive status was determined from a comparison of self-reported HIV status with the laboratory-confirmed HIV status. For both models, variables that had P values $< .2$ in univariable analysis were included in the multivariable models, with age and gender included *a priori*. The total expected sample size was 1400 equivalent to 150 male attendees with MUS per site, 100 female attendees with VDS per site and 100 attendees with GUS per site. These sample sizes were calculated to measure *N gonorrhoeae* prevalence of 70%-80% among males with MUS and at least 100 viable isolates antimicrobial resistance testing, *N gonorrhoeae* prevalence 12% to 22% among females with VDS and ulcer-derived herpes simplex virus prevalence of 60% to 70% among attendees with GUS, assuming an α-level of 0.05 and a power of 80%.

2.6. Ethical considerations

The primary public health surveillance activity was approved by the University of the Witwatersrand Human Research Ethics Committee (protocol numbers M120365 and M131129). Written informed consent was obtained from eligible and consenting attendees before administration of questionnaire and specimen collection. In order to protect the privacy of participants, the surveillance was anonymous and unlinked and therefore no identifying information or contact details were collected and all materials – questionnaires and specimens were identified and linked through a unique study number. Service attendees who wanted to be tested for HIV and those with a self-reported unknown or negative HIV status were referred to HIV counselling and testing staff located within the clinic. As syndromic management of STIs is standard of care for STIs in the country, the laboratory results were not used for management and were not returned to participating attendees.

3. Results

3.1. Characteristics of STI service attendees enrolled

During the surveillance period, 1054 individuals were enrolled. The median age was 26 years (interquartile range [IQR] 23–32 years) with 394 (37.4%) aged 24 years or younger and 559 (53%) males. The majority of attendees were enrolled at the GP site—364 (34.5%), followed by the EC site—282 (26.8%), the WC—227 (22.5%) and FS site with 181 (17.2%). Of those enrolled 288 (27.3%) were HIV positive on laboratory-based rapid HIV testing. Table 1 describes the demographic, behavioural and clinical characteristics of enrolled attendees comparing HIV positive to HIV negative attendees. HIV positive attendees were more likely to be older—median age 29 years versus 26 years ($P < .001$) but less likely to be male—46.9% versus 55.4% ($P = .014$) (see Table 1). HIV positive males were less likely to be circumcised (regardless of circumcision method) compared to HIV negative males—58.5% versus 73.8% although this difference was not statistically significant for medical circumcision. HIV positive attendees were more likely to present with GUS compared to HIV negative attendees—21.3% versus 10.9% but less likely to present with MUS—37.3% versus 49.0%. The 2 groups did not differ with respect to any sexual behavioural characteristics included in the questionnaire.

3.2. Knowledge of HIV status and yield of HIV testing

Of the enrolled attendees, 830 (78.8%) reported knowing their HIV status (see Table 1). There was a trend towards lower knowledge of HIV status among HIV positive attendees compared to HIV negative attendees—76% versus 79.8%, $P = .188$. Knowledge of HIV status was lower among male attendees compared to females—403/559 (72.1%) versus 427/495 (86.3%), $P < .001$. The median time since most recent HIV test was significantly longer in HIV-positive than HIV-negative attendees (9.5 months [interquartile range (IQR) 2.1–36.0] versus 3 months [IQR 0.1–9]; $P = .001$), with a significantly lower proportion of HIV-positive attendees having tested in the preceding 6 months—44.1% versus 66.8%, $P < .001$—(Table 1). Table 2 shows the results of the univariable and multivariable logistic regression for factors associated with not knowing one's HIV status among all attendees. Not knowing one's HIV status was significantly more likely among males, among those reporting a non-regular sexual partner in the preceding 3 months, among those enrolled at the GP and EC sites compared to the WC/FS sites; but less likely among those who reported condom use at last sexual encounter and males who had been medically circumcised in univariable analyses. In a multivariable model adjusting for age, gender, non-regular sexual partner, condom use at last sexual encounter, circumcision method, STI syndrome diagnosed at enrolment, laboratory-confirmed HIV status and site of enrolment, not knowing one's HIV status was independently associated with being male aOR 2.66 (95% 1.70–4.18), if male—being medically circumcised compared to being uncircumcised— aOR 0.48 (95% CI 0.24–0.95) compared to those not circumcised and site of enrolment—aOR 6.20 (95% CI 3.51–10.95) for the GP site and aOR 17.29 (95% CI 10.08–29.66) compared to the FS/WC sites.

Table 1

Demographic, behavioral and clinical characteristics of enrolled attendees by HIV status.

Variable	All (N = 1054)	HIV positive (N = 288)	HIV negative (N = 766)	*P* value
Male (n, %)	559 (53.0)	135 (46.9)	424 (55.4)	.014
Age (median, IQR)	26 (23–32)	29 (25–36)	26 (22–30)	<.001
Age <= 24 years	394 (37.4)	67 (23.3)	327 (42.7)	.001
Site of enrolment (n, %)				
EC	282 (26.8)	73 (25.4)	209 (27.3)	
FS	181 (17.2)	72 (25.0)	109 (14.6)	
GP	364 (34.5)	100 (34.7)	264 (34.5)	.001
WC	227 (22.5)	43 (14.9)	184 (24.0)	
Condom use at last sexual encounter, (n, %)	166 (15.8)	53 (18.4)	113 (14.8)	.147
Sex with non-regular sexual partner in the last 3 months, (n, %)	370 (35.1)	86 (29.9)	284 (37.1)	.029
Sex with a partner living in a different province/country in the last 3 months, (n, %)	238 (22.6)	68 (23.6)	170 (22.2)	.624
Treated for an STI syndrome in the past 12 months, (n, %)	298 (28.3)	84 (29.2)	214 (27.9)	.693
Ever circumcised*	392 (70.1)	79 (58.5)	313 (73.8)	.001
Medically circumcised*	79 (14.1)	14 (10.4)	65 (15.3)	.150
Clinical syndrome diagnosed at enrolment, (n, %)				
VDS	396 (40.4)	109 (41.4)	287 (40.1)	
MUS	449 (45.9)	98 (37.3)	351 (49.0)	<.001
GUS	134 (13.7)	56 (21.3)	78 (10.9)	
Any STI pathogens detected in the laboratory, (n, %)	748 (71.0)	208 (72.2)	540 (70.5)	.582
Reported knowledge of HIV status, (n, %)	830 (78.8)	219 (76.0)	611 (79.8)	.188
Time since most recent HIV test, (n, %)†	3.5 (0.3–10.6)	9.4 (1.9–37.8)	2.8 (0.1–6.8)	.001
Tested in past 6 months, (n, %)†	516 (64.7)	93 (44.7)	423 (71.7)	<.001
Tested in the past 3 months, (n, %)†	374 (46.9)	66 (31.7)	308 (52.2)	<.001

EC = Eastern Cape, FS = Free State, GP = Gauteng Province, GUS = genital ulcer syndrome, HIV = human immunodeficiency virus, IQR = interquartile range, MUS = male urethritis syndrome, N/A = not applicable, STI = sexually transmitted infection, VDS = vaginal discharge syndrome, WC = Western Cape.

* among 559 males (135 HIV positives and 424 HIV negatives).

† among 798 individuals (208 HIV positives and 590 HIV negatives) with a known/estimated HIV test date.

Table 2

Factors associated with knowledge of HIV status among STI service attendees (N = 1054).

Variable	Categories	% who did not know their status	Univariable OR (95% CI)	*P* value	Multivariable OR (95% CI)	*P* value
Age < 25 years	No	147/660 (22.3)	1		1	
	Yes	77/394 (19.5)	0.84 (0.62–1.15)	.295	0.95 (0.66–1.37)	.790
Male	No	68/495 (13.7)	1		1	
	Yes	156/559 (27.9)	2.43 (1.77–3.33)	<.001	2.66 (1.70–4.18)	<.001
Reported non-regular sex partner in the preceding 3months	No	117/684 (17.1)	1		1	
	Yes	107/370 (28.9)	1.97 (1.46–2.66)	<.001	1.16 (0.79–1.72)	.445
Condom use at last sexual encounter	No	201/888 (22.6)	1		1	
	Yes	23/166 (13.9)	0.55 (0.34–0.88)	.012	0.84 (0.49–1.44)	.534
Partner living in a different province/country	No	171/816 (21.0)	1		—	
	Yes	53/238 (22.3)	1.08 (0.76–1.53)	.663		
Treated for an STI syndrome in the past 12 months	No	153/756 (20.2)	1			
	Yes	71/298 (23.8)	1.23 (0.89–1.70)	.200	—	
STI syndrome diagnosed at enrolment	MUS/VDS	185/910 (20.3)	1		1	
	GUS	39/144 (27.1)	1.46 (0.97–2.17)	.067	1.19 (0.75–1.88)	.454
Circumcision method	Traditional	144/480 (30.0)	1		1	
	Medical	12/79 (15.2)	0.42 (0.22–0.80)	<.001	0.48 (0.24–0.95)	.034
	Female (N/A)	68/495 (13.7)	0.37 (0.27–0.51)		—	
Any STI detected in the laboratory	No	56/306 (18.3)	1		1	
	Yes	168/748 (22.5)	1.29 (0.92–1.81)	.135	0.89 (0.58–1.37)	.600
Laboratory confirmed HIV status	Negative	155/766 (20.2)	1		1	
	Positive	69/288 (24.0)	1.24 (0.90–1.72)	.188	1.42 (0.97–2.07)	.068
Site of enrolment	FS/WC	18/408 (4.4)	1		1	
	GP	79/364 (21.7)	6.01 (3.50–10.25)	<.001	6.20 (3.51–10.95)	<.001
	EC	127/282 (45.0)	17.75 (10.48–30.09)		17.29 (10.08–29.66)	

CI = confidence interval, EC = Eastern Cape, FS = Free State, GP = Gauteng Province, GUS = genital ulcer syndrome, HIV = human immunodeficiency virus, MUS = male urethritis syndrome, N/A = not applicable, OR = odds ratio, STI = sexually transmitted infection, VDS = vaginal discharge syndrome, WC = Western Cape.

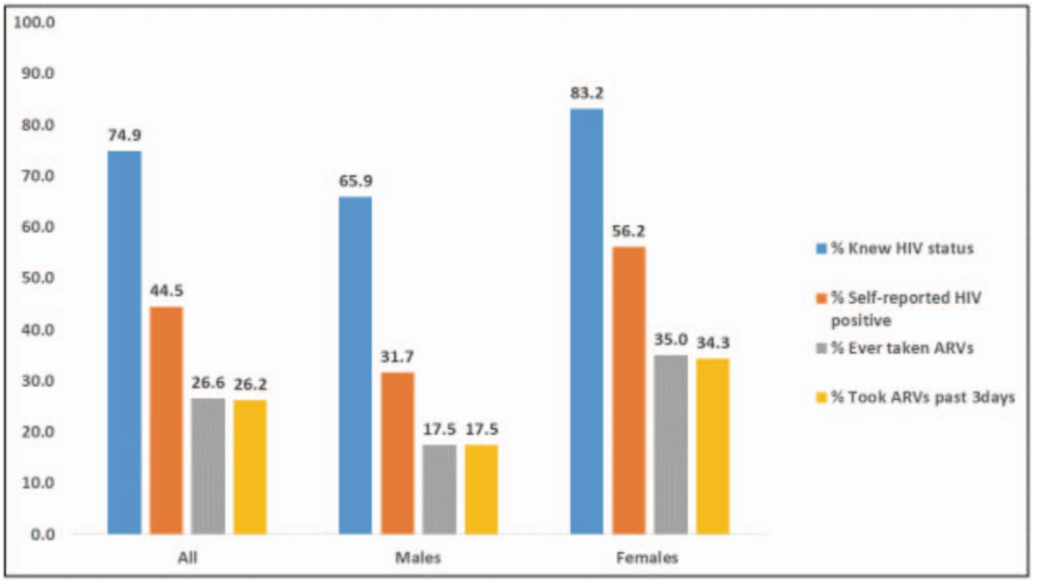

Figure 1. HIV care cascades among HIV positive STI service attendees by gender (N = 288). HIV = human immunodeficiency virus, STI = sexually transmitted infection. For all attendees denominator = 288 laboratory confirmed HIV positive attendees; for Males denominator = 135 laboratory confirmed HIV positive males; for Females denominator = 153 laboratory confirmed HIV positive females.

Overall, 573 (54.4%) attendees met criteria for inclusion in the analysis of HIV testing yield. The number of included attendees was highest at the GP site (226), followed by EC (205), WC (72), and FS (70) sites. The overall yield of HIV testing was 21.3% and was high at the GP, FS and EC sites at 27.4%, 27.1%, and 18.5% respectively but very low at 1.4% at the WC site.

3.3. Self-reported HIV status and inconsistent report of HIV status

Of 219 HIV positive service attendees who reported knowledge of HIV status, 136 (62.1%) reported being HIV positive. This represented 47.2% of laboratory-confirmed HIV positives. Of the 136 who self-reported being HIV positive, 81 (59.6%) reported ever taking ARVs while 80 (58.8%) reported doing so in the preceding 3 days. This was 28.1% and 27.7% of all laboratory-confirmed HIV positives, respectively. The proportions who reported knowledge of HIV status, reported being HIV positive and taking ARVs were higher among females compared to males and varied by site of enrolment with higher knowledge of HIV status, and correct reports of HIV status and ART use highest at the WC site (Figs. 1 and 2). Table 3 shows the results of univariable and multivariable analysis of factors associated with the inconsistent report of HIV status among HIV positive

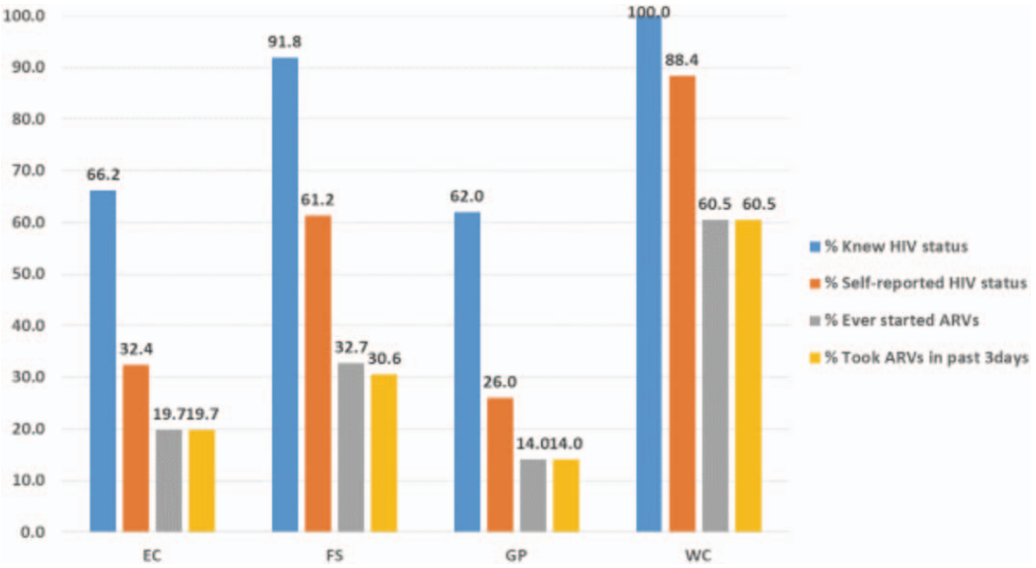

Figure 2. HIV care cascades among HIV positive STI service attendees by site of enrolment (N = 288). HIV = human immunodeficiency virus, STI = sexually transmitted infection. For EC denominator = 73; FS denominator = 72; GP denominator = 100; WC denominator = 43.

Table 3

Factors associated with the inconsistent report of HIV status among HIV positive STI service attendees who knew their HIV status (N = 219).

Variable	Categories	% who inconsistently reported HIV status	Univariable OR (95% CI)	*P* value	Multivariable OR (95% CI)	*P* value
Age <25 years	No	57/163 (35.0)	1		1	
	Yes	26/56 (46.4)	1.61 (0.87–2.98)	.129	1.96 (0.96–4.00)	.066
Male	No	40/130 (30.8)	1		1	
	Yes	43/89 (48.3)	2.10 (1.20–3.68)	.009	2.26 (1.05–4.87)	.037
Reported non-regular sex partner in the preceding 3months	No	54/162 (33.3)	1		1	
	Yes	29/57 (50.9)	2.07 (1.12–3.83)	.020	1.56 (0.71–3.46)	.271
Condom use at last sexual encounter	No	69/178 (38.8)	1			
	Yes	14/41 (34.2)	0.82 (0.40–1.67)	.583		
Partner living in a different province/country*	No	60/175 (34.3)	1			
	Yes	23/44 (52.3)	2.10 (1.08–4.10)	.030		
Treated for an STI syndrome in the past 12 months	No	62/152 (40.8)	1		1	
	Yes	21/67 (31.3)	0.66 (0.36–1.22)	.186	0.33 (0.16–0.69)	.003
STI syndrome diagnosed at enrolment	MUS/VDS	69/177 (39.0)	1			
	GUS	14/42 (33.3)	0.78 (0.39–1.59)	.498		
Any STI detected in the laboratory	No	20/65 (30.8)	1		1	
	Yes	63/154 (40.9)	1.56 (0.84–2.87)	.159	0.70 (0.32–1.53)	.370
Circumcision method†	Traditional	35/76 (46.1)	1			
	Medical	8/13 (61.5)	1.87 (0.50–6.25)	.307		
	Female (N/A)	40/130 (30.8)	0.52 (0.29–0.93)	.029		
Tested for HIV in the last 6 months	No	36/126 (28.6)	1		1	
	Yes	47/93 (50.4)	2.55 (1.46–4.48)	.001	3.20 (1.62–6.36)	<.001
Site of enrolment	FS/WC	22/108 (20.4)	1		1	
	GP	36/62 (58.1)	5.41 (2.72–10.77)	<.001	6.89 (3.21–14.82)	<.001
	EC	29/49 (51.0)	4.07 (1.96–8.45)		5.08 (2.15–11.64)	

CI = confidence interval, EC = Eastern Cape, FS = Free State, GP = Gauteng Province, GUS = genital ulcer syndrome, HIV = human immunodeficiency virus, MUS = male urethritis syndrome, N/A = not applicable, OR = odds ratio, STI = sexually transmitted infection, VDS = vaginal discharge syndrome, WC = Western Cape.

* excluded from multivariable model because of collinearity with site of enrolment OR 11.15 (95% CI 4.91–25.32) for association with GP facility.

† excluded from multivariable model because *P* value for medical circumcision was >.2 although overall *P* values was less.

attendees who self-reported knowledge of HIV status. The inconsistent report of HIV status among these attendees was independently associated with

1. gender—with males 2.3 times more likely to inconsistently report their HIV positive status [aOR 2.26 (95% CI 1.05–4.87)];
2. receiving treatment for an STI syndrome in the preceding 12 months with those who received such treatment being 67% less likely to inconsistently report an HIV positive status[aOR 0.33 (95% CI 0.16–0.69)];
3. being tested for HIV in the preceding 6 months with those who tested in this period 3.2 times more likely to inconsistently report their HIV status [aOR 3.20 (95%CI 1.62–6.36)]; and
4. site of enrolment—with attendees enrolled the GP and EC sites 6.9 and 5 times more likely to inconsistently report their HIV status [aOR 6.89 (95% CI 3.21–14.82) and aOR 5.08 (95% CI 2.15–11.64) respectively].

4. Discussion

We described the knowledge of HIV status, yield of HIV testing and self-reported ART among STI service attendees. We found that although the majority of STI service attendees were HIV negative, there was higher HIV positivity in this group compared to the general population, lower than targeted knowledge of HIV status, high yield of HIV testing and low self-reported ART use among attendees who self-reported being HIV positive. Not knowing one's HIV status was associated with being male and with enrolment at the GP and EC sites while inconsistent reporting was associated with being male, a recent HIV test and being enrolled at the GP and EC sites.

The Joint United Nations Programme on HIV and AIDS (UNAIDS) set targets for the goal of ending Acquired Immune deficiency syndrome (AIDS) as a public health threat by 2030. To be on track to meet this goal, countries need to ensure that 90% of all HIV positive individuals know their HIV status, 90% of HIV positive individual who knows their status are on ART (81% of all HIV positives) and 90% of those on ART are virally suppressed (73% of all HIV positives) by 2020.[22] Our analysis found that attendees met the target for knowledge of HIV status at only 1 site, but this did not extend to the ARV use indicator. STI service attendees sampled at the all the other sites were yet to meet targets for knowledge of HIV status and ART coverage. Consistent with the literature, our analysis also found lower rates of testing among males.[23–27] There is need to ensure that STI service clients are tested for HIV and those that are HIV positive linked and retained in HIV care and remain virally suppressed. There is also need to ensure that HIV positive individuals in care have access to STI screening and treatment services and ongoing risk reduction counselling to reduce the occurrence of new STIs, which has been associated with loss of viral suppression and increased risk of HIV transmission.[28] The introduction of interventions such as HIV self-testing within STI services may improve access to HIV testing for STI service attendees and their partners.[29]

The lower than targeted knowledge of HIV status and self-reported ART use could have been due to under-reporting, a

phenomenon that has been observed with self-reported measures in HIV and other surveys.[30–32] The high levels of inconsistent reporting of the HIV status among HIV positive STI service attendees could be due to a combination of misreporting of the HIV status or recent infections in those HIV negative at most recent test.[33] Inclusion of biological markers such as tests of recent infection, viral load measurement and ARV drug level measurement in our sentinel surveillance will be necessary to determine the relative contribution of recent infection and misreporting of HIV diagnosis and ART use.[34] In addition, empathetic, non-discriminatory and non-judgemental STIs services are needed to improve disclosure of HIV status to providers and allow timely linkage to care where needed.

This analysis, which adds to the literature addressing the need for better integration of HIV and STI services had some important limitations. First, the main outcomes in the study were based on self-report and there may have been under-reporting as a result of incorrect recall or social desirability bias. Second, the analysis used third generation rapid tests, which could have missed some acute infections and therefore under-estimated the burden of HIV in this population. Lastly, the enrolment of STI attendees occurred at only 4 primary care centres, 1 in each province and therefore the findings in the study may not be generalizable to other facilities in the same province, district or sub-district. The different rates of knowledge and consistent reports of HIV status and ART use observed across the facilities suggest HIV testing coverage, inconsistent reporting from misreporting or new infections may greatly across locations as a result of health system factors such as STI burden, human resources for health, patient demand and availability of services. Despite these limitations, our analysis demonstrates the need to better integrate HIV prevention, testing and treatment services into STI services and STI prevention services within HIV services in order to reach high-risk populations with HIV prevention, care and treatment and prevent new infections.

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Author contributions

TK and RK designed the analysis; FR oversaw data collection in the field, VM and DN oversaw laboratory procedures. TK analysed the data and drafted the manuscript. All authors critically reviewed and revised the manuscript and approved the manuscript for submission.

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