

# HIV self-testing: a cross-sectional survey conducted among students at a tertiary institution in Johannesburg, South Africa in 2020

Hloniphile R. Mthiyane,<sup>1</sup> Zinhle Makatini,<sup>1</sup> Refilwe Tsukulu,<sup>2</sup> Rumaanah Jeena,<sup>2</sup> Motheo Mutloane,<sup>2</sup> David Giddings,<sup>2</sup> Sifiso Mahlangu,<sup>2</sup> Paballo Likotsi,<sup>2</sup> Liezl Majavie,<sup>2</sup> Tali Druker,<sup>2</sup> Florette Treurnicht<sup>1</sup>

<sup>1</sup>Department of Virology, School of Pathology; <sup>2</sup>Clinical Medicine, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa

## Abstract

**Background.** Despite the growing evidence for reasonable acceptance and the willingness to use HIV self-testing (HIVST), South Africa has not yet fully explored HIVST.

**Objective.** This study's objective was to determine knowledge, attitudes, and practices for HIVST among students aged 18 to 29 years from the University of the Witwatersrand, Johannesburg.

**Methods.** An online cross-sectional self-administered survey was used to collect data from 01 January 2020 to 31 June 2020.

Chi-squared test was used to determine the contribution between categorical variables and HIVST outcomes at a P-value of  $\leq 0.05$ . Logistic regression was performed to analyze the association between categorical variables with HIVST at a 95% confidence interval.

**Results.** A total of 227 students were included and more than half were females and 68% were between 20 and 24 years of age. Only 15% reported prior access to HIVST. Almost all students (99%) indicated that they would confirm self-test results if positive. Age group 25-29 (aOR 3.43; 95% CI 1.7-77) was associated with HIVST access compared to  $\leq 19$  and 24-29 age groups.

**Conclusions.** HIVST awareness was generally high among this study population. Of concern is the extremely low number of students who had previously used HIVST, as well as those who were unaware of HIVST's existence. Our findings highlight a necessity for HIVST advocacy in South Africa that provides information on where and how HIVST kits can be accessed to potentially upscale HIV testing – essential for achieving UNAIDS targets towards the elimination of HIV/AIDS epidemic as a public health threat.

Correspondence: Hloniphile R. Mthiyane, Department of Virology, School of Pathology, Faculty of Health Sciences, University of the Witwatersrand, 07 York Road, Parktown, Johannesburg, 2193, South Africa.

Tel.: +27.114898401.

E-mail: hloni.mthiyane@wits.ac.za

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## Introduction

Despite the benefits attributed to combination antiretroviral treatment (cART) for reducing human immunodeficiency virus (HIV) infection and transmission as well as progression to acquired immunodeficiency syndrome (AIDS) and death, it is estimated that approximately 19% of South Africans do not know their HIV status.<sup>1</sup> According to UNAIDS 2020 report, only 70% of South Africans living with HIV/AIDS were accessing ART and among which 64% were virally suppressed.<sup>1</sup> In 2014, the World Health Organization (WHO) made the HIV epidemic a top priority by establishing fast-track 90-90-90 targets defined as: i) 90% of all HIV-positive individuals know their status; ii) 90% of all HIV-positive individuals have access to ART; iii) 90% of all HIV-positive individuals on treatment have undetectable viral loads.<sup>2</sup> These targets were revised to 95-95-95 and aimed to be met by 2030 in a strategy to end the HIV/AIDS epidemic as a public health threat.<sup>2-4</sup> To address the first target which is "to know HIV status" scaling-up of HIV testing is essential.<sup>2</sup> HIV-positive diagnosis serves as the gateway to treatment and monitoring of HIV infection; therefore, testing should be expanded to reach HIV undiagnosed populations. Most of the new HIV infections are transmitted by persons who are unaware of their HIV status.<sup>5</sup> Since 2015, persons aged between 15 and 24 years account for the majority of the undiagnosed population who are at risk of acquiring and transmitting HIV.<sup>5-7</sup> Following WHO recommendation, South Africa adopted HIV self-testing (HIVST) in 2016 as a supplementary strategy linked to the national HIV testing modalities.<sup>8</sup> Emerging evidence-based surveillance studies indicates that HIVST utilization could overcome

barriers associated with traditional HIV testing such as lack of privacy, confidentiality, and stigma.<sup>7</sup> HIVST could bridge the gap for HIV diagnosis among the unreached and those at high risk of acquisition of HIV infection.<sup>9</sup> However, in South Africa, HIVST has not yet been fully explored, despite several studies conducted among the “hard to reach” population groups such as the youth aged 15-29 years old and men who report reasonable acceptance and willingness to use HIVST.<sup>10-13</sup> Studies conducted among South African youth show varying degrees of acceptance and willingness ranging from 43 to 74% and 74 to 96% respectively.<sup>5,12,14,15</sup> Other studies have also shown that HIVST education and awareness, accompanied by freely available kits have the potential of increasing HIV testing uptake.<sup>15-17</sup> Furthermore, awareness and access have been reported as the main obstacles associated with the use of HIVST in South Africa.<sup>18</sup> However, the details on subsequent intervention strategies and their impact are unclear. This study, therefore, aims to determine knowledge, attitudes, and practices related to HIVST among students aged 18 to 29 years from the University of the Witwatersrand, Johannesburg South Africa in 2020.

## Materials and Methods

### Ethical consideration

This study was approved by the University of the Witwatersrand Human Research Ethics Committee (reference number R14/49 M191103). All data from the database remained confidential as participants’ details were kept anonymous.

### Study design

The cross-sectional self-administered survey was conducted from the 1<sup>st</sup> of January to 31 June 2020. All students aged 18-29 years of age, studying within the Faculty of Health Sciences at the University of the Witwatersrand were recruited to participate. The Faculty of Health Sciences at the University of Witwatersrand offers eleven undergraduate and postgraduate programs with approximately 7000 students enrolled in 2020.

### Data collection

An online questionnaire developed using Google Forms was used for data collection. Students were recruited via email as general communication from the Office of the Deputy Registrar. The email sent to students contained a summary outlining the aim of the study, contact details of investigators, online consent forms, and a link to access the questionnaire. Student participants had to complete the online consent forms first before they could access and complete the self-administered questionnaire.

### Measurements

HIV self-testing awareness was measured by asking “Are you aware of the existence of HIVST?”. HIV self-testing access was measured by asking “Have you ever used HIVST before?”. Responses were rated on a nominal scale with “yes” or “no” response categories. Categorical variables included for data collection and analysis were gender, age, race, the year of study, and the area of origin (urban, suburban, or rural setting within South Africa).

### Data analysis

The data analysis was conducted using Statistica software version 14.0.0.18. Frequencies and percentiles were used to summarise the distribution of categorical variables and HIVST out-

comes. Chi-squared test was used for bivariate analysis between categorical variables and the outcomes. A statistically significant association with a P-value of  $\leq 0.05$  was used in the logistic regression analysis. Logistic regression was performed to assess the association between covariates to the probability of the occurrence of the expected outcomes; “Are you aware of the existence of HIVST?” and “Have you ever used HIVST before?” Odd ratios were reported with 95% confidence intervals (95% CI).

## Results

### Participants’ demographic characteristics

Of the 520 respondents to the survey, 227 (44%) met the criteria for inclusion in the study. Participants’ demographic information is provided in Table 1. Among the participants, 64% (145/227) were females, and 34.7% (79/227) were males. The majority (156/227; 68%) of students were 20 to 24 years of age, followed by the 25 to 29-year-old age group (40/227; 17%) and lastly the  $\leq 19$  years age group (31/227; 15%). African and Caucasian students accounted for 36% (81/227) and 33% (76/227) of participants respectively, while Asians accounted for 21% (48/227) and other ethnicities for 10% (22/227). Participants who were not classified as African, Asian, or Caucasian were reported as “other” for this study. The majority of students were enrolled in the fifth year of study (54/227; 24%) followed by the 3<sup>rd</sup> (45/227) and 4<sup>th</sup> (44/227) year students. Most students originate from urban (103/227; 45%) and suburban (96/227; 43%) areas.

### HIV self-testing knowledge and attitudes

Among all participants, the majority (145/227; 64%) were aware of HIVST; however, only 15% (34/227) reported having had access to HIVST at the time of the survey (Table 2). More than two-thirds (158/227; 70%) indicated they would consider using

**Table 1. Demographic characteristics of study participants.**

Variable	Participants (N=227)	Percentage (%)
Gender		
Female	145	64
Male	79	34.7
Other	3	1.3
Age		
$\leq 19$	31	15
20-24	156	68
25-29	40	17
Race		
African	81	36
Asian	48	21
Caucasian	76	33
Other	22	10
Year of study		
1st	19	8
2nd	22	10
3rd	45	20
4th	44	19
5th	54	24
6th	19	8
Post Grad	24	11
Type of living area you originate from?		
Suburban	96	43
Urban	103	45
Rural	28	12

HIVST in the future and 80% (188/227) stated that they would recommend HIVST to friends and family. The proportion of responders who cited affordability, privacy, quick, user-friendly, consistent risk of HIV exposure, and stigma-free as reasons to use self-testing, was similar (ranging from 16% to 21%). Almost all participants (225/227; 99%) indicated that they would confirm the results if tested positive, while 68% (155/227; 68%) said that they would confirm negative self-test results (Table 2).

### Factors associated with HIV self-testing awareness

Age groups 20-24 (aOR 13; 95% CI 12.5-67) and 25-29 (aOR 3.43; 95% CI 1.7-77) were associated with HIVST awareness compared to younger students ≤19. Univariate logistic regression analysis showed that students enrolled in fifth (OR 10; 95% CI 3.2-31.7), sixth (OR 31.5; 95% CI 3.5-282), and postgraduate (OR 6.6; 95% CI 1.7-24.7) years of study were associated with HIVST awareness. However, statistical significance was lost at adjusted ratio multivariate logistic regression analysis. No association was found between the area of origin, gender, and race. (Table 3).

### Factors associated with HIV self-testing access

Age group 25-29 (aOR 3.43; 95% CI 1.7-77) was associated with HIVST access compared to ≤19 and 24-29 age groups. Students enrolled in the sixth year of study were associated with HIVST access at an unadjusted odd ratio (OR 5.8; 95% CI 1-32.7). No association was found between the area of origin, race, and gender (Table 4).

## Discussion

Our findings revealed high levels of HIVST awareness (64%) compared to that previously reported in other studies conducted in

an African continent from Malawi (11.4%) and Zimbabwe (14.5%) and among higher education students from the Democratic Republic of Congo with 54.6% and 55.6% from Nigeria.<sup>6,12,19,20</sup> Also when compared to a large study conducted on South African

**Table 2. HIV self-testing knowledge (awareness and access) and attitudes among students aged ≤19 to 29 years from the University of the Witwatersrand, Johannesburg South Africa, 2020.**

Variable	Frequency (N=227)	Percentage (%)
Are you aware of HIVST?		
Yes	145	64
No	82	36
Have you ever used HIVST before?		
Yes	34	15
No	193	85
How did you learn about HIVST?		
Health care experience	82	36
Today was the first time	81	35.6
Media	23	10
Lecture	3	1.3
Pharmacy	3	1.3
Word of mouth	5	2.2
Missing	3	1.3
Would you consider using HIVST in the future?		
Yes	159	70
No	11	5
Maybe	56	24.6
No response		
Would you confirm the results if tested positive?		
Yes	225	99
No	2	1

HIVST, HIV self-testing.

**Table 3. Univariate and multivariate logistic regression analyses of factors associated with HIVST awareness among students aged ≤19 to 29 years from the University of the Witwatersrand, Johannesburg, South Africa, 2020.**

Variable	Are you aware of the existence of HIVST?		p	Univariate unadjusted OR (95% CI)	Multivariate adjusted OR (95% CI)
	Yes	No			
Year of study					
1st	8	11	0.00*	1.3 (0.4-4.5)	Reference
2nd	8	14			
3rd	23	22			
4th	23	21			
5th	46	8			
6th	18	1			
Postgrad	19	5	6.6 (1.7-24.7)	1.6 (0.2-10.3)	
Gender					
Female	95	50	0.6	1.2 (0.6-2.0)	Reference
Male	49	30			
Race					
African	57	24	0.4	1.3 (0.5-3.6)	Reference
Asian	27	21			
Caucasian	47	29			
Other	14	8			
Type of area of origin					
Suburban	57	39	0.4	0.5 (0.2-1.4)	Reference
Urban	68	35			
Rural	20	8			
Age					
≤19	7	24	0.00*	7.4 (3.0-18.5)	Reference
20-24	31	9			
25-29	107	49			
				11.8 (3.8-36.2)	13 (2.5-67)
					11.7 (1.7-77)

\*significant P-value; OR: Odd Ratio; CI: 95% confidence interval.

students where HIVST awareness was reported at 46.3%.<sup>12</sup> The area of study which is the FHS could explain higher HIVST, our findings are corroborated by the study conducted among Tanzanian medical students that showed a comparable 66.5% awareness.<sup>21</sup> In this study, we noted higher HIVST awareness among older participants enrolled in advanced years of study. Increased HIVST awareness among older students from advanced years of study may indicate that the knowledge of HIV testing options including HIVST improves with academic exposure. To note is the finding that 35.6% of study participants only learned about HIVST through this survey. As well as the majority of the participants never had previously used HIVST, highlighting that this testing modality in South Africa is incredibly underutilized. While our findings revealed low levels of HIVST access, other studies have reported even lower access to HIVST. The highest access level reported in a South African study conducted in a population aged 18 to over 60 years old was 18%,<sup>10</sup> while <2% access was reported amongst participants from a multi-centered survey conducted in Malawi and Zimbabwe.<sup>19</sup> Moreover, studies conducted among both young and old South Africans reported that the likelihood for the participants to use HIVST in the future increased if the kits were to be offered free of charge.<sup>11,12,17</sup> Overall, these findings emphasize a need for HIVST advocacy at the country level that provides information on where and how HIVST kits can be accessed to promote and improve HIVST usage. South Africa should also consider making these HIVST kits easily or freely accessible to vulnerable and hard-to-reach populations to potentially scale up HIV testing toward achieving the first of the 95 UNAIDS targets. In this study, 70% of students stated that they would consider using HIVST in the future. While almost all indicated that they would confirm HIVST-positive results. Our find-

ings are consistent with other research conducted among higher education students that showed generally high willingness, ranging from 72% to 78.4% among South African and DRC students respectively. In addition, studies conducted among South African youth from rural areas revealed a staggering willingness to use HIVST, ranging from 95% from 18-26-year-olds to 100% from 18-24 years old.<sup>5,7</sup> The South African HIV screening algorithm recommends that all HIVST-positive results must be confirmed through a health care testing facility. Confirmation of HIVST-positive results through healthcare facilities in South Africa is important to ensure linkage to care and subsequent monitoring and management of infected persons.<sup>22,23</sup> Linkage to care is essential to ensure that those who are HIV infected are initiated on cART and that HIV viral load suppression is achieved and sustained, which is vital in achieving the second and the third UNAIDS targets.<sup>2</sup>

### Limitations

This study was only conducted among students from the FHS, which may limit its scope and introduce bias given the field of study. The knowledge accompanied by positive attitudes and views concerning HIVST may be expected from this group due to their exposure to the subject.

### Conclusions

High levels of awareness did not translate to high access; therefore, South Africa should reinforce inclusivity toward a comprehensive understanding of HIVST access aiming at outlining appropriate intervention strategies.

**Table 4. Univariate and multivariate logistic regression analyses of factors associated with HIVST access among students aged ≤19 to 29 years from the University of the Witwatersrand, Johannesburg, South Africa, 2020.**

Variable	Have you ever used HIVST before?		p	Univariate unadjusted OR (95% CI)	Multivariate adjusted OR (95% CI)
	Yes	No			
Year of study			0.05*		
1st	3	16		1.8 (0.2-12.6)	3.6 (0.3-42)
2nd	2	20			Reference
3rd	6	39		1.5 (0.2-8.3)	0.6 (0.08-4.2)
4th	2	42		0.4 (0.06-3.6)	0.1 (0.01-1.5)
5th	10	44		2.2 (0.4-11.3)	0.7 (0.1-5.2)
6th	7	12		5.8 (1-32.7)	2.8 (0.3-22)
Postgrad	4	20		2 (0.3-12.1)	0.4 (0.05-4.4)
Gender			0.6		
Female	21	124		0.8 (0.4-1.8)	0.8 (0.3-2.0)
Male	13	66			Reference
Race			0.00*		
African	22	59		2.3 (0.6-8.7)	2.6 (0.5-11.6)
Asian	5	43		0.7 (0.2-3.4)	0.6 (0.1-3.6)
Caucasian	4	72		0.3 (0.07-1.7)	0.4 (0.1-3.6)
Other	3	19			Reference
Type of area of origin			0.00*		
Suburban	10	86		0.2 (0.07-0.5)	0.3 (0.1-1.1)
Urban	14	89		0.2 (0.1-0.7)	0.5 (0.2-2)
Rural	10	18			Reference
Age			0.03*		
≤19	1	30			Reference
20-24	23	133		5 (0.6-39.9)	23.7 (0.7-326)
25-29	10	30		10 (1.2-83)	29 (1.8-451)

\*significant p; OR: Odd Ratio; CI: 95% confidence interval.



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