



Original Research

Prevalence of self-reported HIV testing and associated factors among adolescent girls and young women in South Africa: Results from a 2017 nationally representative population-based HIV survey



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ABSTRACT

Objectives: This article estimated the prevalence of self-reported HIV testing and identified associated factors among sexually active adolescent girls and young women (AGYW), aged 15–24 years, in South Africa.

Study design: This is a secondary data analysis of a nationally representative population-based cross-sectional multi-stage cluster survey of households in South Africa conducted in 2017.

Methods: Descriptive statistics were used to describe AGYW characteristics and the multivariable logistic regression model was used to determine factors associated with HIV testing. All analyses were adjusted for unequal sampling probabilities using survey weights.

Results: From the 1360 AGYW analysed (70.3% aged 20–24 years, 89.0% Black African, 95.5% unmarried, 88.7% unemployed), 1154 (estimate 85.8% (95% Confidence Interval (CI): 83.0 to 88.1)) had ever tested for HIV. In adjusted analysis, AGYW who had been pregnant in the past 24 months (adjusted Odds Ratio [aOR] 3.67, 95%CI: 1.68 to 8.02), were older (20–24 years: aOR 3.13, 95%CI: 1.86 to 5.28), or did not use condoms consistently compared to using them every time (almost every time: aOR 3.31, 95%CI: 1.07 to 10.22; sometimes: aOR 2.54, 95%CI: 1.29 to 4.98) had significantly higher odds of ever testing for HIV.

Conclusions: This research identified an unmet need for HIV testing among AGYW and increasing awareness of HIV counselling and testing among AGYW in South Africa is recommended.

1. Introduction

In 2018, the UNAIDS estimated that globally 37.9 million people were living with HIV (PLHIV), 1.7 million were newly infected with HIV, and 770,000 died from AIDS-related illnesses [1]. The sub-Saharan Africa region bears the greatest burden with two thirds of PLHIV; 20.6 million (54% of global PLHIV) live in Eastern and Southern Africa [1]. Furthermore, South Africa alone carries the biggest epidemic in the world with an estimated 7.7 million PLHIV, 20.4% adult prevalence (15–49 years), 71,000 AIDS related deaths, and 240,000 new HIV infections, in 2018 [2].

In 2017, new HIV infections in South Africa were highest among the youths aged 15–24 years (1% annual incidence), with females having three times higher annual incidence than males (1.5% versus 0.5%) [3]. Although some of these youths may have acquired HIV infections through mother to child transmission, the higher incidence further suggests that the majority were due to recent sexual transmissions. Some of the factors associated with HIV infection among adolescent girls and young women (AGYW), aged 15–24 years, include biological susceptibility [4], age-disparate relationships [3], early sexual debut [5], experiencing intimate partner violence [6], transactional sex [7], having

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multiple sex partners, and socio-demographic factors such as being aged 20–24 years and lower level of education [8].

The UNAIDS has set 90-90-90 targets to combat HIV and AIDS globally, implying that by year 2020, 90% of PLHIV would know their HIV status, 90% of those testing HIV positive would be on anti-retroviral treatment (ART), and 90% of those on ART would achieve viral load suppression [9]. According to the 2016 South African National HIV Testing Services policy, the gateway to HIV prevention, treatment, care, and support is HIV counselling and testing (HCT) [10]. Furthermore, the South African National Strategic Plan for HIV, STIs and TB (2017–2022) called for increased efforts to heighten HCT among targeted populations including AGYW [11]. This study determined the prevalence and factors associated with HIV testing among sexually active AGYW in South Africa using a nationally representative population-based survey conducted in 2017. The findings in this study will inform interventions and strategies to increase uptake of HCT among AGYW in South Africa.

2. Methods

2.1. Study design and sampling

This is a secondary data analysis of a nationally representative population-based cross-sectional multi-stage cluster survey of households in South Africa conducted by the Human Sciences Research Council (HSRC) in 2017. This is the fifth wave of the surveys that HSRC has undertaken, with previous four surveys having been conducted in 2002, 2005, 2008 and 2012 [12]. The methodology for the fifth South African National HIV Prevalence, Incidence, Behaviour and Communication Survey, 2017 (SABSSM V) is described in detail elsewhere [3]. A multi-stage random sampling procedure involving both stratification and clustering was used. Stratification was by province and locality type (urban, rural formal and rural informal settings). There were 11,743 valid households with a total of 39,132 eligible individuals. The sampling frame consisted of a master sample of 1000 small area layers (SAL) which were randomly selected proportional to the number of households. A systematic random probability sample of a cluster of 15 households was selected in each SAL. The design was similar to earlier SABSSM's [12] where all members of the households were invited to participate in the survey.

2.2. Setting and participants

South Africa has nine provinces and a population of almost 59 million [13] with the highest number of PLHIV of approximately 7.7 million [2]. AGYW had the highest HIV incidence in 2017 of 1.5% [3]. This study includes AGYW aged 15–24 years in South Africa who were enrolled in the 2017 survey and who reported being sexually active; those who never had sex were excluded as they were not at high risk of contracting HIV.

2.3. Data collection

The data for this study were collected using questionnaires administered to the head of the household to collect household relevant data, and to every member of the households that agreed to participate. The current paper only focuses on members who were AGYW aged 15–24 years at the time of survey administration.

2.4. Variables and measurements

The main outcome of interest was self-reported HIV testing. The participants were asked whether they ever had an HIV test and the responses were either 'Yes', 'No', or 'No response'. We treated the 'No response' category as missing, and therefore the outcome variable was binary (Yes, No). The socio-demographic variables were age category (15–19 years, 20–24 years), race (Black African, Coloured, White, Asian), married (Yes, No), employed (Yes, No), and receiving income from any

source including salary, earnings, relatives, grants, or any other source (Yes, No). Participants were also asked whether they had been pregnant in the past 24 months (Yes, No). Knowledge regarding prevention of HIV infection was a multiple response question on whether they were aware of the following HIV prevention methods: condom use, having one faithful partner, reducing number of sex partners, abstaining from sex, avoiding blood contact with infected person, taking anti-retroviral drugs (ARVs) to prevent mother-to-child transmission, male circumcision, vaginal microbicides, and pre-exposure prophylaxis (PrEP). Their perception regarding whether a person can prevent TB by completing religious or traditional practice (Agree, Disagree, Don't know) was also analysed. In terms of HIV risky sexual behaviours, age at sexual debut (in years), number of sex partners in the last 12 months (No sex, 1 partner, 2 partners, 3 or more partners), ever receiving money or gifts in exchange of sex (Yes, No), having an older partner by at least 5 years (Yes, No), consistent condom use (Every time, Almost every time, Sometimes, Never) and alcohol use at last sex (Yes, No) were all included. Participants were also asked whether they experienced any form of gender based violence; this was measured by saying 'Yes' to any one or more of the following: being pushed; slapped; having arm twisted or hair pulled; punched with fist or hit with something; kicked, dragged or beaten up; attempt to be choked or burned; threatened or attacked with knife, gun, or other weapon; physically forced to have sexual intercourse; physically forced to have any other sexual act; forced with threats or any other way; or performed any sexual acts they did not want to.

2.5. Statistical methods

Characteristics of participants were summarized using descriptive statistics. Bivariate and multivariable logistic regression models were applied to determine factors associated with self-reported HIV testing. Independent variables included socio-demographic characteristics, pregnancy, knowledge regarding HIV and TB prevention, HIV risky sexual behaviours, and experiencing gender-based violence. Manual forward stepwise procedure was used to enter variables with p-values <0.20 in the bivariate analysis into the multivariable model. The Hosmer-Lemeshow test was used to test the goodness of fit of the final multivariable model. A p-value ≤ 0.05 was considered statistically significant with Odds Ratios (OR), 95% confidence intervals (CI) and p-values calculated for each independent variable. A complete case analysis was performed where cases with missing data on either outcome or independent variable were excluded from the analysis; no data imputation was done. All analyses, including percentages, were adjusted for the complex multi-stage stratified cluster sampling procedure using survey weights that were benchmarked to the 2017 mid-year population estimates. The statistical package used for analyses was Stata (version 15, StataCorp, College Station, TX, USA).

3. Results

3.1. Study cohort

There were 1369 AGYW, aged 15–24 years, who had ever had sex. Nine of them were excluded as they did not have the outcome on whether they ever tested for HIV, leaving 1360 participants that formed the final study sample.

3.2. Socio-demographic characteristics of study participants

From 1360 AGYW, more than 70% were aged 20–24 years (70.3%, $n = 944$), almost 90% were Black African (89.0%, $n = 1065$), more than 95% were never married (95.5%, $n = 1290$), nearly 90% were not employed (88.7%, $n = 1175$), and more than two-thirds were not receiving an income from any source (68.9%, $n = 927$). (Table 1).

Table 1
Socio-demographic characteristics of adolescent girls and young women aged 15–24 years, South Africa, 2017.

Characteristic	n	% ^a	95%CI
Age category (N=1360)	15–19 years	416	29.7 26.5 to 33.0
	20–24 years	944	70.3 67.0 to 73.5
Racial group (N=1360)	Black African	1065	89.0 86.5 to 91.1
	Coloured	244	8.4 6.6 to 10.6
	White	23	1.9 1.1 to 3.4
	Indian/Asian	28	0.7 0.5 to 1.1
Marital Status (N=1356)	Married	66	4.5 3.1 to 6.5
	Never Married	1290	95.5 93.5 to 96.9
Employment status (N=1358)	Employed	183	11.3 9.2 to 13.9
	Not employed	1175	88.7 86.1 to 90.8
Receiving any income (N=1359)	Yes	432	31.1 27.4 to 35.0
	No	927	68.9 65.0 to 72.6

^a Weighted percent, n = Frequency, CI: Confidence Interval.

3.3. Factors associated with self-reported HIV testing

From the 1360 AGYW, 1154 self-reported as having ever tested for HIV, giving a prevalence of 85.8% (95%CI: 83.0 to 88.1).

3.3.1. Sociodemographic factors

Among the 1360 AGYW, the odds of HIV testing were significantly higher among the older (20–24 years) compared to the younger (15–19 years) age groups (91.5% vs 72.3%, OR 4.11, 95%CI: 2.70 to 6.25, $p < 0.001$). This difference remained statistically significant (aOR 3.13, 95% CI 1.86 to 5.28, $p < 0.001$) after adjusting for potential confounders. Compared to Black African AGYW, the odds of HIV testing were 82% lower among the white AGYW (53.6% vs 86.7%, OR 0.18, 95%CI: 0.06 to 0.57, $p = 0.004$) although this difference was no longer significant after adjusting for potential confounders. There was no statistically significant difference in HIV testing prevalence when comparing Coloured or Indians/Asians versus Black Africans, employed versus unemployed, married versus unmarried, and receiving versus not receiving income. (Table 2).

3.3.2. Pregnancy

Among the 1026 AGYW who responded to the question on pregnancy, more than a quarter (27.6%) had been pregnant in the previous 24 months. The odds of testing for HIV were significantly higher among those who had been pregnant in the past 24 months (95.5% vs 83.6%, OR 4.21, 95%CI: 1.84 to 9.62, $p = 0.001$); the association remained statistically significant even after accounting for potential confounding factors (aOR 3.67, 95%CI: 1.68 to 8.02, $p = 0.001$). (Table 2).

3.3.3. Knowledge regarding HIV prevention

Out of the 1360 AGYW analysed, most (93.8%) believed that condom use prevents HIV. Furthermore, the odds of HIV testing were significantly higher among those who knew that condom use prevents HIV (87.1% vs 66.2%, OR 3.43, 95% CI: 1.69 to 6.98, $p = 0.001$) compared to those who were not aware; however the association was no longer significant in adjusted analysis. HIV testing prevalence did not significantly differ with respect to responses to all other HIV prevention methods. (Table 2).

3.3.4. Perception of religious and traditional practices regarding TB prevention

Out of 1354 AGYW who responded to questions regarding religion and TB, most (85.2%) disagreed that TB can be prevented by following religious and traditional practices; 7.2% agreed and the remaining 7.6%

did not know. Compared to those who agreed, those who disagreed had significantly higher odds of HIV testing (87.7% vs 70.3%, OR 3.00, 95% CI: 1.64 to 5.51, $p < 0.001$), even after accounting for other confounding variables (aOR 3.77, 95%CI: 1.49 to 9.52, $p = 0.005$). (Table 2).

3.3.5. HIV risky sexual behaviours

From 1342 AGYW, the mean (standard deviation[SD]) age at sexual debut was 17.1 (1.9) years. A one year increase in age at first sexual debut was significantly associated with an average 15% increase in the odds of HIV testing (OR 1.15, 95%CI: 1.02 to 1.30, $p = 0.018$); however, this was no longer significant in the adjusted analysis. Out of 1326 AGYW who responded to a question on the number of sexual partners they had in the past 12 months, the majority (71.3%) indicated they had one partner. Compared to those who had no sex in the previous 12 months, those who had one partner had 59% higher odds of HIV testing (OR 1.59, 95%CI: 1.01 to 2.48, $p = 0.042$); however, this was no longer statistically significant after adjusting for other confounding variables.

From 1008 AGYW who responded to questions on consistent condom use, 34.5% used condoms every time, 7.4% almost every time, 26.2% sometimes, and 32.0% never used condoms. Compared to AGYW who used condoms every time, the odds of HIV testing were higher among those who used condoms almost every time (93.8% vs 80.4%, OR 3.65, 95%CI: 1.31 to 10.17, $p = 0.014$) or sometimes (92.6% vs 80.4%, OR 3.03, 95%CI: 1.59 to 5.79, $p = 0.001$) or never (89.2% vs 80.4%, OR 2.00, 95%CI: 1.12 to 3.59, $p = 0.020$). The difference remained statistically significant for the first two categories, even after adjusting for potential confounders: almost every time (aOR 3.31, 95%CI: 1.07 to 10.22, $p = 0.037$); sometimes (aOR 2.54, 95%CI: 1.29 to 4.98, $p = 0.007$).

However, ever receiving money or gifts for sex, having an older sex partner (at least 5 years older), and alcohol use at last sex were not significantly associated with self-reported HIV testing. (Table 2).

3.3.6. Experiencing gender-based violence

Out of the 302 (22.2%) AGYW who responded to questions on gender-based violence (GBV), 59 (21.6%) had experienced GBV. The odds of HIV testing were significantly higher among those who experienced GBV (95.6% vs 82.2%, OR 4.77, 95% CI: 1.50 to 15.16, $p = 0.008$), with wider confidence intervals probably due to smaller sample size; however, the association was no longer statistically significant after taking account of potential confounding variables.

4. Discussion

The objective of this study was to determine the prevalence and associated factors of self-reported HIV testing among AGYW in South Africa using secondary data from a population-based survey in South Africa in 2017. This study found a prevalence of self-reported HIV testing of 85.8% (95%CI: 83.0 to 88.1) among sexually active AGYW in South Africa. In adjusted analysis, history of pregnancy, older age (20–24 years), inconsistent condom use, and perceiving that TB cannot be prevented by following religious or traditional practice, were significantly associated with self-reported HIV testing. Knowledge regarding HIV prevention through condom use and experiencing gender-based violence were associated with self-reported HIV testing in unadjusted analyses but this association did not remain after adjusting for confounders.

Secondary analysis of a previous wave of this survey also found that a history of pregnancy was associated with HIV testing uptake among sexually active AGYW in South Africa [14]. This is partly because pregnant women attending public antenatal clinics in South Africa are required to test for HIV. A study from Tanzania found a significant association between receiving antenatal care with HIV testing among AGYW [15]. Another study of 2016 Ethiopian demographic and health survey (DHS) found an association between visiting health care facilities and HIV testing among AGYW [16]. We postulate that the reason for visiting health facilities for some of these women could be pregnancy.

Table 2

Factors associated with self-reported HIV testing among adolescent girls and young women aged 15–24 years, South Africa, 2017.

Variable	Univariate models					Multivariate model ^b			
	n	% ^a HIV tested	OR	95%CI	P-value	aOR	95%CI	P-value	
Sociodemographic characteristics									
Age (N = 1360)	15–19 years	416	72.3	Ref					
	20–24 years	944	91.5	4.11	2.70 to 6.25	<0.001	3.13	1.86 to 5.28	<0.001
Race (N = 1360)	Black African	1065	86.7	Ref					
	White	23	53.6	0.18	0.06 to 0.57	0.004			
	Coloured	244	84.9	0.87	0.51 to 1.58	0.597			
	Indian/Asian	28	69.9	0.36	0.12 to 1.05	0.061			
Married (N = 1356)	No	1290	85.6	Ref					
	Yes	66	88.7	1.32	0.39 to 4.44	0.652			
Employed (N = 1358)	No	1175	85.7	Ref					
	Yes	183	86.3	1.05	0.53 to 2.08	0.891			
Income (N = 1359)	No	927	84.5	Ref					
	Yes	432	88.5	1.40	0.90 to 2.18	0.130			
Pregnant in the past 24 months (N = 1026)	No	729	83.6	Ref					
	Yes	297	95.5	4.21	1.84 to 9.62	0.001	3.67	1.68 to 8.02	0.001
Knowledge regarding prevention of HIV (N = 1360)	Using condoms	1275	87.1	3.43	1.69 to 6.98	0.001			
	One partner	443	88.0	1.32	0.83 to 2.10	0.247			
	Faithful to one partner	343	88.8	1.42	0.89 to 2.26	0.144			
	Reduce partners	162	90.6	1.68	0.92 to 3.09	0.093			
	Abstain from sex	382	86.9	1.15	0.72 to 1.83	0.555			
	No blood contact	634	87.3	1.26	0.85 to 1.87	0.257			
	PMTCT ARVs	79	85.7	0.96	0.42 to 2.34	0.992			
	Male circumcision	51	92.2	2.00	0.58 to 6.83	0.270			
	Microbicides	18	93.8	2.54	0.52 to 12.40	0.248			
	PrEP	57	87.2	1.13	0.49 to 2.60	0.771			
	A person can prevent TB by completing religious or traditional practices (N = 1352)	Agree	111	70.3	Ref				
Disagree		1140	87.7	3.00	1.64 to 5.51	<0.001	3.77	1.49 to 9.52	0.005
Don't know		103	77.7	1.47	0.64 to 3.38	0.363	1.50	0.45 to 5.04	0.507
HIV Risky sexual behaviours									
Age at first sex, years (N = 1342)	Mean (SD) = 17.1(1.9)	1342	N/A	1.15	1.02 to 1.29	0.018			
Number of sex partners in last 12 months (N = 1326)	No sex	306	81.2	Ref					
	1 partner	940	87.3	1.59	1.01 to 2.48	0.042			
	2 partners	60	88.7	1.82	0.68 to 4.89	0.236			
	3 or more partners	20	75.2	0.70	0.14 to 3.55	0.669			
Ever received money or gifts for sex (N = 1.008)	No	961	87.1	Ref					
	Yes	47	81.4	0.65	0.28 to 1.50	0.311			
Partner aged 5 years or older (N = 1016)	No	604	85.5	Ref					
	Yes	412	89.2	1.40	0.89 to 2.22	0.149			
Consistent condom use (N = 1008)	Every time	342	80.4	Ref					
	Almost every time	74	93.8	3.65	1.31 to 10.17	0.014	3.31	1.07 to 10.22	0.037
	Sometimes	272	92.6	3.03	1.59 to 5.79	0.001	2.54	1.29 to 4.98	0.007
	Never	320	89.2	2.00	1.12 to 3.59	0.020	1.63	0.86 to 3.07	0.134

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Table 2 (continued)

Variable		Univariate models					Multivariate model ^b		
		n	% ^a HIV tested	OR	95%CI	P-value	aOR	95%CI	P-value
Sociodemographic characteristics									
Alcohol use at last sex (N = 1008)	No	937	87.9	Ref					
	Yes	71	78.6	0.50	0.23 to 1.13	0.095			
Experienced any gender-based violence (N = 302)	No	236	82.2	Ref					
	Yes	66	95.6	4.77	1.50 to 15.16	0.008			

a: Weighted percent, b: The Hosmer-Lemeshow goodness of fit test ($p = 0.242$); PMTCT ARVs, Prevention of Mother to Child Transmission Anti-retrovirals; PrEP, Pre-exposure Prophylaxis, CI, Confidence Intervals; OR, Odds Ratio; aOR, adjusted Odds Ratio; Ref, Reference category, SD, Standard Deviation.

This suggests that antenatal clinics are an important source of HCT services for AGYW who may not receive HIV testing through routine care or other testing sites.

This study found that older age for AGYW (20–24 years) was associated with self-reported HIV testing. The same association was also determined among sexually active AGYW in Zambia [17]. The association can be attributed to the fact that older AGYW may be more knowledgeable about HIV testing [18], probably due to their higher level of education as these AGYW are more likely to have finished secondary school education than the 15–19 year olds. Higher level of education was found to be associated with HIV testing among Ethiopian AGYW [16]. There is therefore a need to increase awareness regarding the importance of HIV testing and to target HCT services towards the younger women (15–19 years).

Similar to the Zambian study [17], this study found an association between inconsistent condom use and self-reported HIV testing. After having unprotected sex, the fear and anxiety that one may have of having been infected can influence individuals to test for HIV. In unadjusted analyses, this study found that those who knew that condom use prevents HIV had higher odds of self-reported HIV testing. HIV knowledge was also found to be associated with HIV testing among youths aged 18–24 years in South Africa [19].

Health care seeking behaviours can also influence the decisions regarding HIV testing uptake since HCT is mainly offered in health care facilities. Individuals who believe in religious or traditional practices, which is common in South Africa [20], may choose not to visit clinics or hospitals for any services due to their beliefs. This study found that those who perceived that following religious or traditional practices does not prevent TB had higher odds of self-reported HIV testing.

4.1. Limitations

Although this was a secondary analysis of a high-quality survey, one must recognize some limitations to this study. This study depended on the variables that were available and was not able to investigate new variables that could be associated with HIV testing such as knowing a place where HCT is done [21], knowing a person who is HIV positive [22], or having a sexually transmitted infection or associated symptoms [15]. Some of the questions relied on self-report, which might have introduced both recall and social desirability biases and could compromise the internal validity of our findings. In addition, the cross-sectional nature of the study means that one is only able to determine association but cannot make inference on causality. There were missing data in some of the independent variables especially on gender-based violence where questions were sensitive in nature. It is assumed that data were missing completely at random (MCAR) and hence a complete case analysis was performed. If this MCAR assumption is false, there may be a need to perform multiple imputation to replace missing data, while assuming that data are missing at random (MAR). The findings from this study therefore need to be interpreted with caution.

4.2. Conclusions

This study found an 85.8% (95%CI: 83.0 to 88.1) prevalence of self-reported HIV testing among sexually active AGYW in South Africa in the previous year of 2016. In multivariable analysis, this study found that sexually active AGYW in South Africa who had been pregnant in the previous 24 months, were aged 20–24 years, inconsistently used condoms, and those who perceived that TB could not be prevented by following religious or traditional practices, had higher odds of self-reported HIV testing.

4.3. Recommendations

Increasing awareness of the importance of HCT among AGYW in South Africa, while targeting younger (15–19 years) age groups and those with negative perceptions towards seeking care at healthcare facilities, is recommended. It is also recommended to conduct qualitative studies to understand the barriers to HIV testing among AGYW in South Africa.

Ethical approval and permission

The Human Sciences Research Council (REC: 4/18/11/15) and the Associate Director for Science, Centre for Global Health, U.S. Centers for Disease Control and Prevention (CDC) reviewed and approved the study protocol (CGH Protocol Number 2016-143a).

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Declaration of competing interest

None declared for all authors.

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