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Original Research

Trends in HIV testing and associated factors among men in South Africa: evidence from 2005, 2008 and 2012 national population-based household surveys

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ABSTRACT

Objectives: In Sub-Saharan African countries, including South Africa, uptake of human immunodeficiency virus (HIV) testing among men remains a major challenge. Few studies have explored HIV testing uptake among men and factors that influence their testing behaviours. This article explores trends in HIV testing uptake and associated factors among men aged 15 years and older in South Africa using national HIV population-based household surveys conducted in 2005, 2008 and 2012.

Study design: A multistage cross-sectional design was used in the three nationally representative household-based surveys.

Methods: P-trend Chi-squared statistic was used to analyze changes in HIV testing in relation to demographic factors, and HIV-related risk behaviours across the three surveys. Univariate and multivariate logistic regression models were used to assess the associations between ever testing for HIV, demographic factors and HIV-related risk behaviours.

Results: HIV testing uptake among men was 28% in 2005, 43% in 2008 and 59% in 2012. A trend was also observed in HIV testing by sociodemographic factors, but differences existed within variables. HIV testing uptake was mainly influenced by the effects of selected population characteristics. Reduced likelihood of HIV testing was significantly associated with males aged 15–24 years, Black African race group, being single and unemployed, those residing in urban informal and rural informal areas, and those men who ever had sex.

Conclusion: The observed sociodemographic differentials suggest that an effective expansion strategy for HIV testing needs to prioritize those most unlikely to test as identified by the current findings.

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Introduction

Human immunodeficiency virus (HIV) counselling and testing is recognized as the gateway to HIV prevention and access to antiretroviral treatment (ART), care and support. Evidence from empirical studies and modelling exercises on HIV testing and treatment from across the world demonstrate that diagnosis of HIV at an early stage is essential to promote long-term health and social support for, and survival of, people infected with HIV.[1–3] Early diagnosis of HIV can also assist in preventing HIV transmission to sexual partners.[1,4,5] However, in South Africa, as in many other African countries, the uptake of HIV testing remains low.[6–8] This is despite South Africa having the highest prevalence of HIV[9,10] and the largest rollout of ART in the world.[11,12]

Few studies have explored the uptake of HIV testing among men or the factors that influence uptake in Sub-Saharan Africa.[4,13–19] In these studies, predictors of HIV testing include sociodemographic factors (age, education, occupation, wealth status, religion, area of residence, marital status and type of marriage), health services (access, cost, waiting time and confidentiality), sociocultural factors (mainly decision making and social beliefs), HIV knowledge/perception and self-perceived risk of HIV.[4,13–23]

Most of these studies found a positive association between the likelihood of the uptake of HIV testing and older age, better HIV knowledge, higher income and higher educational, socioeconomic and marital status.[20–23] Nevertheless, proper understanding of the complexity of the decision-making process, which leads men to undergo an HIV test is still unclear, especially in the South African context. Understanding the factors associated with the uptake of HIV testing in this population is therefore critical.

This information is crucial in South Africa, where, as in other African countries, men are usually the heads of households who control resources and make decisions about family members that are essential for HIV testing, prevention, care and treatment. Improved understanding of what drives the decision to test or not to test for HIV among men may lead to intervention pathways to encourage male participation in HIV testing. This study explored trends in the uptake of HIV testing and associated factors among men aged ≥15 years in South Africa using national HIV population-based household surveys conducted in 2005, 2008 and 2012.[10,24,25]

Methods

Study design and sampling

A multistage cross-sectional survey design was used in three nationally representative household-based surveys conducted in 2005, 2008 and 2012.[10,24,25] In each of the three surveys, enumeration areas (EAs) were selected from the 2001 population census and mapped by aerial photography to create the master samples that informed the sampling of households. A systematic probability sample of 15 households was drawn from each of the 1000 EAs selected at random. The selection of EAs was stratified by province, and four locality types were defined as urban formal, urban informal, rural formal (including commercial farms) and rural informal (including tribal authority areas) localities.

In the 2005 and 2008 surveys, a maximum of three people (aged ≥2 years) were invited to participate from each household, and one person in each of the following age groups in each household was selected at random: 2–14, 15–24 and ≥25 years.[24,25] In 2012, all household members were selected to participate in the survey: children aged 0–11 years (filled out by a parent), children aged 12–14 years, and youth and adults aged ≥15 years.[10] Three different questionnaires based on the age group (namely, parents and guardians of children aged <12 years, 12–14-year-old children, and youth and adults aged ≥15 years) were used for the study to solicit information on demographic characteristics and HIV-related knowledge, attitudes and behaviours. The current analysis is based on the subsample of youth and adult data, and focusses on HIV testing among men aged ≥15 years.

Ethical consideration

The survey protocols were approved by the HSRC's Research Ethics Committee (REC: 5/17/11/10) and the Associate Director of Science of the National Center for HIV and AIDS, Viral Hepatitis, STD and TB Prevention at the Centers for Disease Control and Prevention (CDC) in Atlanta, GA, USA.

Measures

Dependent variable

The outcome variable 'HIV testing' was ascertained by the yes/no question: 'Have you ever had an HIV test?' 'Ever been tested' was defined as having accessed HIV testing services at least once before the survey.

Independent variables

Demographic variables included age (subsequently grouped into 15–19, 20–24, 25–49 and ≥50 years), race (Black African, White, Coloured and Indian), marital status (no/yes), employment status (employed/unemployed) and place of residence (urban formal, urban informal, rural informal and rural formal). HIV-related risk behaviours included ever had sexual intercourse (no/yes), multiple sexual partners in the last 12 months (one partner/two partners/more than two partners), condom use at last intercourse (no/yes), excessive alcohol use (no/yes) based on the Alcohol Use Disorder Identification Test scale (abstainers/low risk = no; risky/hazardous, high-risk/harmful and high-risk drinkers = yes)[26] and self-perceived risk of HIV infection (no/yes).

Statistical analysis

Descriptive statistics were used to summarize HIV testing, demographic factors and HIV-related risk behaviours in each year. Trend analysis was used to analyze changes in HIV testing in relation to demographic factors and HIV-related risk behaviours across the three survey years using *P*-trend Chi-squared statistic. Univariate logistic models were used to assess associations between HIV testing and each explanatory variable by survey year. Finally, multivariate models of factors

independently associated with HIV testing were fitted. Adjusted odds ratios (aORs) with 95% confidence intervals (CIs) are reported to indicate the strength and direction of association, and $P \leq 0.05$ was taken to indicate statistical significance. All analyses were performed using Stata Version 11 (Stata Corp., College Station, TX) using the 'syv' command to take into account the complex survey design in each year.

Results

Trends in HIV testing in relation to participants' characteristics

Tables 1 and 2 show trends in HIV testing among men aged ≥15 years for the three survey years, and the change in HIV testing in relation to participants' characteristics for the three survey years. HIV testing increased remarkably from 28% (n = 6193) in 2005 to 43% (n = 5193) in 2008 and 59.0% (n = 11,403) in 2012. Overall change in HIV testing was 31 percentage points between 2005 and 2012. There was a significant increase in HIV by age, race, marital status, employment and locality type. A greater change in HIV testing was notable among those aged 25–49 years. Across the three surveys, HIV testing was consistently higher in other race groups compared with Black African males. Change in the uptake of HIV testing was higher among those who were married compared with those who were not married, and was also higher among those residing in urban formal settings compared with other locality types.

There were significant changes in HIV testing by HIV-related risk behaviours and perceived risk of HIV infection over the three survey periods. Overall, HIV testing was higher among men who had ever had sexual intercourse, men who did not use a condom at last intercourse, men who had only had one sexual partner in the previous 12 months, excessive alcohol users and men who perceived themselves to be at risk of HIV infection.

Factors associated with the uptake of HIV testing

Fig. 1 shows the final multivariate models of factors independently associated with HIV testing among men aged ≥15 years in 2005, 2008 and 2012 in South Africa.

Men aged 25–49 years were significantly more likely to undergo HIV testing compared with those aged 14–24 years in 2005 (aOR 2.65, 95% CI 1.95–3.60; $P < 0.001$), 2008 (aOR 2.62, 95% CI 1.89–3.62; $P < 0.001$) and 2012 (aOR 1.95, 95% CI 1.58–2.41; $P < 0.001$), followed by those aged ≥50 years in 2008 (aOR 1.79, 95% CI 1.12–2.87; $P = 0.015$) and 2012 (aOR 1.32, 95% CI 0.99–1.76; $P = 0.058$), although the latter differences were not significant.

Compared with Black Africans, other race groups were significantly more likely to undergo HIV testing, with aOR of 3.19 (95% CI 2.28–4.47; $P < 0.001$), 1.76 (95% CI 1.12–2.76; $P = 0.013$) and 1.42 (95% CI 1.03–1.94; $P = 0.031$) in Whites in 2005, 2008 and 2012, respectively; aOR of 1.30 (95% CI 0.78–1.74; $P = 0.058$) in Coloureds in 2005; and aOR of 2.38 (95% CI 1.44–3.89; $P = 0.001$) in Indians in 2005. Employed men were significantly more likely to undergo HIV testing compared with their unemployed counterparts in 2005 (aOR 2.02, 95% CI 1.54–2.63; $P < 0.001$) and 2012 (aOR 1.21, 95% CI 1.00–1.46; $P = 0.045$).

Table 1 – Trend in human immunodeficiency virus testing by sociodemographic characteristics of the study participants across three survey periods in South Africa.

	2005			2008			2012			P-value[a]
	n	%	95% CI	*n*	%	95% CI	*n*	%	95% CI	
Total	6193	27.6	25.6–29.8	5193	43.0	40.9–45.2	11,403	59.0	57.2–60.8	
Age group (years)										
15–24	2486	11.4	9.6–13.4	1947	22.9	19.9–26.1	3433	39.5	36.4–42.6	<0.001
25–49	2442	41.7	38.1–45.5	2089	58.1	54.8–61.4	4935	69.4	66.8–71.9	<0.001
≥50	1265	24.9	21.5–28.8	1157	42.9	38.6–47.2	3035	60.2	57.0–63.3	<0.001
Race										
Black African	3521	22.2	19.9–24.6	2954	39.7	37.1–42.3	6409	57.0	54.9–59.1	<0.001
White	761	52.2	44.8–59.5	672	59.5	53.9–64.8	1332	68.9	63.3–74.0	<0.001
Coloured	1180	32.2	27.6–37.1	1014	47.1	43.2–51.1	2090	63.8	60.3–67.1	<0.001
Indian	720	46.3	38.6–54.2	540	50.2	41.4–59.0	1538	62.2	57.9–66.3	<0.001
Marital status										
No	3893	20.6	18.4–23.0	3294	37.4	34.7–40.1	4210	54.3	52.0–56.6	<0.001
Yes	2273	39.4	35.5–43.4	1865	54.0	50.5–57.5	7000	70.3	67.3–73.1	<0.001
Employment status										
No	3373	16.1	14.2–18.2	2617	31.1	28.6–33.8	5059	50.2	47.8–52.5	<0.001
Yes	2688	43.2	39.4–47.1	2433	57.2	53.7–60.5	5266	70.1	67.4–72.7	<0.001
Locality type										
Urban formal	3690	37.9	34.8–41.0	3292	49.1	46.1–52.1	6752	64.6	62.2–67.0	<0.001
Urban informal	644	23.1	18.6–28.4	534	43.3	38.2–48.5	1181	58.6	52.8–64.2	<0.001
Tribal area	1206	15.2	12.3–18.6	1003	31.1	27.6–34.9	2214	49.9	47.1–52.6	<0.001
Rural formal	653	16.2	11.2–22.9	364	42.2	34.3–50.6	1256	61.3	51.6–70.2	<0.001

CI, confidence interval.
[a] P-trend Chi-squared statistic measuring significant change across the three survey years.

Table 2 – Trend in HIV testing by HIV-related risk behaviours and perceived risk of HIV among men aged ≥15 years across three survey periods in South Africa.

	2005			2008			2012			P-value[a]
	n	%	95% CI	*n*	%	95% CI	*n*	%	95% CI	
Ever had sexual intercourse										
No	1193	7.5	5.1–10.9	3686	9.6	7.3–12.7	1642	25.7	22.2–29.6	<0.001
Yes	4832	32.1	29.9–34.5	930	47.9	45.3–50.4	9456	64.4	62.4–66.4	<0.001
Condom use at last intercourse										
No	361	33.9	26.5–42.1	1076	63.8	59.1–68.3	4790	68.2	65.6–70.8	<0.001
Yes	402	33.7	27.9–40.0	1637	47.7	44.2–51.3	2417	66.4	63.1–69.6	<0.001
No. of sexual partners in last 12 months										
One	3272	35.6	32.8–38.5	2814	53.6	50.7–56.5	6202	68.4	66.2–70.6	<0.001
Two	347	32.5	24.2–42.0	286	40.1	31.8–49.0	632	64.6	58.4–70.3	<0.001
More than two	192	29.4	21.8–38.3	231	45.4	37.1–53.9	531	65.3	58.8–71.2	<0.001
Excessive alcohol use										
No	4869	25.8	23.7–28.1	4172	42.7	40.2–45.2	8131	58.2	56.1–60.2	<0.001
Yes	1247	34.9	30.7–39.3	926	44.1	39.4–49.0	1904	61.3	57.2–65.2	<0.001
Perceived risk of HIV infection										
No	4438	26.5	24.1–29.0	1017	42.7	40.2–45.1	9400	57.4	55.3–59.5	<0.001
Yes	1737	30.3	26.6–34.3	4158	44.1	40.3–48.1	1909	63.6	60.2–66.9	<0.001

CI, confidence interval; HIV, human immunodeficiency virus.
[a] P-trend Chi-squared statistic measuring significant change across the three survey years.

In 2005, married men were less likely to undergo HIV testing than unmarried men, whereas in 2008, the odds of undergoing HIV testing were equal for married and unmarried men; however, these associations were not significant. There was a shift in 2012, when married men were significantly more likely to undergo HIV testing than unmarried men (aOR 1.32, 95% CI 1.03–1.69; $P = 0.026$).

Men residing in rural informal areas were significantly less likely to undergo HIV testing in 2005 (aOR 0.60, 95% CI 0.43–0.84; $P = 0.002$), 2008 (aOR 0.57, 95% CI 0.41–0.80; $P = 0.001$) and 2012 (aOR 0.64, 95% CI 0.51–0.81; $P < 0.001$) compared with those living in urban formal areas. Those who resided in urban informal areas were significantly less likely to undergo HIV testing compared with men residing in urban formal areas in 2005 (aOR 0.62, 95% CI 0.44–0.89; $P = 0.009$) and 2012 (aOR 0.73, 95% CI 0.53–1.01; $P = 0.057$). On the other hand, while men residing in rural formal areas were less likely to undergo HIV testing compared with men residing in urban formal areas, this association was only significant in 2005 (aOR 0.24, 95% CI 0.14–041; $P < 0.001$).

Men who had ever had sex were significantly more likely to test for HIV in 2005 (aOR 2.52, 95% CI 1.59–3.98; $P < 0.001$) and 2012 (aOR 2.85, 95% CI 2.26–3.61; $P < 0.001$). Men who perceived themselves to be at risk of HIV were significantly less likely to undergo HIV testing; however, this was only significant in 2005 (aOR 0.76, 95% CI 0.61–0.96; $P = 0.018$).

Discussion

The findings show that there has been an increase in HIV testing over the past 7 years among the three surveys. The increase in the uptake of HIV testing could be attributable to the South African national HIV counselling and testing campaign.[27] Although the continuous increase in HIV testing among men in South Africa since 2005 suggests progress, these rates are still far below the figures required to reach the current target of the National Strategic Plan for HIV/AIDS, Sexually Transmitted Infections and Tuberculosis (80% of the South African population knowing their HIV status by 2016),[27] and the UNAIDS '90-90-90' target (90% of people with HIV should know their status, 90% should be linked to ART and 90% should be virally suppressed by 2020).[28]

The results showed that age, race, marital status, employment status and locality type were associated with HIV testing behaviour among men in South Africa. Contrary to current findings and results from the studies mentioned above, studies conducted in the Eastern Cape, South Africa[29] and in rural Western Uganda[4] found that older men were less likely to be tested for HIV than younger men. The present study found that men aged between 25 and 49 years were more likely to undergo HIV testing than younger men aged 15–24 years, followed by those aged ≥50 years in 2005, 2008 and 2012. HIV testing among older men probably reflects the cumulative effects of testing over the past decade, whereas it only reflects recent testing among men aged 15–24 years. These findings highlight the importance of targeting younger men with specific interventions to increase awareness and the uptake of HIV testing among this group.

Men who were employed were significantly more likely to undergo HIV testing than their unemployed counterparts in 2005, 2008 and 2012. These results are consistent with previous studies showing a connection between employment and HIV testing among men.[4,7,18] The connection between employment and HIV testing among men may be confounded by education, income and access to health services. This can be attributed to the various employee health and wellness programmes facilitated by both the government and the private sectors. These interventions seek to inform, educate, sensitize, mobilize and encourage maximum participation by employees in company-funded HIV disease management efforts.[30]

These data also show a shift from unmarried men being significantly more likely to undergo HIV testing in 2005 to

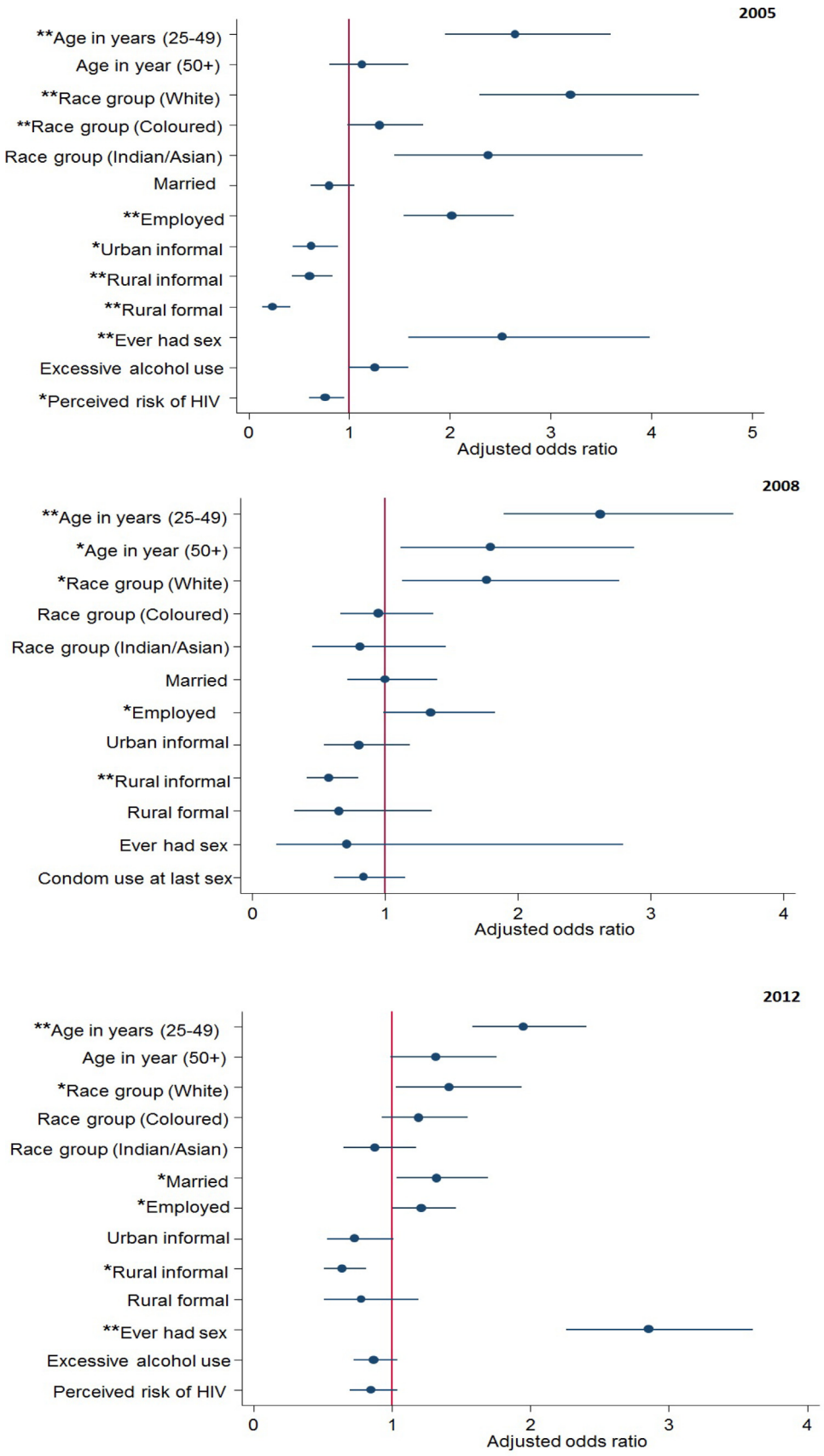

Fig. 1 – Multivariate models of independent factors associated with HIV testing among men aged ≥15 years in 2005, 2008 and 2012 in South Africa. HIV, human immunodeficiency virus. All asterisks highlight statistically significant variables at *P ≤ 0.05 and **P ≤ 0.01.

married men being significantly more likely to undergo testing in 2012. This shift may be due to the innovative strategies that are being implemented across the country to encourage couples to undergo HIV testing.[31] Men who resided in rural informal areas were significantly less likely to undergo HIV testing compared with those residing in formal urban areas in all three surveys. This probably reflects the fact that HIV counselling and testing services are much better in urban areas than rural informal areas, thus suggesting the need to improve services in the latter. Clearly, specified and targeted interventions need to be directed at men aged 15–24 years, Black African men, men who reside in rural informal areas, unemployed men and single men.

The cross-sectional nature of the survey limits the analysis to identifying associations, and cannot infer causality between the various predictors and HIV testing among men. Lastly, the data are dependent on self-reports and may be limited by recall and social desirability bias. Nevertheless, this study presents trends of HIV testing and associated factors based on a nationally representative sample that allows the generalization of the findings to the population of men aged ≥15 years in South Africa.

Conclusion

The findings revealed that the uptake of HIV testing among men increased over the three survey periods, although it remained well below the required national target. A trend was also observed in HIV testing by sociodemographic characteristics, but differences existed between variables over the three survey periods. The sociodemographic differentials identified in HIV testing rates indicated the need for strategies aimed at young men aged 15–24 years, Black African men, single men, unemployed men and men residing in urban informal and rural informal areas. This suggests that an effective expansion strategy for HIV testing needs to prioritize those who are least likely to undergo HIV testing based on the identified characteristics of the target population, and avoid a 'one size fits all' model.

Author statements

Ethical approval

The survey protocols were approved by the HSRC's Research Ethics Committee (REC: 5/17/11/10) and the Associate Director of Science of the National Center for HIV and AIDS, Viral Hepatitis, STD and TB Prevention at the Centers for Disease Control and Prevention (CDC) in Atlanta, GA, USA.

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Competing interests

None declared.

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