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The impact of home-based HIV testing services on progress towards the UNAIDS 90-90-90 targets in a hyperendemic area of South Africa

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Abstract

Background: In several sub-groups of South Africa, the percentage of HIV-positive individuals aware of their status falls well below the UNAIDS 90% target. This study examined the impact that home-based HIV testing services (HBHTS) had on knowledge of status in a hyperendemic area of South Africa.

Methods: We analysed data from the second cross-sectional HIV Incidence Provincial Surveillance System survey (2015/2016), a representative sample (n=10236) of individuals aged 15–49 years. Participants completed a questionnaire, provided blood samples for laboratory testing (used to estimate HIV prevalence) and were offered HBHTS. The proportion of people living with HIV (n=3870) made aware of their status through HBHTS was measured and factors associated with HBHTS uptake were identified.

Results: Knowledge of HIV-positive status at the time of the survey was 62.9% among men and 73.4% among women. Through HBHTS, the percentage of HIV-positive men and women who

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Authors' contributions

ABMK is the principal investigator of HIPSS. ABMK, CC, and DK, were responsible for HIPSS study operations and quality assurance. LL analysed the data. LL, BMB, AG and ABMK contributed to analysis and the interpretation of the data of the first draft. All authors contributed to subsequent drafts, and approved the final version of the report.

knew their status rose to 74.2% and 80.5% respectively. The largest impact was observed among youth (15–24 years). Knowledge of status increased from 36.6% to 59.3% and from 50.8% to 64.8% among young men and women respectively. Additionally, 51.4% of those who had previously never tested received their first test. Key reasons for declining HBHTS among undiagnosed HIV-positive individuals included fear and self-report of a HIV-negative status.

Conclusions: HBHTS was effective in increasing awareness of HIV-positive status, particularly among youth, men and those who had never tested. HBHTS could have a marked impact on progress towards the UNAIDS 90–90-90 targets within these sub-groups.

Keywords

Community-based HIV testing services; HIV diagnosis; determinants of HIV testing; UNAIDS 90–90-90; Southern Africa, reasons not tested

Introduction

In 2015, 46% of the world's new HIV infections came from Eastern and Southern Africa and nearly 40% of the infections in this region originated from South Africa alone.[1] The 'treat-all' policy recommended by the World Health Organization (WHO)[2] enables all people living with HIV access to antiretroviral therapy (ART) and offers promise for rapid reduction in HIV incidence in the region. This is because, in addition to the life-expectancy benefits of ART, ART has also been shown to greatly reduce the transmission risk from those infected.[3] The key to optimising the HIV-prevention benefits from ART is initiation of ART early in disease progression, which can only be achieved with early HIV diagnosis. Achieving early HIV diagnosis by ensuring regular HIV counselling and testing of those at risk is therefore critical to the reduction of incidence in the region.

South Africa has made considerable progress in increasing access to HIV testing services (HTS) in the country. The 2010 national HIV testing campaign conducted approximately 13 million HIV tests, with an estimated 7.6 million first-time testers between 2010 and 2012.[4] In 2012, 65.5% of South Africans reported having ever tested for HIV, an increase from 21.4% in 2002 and 50.8% in 2008.[5] Furthermore, recent estimates based on mathematical modelling indicate that as much as 86% of people living with HIV in the country have been diagnosed.[6] This estimate suggests that the country is close to achieving the first of the 90–90-90 targets set out by UNAIDS, which proposes that by 2020 coverage of HIV diagnosis should meet or exceed 90% of HIV-positive individuals.[7] In contrast, however, a recent representative household survey in a hyperendemic region of South Africa,[8] indicated a significant shortfall from the UNAIDS 90–90-90 targets – only 65% of women and 52% of men who were HIV positive knew their status.[9] Shortfalls in reaching the 'first 90' target have also been observed in 2016 in Malawi, Zimbabwe and Zambia.[10–12] The findings from these studies support previous findings that men and youth (aged 15–24) continue to lag behind in terms of knowledge of HIV status and contribute disproportionately to the shortfall in the 'first 90.'[4,13,14]

Access to HTS in South Africa is primarily facility-based through public clinics and hospitals.[5] This approach limits access to HTS to individuals seeking care, leaving many

asymptomatic HIV-positive persons undiagnosed. Moreover, self-perceived risk of HIV infection has been shown to be highly inaccurate among individuals in South Africa.[15] Consequently, large proportions of people living with HIV will be unaware of the need for HIV testing until they become ill. Alternative testing strategies that facilitate regular testing among asymptomatic individuals are therefore needed.

Home-based HIV testing services (HBHTS) has been shown to increase the uptake of HIV testing in several African countries,[16] and to be effective in reaching men, young adults and first-time testers.[13] In South Africa, HBHTS has been shown to be less costly than clinic-based testing,[17] and effective at increasing testing uptake in rural areas.[18] Moreover, with facilitated interventions, it has been shown that individuals diagnosed HIV-positive during HBHTS can be linked to care effectively.[19] However, HBHTS also needs to be effective in reaching HIV-positive individuals who are unaware of their status. To date, little is known about HBHTS uptake among undiagnosed HIV-positive individuals. There are also limited data on the impact of HBHTS in enhancing progress towards the UNAIDS 90–90-90 targets and the role of HBHTS on awareness of HIV-positive status in regions with high coverage of individuals ever-tested for HIV.

This study measured the uptake of HBHTS and the impact of the home-test on knowledge of HIV-positive status among individuals in a hyperendemic area of South Africa. We examined the socio-demographic, psychosocial and behavioural factors associated with HBHTS uptake, with a particular emphasis on understanding HBHTS uptake among undiagnosed HIV-positive men and women in high prevalence settings.

Methods

Study setting

The data for this study were collected during the second cross-sectional survey of the HIV Incidence Provincial Surveillance System (HIPSS) conducted in the Vulindlela and Greater Edendale areas of the uMgungundlovu district of KwaZulu-Natal, South Africa. The area is predominantly rural to peri-urban, with limited employment opportunities and high levels of poverty. HIV prevalence is estimated to be one of the highest in the country. HIV prevalence among individuals aged 15–49 years in 2014–2015 was estimated to be 36%,[9] and district-level antenatal prevalence in 2013 was 42%.[20]

Study design and procedures

The HIPSS design, described in detail elsewhere,[8] involves serial cross-sectional household surveys with imbedded HIV incidence cohorts. The survey analysed in the present study was conducted between July 2015 and June 2016 (referred to as the ‘second baseline’ survey) and included one individual per household between the ages of 15 and 49 years. Multistage sampling was used to select a representative sample of individuals for the survey, with enumerated areas being the primary sampling unit.

The key objective of HIPSS was to determine HIV prevalence and incidence in the area. To this end, eligibility criteria for study enrolment was a willingness to provide peripheral blood samples for laboratory HIV testing. Thus data on HIV status were available for all

participants. While all participants provided blood for laboratory HIV testing, results from these tests were only available to participants at local clinics after some time (should they have wished to access the results). All participants were however provided with the option of HBHTS to determine their status during the survey.

All participants provided written informed consent, peripheral blood samples for laboratory measurements (HIV, CD4 cell count, viral load) and completed a standardised, face-to-face questionnaire capturing demographic, socio-economic and behavioural data. Self-reported data regarding HIV testing history, reasons for never testing, and perceived HIV status (based on self-reported results from participants most recent HIV test: positive, negative, indeterminate, or did not respond) were captured as part of the questionnaire.

At the end of the study visit, all participants (regardless of self-reported HIV status) were offered HBHTS. Field staff were certified to perform the HBHTS procedures in line with National Department of Health guidelines. The testing algorithm, described in detail elsewhere,[21] involved a serial algorithm with two rapid diagnostic tests using blood specimens from finger pricks.[22] The first rapid diagnostic test was performed with Alere Determine HIV-1/2 (Alere, Matsudo, Japan) and the second, if required, with UniGold HIV (Trinity Biotech, Bray, Ireland). Reasons for refusing the home-test were captured. The accuracy of the rapid tests used in the HIPSS study is described in detail elsewhere.[21]

Laboratory HIV testing was conducted using 4th generation HIV enzyme immunoassays to test for HIV antibodies and antigens. Positive HIV tests were confirmed with the HIV 1/2 Combi Roche Elecys (Germany) (Roche Diagnostics, Penzberg, Germany) and HIV-1 Western Blot Biorad assay (Bio-Rad Laboratories, Redmond, WA 98052, USA).

Ethical Approval

HIPSS was approved by the University of KwaZulu-Natal Biomedical Research Ethics Committee (BF269/13), in collaboration with the Department of Health, Province of KwaZulu-Natal (HRKM 08/14). The project was reviewed according to Centers for Disease Control and Prevention (CDC) human research protection procedures and was determined to be research, but CDC was not engaged.

Data Analyses

Sampling weights were calculated to account for the unequal probability of selection associated with the multistage sampling design as well as non-response. The weights were benchmarked against the 2011 Census data by gender and 5-year age group to ensure that the weights of the participants sampled added up to the population estimates for the area. All statistics were estimated by applying survey weights and survey procedures that corrected for sampling and participation biases, and took into account clustering within enumeration areas. All analyses were performed using SAS (SAS Institute, Cary, North Carolina), version 9.4 and STATA 13 (Stata Corporation LP, College Station, TX).

Descriptive statistics were reported for the full sample (n=10236) and for the sample of individuals who had never tested or did not report a positive result from their last HIV test (n=7484) as interest in HBHTS amongst individuals who reported a positive result from

their last HIV test was (as expected) minimal. Statistics were also reported for the sample of individuals who were HIV-positive (as determined by laboratory HIV test results) but undiagnosed prior to being offered HBHTS (n=1118). People living with HIV were assumed to be undiagnosed prior to being offered HBHTS if they had a positive test result from the HIV laboratory test but reported never having had an HIV test or did not report a positive result from their last HIV test.

The impact of HBHTS on the proportion ever-tested for HIV was assessed by estimating the proportion of individuals who received their first HIV test during the HBHTS. The impact of HBHTS on knowledge of HIV-positive status was assessed by estimating the proportion of HIV-positive individuals (as determined by laboratory testing) who were made aware of their HIV-positive status through the HBHTS offered during the HIPSS survey.

Uptake of HBHTS was estimated by gender, age and testing history. Log-binomial regression was used to assess the association between HBHTS uptake and a range of sociodemographic, behavioural and health variables. Separate exploratory models were run for each independent variable, selected on the basis that the factor could theoretically influence demand for HIV testing. Risk ratios presented were adjusted to control for key demographic covariates, identified prior to analysis, that are associated with HIV testing: age group, highest education level and relationship status.[4,14,23,24] Models were estimated separately by gender.

Results

Of the 17199 eligible households approached during the second HIPSS baseline survey, 12247 (71.2%) households agreed to participate. A total of 10236 (83.6%) individuals were enrolled from these households; refusal rates of men and women were 19.5% and 13.1% respectively. Of those enrolled, 48.2% were men and 51.8% were women (Table 1). The median age was 26 years for men and 27 for women. HIV prevalence was 24.5% (95% CI: 23.0%−26.1%) among men and 45.0% (95% CI:43.4%−46.7%) among women. Among all HIV-positive individuals, prior to the offer of HBHTS, 62.9% of men and 73.4% of women were correctly aware of their status as confirmed by laboratory results. The majority reported having had an HIV test at least once previously, with only 18.0% of men and 8.6% of women having never tested. The most common reasons for never having tested were being afraid to know one’s status (men: 41.6%, women: 29.9%), and never previously considering an HIV test (men: 35.1%, women: 39.2%).

Among individuals who had never tested or did not report a positive result from their last HIV test, 76.1% of men and 85.5% of women reported that their last HIV test was negative. A further 0.3% reported that their last test result was indeterminate, 17.4% had never tested for HIV, and 1.0% refused to respond to the question regarding HIV status. Within this group, 10.8% of men and 17.9% of women tested HIV-positive through laboratory testing of peripheral blood samples.

Among undiagnosed HIV-positive individuals – those with a positive HIV laboratory test who did not self-report a positive result from their last HIV test – 66.5% of men and 83.7%

of women self-reported their HIV-status to be negative. Approximately one quarter of undiagnosed HIV-positive men had never had an HIV test prior to the survey, with 48.1% of these men reporting fear, and 32.1% reporting never thinking of it as reasons for never testing. A total of 31.8% and 44.5% of undiagnosed HIV-positive men and women respectively reported their last HIV-negative test result was received within the previous 12 months.

Impact of HBHTS

Following HBHTS, the proportion of individuals ever-tested for HIV increased from 82.1% (95% CI:80.5%−83.6%) to 90.8% (95% CI:89.8%−91.8%) among men and from 91.4% (95% CI:90.5%−92.3%) to 96.2% (95% CI:95.6%−96.8%) among women (Figure 1). The largest impact was observed in the 15–19 year age group, with HBHTS increasing the proportion ever-tested from 73.9% (95% CI:70.4%−77.4%) to 88.2% (95% CI:85.7% −90.7%) among men and from 70.5% (95% CI:67.3%−73.6%) to 88.0% (95% CI:85.8% −90.3%) among women.

Through HBHTS, the percentage of HIV-positive individuals who knew their status increased from 62.9% (95% CI:59.4%−66.4%) to 74.2% (95% CI:70.8%−77.5%) among men, and from 73.4% (95% CI:71.5%−75.4%) to 80.5% (95% CI:78.6%−82.4%) among women (Figure 2). The greatest gains in knowledge of HIV-infection were observed in the 15–19 year and 20–24 year age groups. The percentage of people living with HIV aged 15–24 years who knew their status increased from 36.6% (95% CI:26.5%−46.8%) to 59.3% (95% CI:48.7%−69.9%) for men, and from 50.8% (95% CI:45.6%−55.9%) to 64.8% (95% CI:59.4%−70.2%) for women.

Uptake of HBHTS

HBHTS uptake among individuals who had tested and reported a positive result from their last HIV test was only 0.4%. Among the sub-sample of participants who had never tested or did not report a positive result from their last HIV test, uptake of HBHTS was 48.1% among men and 52.6% among women (Table 2). HBHTS was accepted by 49.1% of men and 55.8% of women who had never tested before. Among individuals who reported a recent HIV test (within 12 months preceding the survey), 44.9% of men and 49.6% of women accepted the home-test.

Uptake of HBHTS was lower among the sub-sample of undiagnosed people living with HIV. In this group, 33% of men and 30.8% of women accepted testing. HBHTS was lowest among undiagnosed HIV-positive individuals who reported having had a test in the year preceding the survey (men:24.3%, women:21.6%). Uptake was highest among individuals who had previously never tested, particularly in the sub-samples who had not tested because of a lack of time (men:34.7%, women:68.8%) and among those who had not thought of testing before (men:56.9%, women:55.4%).

Reasons for refusing HBHTS

Among individuals who had never tested or did not report a positive result from their last HIV test, the most common reason provided for not accepting HBHTS was ‘I know my

status' (men:46.2%, women:61.1%) (Supplemental Digital Content 1, Table S1). Fear of knowing one's status was the second most common reason given for not home-testing, with 35.1% of men and 23.5% of women refusing to test because of fear. Among undiagnosed HIV-positive individuals, the most common reasons provided for refusing HBHTS were also 'I know my Status' (men:28.5%, women:46.4%) and fear (men:46.4%, women:33.6%).

Factors associated with HBHTS uptake

Among individuals who had never tested or did not report a positive result from their last HIV test (Table 3), HBHTS uptake was positively associated with perceived HIV-risk: individuals were more likely to take up HBHTS if they perceived themselves at higher risk of acquiring the disease (men: aRR:1.21; 95% CI:1.11–1.32; women: aRR:1.13; 95% CI: 1.04–1.23). HIV-positive individuals (as determined by the laboratory tests) were less likely to home-test compared to HIV-negative individuals (men: aRR:0.66; 95% CI:0.55–0.80; women: aRR:0.54; 95% CI:0.47–0.61). In addition, men who home-tested were more likely to have reported having a partner with an STI than those who did not home-test (aRR:1.40; 95% CI:1.16–1.68) and women who home-tested were more likely to report never using a condom in their last 3 relationships (aRR:1.10; 95% CI:1.01–1.20).

Factors Associated with uptake of HBHTS among undiagnosed HIV-positive individuals

Among undiagnosed HIV-positive men and women (see Supplemental Digital Content 2, Table S2 for regression results), there was a negative relationship between recent HIV testing and HBHTS uptake. Individuals were more likely to home-test if their last HIV test had been more than 12 months before (men: aRR:1.32; 95% CI:0.83–2.11; women aRR: 1.76; 95% CI:1.32–2.35) or if they had never tested (men: aRR:1.61; 95% CI:1.01–2.56; women aRR:1.96; 95% CI:1.33–2.88). Those who accepted HBHTS were more likely to perceive themselves at risk of HIV-acquisition in the future (men: aRR:1.46; 95% CI:1.01–2.10; women aRR:1.47; 95% CI:1.11–1.94). Among women, those who home-tested were more likely to report having had emotional support from a family member in the 12 months preceding the survey (aRR:1.37; 95% CI:1.04–1.80). The CD4 count distribution of the home-testers was not significantly different to that of the non-testers.

Discussion

In a high HIV burden region in South Africa, with adult (15–49 years) HIV prevalence of 24.5% among men and 45% among women, our study findings showed that most individuals had previously been tested for HIV (82.0% of men and 91.4% of women). However, despite the high coverage of HIV testing, the percentage of people living with HIV who knew their status fell considerably short of the UNAIDS target of diagnosing 90% of people living with HIV by 2020: 62.9% of HIV-positive men and 73.4% of HIV-positive women were aware of their status at study enrolment. The proportion of diagnosed HIV-positive individuals was particularly low among young (15–24 years) men (36.6%) and women (50.8%). These gender and age differentials in awareness of HIV-status are consistent with results from nationally representative samples in South Africa,[25] and reflective of similar differentials in the uptake of HIV testing nationally.[4] Our results indicate that the current UNAIDS estimate

of 86% of South Africans living with HIV knowing their status,[6] does not necessarily apply to locations with high HIV burden.

The study results demonstrate that HBHTS can lead to substantial gains in the proportion of HIV-positive individuals aware of their status even in a context with high coverage of past HIV testing. Gains were greatest among younger populations, and particularly among young men, with a 62% relative increase in the proportion of 15–24 year-old HIV-positive men aware of their status. In addition, results indicate that HBHTS could potentially facilitate regular testing, as approximately 47.5% of our sample who had tested for HIV in the 12 months preceding the survey accepted HBHTS. The importance of repeat testing in regions with high HIV incidence is underscored by the study finding that almost half (44.5%) of undiagnosed HIV-positive women in the sample had been tested for HIV in the 12 months preceding the survey.

Patterns of uptake of HBHTS in our study also indicate the potential of this testing approach in reaching groups with historically poorer uptake of HIV testing: men, younger individuals, and healthier individuals.[4,1426] Our findings showed that uptake of HBHTS was similar by gender, age groups, and health status (as indicated by CD4 count). Moreover, indicative of the importance of taking HIV testing to certain individuals, approximately half the sample who had never previously tested also accepted HBHTS. HBHTS provided first-time testing to the majority of individuals who reported never testing previously due to a lack of time or because they had not considered it, and to almost half the sample who had never tested previously due to fear of the diagnosis.

However, patterns of testing uptake revealed potential barriers to the efficacy of HBHTS. Approximately 67% of undiagnosed HIV-positive men and 69.2% of undiagnosed HIV-positive women refused HBHTS. Our findings suggest that refusal of HBHTS among undiagnosed individuals was linked to an incorrect perception of status and risk. Undiagnosed HIV-positive men and women were less likely to accept HBHTS if they did not perceive themselves at risk of HIV-infection, and significant proportions of undiagnosed HIV-positive men and women who refused HBHTS reported knowing their status as a reason for refusal. Likely related to this phenomenon, HBHTS uptake was lower among undiagnosed HIV-positive individuals who reported testing for HIV in the 12 months preceding the survey; fewer than a quarter of these individuals agreed to the test. Lastly, the data from this study suggest that fear continues to be an important deterrent to testing, particularly among undiagnosed HIV-positive men.

Our results should be considered alongside the study's limitations. Uptake of HBHTS was lower in this study than that observed in other studies in Sub-Saharan Africa.[13,16] The high coverage of past HIV testing observed in this study relative to other studies is one potential explanation. It is also possible that participants might have been deterred from accepting the home-test because of the time they had already spent on other aspects of the study. However, given that fewer than 8% of men and 4% of women reported a lack of time as a reason for refusing the HBHTS, we believe the impact of this would have been minimal. HBHTS services in general offer testing at a household level. It is unclear what impact the HIPSS study design – the selection of one individual per household – had on uptake and the

applicability of our results to HBHTS programmes. Testing families as a unit has been endorsed as a positive benefit of HBHTS,[27] and hence it is possible that the lack of support from other family members may have undermined testing uptake. Self-reporting bias might have also influenced the accuracy of study measures. There is potential, for example, for under-reporting of prior HIV-positive diagnosis.[25] HIV prevalence estimates might also have been underestimated due to selection effects. Population-based surveys often have high non-participation in HIV testing, resulting in underestimates of HIV prevalence due to a positive correlation between non-participation and knowledge of HIV-positive status.[26,28–30] We believe the potential for such bias is limited in our study as all study participants provided blood samples for laboratory HIV testing, and individual non-response in the study was low. High study participation may relate to the collection of peripheral blood being used to screen for several diseases, not solely HIV. Nevertheless, it is possible that large gender differences in HIV prevalence estimates in our study are related to differences in non-participation, and correlated factors, by gender.[30] A study based on 2007 Zambia Demographic and Health Survey data, for example, found that HIV prevalence estimates from models corrected for selection were substantially higher for men, but not women.[30] It is possible that bias of this nature led to study results overestimating the impact of HBHTS in increasing awareness of HIV-positive status among men. Finally, it is unclear how our findings would apply in other settings, such as regions with lower HIV-prevalence.

Conclusions

Overall, results from our study underscore the importance of regular testing in regions with high HIV incidence, as is recommended by the WHO.[31] Our findings highlight the importance of community-based testing strategies, such as HBHTS, in increasing HIV status awareness among people living with HIV who would otherwise delay testing because they do not perceive the need to test, or are afraid to find out their status. HBHTS combined with interventions to facilitate linkage to care,[19] could play a major role in reducing high rates of HIV infection among young men and women in the area. Our results also suggest that HBHTS programmes need to consider and counter significant barriers to uptake of testing among undiagnosed HIV-positive individuals in order to maximise the effect of HBHTS on progress towards the UNAIDS 90–90-90. Opt-out HBHTS or incentivized testing[32,33] may be useful strategies to increase uptake of testing among undiagnosed HIV-positive individuals who do not perceive the need for testing. HBHTS should also be designed to encourage testing among individuals who tend to refuse testing due to fears around knowing their HIV-status. Future research is required to determine the optimal frequency of HBHTS in regions with high HIV incidence.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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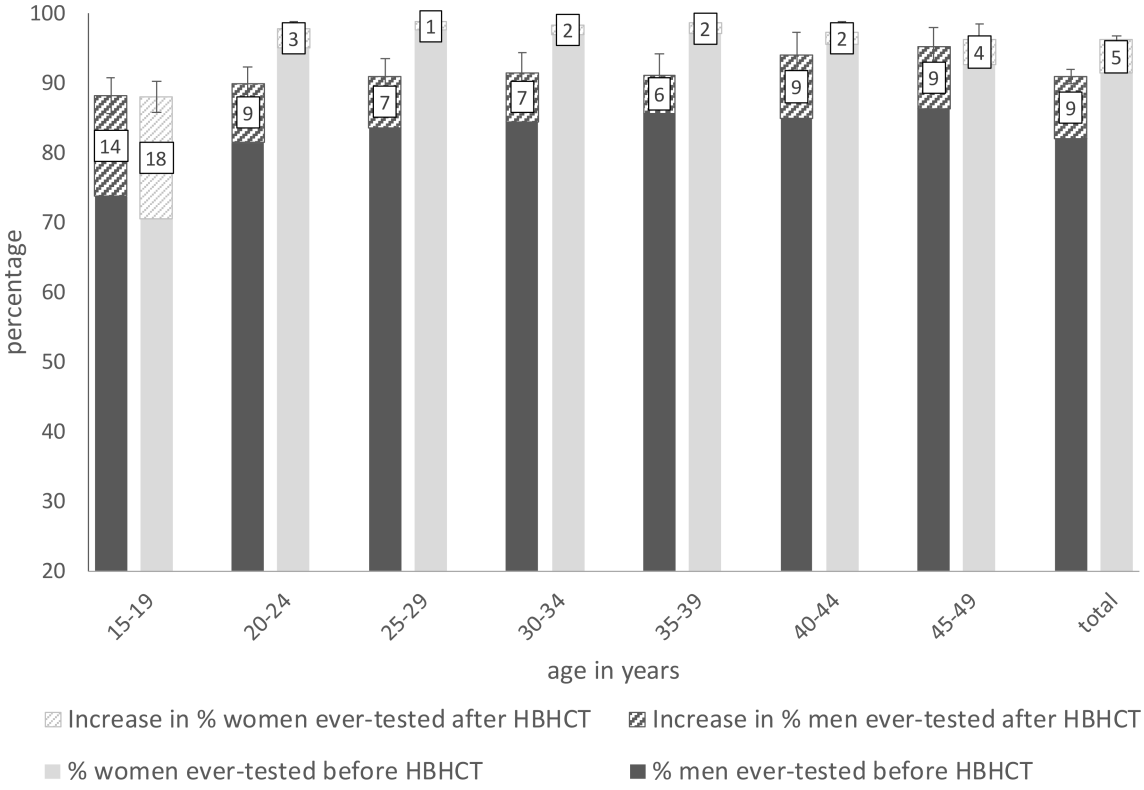

Figure 1:

Impact of HBHTS on prevalence of ever-testing among participants enrolled in the second baseline HIPSS study (2015–2016)

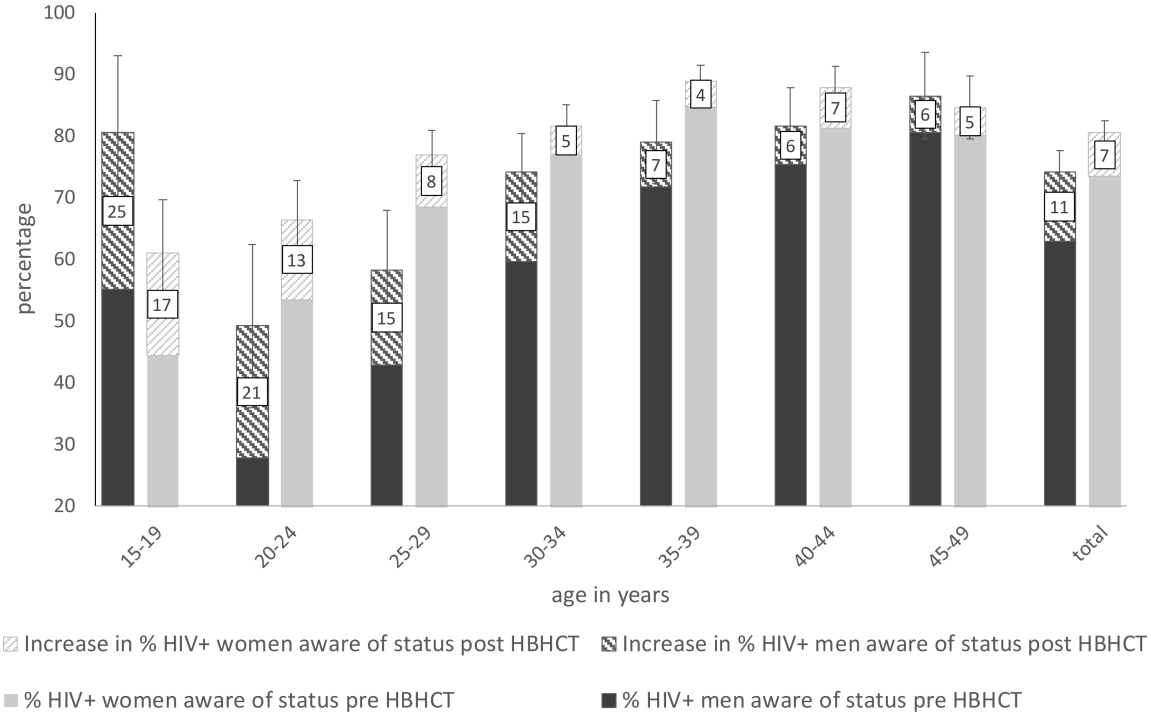

Figure 2:

Impact of HBHTS on knowledge of HIV-positive status among participants enrolled in the second baseline HIPSS study (2015–2016)

Table 1:

Baseline characteristics of participants enrolled in the second baseline HIPSS study (2015–2016), by gender, self-reported HIV status and laboratory HIV status

	All		Self-reported HIV negative or unknown status^		Undiagnosed HIV positive#	
	Men (n=3895)	Women (n=6341)	Men (n=3325)	Women (n=4159)	Men (n=352)	Women (n=766)
Demographics						
Age median (IQR) in years	26(20–35)	27(21–36)	25(19–32)	24(19–32)	31(26–36)	28(23–36)
Age categories % (n)						
15–24	40.4(1776)	37.7(2331)	46.7(1731)	50.8(2086)	16.9(66)	29.8(225)
25–34	32.2(1178)	31.7(2139)	32.4(999)	27.2(1193)	46.7(170)	42(334)
35–49	27.4(941)	30.7(1871)	20.9(595)	22.1(880)	36.4(116)	28.2(207)
Married % (n)	8.3(251)	13.3(855)	7.5(186)	12.6(526)	8.9(25)	11.1(90)
Incomplete secondary schooling % (n)	55.5(2170)	54.1(3407)	53.6(1791)	50.2(2060)	56.9(198)	49.7(377)
Unemployed % (n)	40(1482)	45.3(2904)	38.1(1197)	40.8(1717)	46(154)	50.4(385)
Monthly Income per capita < ZAR500, % (n) $	36.1(1248)	45.6(2599)	35.6(1053)	43.7(1601)	29.8(89)	43.9(291)
HIV Testing and Status						
Never tested % (n)	18(698)	8.6(486)	21.3(698)	12.9(486)	26.1(87)	11.6(80)
Never tested by reason % (n) *						
I'm afraid to know	41.6(288)	29.9(145)	41.6(288)	29.9(145)	48.1(47)	48.4(38)
I have never thought of it	35.1(249)	39.2(190)	35.1(249)	39.2(190)	32.1(25)	23(18)
I don't have time	16.1(107)	11.3(56)	16.1(107)	11.3(56)	20.1(15)	16.7(16)
I am not having sex	6.3(50)	22.2(106)	6.3(50)	22.2(106)	3(2)	7.8(4)
Tested < 1 year % (n)	41.2(1613)	48.3(3141)	43.1(1448)	60.3(2603)	31.8(123)	44.5(365)
Tested >= 1 year % (n)	40.8(1580)	43.1(2713)	35.6(1175)	26.8(1069)	42.1(142)	43.8(320)
Report being likely to acquire HIV in the future %(n)	36.0(1189)	37.0(1596)	35.2(1156)	36.3(1508)	54.9(176)	52.4(373)
Report being HIV-negative % (n)	64.4(2551)	57.2(3605)	76.1(2551)	85.5(3605)	66.5(243)	83.7(648)
HIV-positive in laboratory test % (n)	24.5(922)	45(2948)	10.8(352)	17.9(766)	100(352)	100(766)
Knows HIV+ (HIV+ individuals only) % (n)	62.9(570)	73.4(2182)	0(0)	0(0)	0(0)	0(0)

^ Includes those who reported never having tested for HIV, those who refused to report an HIV status and those who self-reported having a negative or indeterminate result at their last HIV test. Participants with both HIV positive and HIV negative laboratory results included

A subset of ^; includes all individuals who had a positive laboratory HIV result but who reported never having tested for HIV, refused to report an HIV status or self-reported having a negative or indeterminate result at their last HIV test

$ ZAR15 = US$1.

* Some individuals selected more than one reason for never testing.

Table 2:

Uptake of HBHTS among participants enrolled in the second baseline HIPSS study (2015–2016), stratified age and testing history

	Self-reported HIV negative or unknown status^		Undiagnosed HIV positive#	
	Men (n=3325)	**Women (n=4159)**	**Men (n=352)**	**Women (n=766)**
Total % (95%CI)	48.1%(45.7%−50.5%)	52.6%(50.2%−55.1%)	33%(27.1%−38.8%)	30.8%(26.7%−34.9%)
Age category % (95%CI)				
15–24	50.8%(47.5%−54.1%)	55.1%(52%−58.2%)	37.1%(23.7%−50.5%)	32.5%(24.9%−40.1%)
25–34	43.6%(40.2%−47%)	48.7%(45.1%−52.3%)	32.5%(24.2%−40.8%)	28.2%(22.4%−34.1%)
35–49	49.1%(44.3%−53.8%)	51.8%(47.8%−55.9%)	31.6%(22.3%−41%)	32.8%(25.4%−40.2%)
HIV testing history % (95%CI)				
tested <1 year ago	44.9%(41.5%−48.4%)	49.6%(46.6%−52.6%)	24.3%(15.4%−33.2%)	21.6%(16.4%−26.8%)
tested >=1 year ago	51.3%(47.9%−54.7%)	57.9%(54.4%−61.5%)	35.1%(26.2%−44%)	36.5%(30.1%−42.9%)
never tested for HIV	49.1%(44.7%−53.6%)	55.8%(50.6%−61%)	40%(27.4%−52.7%)	44.7%(32.8%−56.6%)
by reason never tested:				
'I don't have time'	60.1%(49.6%−70.6%)	72.8%(59.9%−85.6%)	34.7%(10.1%−59.3%)	68.8%(46.1%−91.4%)
'I never thought of it'	53.9%(47.2%−60.6%)	61.4%(53.5%−69.3%)	56.9%(35.1%−78.7%)	55.4%(33.2%−77.6%)
'I am afraid to know'	42.9%(35.9%−50%)	45.5%(35.9%−55.2%)	28.8%(12%−45.7%)	32.9%(17.1%−48.8%)

^Includes those who reported never having tested for HIV, those who refused to report an HIV status and those who self-reported having a negative or indeterminate result at their last HIV test.

#A subset of ^; includes all individuals who had a positive laboratory HIV result but who reported never having tested for HIV, refused to report an HIV status or self-reported having a negative or indeterminate result at their last HIV test.

Table 3:

Factors associated with Uptake of HBHTS among participants enrolled in the second baseline HIPSS study (2015–2016) who self-reported HIV-negative or unknown status

	Men (n=3325)				Women (n=4159)			
	HBHTS Uptake % (n)	**RR**	**aRR^**	**95% CI**	**HBHTS Uptake % (n)**	**RR**	**aRR^**	**95% CI**
Demographics								
Age								
15–19	53.6(448)	1	1		55.8(568)	1	1	
20–24	48.1(406)	0.9	0.93	0.83–1.05	54.4(582)	0.97	1	0.91–1.11
25–29	42(243)	0.78*	0.80*	0.70–0.93	49.5(362)	0.89*	0.91	0.81–1.02
30–34	46(191)	0.86*	0.87	0.74–1.01	47.3(214)	0.85*	0.86*	0.75–0.98
35–39	48.1(113)	0.9	0.86	0.72–1.03	50.6(140)	0.91	0.90	0.77–1.04
40–44	50.8(94)	0.95	0.90	0.73–1.09	52.8(137)	0.95	0.93	0.80–1.07
45–49	48.7(75)	0.91	0.84	0.68–1.04	52.1(155)	0.93	0.89	0.76–1.05
Relationship status								
Single and always been	51.9(151)	1	1		52.9(360)	1	1	
Single but had previous relationship	47.3(1360)	1.19	1.24	0.98–1.56	52.5(1724)	1.06	1.10	0.91–1.32
Married/in serious relationship	56.1(59)	1.10	1.15*	1.011.32	55.9(74)	1.01	1.06	0.96–1.17
Education								
Incomplete secondary	51(900)	1	1		54.7(1107)	1	1	
Completed secondary	44.8(571)	0.88*	0.91*	0.84–1	50.7(879)	0.93*	0.94	0.86–1.02
Tertiary	44.5(99)	0.87	0.92	0.76–1.10	49.5(172)	0.91	0.92	0.81–1.04
Employment								
Employed	47.7(388)	1	1		52(348)	1	1	
Student/School	50.7(524)	1.06	0.92	0.79–1.08	56.1(667)	1.08	1.00	0.87–1.15
Unemployed	47.2(550)	0.99	0.98	0.87–1.10	50.2(845)	0.96	0.93	0.83–1.04
Other#	44.5(108)	0.93	0.89	0.74–1.08	53.4(298)	1.03	0.99	0.87–1.13
Income per capita per month in ZAR$								
<R500	48.5(498)	1	1		53.2(846)	1	1	
R500-R1000	49(462)	1.01	1.01	0.92–1.12	52.9(625)	0.99	1.00	0.91–1.09
R1000-R2000	48.9(334)	1.01	1.03	0.93–1.14	52.7(428)	0.99	1.00	0.91–1.10
>R2000	44.6(275)	0.92	0.95	0.84–1.07	49.1(257)	0.92	0.94	0.83–1.06
Distance to local clinic								
< 1 km	45.9(507)	1	1		50.4(683)	1	1	
1–2 km	52.8(623)	1.15*	1.14*	1.02–1.27	55.2(826)	1.09*	1.09	1.00–1.19
> 2km	45.3(440)	0.99	0.98	0.86–1.11	52(649)	1.03	1.02	0.90–1.15
Have you received emotional support from family members in the last 12 months?								
No	47.4(492)	1	1		49.6(623)	1	1	
Yes	48.4(1078)	1.02	1.01	0.91–1.12	53.9(1535)	1.09*	1.07	0.99–1.16

	Men (n=3325)				Women (n=4159)			
	HBHTS Uptake % (n)	RR	aRR^	95% CI	HBHTS Uptake % (n)	RR	aRR^	95% CI
HIV Status and Risk								
How likely do you think you are to contract HIV in the future?								
Definitely/probably not	45.6(970)	1	1		51.1(1312)	1	1	
Definitely/probably	53.4(597)	1.17*	1.21*	1.11–1.32	56.6(838)	1.11*	1.13*	1.04–1.23
I am not afraid of contracting HIV as there are effective drugs to treat it								
Agree	49.7(362)	1	1		58.5(552)	1	1	
Partially agree	41.4(81)	0.83	0.83	0.65–1.05	42.8(108)	0.73*	073*	0.60–0.91
Don't agree	48.2(1127)	0.97	0.96	0.88–1.06	51.6(1498)	0.88*	0.88*	0.81–0.95
When did you last have an HIV test?								
< 1 year ago	44.9(635)	1	1		49.6(1289)	1	1	
>= 1 year ago	51.3(598)	1.14*	1.12*	1.02–1.23	57.9(608)	1.17*	1.18*	1.10–1.28
Never	49.1(335)	1.09	1.07	0.96–1.18	55.8(261)	1.12*	1.10	0.98–1.23
Result from laboratory HIV test								
Negative	49.9(1458)	1	1		57.4(1942)	1	1	
Positive	33(112)	0.66*	0.66*	0.55–0.80	30.8(216)	0.54*	0.54*	0.47–0.61
Sexual Behaviour								
Number of lifetime sex partners								
0	50.6(295)	1	1		55.3(372)	1	1	
1–2	45.9(298)	0.91	1.00	0.87–1.16	53.5(1023)	0.96	1.01	0.92–1.12
3–5	48.1(404)	0.95	1.09	0.95–1.26	56.5(615)	0.98	1.06	0.94–1.20
>5	50.5(555)	1.00	1.18*	1.03–1.35	52.1(103)	0.92	1.02	0.85–1.21
Number of sex partners last 12 months								
0	51.5(428)	1	1		55(574)	1	1	
1	45.2(733)	0.88*	0.93	0.83–1.04	51.7(1418)	0.94	0.97	0.89–1.05
2 or more	50.9(403)	0.99	1.07	0.94–1.21	50.9(146)	0.93	0.96	0.82–1.11
One of the last 3 partners was a casual partner								
No	47.1(1223)	1	1		52.6(1903)	1	1	
Yes	51.9(347)	1.10	1.12	1.02–1.23	52.6(255)	1.00	1.01	0.91–1.13
In your last 3 relationships, did you *never* wear a condom?								
No	47.7(1216)	1	1		51.6(1559)	1	1	
Yes	49.5(354)	1.04	1.05	0.94–1.17	55.7(599)	1.08	1.10*	1.01–1.20
Have any of your last 3 partners had STIs?								
No	62.7(62)	1	1		52.3(102)	1	1	
Yes	46.7(1175)	1.34*	1.40*	1.19–1.64	52.4(1640)	1.00	1.01	0.85–1.20
Refused	63.9(38)	1.37*	1.40*	1.16–1.68	47.9(42)	0.91	0.91	0.71–1.16

^Adjusted for age, relationship status and education level.

*Significant at a 5% significance level.

[#] Includes stay-at-home parents, those who are disabled or unable to work, and pensioners.

[$] ZAR15 = US$1.