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The Status of HIV Testing and Counseling in Kenya: Results From a Nationally Representative Population-Based Survey

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Abstract

Background—HIV testing and counseling (HTC) is essential for successful HIV prevention and treatment programs. The national target for HTC is 80% of the adult population in Kenya. Population-based data to measure progress towards this HTC target are needed to assess the country's changing needs for HIV prevention and treatment.

Methods—In 2012–2013, we conducted a national HIV survey among Kenyans aged 18 months to 64 years. Respondents aged 15–64 years were administered a questionnaire that collected information on demographics, HIV testing behavior, and self-reported HIV status. Blood samples were collected for HIV testing in a central laboratory. Participants were offered home-based testing and counseling to learn their HIV status in the home and point-of-care CD4 testing if they tested HIV-positive.

Results—Of 13,720 adults who were interviewed, 71.6% [95% confidence interval (CI): 70.2 to 73.1] had been tested for HIV. Among those, 56.1% (95% CI: 52.8 to 59.4) had been tested in the past year, 69.4% (95% CI: 68.0 to 70.8) had been tested more than once, and 37.2% (95% CI: 35.7 to 38.8) had been tested with a partner. Fifty-three percent (95% CI: 47.6 to 58.7) of HIV-infected

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persons were unaware of their infection. Overall 9874 (72.0%) of participants accepted home-based HIV testing and counseling; 4.1% (95% CI: 3.3 to 4.9) tested HIV-positive, and of those, 42.5% (95% CI 31.4 to 53.6) were in need of immediate treatment for their HIV infection but not receiving it.

Conclusions—HIV testing rates have nearly reached the national target for HTC in Kenya. However, knowledge of HIV status among HIV-infected persons remains low. HTC needs to be expanded to reach more men and couples, and strategies are needed to increase repeat testing for persons at risk for HIV infection.

Keywords

HIV testing and counseling; Kenya; home-based testing and counseling; PIMA CD4 Analyzer

INTRODUCTION

HIV continues to be one of the greatest health challenges in the world with an estimated 34 million people living with HIV infection globally by the end of 2011.[1] Sub-Saharan Africa carries the heaviest burden of HIV infection, accounting for 69% of the total number of people living with HIV and 71% of all new HIV infections.

Improvements in the coverage of antiretroviral therapy (ART) have resulted in broad-based health gains in the sub-Saharan Africa region, saving an estimated 9 million life years.[1] Costs to the health care system for sustaining treatment for the number of persons living with HIV are high and underscore the importance of reducing transmission and new infections if an AIDS-free generation is to be realized.

HIV testing and counseling (HTC) is an essential step towards receiving HIV care and treatment among HIV-infected persons and plays an important role in HIV prevention for both HIV-infected and uninfected persons. Among people living with HIV, knowledge of HIV status has been associated with more than 60% reduction in HIV transmission through improved risk-reduction behavior.[2] ART itself is now recognized to confer substantial HIV prevention benefit, with a demonstrated 96% reduction in transmission within serodiscordant couples, further emphasizing the importance of HIV diagnosis.[3]

In the quest for universal access to HIV testing, a national target for HTC and knowledge of HIV serostatus has been set at 80% of the adult population in Kenya.[4] Although considerable strides have been made toward reaching this target, Kenya faces barriers to successful HIV prevention and treatment because of high rates of undiagnosed HIV infection. In 2007, only 36% of Kenyans had ever been tested for HIV, citing limited access to services and distance to testing sites as major barriers to HIV testing.[5] Furthermore, among an estimated 1.4 million Kenyans who were HIV infected at that time, 84% were unaware of their HIV infection.[6]

In 2008, Kenya implemented a national HTC strategy to achieve universal testing and knowledge of HIV status by 2013.[7] The strategy recommended a broader package of HTC modalities beyond client-initiated voluntary counseling and testing (VCT) with greater focus

on services provided directly to individuals, including provider-initiated testing and counseling in health care settings and home-based testing and counseling (HBTC).[8,9] Among 6.8 million HIV tests conducted in 2012, provider-initiated testing and counseling in outpatient settings and inpatient wards was the most common testing strategy, representing 42.7% of all tests conducted; traditional VCT accounted for 38.2% of tests conducted that year.[10]

HBTC, where HTC services are offered to families in the privacy of their home, has been successfully implemented in sub-Saharan Africa since the early 2000s.[11] Before the availability of HBTC in Kenya, 83% of Kenyans in 2007 said they would be willing to accept HIV testing in the home should it be offered to them in the future. Since then, HBTC has been implemented in high HIV prevalence regions in the country and has resulted in high testing rates among those offered the service.[12] Self-testing as part of HBTC could further increase HTC coverage while addressing the issues of confidentiality for the client[13] but has had limited use to date.

In this article, we assess progress towards achievement of universal access to HTC in Kenya using the results from the second Kenya AIDS Indicator Survey (KAIS 2012).

METHODS

Study Setting and Design

KAIS 2012 was a population-based household survey of persons aged 18 months to 64 years covering 9 of 10 programmatic regions in Kenya. North Eastern region was not included in the survey because of regional insecurity at the time of the study. A 2-stage stratified sampling design was used to produce national and regional estimates of HIV indicators. A fuller description of the survey methods is described in detail elsewhere.[14] This analysis was restricted to persons aged 15 to 64 years.

Participants were administered a questionnaire that collected information on demographics, sexual behavior, and HIV testing. Questions on HIV testing included whether participants had ever been tested for HIV, type of HIV testing received, location and frequency of HIV testing, and self-reported HIV status based on the last HIV test conducted.

Central Laboratory Testing

Following the questionnaire, participants provided blood samples for centralized HIV testing at the National HIV Reference Laboratory in Nairobi. Specimens were screened for HIV antibodies with Vironostika HIV Uni-Form 2012 Plus O Enzyme Immunoassay (bioMérieux, Marcy d'Etoile, France) and confirmed using the Murex HIV HIV.1.2.O HIV Enzyme Immunoassay (DiaSorin, SpA, Saluggia, Italy). Specimens testing negative on the screening assay were classified as HIV-negative, whereas specimens testing positive on the screening and confirmatory assays were classified as HIV-positive. Specimens with discordant results after confirmatory testing were re-tested using the same testing algorithm. Specimens with discrepant results after re-testing were tested with polymerase chain reaction (Cobas Amplicor HIV-1 Monitor Test, version 1.5, Roche Molecular Diagnostics, Pleasanton, CA) for final HIV results. Central laboratory results were not linked to

individuals or households and therefore, the results of these tests were not returned to participants.

Home-Based HTC

Survey participants were offered HBTC to learn their HIV status in their home using the national HIV testing algorithm for rapid HIV testing.[7] After providing informed consent, participants were administered pretest counseling by trained HBTC service providers. Rapid testing was conducted using a sample of venous blood collected for central laboratory HIV testing, unless a venous sample was not provided, in which case a capillary sample was collected. An individual was diagnosed as HIV-positive in HBTC after receiving a reactive test result on the screening test [Determine HIV-1/2 (Inverness Medical, Waltham, MA)] and a subsequent reactive test result on the confirmatory test [Unigold (Trinity Biotech PLC, Bray, Ireland)]. Individuals were determined to be HIV-negative after receiving a nonreactive result on the screening test. If test results were discrepant between the screening and confirmatory test, individuals were referred to a nearby health facility for re-testing. Individuals who tested HIV-positive through HBTC were offered point-of-care CD4 testing using the PIMA CD4 Analyzer (Alere, Wallthan, MA). HBTC service providers delivered test results back to participants with post-test counseling and provided referrals for follow-up services where needed.

Measures

Our two outcomes of interest were ever been tested for HIV and being unaware of HIV infection. Persons who had at least 1 HIV test before the survey were defined as persons who had ever been tested for HIV. Persons who tested HIV-positive in the central laboratory but self-reported that their last HIV test result was HIV-negative, indeterminate, or unknown; had not received the test result back; or had never been tested for HIV were defined as being unaware of their HIV infection. We examined these outcomes across select sociodemographic, behavioral, and clinical variables. These variables included sex, age, education, marital status, wealth, residence, region, sexual behavior, history of sexually transmitted infection (STI), and pregnancy status for women.

Statistical Analyses

We conducted univariate analysis to describe HIV testing coverage, HIV testing behavior, and unawareness of HIV infection by select variables. Bivariate analysis was conducted to compare persons who accepted and did not accept HBTC. Data were weighted to account for sampling probability, adjusted for survey nonresponse, and presented as weighted proportions and 95% confidence intervals. A χ^2 test for homogeneity was conducted to test for equality of proportions at any specified level of categorical variables. A χ^2 test for independence was used to test for equality of proportions between populations. *P* values of less than 0.05 were considered statistically significant. Data were analyzed using SAS version 9.3 (SAS Institute, Cary, NC).

Ethical Considerations

The survey protocol was approved by the Ethical Review Committee of the Kenya Medical Research Institute, the Committee on Human Research of the University of California, San Francisco, and the Institutional Review Board of the US Centers for Disease Control and Prevention. Verbal informed consent was obtained from survey participants aged 18 years and older and emancipated minors aged 15–17 years (the latter defined as persons below 18 years who were married, pregnant, or a parent). Consent was provided by parents or guardians for minors aged 15–17 years, and assent was provided by the minor participant. HBTC was conducted in a private setting around the home, with strict adherence to confidentiality. HBTC test results were not shared with any of the survey staff.

RESULTS

Out of 16,383 eligible persons aged 15–64 years, 13,720 (83.7%) agreed to be interviewed. Of these, 7954 (58.0%) were women and 5766 (42.0%) were men. Of 13,655 participants who provided information on HIV testing history, 71.6% had ever been tested for HIV (Table 1). Women were more likely to have ever been tested compared with men (80.4% vs. 62.5%, $P < 0.001$).

HIV testing rates were highest among persons aged 25–34 years (84.6%) and lowest among persons aged 55–64 years (50.1%) ($P < 0.001$). Persons who were divorced or separated had the highest testing rates (78.9%) followed by persons who were married or cohabiting (77.6%) ($P < 0.001$). Testing rates increased with increasing education level (56.3% for those reporting no primary education compared with 74.3% for those reporting secondary education or higher, $P < 0.001$) and wealth index (61.8% for those in the poorest wealth category compared with 81.6% among those in the richest wealth category, $P < 0.001$). Urban residents were more likely to have been tested compared with rural residents (79.5% vs. 67.0%, $P < 0.001$). Nairobi region (84.2%) followed by Nyanza region (80.0%) had the highest levels of testing, whereas Rift Valley region had the lowest level (66.3%) ($P < 0.001$).

Those who perceived themselves to be at great risk for HIV had high testing rates (83.2%) compared with those who perceived themselves to be at no risk for HIV (64.1%) ($P < 0.001$). Among women, those who had ever been pregnant had higher levels of testing (88.9%) compared with those who had never been pregnant (59.7%) ($P < 0.001$). Nearly all (95.1%) women who were currently pregnant had ever been tested for HIV. Among women who had given birth in the past 5 years, 93.0% reported that they received an HIV test during their last pregnancy (data not shown).[15]

Among testers, 56.1% reported being tested for HIV in the past year (Table 2). The most common testing settings were outpatient clinics (44.0%) followed by VCT settings (30.2%). Men were more likely to have been tested at VCT settings (41.3% vs. 22.0%, $P < 0.001$) but equally likely to have tested at outpatient clinics compared with women (43.5% vs. 44.4%). In total, 69.4% of participants had been tested for HIV more than once in their lifetime. The median number of HIV tests per person was 3 (interquartile range, 2–4) (data not shown).

The majority of testers had been tested on their own. However, over one-third (37.2%) reported that they were tested with a sexual partner in the past. Among those, men were more likely to have been tested with a partner (42.0%) compared with women (33.8%) ($P < 0.001$). A small proportion (3.5%) of testers reported that they had ever used an HIV self-test kit, with significantly more men citing use of such kits compared with women (5.2% vs. 2.3%, $P < 0.001$). Among all testers, 3.7% self-reported that they were HIV-positive based on the results of their last HIV test.

A total of 648 (5.6%) persons were HIV infected based on central laboratory testing. Among those, 53.1% were unaware of their HIV infection (Table 3). Unawareness of infection was high among men (62.0%), women who had never been pregnant (82.5%), young persons aged 15–24 years (82.0%), those reporting no primary education (61.1%), individuals who had never been married or cohabited (77.7%) or had been divorced or separated (64.6%), those in the richest wealth quintile (65.2%), and persons who did not use a condom with their most recent sexual partner in the past 12 months (67.7%). Among HIV-infected persons unaware of their infection, 76.4% had been tested for HIV in the past. Of these, 90.7% reported that they had tested HIV-negative on their last HIV test, and of these, over half (55.9%) reported having been tested for HIV in the past year (data not shown).

In total, 9874 (72.0%) of 13,720 survey participants accepted HBTC and received their HIV results in the home (Table 4). Compared with persons who accepted HBTC, persons who refused were more likely to be in the richest wealth quintile (25.1% vs. 19.0%, $P < 0.001$), live in urban residences (42.0% vs. 35.1%, $P = 0.003$) and Coast region (11.3% vs. 8.4%, $P < 0.001$), report condom use with the most recent sexual partner in the past 12 months (18.8% vs. 15.6%, $P = 0.002$), have been tested for HIV in the past 3 months (26.1% vs. 17.7%, $P < 0.001$), and self-report HIV-positive status (4.6% vs. 1.9%, $P = 0.002$).

Among those who accepted HBTC, 48.7% were men, one-third (33.8%) were aged 15–24 years, 29.7% had never been married or cohabited, 52.0% reported secondary education or higher, and 64.9% resided in the rural areas. Most (70.7%) had been tested for HIV in the past, with 54.4% reporting that their last HIV test was conducted in the past 12 months. Over 85% of respondents who accepted HBTC felt they were at no (42.3%) to low (43.1%) risk for HIV, while only 4.7% felt they were at great risk for HIV. Among participants who accepted HBTC, 1.9% reported a previous HIV-positive diagnosis. The proportion of HIV-infected persons who were unaware of their HIV infection and accepted HBCT was 68.6% (data not shown).

Overall, 4.1% participants tested HIV-positive in HBTC. Of those, 26.6% (n = 78) were on ART, and 73.4% (n = 258) were not on ART (data not shown). Among those who accepted point-of-care CD4 testing and were not on ART (n = 244), 42.5% had CD4 cell counts ≤350 cells per micro-liter, and 18.4% had CD4 cell counts ≤200 cells per microliter.

DISCUSSION

In 2012, over 70% of Kenyans aged 15–64 years had ever had an HIV test, double the rate observed in 2007 when only 36.6% of adults reported ever having been tested for HIV.[6]

Among women, testing rates increased from 40.7% in 2007 to 80.4% in 2012, achieving the universal access target for testing. Among men, a substantial increase in HIV testing was also observed from 24.9% in 2007 to 62.5% in 2012, but this still remained below the universal access target.

Routine HIV testing for pregnant women attending antenatal clinics (ANC) for prenatal care has played a major role in increasing HIV testing rates among women. In 2012, over 90% of women who had given birth in the past 5 years received an HIV test at an ANC visit for their last pregnancy.[15] Still, approximately 5% of women do not attend ANC for prenatal care and require alternative approaches for accessing HTC, linkages to ART, and prevention of mother-to-child transmission of HIV services.

We found that men who had ever been tested were more likely to have been tested in community-based settings (eg, VCT facility and mobile VCT) compared with other venues. Community testing programs, therefore, could play an important role in expanding testing to underserved men such as those who are less educated and economically disadvantaged. Furthermore, innovative testing strategies for men in clinical settings may be needed, irrespective of whether they are at the clinic for their own care or accompanying a family member, including in antenatal care settings.

Only one-third of testers had ever tested together with a sexual partner. Approximately 4 in 10 new infections in the country occur within steady heterosexual partnerships,[16] and the majority of persons in discordant relationships are unaware of their HIV status. Expansion of couples-centered HTC can offer major prevention benefit by identifying discordant couples and presenting options for reducing risk and transmission within these relationships.[17,18] The World Health Organization recommends that couple testing be expanded in settings where routine HIV testing is offered, with support for mutual disclosure to empower couples to make informed decisions about HIV prevention and family planning.[19] As Kenya begins to implement these recommendations, there will be need to assess their feasibility, acceptability, and behavioral and clinical impact among couples.

More than half of HIV-infected Kenyans were unaware of their infection, presenting a major barrier to HIV prevention and treatment in the country. Over 90% of persons who were unaware of their infection had reported that they were HIV-negative based on their last HIV test result; over half of these had been tested in the past year. A number of reasons may explain the discrepancies between self-reported including recently acquired HIV infection since the last HIV test, reluctance in reporting HIV-positive status in a survey setting, false-negative results on previous HIV tests, or lack of understanding of previous positive test results. HIV-infected persons who were unaware of their HIV infection perceived themselves to be at no or low risk for HIV infection despite recent testing behavior. The national HTC guidelines recommend annual testing for persons with ongoing risk and more frequent testing after known occurences of HIV exposure.[7] Counseling messages during HTC should include comprehensive risk assessment measures and provide recommendations on when to re-test for HIV infection.

Through HBTC, 72.0% of survey participants were tested and received their HIV test results within the privacy of their homes. Furthermore, 69% of HIV-infected persons who were unaware of their infection learned their HIV status through HBTC. In KAIS 2007 where HIV testing was conducted at a central laboratory, test results were made available at a nearby health facility approximately 6 weeks after survey teams had visited the households. As a result, only 49% of participants who agreed to HIV testing in the survey accessed their test results.[5] The successful implementation of HBTC in KAIS 2012 demonstrates the feasibility of its inclusion in surveys with important benefits to survey participants, including immediate knowledge of HIV status, counseling, and early linkage to HIV care.

The proportion of participants who tested HIV-positive in HBTC was 4.1%, lower than the prevalence of HIV infection reported in the survey (5.6%).[20] Around 28% of survey participants did not accept HBTC and of these, 14.2% were HIV-positive based on central laboratory HIV testing. These data suggest that some individuals with previously known HIV infection declined to participate in HBTC. Although HBTC provides an essential service to survey participants, use of HBTC data alone for estimating HIV prevalence in the broader population may be subject to bias.

Through point-of-care CD4 testing, we were able to determine that over 40% of HIV-positive persons identified through HBTC were in need of immediate treatment based on the current immunologic criterion for HIV treatment (CD4 ≤ 350 cells per microliter)[21]; 17% had CD4 ≤ 200 cells per microliter, indicative of advanced HIV disease. Sub-Saharan Africa is particularly challenged by high rates of late HIV diagnosis of persons in advanced stage of HIV disease, late enrollment into HIV care, and delayed initiation of ART leading to poor clinical outcomes and higher mortality.[22,23] Continued expansion of HTC toward universal access, routine re-testing of persons at high-risk for HIV exposure, and point-of-care CD4 testing at the point of HIV diagnosis can help to increase identification of HIV-infected persons and improve early linkages to HIV care for better health outcomes.

This analysis had a few limitations. Our main outcome variables relied on self-report of HIV testing behavior and HIV status. It is possible that participants answered according to what they perceived to be socially desirable, resulting in a dilution of observed findings. Additionally, we relied on historical data around the respondent's last HIV test, including when and where the last HIV test was conducted, allowing for the potential for recall bias. Third, because of regional insecurity at the time of the survey, North Eastern region was not included in the KAIS 2012 sample, and therefore, results are not generalizable to the country as a whole. However, North Eastern region is sparsely populated and the least affected by HIV of all regions of Kenya, with an estimated prevalence of HIV infection of less than 1%.[5] It is thus unlikely that exclusion of North Eastern region biased our results substantially. Finally, HBTC and point-of-care CD4 testing were provided to participants who wanted to learn their HIV status on the day of the survey. As a result, the estimates presented on HBTC are specific for a limited sample and not generalizable to the broader Kenyan adult population.

Despite these limitations, the results presented in this analysis provide an acceptably representative picture of the status of HIV testing in Kenya. KAIS 2012 found high testing

rates among adult and adolescent Kenyans, nearly achieving the national testing goal for the country. Yet, the majority of HIV infection remains unidentified, contributing to ongoing HIV transmission and disease progression in the country. We recommend that the national HTC program expands all testing modalities to rapidly identify HIV-infected persons so that they can access the care they need immediately. Greater emphasis is required on increasing uptake of HTC among couples, promoting retesting among those at high risk for HIV infection, and increasing HIV testing in men. The inclusion of HBTC and point-of-care CD4 testing in this national survey was demonstrated to be feasible, improved knowledge of HIV status among participants, and identified a group in need of treatment that would have otherwise not sought care. These data will be essential as new strategies for HTC are implemented, moving Kenya closer to achieving its universal access targets of prevention, care, and treatment.

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TABLE 1

HIV Testing Coverage by Select Characteristics of Persons Aged 15–64 Years by Sex, Kenya AIDS Indicator Survey 2012

Select Variables	Unweighted, n/N	Weighted % (95% CI)	P^*
Total	9947/13,655	71.6 (70.2 to 73.1)	
Sex			< 0.001
Women	6329/7907	80.4 (78.9 to 81.9)	
Men	3618/5748	62.5 (60.4 to 64.6)	
Age category, yrs			< 0.001
15–24	3009/4515	65.2 (63.0 to 67.5)	
25–34	3288/3831	84.6 (83.1 to 86.2)	
35–44	2028/2562	77.8 (75.9 to 79.7)	
45–54	1075/1689	63.2 (60.4 to 66.1)	
55–64	546/1057	50.1 (45.4 to 54.8)	
Marital status			< 0.001
Never married/never cohabited	2360/3967	58.8 (56.4 to 61.2)	
Ever widowed	731/1025	72.0 (67.9 to 76.1)	
Divorced/separated	676/845	78.9 (75.3 to 82.5)	
Married/cohabiting	6175/7812	77.6 (75.9 to 79.2)	
Highest educational attainment			< 0.001
No primary	911/1552	56.3 (50.9 to 61.8)	
Primary incomplete	763/1155	64.0 (59.3 to 68.8)	
Primary complete	3173/4299	72.5 (70.6 to 74.3)	
Secondary or higher	5095/6641	74.3 (72.6 to 76.0)	
Wealth index			< 0.001
Poorest	1777/2836	61.8 (58.3 to 65.4)	
Second	1961/2842	66.9 (64.2 to 69.5)	
Middle	1961/2661	71.3 (69.2 to 73.5)	
Fourth	1996/2565	76.1 (73.8 to 78.3)	
Richest	2252/2751	81.6 (79.4 to 83.8)	
Residence			< 0.001
Rural	5879/8602	67.0 (65.0 to 69.0)	
Urban	4068/5053	79.5 (77.7 to 81.4)	
Region			< 0.001
Nairobi	1463/1733	84.2 (81.9 to 86.4)	
Central	1107/1576	69.1 (66.5 to 71.7)	
Coast	1253/1703	72.9 (69.7 to 76.2)	
Eastern	1795/2671	68.2 (64.7 to 71.7)	
Nyanza	1482/1830	80.0 (75.5 to 84.6)	
Rift Valley	1701/2469	66.3 (62.6 to 70.0)	
Western	1146/1673	67.9 (63.8 to 71.9)	
Ever pregnant[†]			< 0.001

Select Variables	Unweighted, n/N	Weighted % (95% CI)	P^*
No	976/1620	59.7 (56.1 to 63.2)	
Yes	5052/5720	88.9 (87.6 to 90.1)	
Currently pregnant†			< 0.001
No	5331/6431	83.0 (81.5 to 84.5)	
Yes	408/438	95.1 (92.4 to 97.8)	
Lifetime number of partners			< 0.001
0	790/1811	41.8 (38.6 to 45.0)	
1–2	3041/3858	77.7 (75.3 to 80.2)	
2–3	3344/4162	79.1 (77.4 to 80.9)	
4–5	1100/1468	73.8 (71.1 to 76.6)	
6–9	450/596	75.3 (70.7 to 79.8)	
10 or more	589/871	65.6 (61.2 to 70.0)	
Do not know	561/771	73.8 (69.7 to 77.8)	
Condom use with most recent sexual partner in past 12 mo‡			0.004
No	6299/8017	77.2 (75.6 to 78.8)	
Yes	1247/1495	81.8 (79.3 to 84.3)	
Symptoms of sexually transmitted infections in the past 12 mo			< 0.001
No	9353/12,979	70.9 (69.3 to 72.4)	
Yes	594/676	87.3 (84.0 to 90.6)	
HIV risk perception			< 0.001
No risk	3344/5050	64.1 (61.9 to 66.3)	
Small risk	3731/4945	74.5 (72.6 to 76.3)	
Moderate risk	968/1190	80.1 (77.3 to 82.9)	
Great risk	428/514	83.2 (79.5 to 86.8)	

Participants with missing values were removed from this analysis.

*P value computed from χ^2 test of homogeneity.

†Among women only.

‡Among persons who had sex in the past 12 months.

TABLE 2

HIV Testing Characteristics Among Persons Aged 15–64 Years Who Have Ever Been Tested for HIV Infection, Kenya AIDS Indicator Survey 2012

	All Participants (n = 9947)		Male Participants (n = 3618)		Female Participants (n = 6329)		
Select Variables	**Unweighted, n**	**Weighted % (95% CI)**	**Unweighted, n**	**Weighted % (95% CI)**	**Unweighted, n**	**Weighted % (95% CI)**	***P****
When was the last HIV test?							0.110
< 3 mo	2035	20.2 (19.0 to 21.4)	722	19.2 (17.5 to 20.9)	1313	21.0 (19.5 to 22.4)	
3–5 mo	1598	16.6 (15.6 to 17.6)	580	16.5 (15.0 to 18.0)	1018	16.7 (15.5 to 17.9)	
6–11 mo	1893	19.3 (18.2 to 20.4)	703	19.6 (18.0 to 21.2)	1190	19.0 (17.7 to 20.4)	
1–2 yrs	2565	25.6 (24.4 to 26.8)	899	25.2 (23.4 to 27.0)	1666	26.0 (24.4 to 27.5)	
> 2 yrs	1750	18.3 (17.1 to 19.4)	697	19.5 (17.7 to 21.3)	1053	17.3 (16.1 to 18.5)	
Where was the last test performed?							<0.001
VCT facility	1370	14.3 (13.1 to 15.6)	733	20.0 (17.9 to 22.1)	637	10.1 (8.8 to 11.4)	
Mobile VCT	1552	15.9 (14.7 to 17.1)	768	21.3 (19.3 to 23.2)	784	11.9 (10.7 to 13.2)	
At home	481	4.6 (3.6 to 5.6)	192	4.9 (3.6 to 6.2)	289	4.3 (3.4 to 5.3)	
Hospital outpatient clinic	4259	44.0 (42.3 to 45.8)	1589	43.5 (40.7 to 46.4)	2670	44.4 (42.3 to 46.6)	
Tuberculosis clinic	13	0.1 (0 to 0.2)	4	0.1 (0 to 0.2)	9	0.1 (0.0 to 0.2)	
Sexually transmitted infection clinic	5	0.0 (0 to 0.1)	1	0 (0 to 0.1)	4	0.1 (0.0 to 0.2)	
Hospital inpatient wards	219	2.2 (1.8 to 2.7)	49	1.5 (0.8 to 2.3)	170	2.7 (2.2 to 3.3)	
Blood donation center	31	0.3 (0.2 to 0.5)	21	0.6 (0.3 to 0.9)	10	0.1 (0 to 0.2)	
Family planning clinic	52	0.5 (0.4 to 0.7)	3	0.1 (0 to 0.2)	49	0.9 (0.6 to 1.2)	
Antenatal care clinic	1236	10.4 (9.4 to 11.5)	19	0.4 (0.2 to 0.6)	1217	18.0 (16.2 to 19.8)	
Maternity clinic	202	2.1 (1.7 to 2.5)	1	0.1 (0.0 to 0.2)	201	3.6 (3.0 to 4.3)	
During voluntary male medical circumcision	22	0.2 (0.1 to 0.3)	17	0.4 (0.2 to 0.6)	5	0.1 (0 to 0.1)	
Other	473	5.2 (4.2 to 6.1)	220	7.2 (5.2 to 9.2)	253	3.6 (2.9 to 4.3)	
Tested for HIV more than once	6731	69.4 (68.0 to 70.8)	2155	63.9 (61.7 to 66.1)	4576	73.3 (71.9 to 74.8)	<0.001
Ever tested for HIV with partner	3326	37.2 (35.7 to 38.8)	1343	42.0 (39.8 to 44.2)	1983	33.8 (32.1 to 35.5)	<0.001
Ever used an HIV self-test kit	329	3.5 (2.6 to 4.5)	185	5.2 (3.2 to 7.3)	144	2.3 (1.8 to 2.7)	<0.001
Self-reported HIV status							<0.001
HIV-positive	357	3.7 (3.1 to 4.3)	91	2.8 (2.1 to 3.4)	266	4.4 (3.7 to 5.1)	
HIV-negative	9299	93.3 (92.6 to 94.0)	3413	93.9 (93.0 to 94.9)	5886	92.8 (91.9 to 93.7)	
Tested but never received results	290	3.0 (2.6 to 3.4)	114	3.3 (2.7 to 4.0)	176	2.7 (2.2 to 3.2)	

Participants with missing values were removed from this analysis.

*P value test of independent association between selected variable and sex among HIV testers.

TABLE 3

Unawareness of HIV Infection Among HIV-Infected Persons Aged 15–64 Years by Select Characteristics, Kenya AIDS Indicator Survey 2012

Select Characteristics Weighted % (95% CI)	Unweighted, N	Unaware of HIV Infection Unweighted, n	
Total	648	343	53.1 (47.6 to 58.7)
Sex			
Male	193	120	62.0 (53.4 to 70.5)
Female	455	223	47.8 (42.1 to 53.4)
Age category, yrs			
15–24	75	59	82.0 (72.3 to 91.7)
25–34	209	121	58.9 (50.5 to 67.4)
35–44	198	89	42.2 (33.4 to 51.0)
45–54	126	53	45.1 (34.6 to 55.6)
55–64*	40	21	48.5 (31.2 to 65.8)
Marital status			
Never married/never cohabited	58	44	77.7 (66.4 to 88.9)
Ever widowed	165	52	31.5 (24.1 to 39.0)
Divorced/separated	83	53	64.6 (51.8 to 77.4)
Married/cohabiting	342	194	56.1 (47.9 to 64.3)
Highest educational attainment			
No primary*	43	26	61.1 (44.1 to 78.2)
Incomplete primary*	46	23	49.1 (32.9 to 65.4)
Complete primary	223	123	56.0 (47.2 to 64.7)
Secondary or higher	335	170	51.2 (44.5 to 57.9)
Wealth index			
Poorest	97	51	49.1 (36.8 to 61.5)
Second	153	75	49.8 (37.4 to 62.2)
Middle	137	68	46.8 (36.0 to 57.5)
Fourth	158	84	55.7 (46.0 to 65.3)
Richest	102	64	65.2 (54.9 to 75.4)
Residence			
Rural	373	192	51.0 (43.6 to 58.3)
Urban	275	151	56.0 (47.5 to 64.5)
Region			
Nairobi	67	40	60.0 (47.5 to 72.4)
Central	60	32	56.3 (41.2 to 71.4)
Coast	66	40	59.1 (44.2 to 74.0)
Eastern	75	41	53.6 (37.6 to 69.7)
Nyanza	242	116	49.7 (40.1 to 59.3)
Rift Valley	79	47	56.0 (40.1 to 72.0)
Western	59	27	46.7 (31.2 to 62.2)

Select Characteristics Weighted % (95% CI)	Unweighted, N	Unaware of HIV Infection Unweighted, n	
Ever pregnant†			
No*	32	26	82.5 (70.1 to 95.0)
Yes	400	186	45.7 (39.7 to 51.7)
Currently pregnant†			
No	374	191	49.9 (43.6 to 56.2)
Yes‡	21	10	—
Lifetime number of partners			
1	128	71	51.0 (40.3 to 61.6)
2–3	236	125	54.8 (47.9 to 61.6)
4–5	105	48	49.1 (37.8 to 60.4)
6–9*	45	24	53.7 (36.4 to 71.0)
10 or more	58	29	50.7 (36.7 to 64.8)
Do not know	62	34	51.2 (36.4 to 66.0)
Condom use with most recent sexual partner in the past 12 mo§			
No	291	202	67.7 (60.3 to 75.1)
Yes	179	61	37.1 (29.1 to 45.2)
Symptoms of sexually transmitted infections in past 12 mo			
No	574	313	54.4 (48.6 to 60.3)
Yes	74	30	42.9 (30.0 to 55.9)
Ever been tested for HIV			
No	72	72	100
Yes	574	269	46.3 (40.5 to 52.1)
When was the last HIV test?			
<3 mo ago	136	56	39.0 (28.9 to 49.2)
3–5 mo ago	91	48	50.5 (37.5 to 63.5)
6–11 mo ago	78	44	58.0 (44.1 to 71.9)
1–2 yrs ago	115	62	53.7 (42.9 to 64.4)
>2 yrs ago	144	52	36.8 (27.2 to 46.4)

Participants with missing values were removed from this analysis.

*Denominator between 25 and 49 observations; estimates may be unreliable.

†Among women only.

‡Due to small denominator (<25 observations), estimates are unreliable and have been suppressed.

§Among persons who had sex in the past 12 months.

TABLE 4

Select Characteristics of Persons Aged 15–64 Years by Acceptance of Home-Based Testing and Counseling in Kenya AIDS Indicator Survey 2012

	Accepted HBTC (n = 9874)		Did Not Accept HBTC (n = 3842)		
Select Characteristics	**Unweighted, n**	**Weighted % (95% CI)**	**Unweighted, n**	**Weighted % (95% CI)**	***P****
Sex					0.254
Men	4106	48.7 (47.5 to 49.8)	1657	49.7 (48.1 to 51.3)	
Women	5768	51.3 (50.2 to 52.5)	2185	50.3 (48.7 to 51.9)	
Age category, yrs					0.502
15–24	3332	33.8 (32.5 to 35.0)	1208	31.2 (29.4 to 33.0)	
25–34	2668	26.8 (25.6 to 28.0)	1170	31.0 (29.1 to 32.8)	
35–44	1857	19.0 (18.1 to 20.0)	721	18.6 (17.3 to 19.9)	
45–54	1215	12.3 (11.5 to 13.1)	479	12.5 (11.2 to 13.8)	
55–64	802	8.1 (7.3 to 9.0)	263	6.7 (5.8 to 7.6)	
Marital status					0.499
Never married/never cohabited	2823	29.7 (28.3 to 31.2)	1166	30.9 (29.1 to 32.7)	
Widowed	726	6.7 (6.1 to 7.4)	2125	6.7 (5.9 to 7.6)	
Divorced/separated	607	6.0 (5.4 to 6.6)	242	6.1 (5.2 to 6.9)	
Married/cohabiting	5713	57.5 (56.0 to 59.0)	304	56.3 (54.4 to 58.1)	
Education					0.007
No primary	1216	7.3 (6.0 to 8.6)	353	7.1 (5.8 to 8.4)	
Incomplete primary	912	8.3 (7.3 to 9.3)	248	5.8 (4.8 to 6.8)	
Complete primary	3087	32.4 (30.9 to 34.0)	1228	32.0 (29.9 to 34.1)	
Secondary or higher	4651	52.0 (50.2 to 53.8)	2013	55.0 (52.6 to 57.4)	
Wealth index					<0.001
Lowest	2163	20.0 (17.1 to 22.9)	687	17.5 (15.0 to 19.9)	
Second	2167	22.1 (20.0 to 24.2)	685	17.7 (15.5 to 19.8)	
Third	1943	20.3 (18.2 to 22.3)	726	18.7 (16.5 to 20.9)	
Fourth	1765	18.6 (16.4 to 20.8)	811	21.1 (18.4 to 23.8)	
Highest	1819	19.0 (16.3 to 21.8)	931	25.1 (21.7 to 28.5)	
Residence					0.003
Rural	6447	64.9 (61.9 to 67.9)	2188	58.0 (54.6 to 61.4)	

Select Characteristics	Accepted HBTC (n = 9874)		Did Not Accept HBTC (n = 3842)		P*
	Unweighted, n	Weighted % (95% CI)	Unweighted, n	Weighted % (95% CI)	
Urban	3427	35.1 (32.1 to 38.1)	1654	42.0 (38.6 to 45.4)	
Region					<0.001
Central	1137	10.1 (8.8 to 11.3)	608	13.3 (10.9 to 15.6)	
Coast	956	11.7 (9.4 to 14.0)	622	16.9 (13.8 to 19.9)	
Eastern	1161	8.4 (7.0 to 9.9)	551	11.3 (9.3 to 13.4)	
Nairobi	2171	16.6 (14.6 to 18.6)	513	12.5 (10.0 to 15.0)	
Nyanza	1283	13.9 (11.6 to 16.2)	550	14.3 (11.8 to 16.8)	
Rift Valley	1783	26.7 (23.5 to 30.0)	700	25.0 (22.0 to 28.1)	
Western	1383	12.6 (10.8 to 14.4)	298	6.6 (5.4 to 7.8)	
Perceived HIV risk					0.455
No risk	3640	42.3 (40.3 to 44.4)	1437	43.7 (41.5 to 45.9)	
Low risk	3633	43.1 (40.8 to 45.3)	1316	41.5 (39.3 to 43.8)	
Moderate risk	873	9.9 (8.9 to 10.8)	319	10.1 (8.9 to 11.3)	
Great risk	366	4.7 (4.1 to 5.3)	148	4.6 (3.8 to 5.4)	
Lifetime number of partners					0.948
0	1311	13.0 (12.0 to 14.0)	516	13.2 (11.7 to 14.7)	
1	2780	25.0 (23.6 to 26.4)	1093	26.8 (25.3 to 28.3)	
2–3	3028	31.0 (29.9 to 32.2)	1142	29.2 (27.5 to 31.0)	
4–5	1034	11.8 (10.9 to 12.7)	435	12.2 (11.0 to 13.5)	
6–9	462	5.4 (4.7 to 6.1)	134	4.2 (3.5 to 4.9)	
10 or more	637	8.1 (7.2 to 9.0)	236	7.2 (6.0 to 8.3)	
Do not know	526	5.7 (4.8 to 6.6)	253	7.2 (5.9 to 8.4)	
Condom use with most recent sexual partner in the past 12 mo†					0.002
No	5878	84.4 (83.2 to 85.5)	2152	81.2 (79.4 to 83.1)	
Yes	1005	15.6 (14.5 to 16.8)	490	18.8 (16.9 to 20.6)	
Ever been tested for HIV infection					0.004
No	2748	29.3 (27.6 to 31.0)	958	26.1 (24.2 to 28.0)	
Yes	7086	70.7 (69.0 to 72.4)	2859	73.9 (72.0 to 75.8)	
When was the last HIV test?‡					<0.001
<3 mo ago	1274	17.7 (16.5 to 18.9)	761	26.1 (24.0 to 28.3)	

Select Characteristics	Accepted HBTC (n = 9874)		Did Not Accept HBTC (n = 3842)		
	Unweighted, n	Weighted % (95% CI)	Unweighted, n	Weighted % (95% CI)	*P*[*]
3–5 mo ago	1162	17.0 (15.8 to 18.2)	436	15.7 (14.1 to 17.4)	
6–11 mo ago	1378	19.7 (18.4 to 21.0)	515	18.3 (16.4 to 20.2)	
1–2 yrs ago	1958	27.4 (25.9 to 28.9)	605	21.4 (19.7 to 23.1)	
2+ yrs ago	1238	18.2 (16.9 to 19.5)	512	18.5 (16.7 to 20.2)	
Self-reported HIV status					0.002
HIV-positive	151	1.9 (1.4 to 2.4)	206	4.6 (3.8 to 5.4)	
HIV-negative	6757	66.9 (65.2 to 68.6)	2540	66.3 (64.5 to 68.1)	
Indeterminate	6	0.1 (0 to 0.1)	3	0.1 (0 to 0.1)	
Tested but never received results	171	1.8 (1.4 to 2.1)	110	2.9 (2.3 to 3.4)	
Do not know/never tested	2770	29.4 (27.7 to 31.1)	963	26.1 (24.3 to 28.0)	
HBTC HIV test result					—
HIV-positive	361	4.1 (3.3 to 4.9)	—	—	
HIV-negative	9470	95.5 (94.7 to 96.3)	—	—	
Indeterminate	43	0.4 (0.2 to 0.6)	—	—	
PIMA CD4 cell count (cells/μL) among persons not on treatment[§]					—
≤ 200	42	18.4 (13.1 to 23.6)	—	—	
200–350	58	24.1 (18.3 to 30.0)	—	—	
351–500	57	22.9 (16.6 to 29.3)	—	—	
>500	87	34.6 (28.2 to 40.9)	—	—	
PIMA CD4 cell count (cells/μL) among persons on treatment[§]					—
treatment[§]≤ 200	8	17.4 (1.6 to 33.3)	—	—	
treatment[§]200–350	24	28.8 (16.0 to 41.7)	—	—	
treatment[§]351–500	19	20.6 (9.3 to 31.9)	—	—	
treatment[§]>500	25	33.2 (19.1 to 47.3)	—	—	

Participants with missing values were removed from this analysis.

Due to rounding error, the sum of stratum-specific estimates may not equal 100 percent.

[*] *P* value computed from χ^2 test of proportions.

[†] Among persons who had sex in the past 12 months.

‡ Among persons who had ever been tested for HIV.

§ Among persons who had an HIV-positive test results in HBTC.