Kenya AIDS Indicator Survey 2007

KAIS

Republic of Kenya

KENYA AIDS INDICATOR SURVEY

KAIS ▪ 2007

FINAL REPORT

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KAIS 2007 Collaborating Institutions

Ministry of Medical Services, and Ministry of Public Health and Sanitation:
- National AIDS and STI Control Programme (NASCOP)
- National Public Health Laboratory Services (NPHLS)
- Kenya Medical Research Institute (KEMRI)

Ministry of State for Special Programmes:
- National AIDS Control Council (NACC)

Ministry of State for Planning, National Development and Vision 2030:
- Kenya National Bureau of Statistics (KNBS)
- National Coordinating Agency for Population and Development (NCAPD)

U.S. Centers for Disease Control and Prevention (CDC), Kenya/USA
U.S. Agency for International Development (USAID), Kenya/USA
World Health Organization (WHO)
United Nations Joint Programme on HIV/AIDS (UNAIDS)

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Online Reference to Report and Data Tables

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Kenya Medical Research Institute (KEMRI): www.kemri.org
National AIDS Control Council (NACC): www.nacc.or.ke
Kenya National Bureau of Statistics (KNBS): www.cbs.go.ke
National Coordinating Agency for Population and Development (NCAPD): www.ncapd-ke.org
U.S. Centers for Disease Control and Prevention (CDC-Kenya): www.cdc.gov/kenya.htm
U.S. Agency for International Development (USAID-Kenya):
www.usaid.gov/locations/sub-saharan_africa/countries/kenya
World Health Organization (WHO): Website: www.euro.who.int
United Nations Joint Programme on HIV/AIDS (UNAIDS): www.unaids.org/en/default.asp

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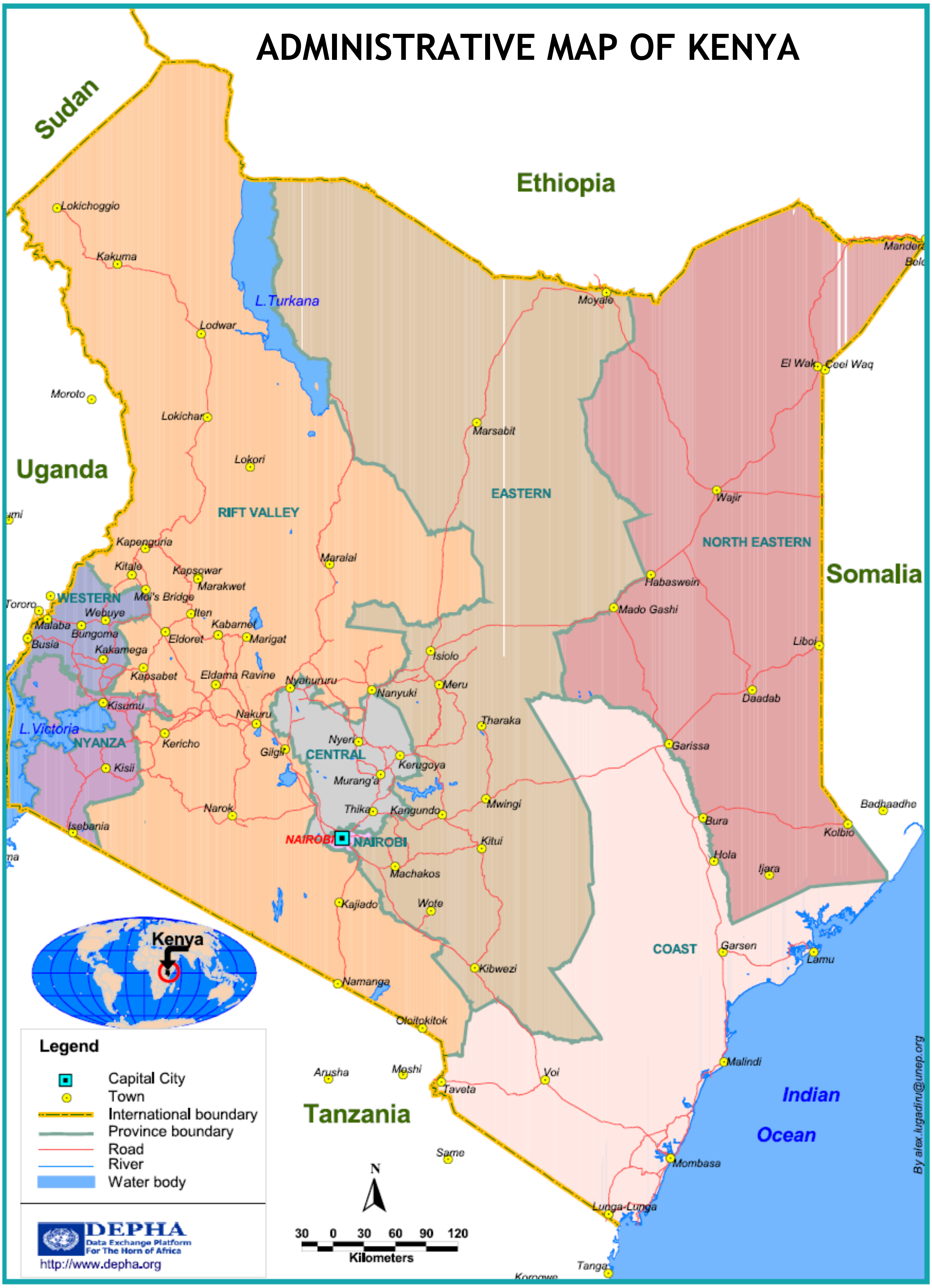

List of Abbreviations

AFASS	Affordable, feasible, acceptable, sustainable and safe
AIDS	Acquired immunodeficiency syndrome
AIS	AIDS Indicator Survey
ANC	Antenatal Clinic
ART	Antiretroviral therapy
ARV	Antiretroviral
BCP	Basic care package
CDC	Centers for Disease Control and Prevention
CD4	CD4 T-lymphocyte
CI	Confidence interval
CSPro	Census and Survey Processing System
CPT	Cotrimoxazole prophylaxis therapy
CTX	Cotrimoxazole
DASCO	District AIDS/STI Coordinator
DBS	Dried blood spot
FBO	Faith-based organization
GOK	Government of Kenya
HAART	Highly-active antiretroviral therapy
HIV	Human immunodeficiency virus
HSV-2	Herpes simplex virus-2
IEC	Information, education, and communication
IRB	Institutional Review Board
ITN	Insecticide-treated bed net
IUD	Intrauterine device
KAIS	Kenya AIDS Indicator Survey
KDHS	Kenya Demographic and Health Survey

KEMRI	Kenya Medical Research Institute
KNASP	Kenya National HIV/AIDS Strategic Plan
KNBS	Kenya National Bureau of Statistics
Ksh	Kenya Shilling
LLITN	Long-lasting insecticide treated net
MCH	Maternal and child health
ml	Milliliter
μL	Microliter
MOMS	Ministry of Medical Services
MOPHS	Ministry of Public Health and Sanitation
MTCT	Mother-to-child transmission
NACC	National AIDS Control Council
NASCOP	National AIDS and STI Control Programme
NASSEP	National Sample Survey and Evaluation Programme
NBTS	National Blood Transfusion Service
NCAPD	National Coordinating Agency for Population and Development
NPHLS	National Public Health Laboratory Service
OVC	Orphans and vulnerable children
PASCO	Provincial AIDS/STI Coordinator
PEPFAR	U.S. President's Emergency Plan for AIDS Relief
PLWHA	People living with HIV/AIDS
PMTCT	Prevention of mother to child transmission
RPR	Rapid plasma reagin
SAS	Statistical Analysis Software
STI	Sexually transmitted infection
SWS	Safe water system
TB	Tuberculosis or Tubercle Bacillus
TWG	Technical working group
TPPA	*Treponema pallidum* particle agglutination
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNGASS	United Nations General Assembly Special Session on HIV/AIDS

USAID	U.S. Agency for International Development
VCT	Voluntary counseling and testing
WHO	World Health Organization

Foreword

It is with great pleasure that we launch this report, which presents the major findings of the inaugural 2007 Kenya AIDS Indicator Survey (KAIS). This was truly a Kenyan study, planned, conducted and documented by a team of survey experts, technical advisors and government officials for the people of Kenya. KAIS is the first national, population-based survey anywhere in the world that included testing for CD4 cells among those infected with HIV, a measure that is critical for understanding the HIV epidemic and planning prevention, care and treatment services. Additionally, for the first time in a national sero-prevalence survey, KAIS covered both women and men aged 50-64 years, typically considered to be at low risk and to have low burden of HIV.

The objective of this survey was to provide comprehensive information on indicators of HIV/AIDS that build upon and go beyond the 2003 Kenya Demographic Health Survey. In 2003, the prevalence of HIV, coverage of HIV testing and data on discordant couples provided important benchmarks for comparison with future studies. In 2007, we included questions on perceived HIV status, awareness of partner HIV status, and utilization of HIV care and treatment.

With this 2007 KAIS report, policymakers, programme planners and researchers will be able to plan HIV services and monitor and evaluate their efforts more effectively. KAIS has provided the Government with valuable information as it continues to better understand, prevent and manage this disease for the well-being of Kenyans.

We wish to acknowledge the contributions of a number of organizations. The survey and report could not have been accomplished without them. We would like to recognize the National AIDS and STI Control Programme (NASCOP), the National AIDS Control Council (NACC), the Kenya National Bureau of Statistics (KNBS), the National Public Health Laboratory Service (NPHLS), the National Coordinating Agency for Population and Development (NCAPD) and the Kenya Medical Research Institute (KEMRI). We are grateful to the hundreds of survey personnel who devoted many hours to conduct this survey. For their technical assistance and financial support, we wish to thank the U.S. President's Emergency Plan for AIDS Relief (PEPFAR) through the Centers for Disease Control and Prevention (CDC) and the United States Agency for International Development (USAID), and the United Nations through UNAIDS and World Health Organization (WHO).

We wish to commend the people of Kenya who embraced this project, allowed survey personnel into their homes and generously offered their time, personal information and blood samples to make the 2007 KAIS a success.

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Executive Summary

Obtaining nationally representative estimates on behavioural, clinical, and biologic indicators for HIV/AIDS is critical for evaluating a country's response to the HIV epidemic. National population-based surveys with HIV testing provide national-level prevalence estimates and the opportunity to link HIV status with behavioural, social, demographic and other biological information.

The 2007 Kenya AIDS Indicator Survey (KAIS) is Kenya's first survey of its type and provides comprehensive information on HIV and other sexually transmitted infections (STIs). These data provide the information needed for advocacy and for planning appropriate interventions for HIV prevention, treatment and care. The 2007 KAIS builds upon previous national-level HIV estimates from the first population-based survey with HIV testing, the 2003 Kenya Demographic and Health Survey (KDHS); this allows us to compare prevalence estimates and important behavioural indicators between 2003 and 2007.

Findings from the 2007 KAIS are summarized below and described in detail in this report. The general background characteristics of respondents are provided in Appendix B.1. Estimates presented in the report and their corresponding sample sizes and 95% confidence intervals are presented in Appendices B.2-B.15. Estimates have been weighted appropriately for the two-stage sample design, with a noted exception in Chapter 15, where we present uptake of test results. The report presents the results of univariate and bivariate analyses; analyses are not adjusted for confounding factors. Multivariate analysis of KAIS data, adjusted for possible confounders, will be presented in other dissemination materials, such as peer-reviewed scientific publications. Throughout the report, the term significant indicates a p-value[1] less than 0.05. Marginally significant indicates a p-value between 0.05 and 0.10, inclusive; and not significant indicates a p-value greater than 0.10.

KEY FEATURES OF THE 2007 KAIS

- Provides nationally-representative information about the HIV/AIDS epidemic
- Reached almost 18,000 individuals from nearly 10,000 households
- Included both women and men aged 50-64 years for the first time in a national HIV survey
- Captured prevalence of HIV, HSV-2 and syphilis, and CD4 cell counts for those with HIV infection
- Covered knowledge of HIV status and uptake of HIV prevention, care, and treatment services.
- Yielded greater blood draw participation rates among women and men, in rural and urban areas compared to the previous national HIV survey

Key Findings: HIV Prevalence

- Of adults aged 15-64 years, an estimated 7.1%, or 1.42 million people, were living with HIV infection in 2007. Prevalence among adults aged 15-49 years was 7.4%, and was not statistically different from the 2003 KDHS estimate (6.7%).
- Prevalence among youth aged 15-24 years was 3.8%. Older Kenyans, aged 50-64 years, sometimes considered to have low risk for HIV, had a HIV prevalence of 5.0%.
- Women were more likely to be infected (8.4%) than men (5.4%). In particular, young women aged 15-24 years were four times more likely to be infected (5.6%) than young men of the same age group (1.4%).
- There was wide regional variation in HIV prevalence among adults aged 15-64 years, ranging from 14.9% in Nyanza province to 0.8% in North Eastern province.
- HIV prevalence among uncircumcised men aged 15-64 years was three times greater than among circumcised men (13.2% vs. 3.9%, respectively).

Prevalence of HIV and trends

National HIV prevalence was estimated to be 7.1% among adults aged 15-64 years. Women were more likely to be infected (8.4%) than men (5.4%), and young women aged 15-24 years were four times more likely to be infected (5.6%) than young men of the same age group (1.4%). The overall HIV prevalence in adults aged 50-64 was 5.0%. Significant differences in HIV prevalence were found across provinces. HIV prevalence among adults aged 15-64 years in urban areas was 8.4% and in rural areas was 6.7%. An estimated 1,027,000 adults living with HIV in Kenya resided in rural areas, and 390,000 lived in urban areas. Of all HIV-infected adults aged 15-64 years, over half (51.4%) lived in Nyanza and Rift Valley provinces.

The 2003 KDHS surveyed women and men aged 15-49 years and estimated that 6.7% of this population was infected with HIV in 2003. In the 2007 KAIS, HIV prevalence among those aged 15-49 years was 7.4% and was not statistically different from the 2003 estimate. HIV prevalence among adults aged 15-49 years in urban areas decreased from 10.0% in the 2003 KDHS to 8.7% in KAIS, while HIV prevalence in rural areas increased from 5.6% to 7.0%; these differences were not statistically significant.

KEY FINDINGS: HIV PREVENTION

- Among adults aged 15-64 years, 33.9% had been tested for HIV and received test results, 44.6% of women and 25.6% of men.
- Knowledge of HIV status was low: only 16.4% of HIV-infected respondents knew they had HIV. Knowledge of partner's HIV status was also low. Among those respondents who reported one or more sexual partners in the past 12 months, their partners had been tested for HIV and disclosed their status to the respondent in only 22.2% of partnerships reported in the year prior to the survey.
- Among women who reported having a live birth between 2003 and 2007, 10.4% did not visit an ANC. Among those who visited an antenatal clinic (ANC), HIV testing increased from 50.4% in 2003 to 78.6% in 2007.
- Condom use at last sex was low in marital/cohabiting partnerships (4.2% among partnerships reported by women and 5.9% among partnerships reported by men) compared to non-marital/non-cohabiting partnerships (35.7% among partnerships reported by women and 52.6% among partnerships reported by men).
- Co-infection with STIs and HIV was common: 16.9% of persons with syphilis were infected with HIV, as were 16.4% of persons with HSV-2 infection.
- Among married/cohabiting couples, 9.7% had at least one HIV-infected partner. At the time of the survey, an estimated 344,000 HIV-discordant couples needed targeted HIV testing and prevention.
- Overall, 57.5% of women and 56.4% of men reported having had unprotected sex with at least one partner of HIV-discordant or unknown HIV status in the 12 months prior to the survey.

HIV prevention

HIV counselling and testing are key elements in a comprehensive response to the HIV epidemic. The proportion of adults who reported that they had ever been tested for HIV increased from 15.2% in 2003 to 36.6% in 2007 among adults aged 15-49 years. Of respondents aged 15-64 years that had ever been tested for HIV, 49.5% had tested within the 12 months prior to KAIS. Women were significantly more likely to have been tested for HIV (44.6%) than men (25.6%). Among adults who had never been tested, 47.2% did not test for HIV because they perceived themselves to be at low risk for HIV infection. According to the 2007 KAIS, 83.6% of all HIV-infected adults were unaware that they were infected. HIV testing must increase substantially to reach Kenya's goal of 80% testing coverage for all adolescents and adults by 2010.

Overall, 86.5% of respondents who had ever been tested for HIV and self-reported positive or negative also reported they had disclosed their HIV status to their sexual partners; however, in 77.9% of sexual partnerships, respondents reported they did not know their partners' HIV status; this percentage was especially high in casual partnerships (92.2%). HIV-infected adults who were aware of their status were significantly more likely to know their partners' HIV status than other infected and uninfected adults. Overall, 5.9% of married or cohabitating couples in Kenya were discordant for HIV, that is, one partner was infected and the other was not. This corresponds to an estimated 344,000 HIV-discordant couples nationwide. HIV testing efforts should be strengthened for individuals and their partners.

Number of sexual partners, inconsistent condom use, young age at first sex, and lack of male circumcision were some of the key factors associated with acquisition and sexual transmission of HIV. The majority of adults aged 15-64 years (52.2% of women and 73.1% of men) have had more than one sexual partner in their lifetime; 1.7% of women and 11.9% of men had more than one sexual partner in the 12 months prior to the survey. Consistent condom use with sexual partners in the 12 months preceding the survey was low, even among women and men who reported more than one sexual partner in the 12 months before the survey. The median age at sexual debut was 17.5 years for both young women and men aged 15-24 years. Twenty percent (20.0%) of young women and 22.4% of young men reported they had first sex by 15 years of age.

Overall, 85.0% of men reported being circumcised; the proportion of men who were circumcised was lowest in Nyanza province (48.2%). Uncircumcised men were three times more likely to be infected with HIV (13.2%) than circumcised men (3.9%).

Knowledge about HIV, realistic perceptions of risk, and stigma reduction are considered critical for reducing the risk of HIV acquisition and transmission. Among all respondents, 98.3% had heard about AIDS. Comprehensive knowledge of HIV and AIDS had improved since 2003, and knowledge was highest among persons with more years of education and among urban residents. Excluding respondents who self-reported positive, 70.7% believed themselves to be at low or no risk for acquiring HIV; among these adults, 76.7% reported having only one partner as the reason they were at low risk. Overall, willingness to care for an HIV-infected family member was high (91.5%).

Mother-to-child transmission

The prevention of mother-to-child transmission (PMTCT) program in Kenya was launched in 2000 and has undergone a substantial scale-up since 2003. A total of 89.6% of women between ages 15-54 years who were pregnant between 2003 and 2007 reported attending an ANC at least once during their pregnancy. HIV testing at ANCs increased steadily since 2003, and in 2007, 78.6% of women who reported attending an ANC also reported receiving an HIV test at the ANC. HIV testing at ANCs accounted for a substantial proportion of HIV testing among women of reproductive age (aged 15-49 years); 63.8% of women who reported ever having been tested at an ANC had never tested elsewhere. Nonetheless, 10.4% of women who reported having a birth between 2003 and 2007 did not visit an ANC indicating a need for sustained efforts to increase ANC attendance and to consider PMTCT services beyond established ANCs.

Reproductive health: pregnancy and contraception

HIV prevalence among women who reported they were currently pregnant was 9.0%. Among HIV-uninfected pregnant women, and currently breastfeeding women who reported unprotected sex in the year before the survey, the HIV status of their partners was unknown in 72.7% and 77.6% of partnerships, respectively.

Among all women of reproductive age (15-49 years), 70.5% reported wanting to delay pregnancy by two or more years; that is, they either did not want a child within the next two years or did not want a child (or more children) ever in the future. Less than half (45.0%) of these women were reportedly using modern contraception. Among HIV-infected women, 66.8% reported wanting to delay pregnancy by two or more years; 40.5% of these women were using modern contraception.

Among HIV-uninfected women, 71.2% reported wanting to delay pregnancy by two or more years; 45.6% of these women were using modern contraception.

Blood safety

Nationwide, an estimated 2.3% of adults reported donating blood in the year prior to the survey; among these adults, 48.3% reported they were approached by a blood transfusion service, the majority of which fall within the Kenya National Blood Transfusion Service network. Of the remainder, 40.4% of participants reported that a family or friend asked them to donate, most likely as a family/replacement donor. The majority of adults who reported donating blood in the year prior to the survey were men: 69.2% of male donors reported they had been requested to donate by a blood transfusion service, and 81.4% were requested by friends or family. Among donors who were requested to donate by a blood transfusion service, 69.2% were under 25 years of age. By comparison, persons who were requested to donate by family or friends were older, with 60.9% aged 30 years or older. HIV prevalence among persons who reported donating blood in the year before the survey was 4.7% and differed marginally by source of donation request. Among donors who had received a request to donate to a blood transfusion service, the prevalence was 2.5% compared to 7.4% among persons who reported donating for a family or friend.

KEY FINDINGS: HIV CARE AND TREATMENT

- Among all HIV-infected persons in KAIS, cotrimoxazole coverage was low at 12.1%. Low coverage was associated with low awareness of HIV status. Among HIV-infected persons who were aware of their HIV status, 76.1% reported taking daily cotrimoxazole.
- Among all HIV-infected persons with a CD4 cell count of <250 cells/µL, antiretroviral (ARV) treatment coverage was 40.5%. As with cotrimoxazole, the majority (93.8%) of persons eligible but not on ARV therapy were unaware they were HIV-infected. Among those who were eligible and knew they were infected, 91.6% were taking daily ARVs.

Care and treatment

Nationwide, an estimated 1.42 million people were HIV-infected at the time of the 2007 KAIS and therefore could benefit from accessing HIV care and treatment services. Among all HIV-infected adults, cotrimoxazole coverage was low at 12.1%, primarily because only 16.4% were aware of their HIV infection. Among HIV-infected respondents who were aware of their HIV status, daily cotrimoxazole use was significantly higher at 76.1%. Of all HIV-infected adults who were eligible for ARV therapy (CD4 count of <250 cells/µL), 59.5% were not taking daily ARVs. The vast majority (93.8%) of these individuals were unaware of their HIV infection. Of those aware of their status and eligible, 91.6% were taking daily ARVs. As HIV testing services are expanded, Kenya also must be prepared to scale-up HIV care and treatment services to meet the needs of those newly diagnosed with HIV.

HIV-infected adults aged 15-64 years who were aware of their HIV infection were twice as likely to have visited an outpatient medical facility in the four weeks prior to the survey, compared to those unaware (51.2% and 22.9%, respectively). Similarly, those aware of their HIV infection were approximately four times more likely to report an overnight hospitalization than those unaware (14.1% and 3.2%, respectively).

Among all HIV-infected adults, 9.6% reported a previous tuberculosis (TB) diagnosis. More than half of these adults (61.1%) were aware of their HIV status; the majority had reported completing TB treatment (85.3%); and approximately half (51.2%) reported taking daily cotrimoxazole. This means that nearly half (48.8%) were not taking cotrimoxazole, which is recommended for all HIV-infected adults. It was not possible to determine whether HIV infection preceded TB infection or vice versa from the survey data.

Many HIV-infected individuals have chronic health care needs and could benefit from an array of prevention, acute care and long-term care services. In particular, the Ministry of Medical Services recommends safe drinking water, mosquito bednets and daily multi-vitamins for all HIV-infected persons. At the time of the 2007 KAIS, 45.5% of HIV-infected adults in Kenya lived in a household that treated its main source of drinking water; the most commonly reported method of treatment was boiling. Among all HIV-infected adults, 45.3% slept under a bednet the night before the survey; 20.2% slept under an insecticide-treated net. There were no significant differences in water treatment practices and bednet usage between those aware or unaware of their HIV status. Among HIV-infected adults aware of their HIV status, 36.4% reported taking daily multi-vitamins.

HSV-2, syphilis and co-infection with HIV

The national prevalence of herpes simplex virus type 2 (HSV-2), the virus that causes genital herpes was estimated at 35.1%, indicating that an estimated 7 million adults aged 15-64 years were infected with HSV-2 at the time of the survey. Women were more likely to be infected than men (41.7% and 26.3%, respectively). Men who were uncircumcised (38.3%) were more likely to be infected with HSV-2 compared to men who were circumcised (24.0%). HSV-2 prevalence increased significantly with increasing number of lifetime sexual partners among women and men. Among individuals with HSV-2, 16.4% were also infected with HIV, which was eight times greater than the HIV prevalence among individuals without HSV-2 (2.1%).

The national prevalence of active syphilis infection (defined as having seropositive results on both a *Treponema pallidum* particle agglutination assay and a rapid plasma reagin test result) was 1.8%. Prevalence was similar between women (1.7%) and men (1.9%) and increased significantly with age, number of lifetime sexual partners and lack of male circumcision. Among those infected with syphilis, 16.9% were also infected with HIV, 71.5% were also infected with HSV-2, and 15.9% were infected with both HIV and HSV-2.

Prevalence of HIV, HSV-2 and syphilis among women and men aged 15-64 years, Kenya 2007.

	HIV (%)	HSV-2 (%)	Syphilis (%)
Women	8.4	41.7	1.7

Men	5.4	26.3	1.9
Total	7.1	35.1	1.8

Orphanhood and household characteristics
Nationally, 11.1% of children under age 15 years had lost one or both parents, corresponding to an estimated 1.78 million children. In Nyanza province, the prevalence of orphaned children was 20.9%, nearly double the national prevalence.

Of all households in KAIS, 11.0% of households were affected by HIV, that is, at least one person in the household was HIV-infected. In 75.6% of HIV-affected households, the HIV-infected household member was the head of household, defined as the person with decision making authority and usually economic responsibility for the household and its members. In both rural and urban areas, most households did not treat their drinking water (60.1% and 52.1%, respectively), including both HIV-affected and HIV-unaffected households. More than one in four rural households (27.2%) reported surface water from rivers, dams, ponds, streams, and irrigation channels as their main source of drinking water. Mosquito net ownership increased 2.5 times between the 2003 KDHS and the 2007 KAIS; 56.1% of households in 2007 owned at least one mosquito net compared to 21.8% in 2003.

1

Introduction, Overview of Methods and Response Rates

1.1 Background

The control of HIV/AIDS remains a major challenge in Kenya. High prevalence of HIV with regional variations, low levels of HIV testing, HIV discordance within couple relationships and concurrent epidemics of other sexually transmitted infections (STIs) make the management of the HIV epidemic difficult and complex. To overcome these challenges, policymakers and programme planners need the highest quality data to implement, monitor and evaluate HIV prevention, care and treatment services. This report presents the primary findings of the 2007 Kenya AIDS Indicator Survey (KAIS) – a nationally and regionally representative household survey that provides information on HIV and STI prevalence, factors associated with infection, and the scope of Kenya's prevention, care and treatment response.

The first case of HIV in Kenya was diagnosed in 1984. Since then, the epidemic and the government's response to it have expanded. When the epidemic was first recognized, the highest rates of infection were concentrated in marginalised and special-risk groups, including women who were sex workers and their clients, and men in mobile occupations, such as long-distance truck drivers. For more than a decade, however, the country has faced a mixed HIV/AIDS epidemic; new infections are occurring both in the general population and in vulnerable, high-risk groups.

HIV epidemics in each country are intricate and dynamic, and governments must track certain indicators for HIV/AIDS to control their epidemics effectively, including the incidence of new HIV infections; mortality due to HIV-related illness and coverage; and access to HIV care, treatment and prevention services. Since 1990, Kenya has conducted annual HIV sentinel surveillance among pregnant women attending antenatal clinics (ANC) and patients attending STI clinics. By 2007, sentinel surveillance included 44 rural and urban sites throughout the country. Other sources of information on HIV/AIDS include program data from voluntary counselling and testing (VCT) sites, prevention of mother-to-child transmission (PMTCT) services, and blood donation screening, and population-based data from the 2003 Kenya Demographic and Health Survey (KDHS), the first survey in Kenya to provide national and provincial estimates of HIV prevalence.

UNAIDS and the World Health Organisation (WHO) recommend that a survey of a representative sample of the general population be included in HIV surveillance systems in countries with generalised and mixed epidemics to provide reliable measures of prevalence for women and men and information to calibrate the data from routine HIV sentinel surveillance.[2]

[2] Guidelines for Second Generation HIV Surveillance: WHO/CDS/CSR/2000.5, UNAIDS/00.03E (2000).

Since the 2003 KDHS, Kenya has witnessed a considerable increase in funding for its HIV/AIDS national programme from major global initiatives. The resulting growth and diversification in HIV/AIDS services highlights the need for commensurate expansion of HIV and STI surveillance systems. In particular, interpreting HIV prevalence trends in the context of scale-up of antiretroviral (ARV) therapy requires surveillance tools that collect comprehensive information on HIV care, treatment, and prevention indicators. The 2007 KAIS was specifically designed to address these new and evolving issues.

1.2 National Policy on HIV/AIDS

The Government of Kenya (GOK) established policy guidelines for HIV and AIDS in Sessional Paper No. 4 of 1997. In 1999, the GOK declared the HIV epidemic a national disaster and created the National AIDS Control Council (NACC) under the Office of the President to coordinate a multi-sectoral response to HIV/AIDS.

The GOK developed the first Kenya National HIV/AIDS Strategic Plan (KNASP) for 2000-2005, establishing a response to the epidemic in partnership with all stakeholders, including civil society, private sector and development partners. The second KNASP for 2005/6-2009/10 provides the framework for the country's current response to HIV/AIDS. The goals of the current KNASP are to reduce the spread of HIV, to improve the quality of life of people who are infected and affected by the disease, and to mitigate the social and economic effects of the epidemic.

Three priority areas have been identified to achieve current KNASP 2005/6 – 2009/10 goals:

Priority Area 1: Prevent new infections
Objective: Reduce the number of new HIV infections in both vulnerable groups and the general population.

Priority Area 2: Improve the quality of life of people infected with and affected by HIV/AIDS
Objective: Improve treatment and care and protect rights and access to effective services.

Priority Area 3: Mitigate the socio-economic effect of HIV/AIDS
Objective: Adapt existing programmes and develop innovative responses to reduce the effect of the epidemic on communities, social services and economic productivity.

The core of the KNASP 2005/6-2009/10 includes a multi-sectoral approach to encourage advocacy, building partnerships and making HIV/AIDS programmes mainstream in important areas of the economy; having programmes for groups most vulnerable to HIV infection and its consequences; recognising the special needs of women and youth; getting the participation of people living with HIV and AIDS in implementing the strategy; encouraging participation of all stakeholders; creating interventions that are evidence based and culturally specific; and supporting international and regional initiatives.[1]

Kenya is also committed to the "Three Ones" principles for country-level scale up of the response to HIV/AIDS: one national action framework, one national coordinating body and one national monitoring and evaluation system.[3]

1.3 Purpose and Objectives of the Survey

The 2007 KAIS was a nationally representative population survey conducted to provide the comprehensive data needed to address the HIV/AIDS epidemic. The findings provide programme managers, policy makers and other decision-makers with essential information to plan and implement future HIV interventions effectively and to assist with the monitoring and evaluation of programmes targeting HIV/AIDS, STIs and other infections such as tuberculosis and malaria. The overall objective of the survey was to collect high-quality, representative data on the prevalence of HIV and STIs among adults, knowledge and attitudes towards HIV, and demographic and behavioural risk factors related to infection with HIV and other STIs.

Data in Context: KAIS Objectives

- Determine the prevalence of HIV, herpes simplex virus type 2 (HSV-2) and syphilis in adults aged 15-64 years and the distribution of CD4 counts among HIV-infected adults.
- Determine access to and unmet need for HIV/AIDS services.
- Describe socio-demographic and behavioural risk factors related to HIV and other STIs.
- Assess knowledge and attitudes regarding HIV/AIDS and other STIs.
- Increase awareness of HIV status and care, treatment and eligibility for services by returning test results to participants.

The following sections give an overview of methods used in the 2007 KAIS. More information about survey methods is provided in Appendix A.

1.4 Survey Design and Sample Frame

Geographic coverage and target population

The 2007 KAIS was conducted among a representative sample of households selected from all eight provinces in the country, covering both rural and urban areas. A household was defined as a person or group of people related or unrelated to each other who live together in the same dwelling unit or compound (a group of dwelling units), share similar cooking arrangements, and identify the same person as the head of household. The household questionnaire was administered to consenting heads of sampled, occupied households. All women and men aged 15-64 years in selected households who were either usual residents or visitors present the night before the survey were eligible to participate in the individual interview and blood draw, provided they gave informed consent. For minors aged 15-17 years, parental consent and minor

[3] Kenya National HIV/AIDS Strategic Plan 2005/06-2009/10

assent were both required for participation. Participants could consent to the interview and blood draw or to the interview alone. The inclusion criteria may have captured non-Kenyans living as usual residents or visitors in a sampled household. Military personnel and the institutionalized population (e.g. imprisoned) are typically not captured in similar household-based surveys may have been included in the 2007 KAIS if at home during the survey.

Sampling frame and design

Administratively, Kenya is divided into eight provinces. Each province is divided into districts, each district into divisions, each division into locations, each location into sub-locations, and each sub-location into villages. For the 1999 Population and Household Census, the Kenya National Bureau of Statistics (KNBS) delineated sub-locations into small units called Enumeration Areas (EAs) that constituted a village, a part of a village, or a combination of villages. The primary sampling unit for Kenya's master sampling frame, and for the 2007 KAIS, is a cluster, which is constituted as one or more EAs, with an average of 100 households per cluster.

The master sampling frame for the 2007 KAIS was the National Sample Survey and Evaluation Programme IV (NASSEP IV) created and maintained by KNBS. The NASSEP IV frame was developed in 2002 based on the 1999 Census. The frame has 1800 clusters, comprised of 1,260 rural and 540 urban clusters. Of these, 294 (23%) rural and 121 (22%) urban clusters were selected for KAIS.

The overall design for the 2007 KAIS was a stratified, two-stage cluster sample for comparability to the 2003 KDHS. The first stage involved selecting 415 clusters from NASSEP IV and the second stage involved the selection of households per cluster with equal probability of selection in the rural-urban strata within each district. The target of the 2007 KAIS sample was to obtain approximately 9,000 completed household interviews. Based on the level of household non-response reported in the 2003 KDHS (13.2% of selected households), 10,375 households in 415 clusters were selected for potential participation in the 2007 KAIS. Table 1.4 shows the provincial distribution of households and clusters originally sampled for the 2007 KAIS.

Table 1.4 Distribution of sampled clusters and households by province, KAIS 2007.

	Clusters			Households		
Province	Rural	Urban	Total	Rural	Urban	Total
Nairobi[4]	0	58	58	0	1,450	1,450
Central	48	7	55	1,200	175	1,375
Coast	24	22	46	600	550	1,150
Eastern	50	5	55	1,250	125	1,375
North Eastern	23	5	28	575	125	700
Nyanza	54	7	61	1,350	175	1,525
Rift Valley	51	12	63	1,275	300	1,575
Western	44	5	49	1,100	125	1,225
Total	294	121	415	7,350	3,025	10,375

Of the original 415 clusters, 402 were accessed and surveyed. Thirteen clusters were inaccessible due to impassable roads or tenuous security situations. All reported estimates and design weights for households, individual interviews, and blood draws are based on data from the 402 clusters. Details on methods for performing an adjustment for cluster-level non-response in the calculation of weights are provided in Appendix A. The survey was not designed to produce reliable district-level estimates. Estimates are presented by rural/urban residence, and by province.

1.5 Data Collection Tools

Questionnaires

Two questionnaires were used: a household questionnaire and an individual questionnaire. The content of the questionnaires was adapted from standard AIDS Indicator Survey questionnaires developed by ORC Macro, the 2003 KDHS HIV Module and previous surveys conducted in Africa. Various stakeholders in NACC, the National AIDS and STI Control Programme (NASCOP) and other HIV/AIDS organizations working in Kenya met to determine the key HIV program information needs and gaps. The KAIS Technical Working Group (TWG) modified existing questions and designed new questions to reflect current and emerging issues in HIV/AIDS in the country. The final questionnaires were translated from English into Kiswahili and 11 vernacular languages and back-translated into English to ensure accuracy. The questionnaires were further refined after a pilot study prior to distribution of the final versions to field staff.

The household questionnaire gathered basic information from the head of the household on usual members and visitors in the household, including age, sex, education, relationship to the head of household, and orphanhood among children. Information was collected on characteristics of the household's dwelling unit, such as the source of water, type of toilet facilities, materials used for the floor of the house, property ownership, and mosquito nets. Information was also collected on whether the household had received specific types of care and support in the 12 months prior to

[4] Nairobi is exclusively urban; there were no rural clusters in Nairobi.

the survey for any chronically ill adults, any household members who died, and any orphans and vulnerable children (OVC). The household questionnaire was also used to record the respondents' consent for blood collection and testing.

The individual questionnaire collected information from eligible women and men aged 15-64 years on basic demographic characteristics, marriage, sexual activity, fertility, and family planning. In addition, the tool included questions regarding HIV and STI knowledge, attitudes and behaviours, HIV testing, HIV care and treatment uptake, and other health issues, such as tuberculosis, blood donation and medical injections.

HOUSEHOLD QUESTIONNAIRE	INDIVIDUAL QUESTIONNAIRE
▪ Household census	▪ Socio-demographic characteristics
▪ Parental survivorship	▪ HIV/STI knowledge and attitudes
▪ Household characteristics	▪ Marriage and sexual partnerships
▪ Mosquito net use	▪ Fertility and family planning
▪ Support to households for sick and recently deceased adults, and OVCs	▪ Uptake of HIV prevention, care and treatment services

Blood draw

Eligible adults were asked individually for their consent to provide a venous blood sample for HIV, HSV-2, and syphilis testing, as well as CD4 cell quantification. They also were asked to consent to extended storage of their samples for future, unspecified testing.

Experiened laboratory technicians were responsible for the collection of blood from an arm by venipuncture. Blood was collected into two separate tubes, one without anticoagulant, from which serum was obtained for HIV, HSV-2, and syphilis serological testing, and the other designed to stabilise whole blood for CD4 testing up to seven days after collection. For participants who were willing to participate but refused venous blood draw, dried blood spot (DBS) samples were collected via finger prick. DBS samples also were collected in cases where venipuncture was not feasible.

BLOOD DRAW

- Venous blood: HIV, HSV-2, syphilis testing; CD4 count for those with HIV
- Dried blood spot: HIV testing only

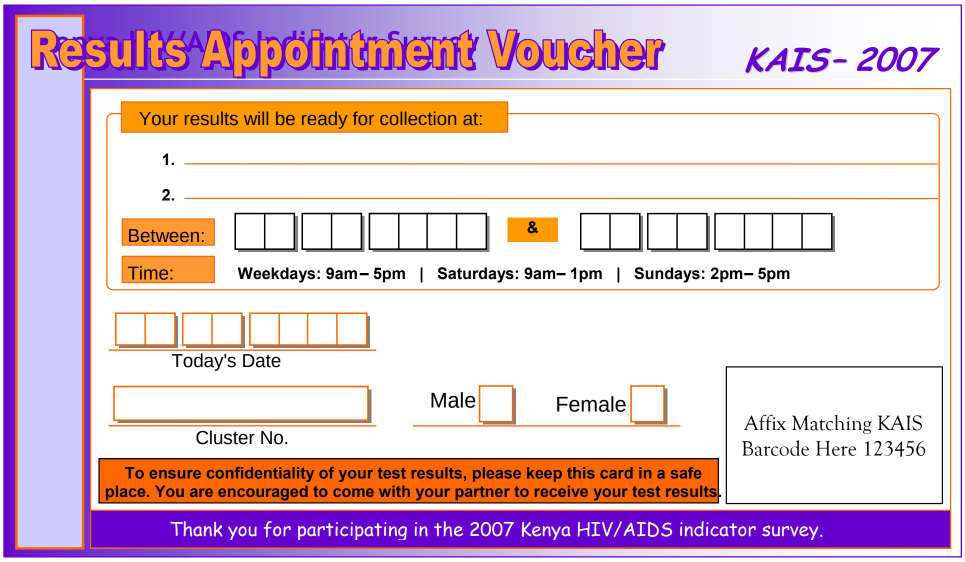
Ethical approvals

The 2007 KAIS protocol was approved by the Scientific Steering Committee and the Ethical Review Committee at the Kenya Medical Research Institute (KEMRI) and by the Institutional Review Board at the U.S. Centers for Disease Control and Prevention (CDC). All participants provided verbal informed consent and had the choice to consent separately to the interview, the blood draw, and the storage of their specimens for future testing.

1.6 Return of Test Results To Participants

The 2007 KAIS participants who consented to the blood draw during the survey were given the opportunity to collect test results and receive appropriate counselling and referrals to prevention, care and treatment services for HIV and other STIs per national guidelines for voluntary testing and counselling for HIV infection. The activity for returning test results to participants involved coordination between the National HIV Reference Laboratory (NHRL) within the National Public Health Laboratory Services (NPHLS), NASCOP, local health facilities and results counsellors. At the time of specimen collection, participants were given a results voucher with a unique barcode identical to the barcode on their blood specimen (see figure 1.6). The voucher listed two facilities (one within the cluster and one outside of the cluster) where they could receive their test results approximately six weeks after the blood draw. Interviewers and laboratory technicians were trained to educate participants on the benefits of knowing one's disease status and encouraged them to return to receive their test results. Returning for results, however, was completed volunatry. Results counsellors explained test results and referred respondents who required follow up to testing and treatment facilities. A form for returning test results was developed for the counsellor to capture basic information about participants who returned for their test results and post-test counselling as part of the 2007 KAIS.

Figure 1.6 KAIS results voucher.



1.7 Survey Implementation

Training

In July 2007, 204 skilled interviewers, laboratory technicians, laboratory scientists and field supervisors were recruited and trained for two weeks in the 2007 KAIS procedures. The training involved didactic presentations, small group discussions and practical sessions, such as mock interviews and blood draws.

Interviewer training

- Informed consent for interview
- Administering questionnaires
- Objective interview techniques
- Explaining KAIS diseases

Interviewers were trained to identify eligible households and individuals, seek informed consent, educate participants about HIV, HSV-2 and syphilis and administer questionnaires using objective using interview techniques. Field laboratory technicians and scientists were trained in preparing respondents for the blood draw and in specimen collection, processing, storage and transportation to the central laboratory in Nairobi. Laboratory training emphasized ways to minimise risks in handling biological specimens. Laboratory technicians were trained to process and analyse specimens in the laboratory and to issue return of results vouchers for participants to retrieve their test results.

Lab technician training

- Informed consent for blood draw
- Universal precautions
- Sample collection
- Sample processing
- Return of results vouchers

In September 2007, NASCOP and the TWG conducted intensive one-week trainings for 202 counsellors and health workers involved in returning test results to participants. Counsellors and health workers, regardless of their health care experience, were required to attend the training to refresh their counselling skills, learn how to return the 2007 KAIS test results to participants and to refer them and their partners for further testing, care and treatment.

Community mobilization

The 2007 KAIS was officially launched on August 1, 2007. This date marked the start of the national television, radio, and print media campaign to inform, sensitise and mobilise Kenyans about the survey and the importance of broad participation. Mobilisation efforts later shifted to community and village level communications to prepare communities before survey teams arrived. Mobilisation efforts at the community and village level were critically important to this survey.

Fieldwork

A total of 29 field teams, each consisting of six data collectors (four interviewers and two laboratory technicians), one supervisor and one driver, conducted fieldwork from August to December 2007. Teams were provided local language questionnaires in addition to questionnaires in Kiswahili and English to accommodate respondents not conversant in vernacular languages.

After obtaining informed consent from the head of the household, interviewers administered the household questionnaire to the head of household followed by individual interviews and blood draws among all eligible and consenting individuals in the household. Participants received brochures on HIV, HSV-2, syphilis, and tuberculosis in Kiswahili and English. Completed questionnaires for each cluster were packed and delivered weekly to KNBS headquarters through secured courier services for data processing.

Supervision

Six teams of supervisors representing different KAIS collaborating institutions routinely visited field teams during data collection. Supervision teams travelled throughout the country to assess mobilisation efforts, perform quality checks on questionnaires and field laboratory procedures, deliver additional survey supplies, troubleshoot challenges and provide psychosocial support to field teams. Supervision reports were disseminated among the KAIS leadership and key issues were addressed immediately.

1.8 Laboratory Logistics

Blood specimens were collected by the field laboratory teams and shipped two to three times per week by secured courier services to the NHRL. Each week, an average of 500 samples from the eight provinces were received at the NHRL, logged into a laboratory information management system and screened for HIV, HSV-2 and syphilis. All reactive samples and 5% of randomly-selected non-reactive samples were retested for quality assurance (QA) at the KEMRI QA laboratory. All HIV seropositive serum samples were referred for immediate CD4 testing at the NHRL. Internal controls with known CD4 quantities were included with each run. Results of HIV, HSV-2, and syphilis testing conducted by the two laboratories were cross-checked and verified by the NHRL laboratory manager to ensure accurate results, and then returned to participants. Detailed information on laboratory testing algorithms and dispatching results are provided in Appendix A.

To ensure that the blood samples collected in remote areas in North Eastern province reached the NHRL in a timely fashion, a local airline was contracted to fly blood samples from North Eastern province to the central laboratory in Nairobi. Overall, 98.9% of whole blood samples and 99.8% of serum samples collected in the 2007 KAIS were of adequate quality for testing.

1.9 Data Processing and Analysis

Data processing included a number of steps to prepare data collected in the field for analysis. The initial steps included editing questionnaires, both in the field and at KNBS, and double-data entry of all questionnaire responses to minimise errors. Data were entered using Census and Survey Processing System (CSPro) version 3.3.[5] Once all survey responses were transferred to electronic format, the next step was to ensure full concordance between the two data entry databases, using paper questionnaires to resolve any discrepancies in transcription. A series of internal consistency and range checks helped to identify any illogical responses and to verify that responses adhered to skip patterns in the questionnaire. Data validation programs for data cleaning were written in Stata version 8.0[6] and corrections were entered directly in CSPro at KNBS.

A concurrent process of cleaning the raw laboratory data was conducted at the NHRL. The final, cleaned questionnaire database at KNBS was merged with the laboratory results database at the NHRL using unique survey identification numbers to ensure accurate matches (>99.9% of identification numbers were matched). After successfully merging the questionnaire and laboratory results databases, cluster and household identification numbers were serialized from 1-402 and from 1-25, respectively. Original cluster and household numbers, barcodes, and individual survey identification numbers were stripped from the database prior to weighting and analysis to ensure anonymity of survey participants.

All results presented in the report are based on weighted data to account for the survey sampling design and participation rates. The weights are used to correct for unequal probability of selection, to produce results that are representative of the larger population from which the sample was drawn and to adjust for survey non-response. The final weights were derived from the design weights of the NASSEP IV sampling frame and subsequently adjusted for non-response. Three weights were calculated for analyses: a household weight, an individual interview weight and a blood draw weight.

This report presents the results of univariate and bivariate analyses; analyses are not adjusted for confounding factors. Multivariate analyses of KAIS data will be presented in other dissemination materials, such as peer-reviewed scientific publications. Data analyses was conducted using Statistical Analysis System (SAS) version 9.13[7], which has procedures to account for multi-stage stratified sampling designs and can produce reliable standard errors and confidence intervals. With the exception of chapter 3 (Trends in HIV Prevalence), statistical significance was assessed based on chi-square p-values. In Chapter 3, we assumed the estimates from each time period (the 2003 KDHS and the 2007 KAIS) were independent and used the z-test to compare two weighted estimates and to determine if differences between 2003 and 2007 were statistically significant. Throughout the report, the term <u>significant</u> indicates a p-value[8] less than 0.05. <u>Marginally</u>

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[5] U.S. Census Bureau, Washington, DC. USA.

[6] Stata Corporation, College Station, Texas. USA.

[7] SAS Institute, Inc. Cary, North Carolina. USA.

[8] A p-value refers to the probability of obtaining a sample showing an association of the observed size or larger by chance alone, assuming that no association exists. To minimize the risk that the results found are

significant indicates a p-value between 0.05 and 0.10, inclusive; and not significant indicates a p-value greater than 0.10.

1.10 Comparison of the 2003 KDHS and the 2007 KAIS

The period between the 2003 KDHS and the 2007 KAIS was characterized by the rapid scale up of HIV prevention, care and treatment services. The GOK implemented the 2007 KAIS in part to understand the reach and impact of these scaled-up services on the HIV epidemic. The institutional partners that implemented the 2003 KDHS also were part of the planning and conduct of the 2007 KAIS. To identify changes in the epidemic since 2003, the 2007 KAIS utilized methodology similar to the 2003 KDHS to allow for comparison to 2003 findings. Participation in both surveys was completely voluntary. Verbal consent was a requisite for participation in both 2003 and 2007. Table 1.10 compares elements of survey design and methodology between the 2003 KDHS and the 2007 KAIS.

Table 1.10 Comparison of survey designs between the 2003 KDHS and the 2007 KAIS.

Characteristic	2003 KDHS	2007 KAIS
Household sampling	Two-stage sample design	Two-stage sample design
Interviews among men and blood draws among women and men	Men in every other household selected for the women's questionnaire were eligible for the men's questionnaire; women and men in every other household selected for the women's questionnaire were eligible for blood draw	Same sampling for women and men; same sampling for interview and blood draw
Weighting of sample by sex	Yes (due to differences in sampling by women and men); non-response adjustment applied	No (due to same sampling for women and men); non-response adjustment applied
Age of participants	15-49 years old	15-64 years old

due to chance alone, a p value is calculated and reported. A p-value less than 0.05 is a conventionally chosen level to control for chance.

Characteristic	2003 KDHS	2007 KAIS
Questionnaire	Focus on demographic, gender, fertility and reproductive health questions; administered in Kiswahili, English and 12 local languages	Focus on HIV/AIDS indicators including knowledge of self and partner HIV status and utilization of HIV care and treatment services; administered in Kiswahili, English and 12 local languages
HIV serologic testing	Antibody only	Antibody plus antigen
Type of blood draw	DBS from finger prick only	Primarily venipuncture (0.92% provided DBS)
Laboratory tests conducted	HIV serology	HIV, HSV-2 and syphilis serology and CD4 cell counts for HIV-infected persons (only HIV for persons providing DBS)
Access to HIV status and other STI testing results	Free VCT vouchers provided to access HIV testing and referrals at mobile or stationary VCT sites	Results vouchers provided to respondents to access HIV, HSV-2 and syphilis results and CD4 cell counts and referrals at nearby facilities

The household sampling strategy was similar between surveys though sampling strategies for individuals differed. In the 2003 KDHS, every other household selected was eligible for the men's individual interview and for a blood draw from eligible adults; this difference in sampling does not compromise comparability between the 2003 KDHS and the 2007 KAIS as the selection of households in both surveys was random. While the 2003 KDHS covered a broader range of demographic and reproduction health measures, the 2007 KAIS focused mostly on HIV/AIDS indicators; thus there are notable differences in the types of questions asked. Where possible, the same or similar wording was used for questions repeated from the 2003 KDHS to enhance comparability. Training of the 2007 KAIS field teams was also similar to the training of the 2003 KDHS field teams, and both questionnaires were administered in 11 different vernacular languages in addition to English and Kiswahili.

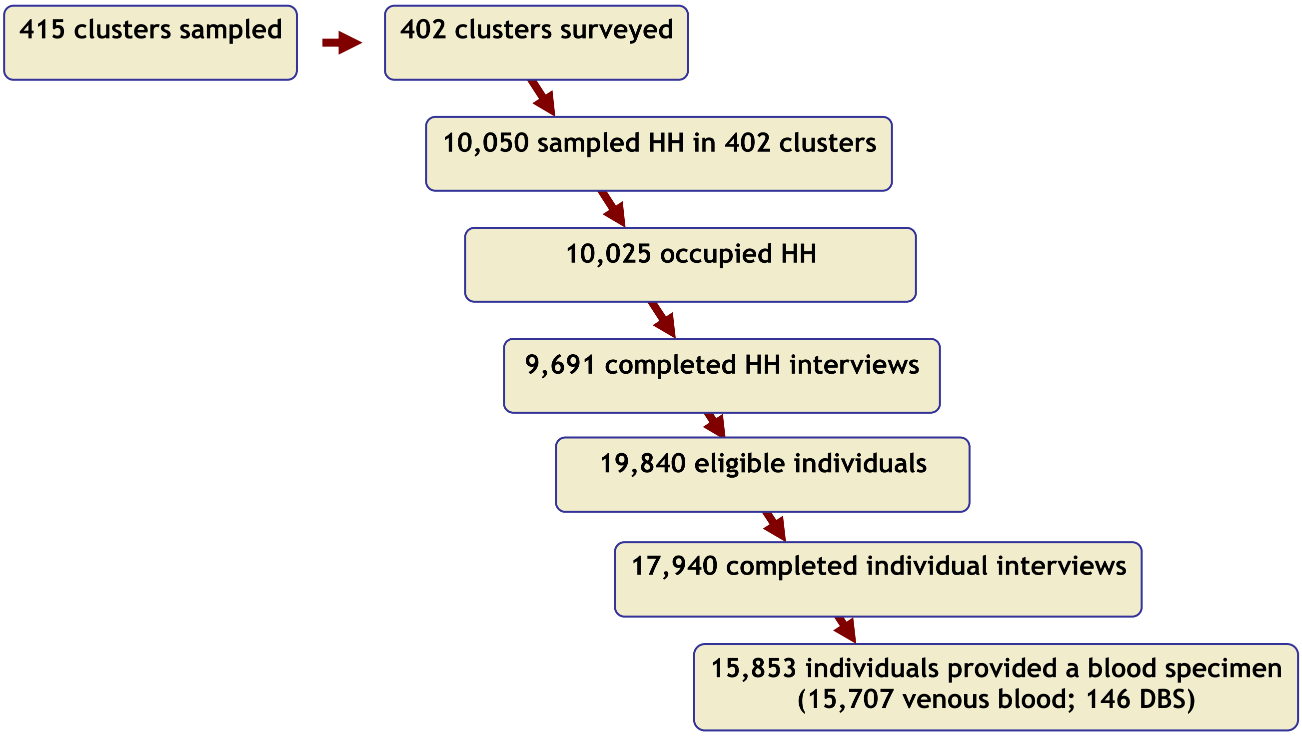
Similar techniques for weighting were applied to datasets in the 2003 KDHS and in the 2007 KAIS; however, separate weights for women and men were calculated in 2003, given that sampling systematically varied by sex in 2003. In the 2007 KAIS, women and men were sampled using the same techniques; therefore the 2007 dataset did not require separate weights for women and men.

HIV testing was performed using antibody/antigen assays in the 2007 KAIS, compared to antibody-only assays in the 2003 KDHS. The antibody/antigen approach is more sensitive for capturing recent infections. Differences in results produced by these two assays are usually small in populations with relatively low incidence, such as Kenya, which had an incidence of HIV between 0.80% and 0.85% in 2007 according to GOK estimates using UNAIDS Estimation and Projection Package (EPP)/Spectrum software. Point estimates calculated from results of the two testing approaches may differ but are likely to fall within similar 95% confidence intervals. Additional laboratory tests were performed in 2007 compared to 2003 and therefore, the vast majority of KAIS participants gave venous blood rather than DBS samples; in 2003, only DBS samples were collected since only HIV serology was performed. Although the methods for returning test results to participants were different in the 2003 KDHS and 2007 KAIS, both surveys offered participants a chance to learn their HIV status. Finally, the 2007 KAIS included adults up to 64 years of age, but throughout the report, when comparisons are made to the 2003 KDHS results, analyses are limited to participants aged 15-49 years.

1.11 RESPONSE RATES

Figure 1.11 illustrates a diagram of sampled clusters, eligible households, and individual participation in the 2007 KAIS. Overall, participation rates in the 2007 KAIS were high. We calculated household response rate as the number of households consenting to the household interview divided by the total number of sampled households that were located and occupied. The individual interview response rate was calculated as the number of individuals who completed interviews divided by the number of individuals eligible for the individual interview based on the household census. Only those participating in the individual interview were eligible to participate in the blood draw. We calculated blood draw coverage as the number of blood draws divided by the number of all individuals eligible for the individual interview; the blood draw response rate reflects the number of successful blood draws divided by the number of individuals who completed individual interviews.

Figure 1.11 Sampled clusters and eligible households and individuals in the 2007 KAIS.



Overall, blood draw coverage was seven percentage points greater in 2007 than in 2003 (Table 1.1a). Differences in blood draw coverage by rural/urban residence and by sex are presented in the following tables. The household and individual interview response rates in KAIS were very similar to those in the 2003 KDHS.

Table 1.11a Survey response rates, 2003 KDHS and 2007 KAIS.

	KDHS 2003[9]	KAIS 2007
Eligible, occupied households (households for 2003 male subsample)	8,889 (4,396)	10,025
Eligible individuals interview	12,900	19,840
Eligible individuals for blood draw	8,486	19,840
Household interview response rate	96%	97%

[9] In the 2003 KDHS, a subsample of all households (4,396 of the 8,889) was selected for the men's survey. Only men in these households were eligible for the individual interview and HIV testing, and only women from these households were eligible for HIV testing. Participation rates for the 2003 KDHS presented here were extracted from Chapter 13 and Appendix A of the 2003 KDHS Final Report and not calculated independently, except where noted.

Individual interview response rate	91%	90%
Blood draw coverage (out of eligible individuals)	73%	80%
Blood draw response rate (out of interviewees)[10]	81%	88%

Table 1.11b Survey response rates by residence, 2003 KDHS and 2007 KAIS.

	KDHS 2003		KAIS 2007	
	Urban	Rural	Urban	Rural
Eligible (occupied) households (households for male subsample)	3,068 (1,505)	5,821 (2,891)	2,918	7,107
Eligible individuals for interview	4,485	8,415	5,357	14,483
Eligible individuals for blood draw	2,954	5,532	5,357	14,483
Household interview response rate	94%	97%	95%	97%
Individual interview response rate	87%	94%	85%	92%
Blood draw coverage (out of eligible individuals)	62%	79%	73%	82%
Blood draw response rate (out of interviewees)[1]	73%	85%	86%	89%

In the 2007 KAIS, participation in rural areas was higher than in urban areas for the household interview, the individual interview and the blood draw. This was in part due to a greater proportion of urban residents being absent during the 2007 KAIS, a pattern also observed in the 2003 KDHS. Blood draw coverage was greater in 2007 than in 2003 for rural and urban residents by three percentage points and 11 percentage points, respectively.

[10] Blood draw response rates were presented only for the female and male subsamples in Appendix tables A.3 and A.4 of the 2003 KDHS report. Corresponding estimates for the total sample and for rural and urban subsamples were calculated by authors of the KAIS report. Interview response rates among females and males eligible for HIV testing were assumed to be the same as individual response rates among all females and males, which are reported in section 1.14 of the 2003 KDHS report.

Table 1.11c Survey response rates by sex in the 2007 KAIS.

	2003 KDHS		2007 KAIS	
	Women	**Men**	**Women**	**Men**
Eligible individuals for interview	8,717	4,183	10,957	8,883
Eligible individuals for blood draw	4,303	4,183	10,957	8,883
Individual interview response rate	94%	86%	93%	87%
Blood draw coverage (out of eligible individuals)	76%	70%	83%	77%
Blood draw response rate (out of interviewees)[11]	81%	82%	88%	88%

Participation in the 2007 KAIS was higher among women than among men by six to seven percentage points for the interview and the blood draw. This was in part due to a greater proportion of men being absent during the survey, a pattern also observed in the 2003 KDHS. Blood draw coverage was higher by seven percentage points among both women and men in 2007 (76% and 70%, respectively) compared to 2003 (83% and 77%, respectively).

1.12 Chapter Summary

- The 2007 KAIS was a representative, population-based survey of households and women and men aged 15-64 years.
- The survey design and methods are comparable to the 2003 KDHS.
- Laboratory data included HIV, HSV-2, and syphilis serologic testing and CD4 cell counts for those infected with HV.
- The survey also captured HIV knowledge and attitudes, sexual risk factors, and health care seeking behaviours.
- Participation rates were 97% for the household survey, 91% for individual interviews and 80% for blood draw.

[11] Blood draw response rates were presented only for the female and male subsamples in Appendix tables A.3 and A.4 of the 2003 KDHS report. Corresponding estimates for the total sample and for rural and urban subsamples were calculated by authors of the KAIS report. Interview response rates among females and males eligible for HIV testing were assumed to be the same as individual response rates among all females and males, which are reported in section 1.14 of the 2003 KDHS report.

2

Prevalence of HIV

2.1 Key Findings

- **Overall, 7.1% of adults (aged 15-64 years) were infected with HIV, representing an estimated 1,417,000 people.**
- **Women were more likely to be infected (8.4%) than men (5.4%). In particular, young women aged 15-24 years were four times more likely to be infected than young men in the same age group (5.6% vs. 1.4%, respectively).**
- **HIV prevalence among older adults aged 50-64 years was 5.0%. KAIS was the first national HIV survey to capture both women and men in this age group.**
- **There was wide regional variation in adult HIV prevalence, ranging from 14.9% in Nyanza province to 0.81% in North Eastern province.**
- **An estimated 1,027,000 adults in rural areas (6.7%) were infected with HIV compared with an estimated 390,000 adults in urban areas (8.4%).**
- **Uncircumcised men were three times more likely to be infected with HIV than circumcised men (13.2% vs. 3.9%, respectively).**
- **Women who reported secondary education or more had significantly lower HIV prevalence (6.2%) than women who reported less education (7.7% - 9.8%).**

2.2 Introduction

The 2007 KAIS was the second national, population-based HIV prevalence survey conducted in Kenya. This chapter presents patterns of HIV infection in the country at the time of the survey. Comparisons between the 2007 KAIS estimates and the 2003 KDHS estimates are provided in Chapter 3 of this report.

Appendix B.2 provides sample sizes and 95% confidence intervals for estimates presented in this chapter. Throughout the chapter, the term significant indicates a chi-square p-value less than 0.05; marginally significant indicates a p-value between 0.05 and 0.10, inclusive; and not significant indicates a p-value greater than 0.10.

Population estimates reported in this chapter were calculated based 2007 projected population by province, age group and sex reported in *The Analytical Report on Population Projections, Volume II, Kenyan National Bureau of Statistics (2002)*. Weighted national estimates for selected indicators from the 2007 KAIS were used in these calculations. Detailed methods used for calculating population estimates are described in Appendix A.

2.3 HIV Prevalence by Age Group and Sex

According to the 2007 KAIS, 7.1% of Kenyan adults aged 15-64 years were infected with HIV at the time of the survey (Table 2.3). A significantly greater proportion of women (8.4%) than men (5.4%) were infected with HIV. There were an estimated 863,000 women and 519,000 men aged 15-64 years living with HIV at the time of the survey. Prevalence in all age groups was above 1.0%.

Table 2.3 HIV prevalence among women and men by five-year age group, Kenya 2007.

	Women		Men		Total	
	HIV-infected (%)	Total number tested	HIV-infected (%)	Total number tested	HIV-infected (%)	Total number tested
Age group (years)						
15-19	3.5	1,328	1.0	1,175	2.3	2,503
20-24	7.4	1,598	1.9	1,034	5.2	2,632
25-29	10.2	1,345	7.3	874	9.1	2,219
30-34	13.3	1,154	8.9	772	11.6	1,926
35-39	11.2	950	9.3	678	10.5	1,628
40-44	9.4	742	10.2	576	9.7	1,318
45-49	8.8	732	5.6	549	7.5	1,281
50-54	7.5	519	8.3	425	7.8	944
55-59	4.7	425	2.3	380	3.6	805
60-64	1.7	256	3.4	341	2.7	597
Totals						
15-24	5.6	2,926	1.4	2,209	3.8	5,135
15-49	8.8	7,849	5.5	5,658	7.4	13,507
50-64	5.2	1200	4.7	1146	5.0	2346
Total (15-64)	**8.4**	**9,049**	**5.4**	**6,804**	**7.1**	**15,853**

Figure 2.3 HIV prevalence among women and men by five-year age group, Kenya 2007.

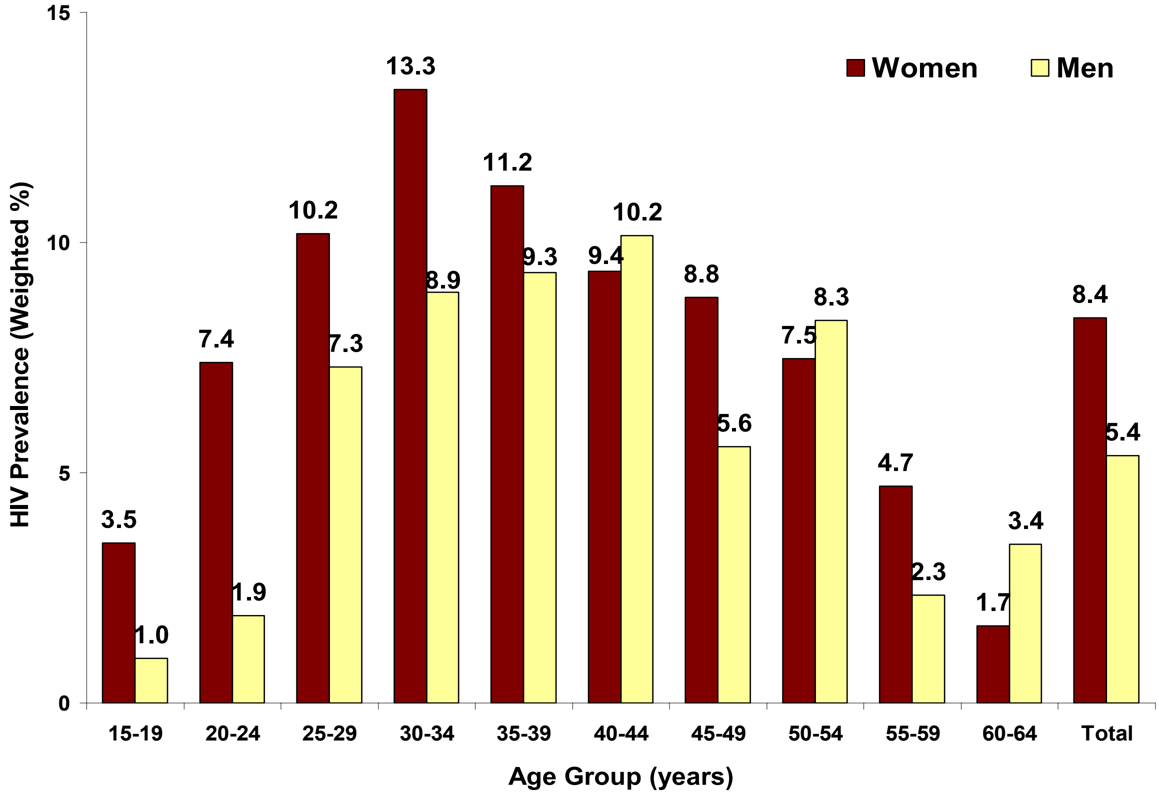


Figure 2.3 HIV prevalence peaked in women aged 30-34 years and in men aged 40-44 years.

HIV prevalence was significantly greater among women than men in the 15-19 and 20-24 year age groups. The highest prevalence among women was among those 30-34 years of age, compared to 40-44 years of age among men. In the 40-44 and 50-54 age groups, women and men had similar HIV prevalence rates. Starting with the 40-44 age group, prevalence estimates declined monotonically among women, though this pattern was not observed among men.

2.4 HIV Prevalence among Youth

Figure 2.4 HIV prevalence among young women and men aged 15-24 years, Kenya 2007.

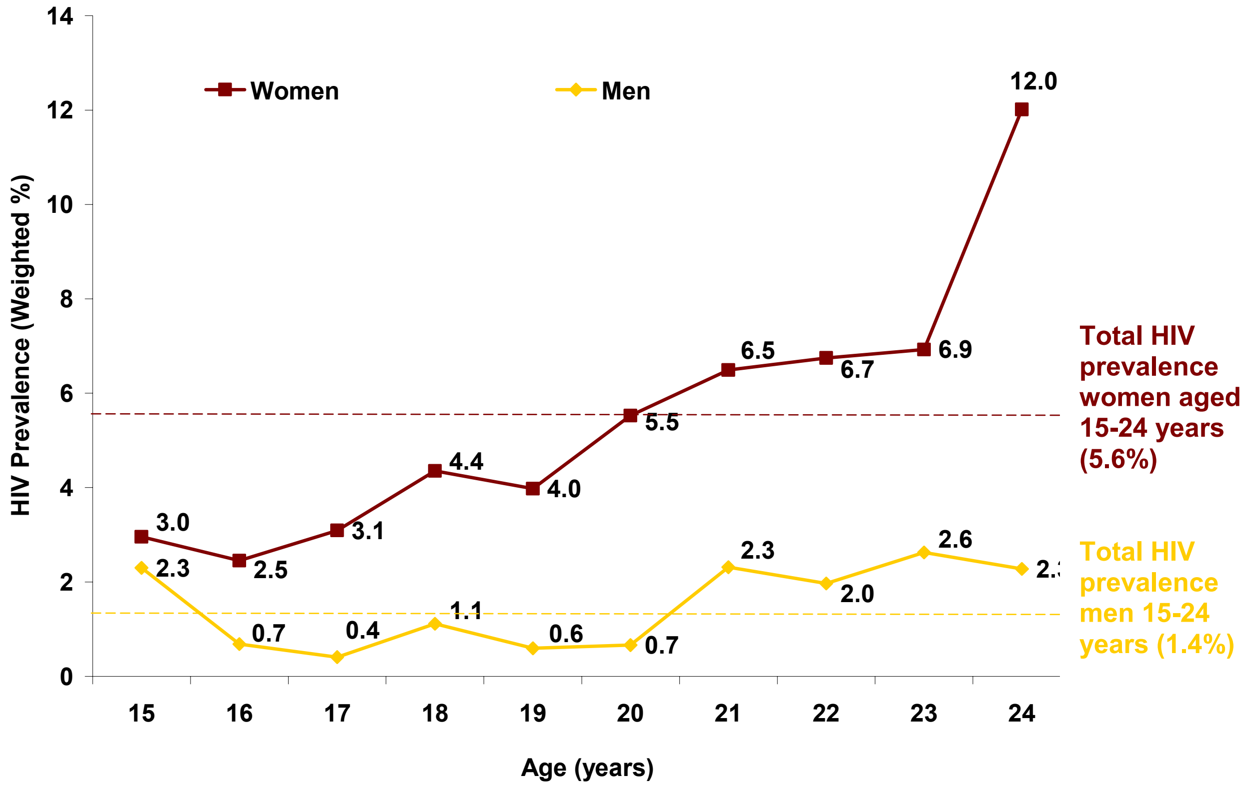


Figure 2.4 Between ages 15 and 24 years, prevalence was significantly higher among women than men.

The overall prevalence of HIV among youth (aged 15-24 years) was 3.8%. Young women had a higher HIV prevalence than young men, ranging from 3.0% in women 15 years old to 12.0% in women 24 years old. Prevalence among men aged 15-24 years ranged from 0.4% to 2.6%. Among young women, prevalence rose with increasing age and by 24 years of age, women were 5.2 times more likely to be infected than men of the same age (12.0% and 2.3%, respectively). This trend was not observed among young men.

2.5 HIV Prevalence among Older Adults (50-64 years old)

Previous population surveys have targeted respondents of reproductive age, aged 15-49 years. The 2007 KAIS included women and men aged 50-64 years to assess the need for HIV prevention, care and treatment in older adults. The overall HIV prevalence in this age group was 5.0% and did not differ significantly by sex (women 5.2%; men 4.7%).

2.6 HIV Prevalence by Rural/Urban Residence

Figure 2.6a HIV prevalence among women and men aged 15-64 years by residence, Kenya 2007.

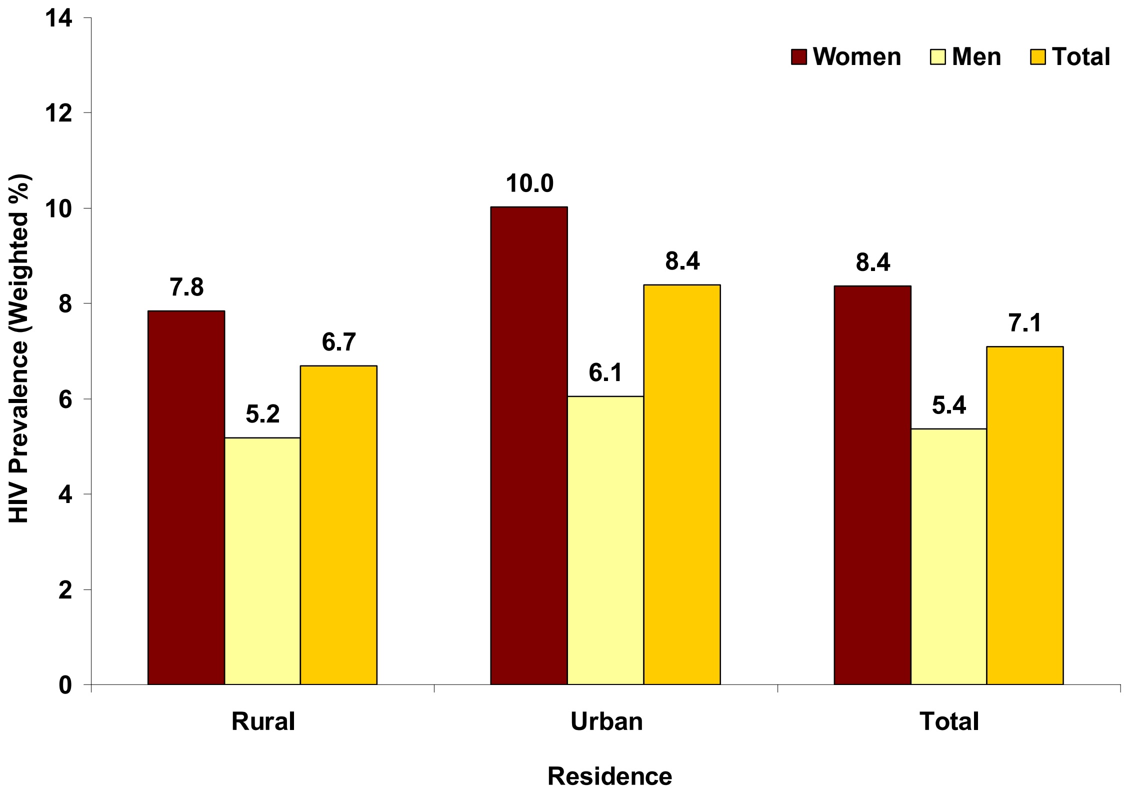


Figure 2.6a HIV prevalence was marginally greater among women in urban areas compared with women in rural areas.

Overall, 6.7% of rural residents were infected with HIV compared to 8.4% of urban residents. In both rural and urban areas, women had a significantly higher prevalence of HIV than men. The difference in HIV prevalence in rural and urban areas was marginally significant among women (10.0% compared to 7.8%, respectively), but not significant among men (6.1% compared to 5.2%, respectively).

Figure 2.6b HIV prevalence among rural and urban residents by five-year age group, Kenya 2007.

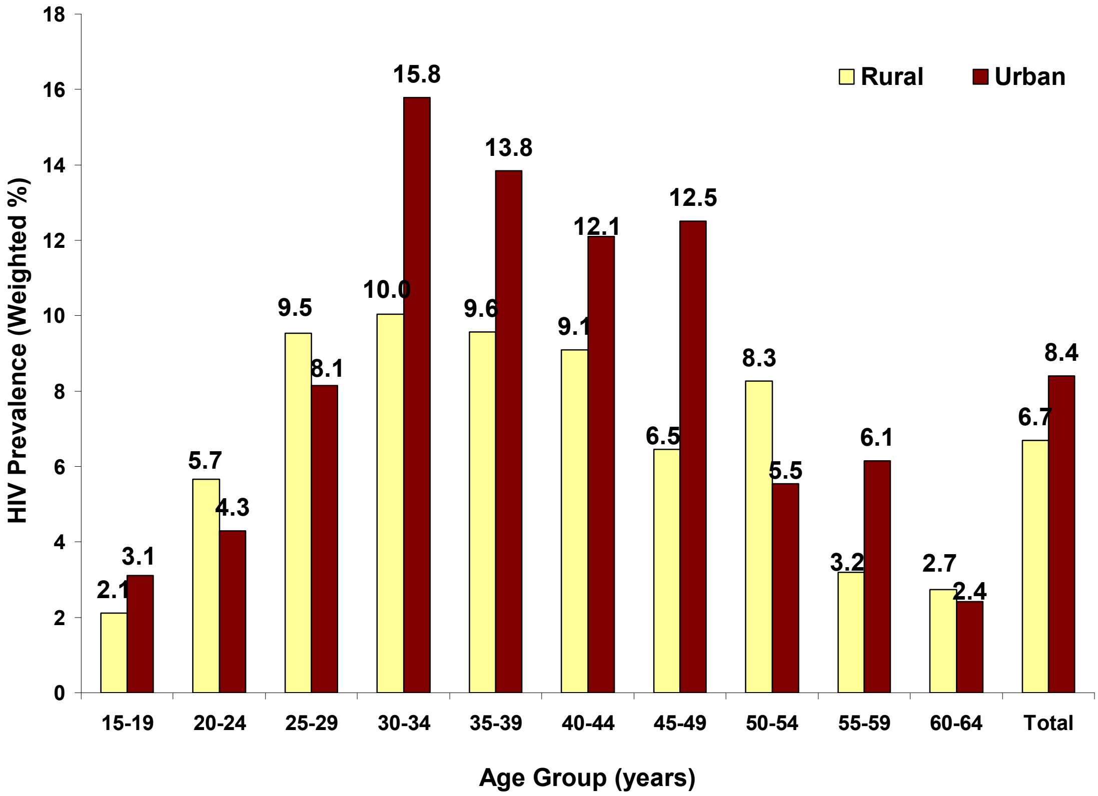


Figure 2.6b The distribution of HIV prevalence across age groups followed a similar pattern in rural and urban areas.

HIV prevalence differed significantly across age groups in both rural and urban areas. For both rural and urban areas, peak prevalence occurred among adults aged 30-34 years (10.0% and 15.8%, respectively). For both rural and urban areas, the lowest prevalence occurred among youth aged 15-19 years and older adults aged 60-64 years.

Figure 2.6c Estimated number of HIV-infected adults aged 15-64 years by rural/urban residence, Kenya 2007.

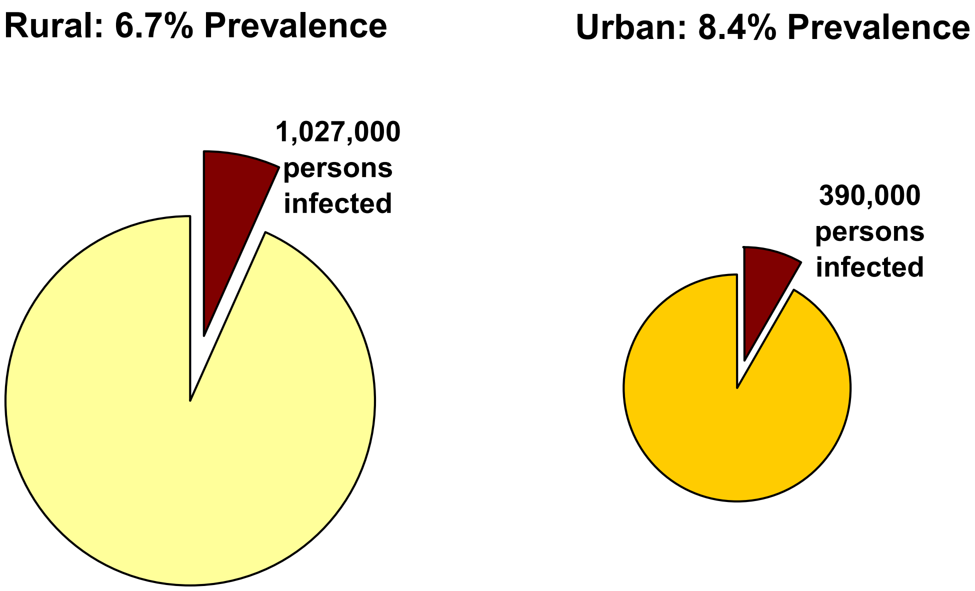
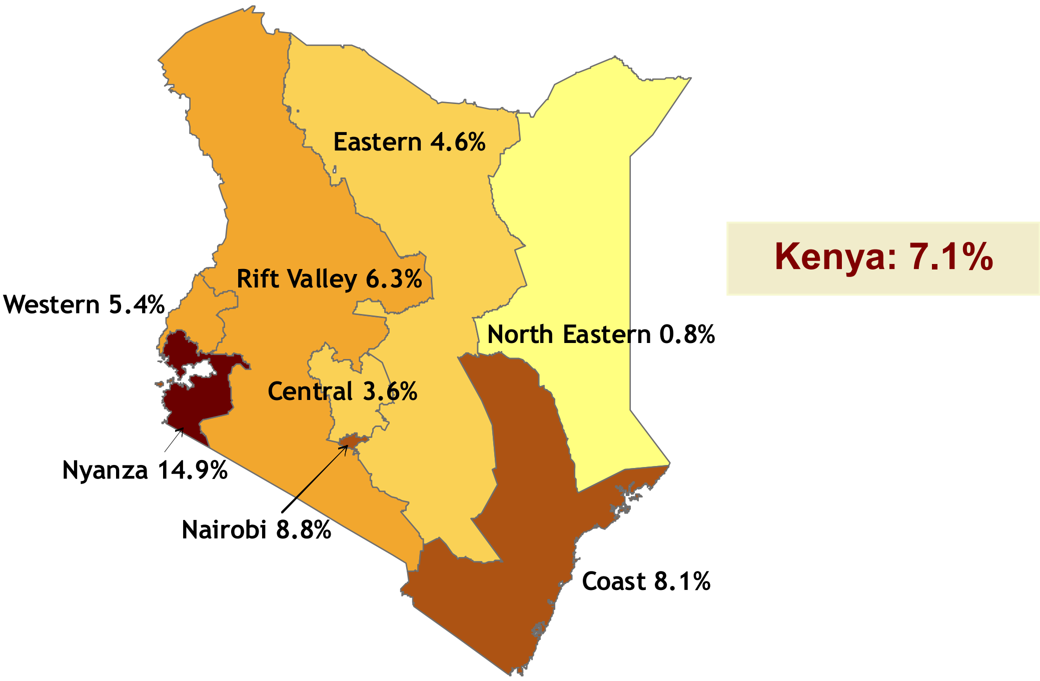


Figure 2.6c The majority of HIV-infected adults aged 15-64 years lived in rural areas.

Among adults aged 15-64 years residing in rural areas, 6.7% were infected with HIV compared to 8.4% of adults in urban areas. Though the prevalence among rural residents was lower than among urban residents, the absolute number of HIV infections was greater in rural than urban areas, given that the vast majority of Kenyans reside in rural areas (approximately three out of four persons in the country). An estimated 1,027,000 adults in rural areas were infected with HIV, compared to 390,000 adults in urban areas.

2.7 HIV PREVALENCE BY PROVINCE

Figure 2.7a HIV prevalence among adults aged 15-64 years by province, Kenya 2007.



There were significant regional differences in HIV prevalence, ranging from 0.81% in North Eastern province to 14.9% in Nyanza province. The following graphs and tables present provincial HIV prevalence estimates by rural/urban residence and sex. Population estimates for the numbers of women and men infected per province are also provided.

Figure 2.7b HIV prevalence among rural and urban residents aged 15-64 years by province, Kenya 2007.

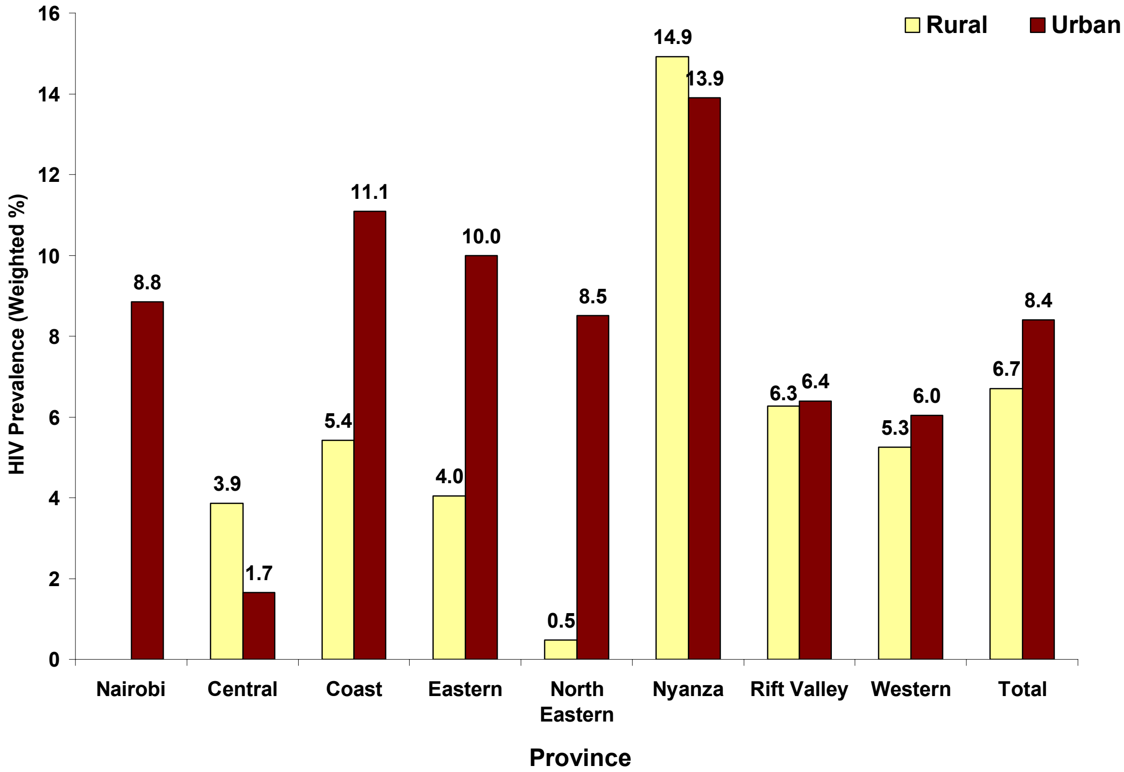


Figure 2.7b In most provinces, urban HIV prevalence tended to be greater than rural HIV prevalence.

* All provinces consist of both rural and urban areas, with the exception of Nairobi province, which is entirely urban.

The prevalence of HIV differed significantly across rural areas of provinces, ranging from 0.5% in North Eastern province to 14.9% in Nyanza province. Although HIV prevalence ranged from 1.7% to 13.9% across urban areas, no significant differences were observed. Nyanza province had the highest prevalence among both rural (14.9%) and urban residents (13.9%) compared to other provinces. Estimates for North Eastern province should be interpreted with caution given its small urban resident population.

Figure 2.7c Estimated number of HIV-infected adults aged 15-64 years by province, Kenya 2007.

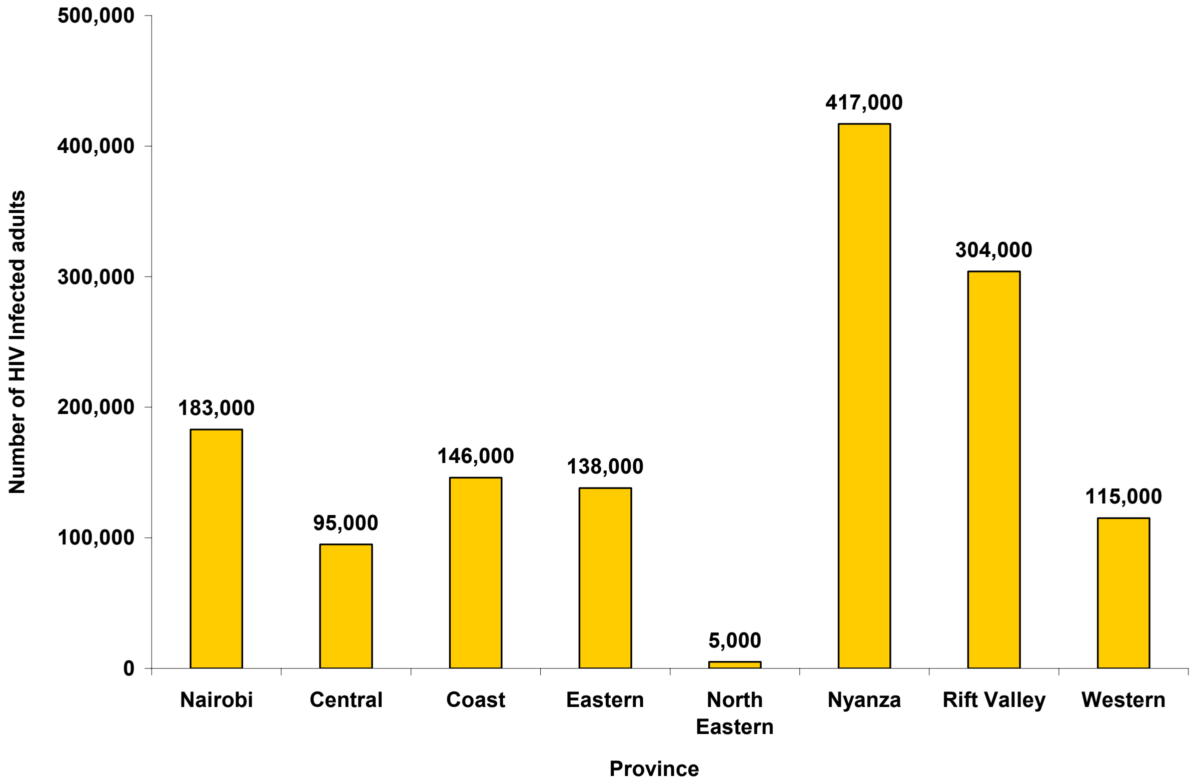


Figure 2.7c The estimated number of HIV-infected persons in Nyanza and Rift Valley provinces represent approximately half of all HIV-infected people in Kenya.

There were large differences across provinces in the estimated number of HIV-infected adults. Nyanza province had the largest estimated number of HIV-infected adults (417,000), followed by Rift Valley (304,000), and Nairobi (183,000). Combined, Nyanza and Rift Valley provinces were home to approximately half (51.4%) of Kenya's HIV-infected adults

2.8 HIV Prevalence by Marital Status

Figure 2.8 HIV prevalence among women and men aged 15-64 years by current marital status, Kenya 2007.

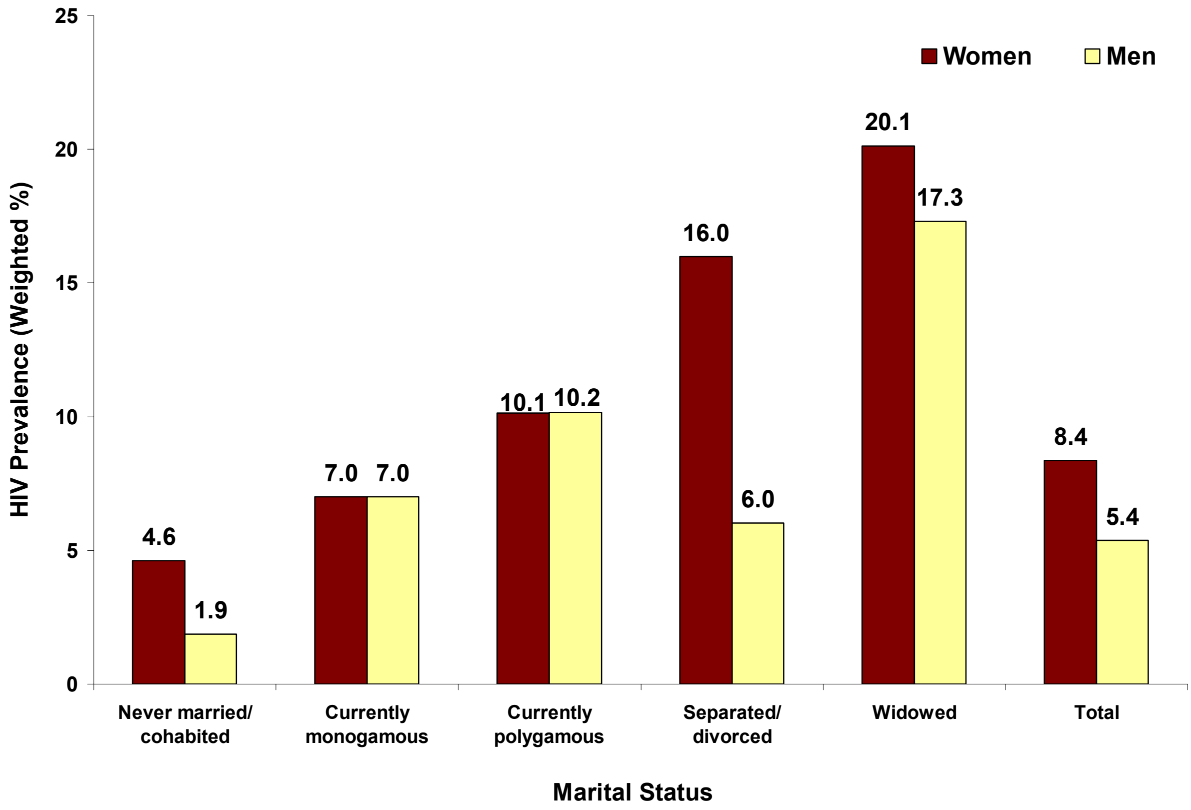


Figure 2.8 HIV prevalence was significantly greater among widowed women and men and separated/divorced women compared to other adults.

The term "currently monogamous" refers to respondents that are married or cohabiting in a union with only one wife or one female partner.

HIV prevalence varied significantly by marital status. Prevalence was highest among currently widowed women (20.1%) and men (17.3%).[1] Women and men who had never married or cohabited had the lowest prevalence rates, at 4.6% and 1.9%, respectively. Prevalence was similar between women and men who were currently monogamous or currently polygamous.

[1] 1,315 women and 376 men reported widowed, divorced or separated marital status. The survey did not capture formerly widowed status for men currently in monogamous or polygynous unions.

2.9 HIV PREVALENCE BY EDUCATION LEVEL

Figure 2.9 HIV prevalence among women and men aged 15-64 years by level of education, Kenya 2007.

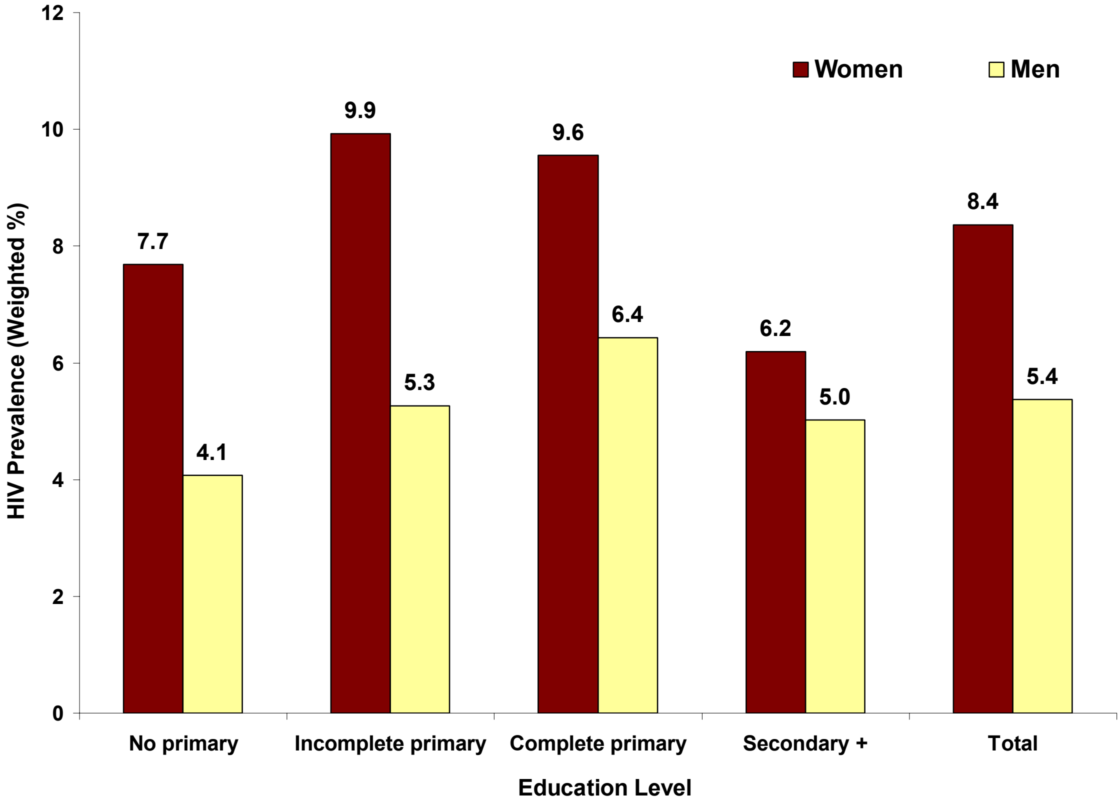


Figure 2.9 Among women, HIV prevalence differed significantly by level of education.

HIV prevalence among women with secondary education or higher (6.2%) was significantly lower than the prevalence observed among women with less education (7.7%-9.6%). Among men, there were no differences in HIV prevalence by education level, with rates ranging from 4.1% to 5.0%. Prevalence among women was significantly higher than men at every level of education with the exception of the highest level.

2.10 HIV PREVALENCE BY WEALTH INDEX[1] AND EMPLOYMENT STATUS

Figure 2.10a HIV prevalence among women and men aged 15-64 years by wealth index, Kenya 2007.

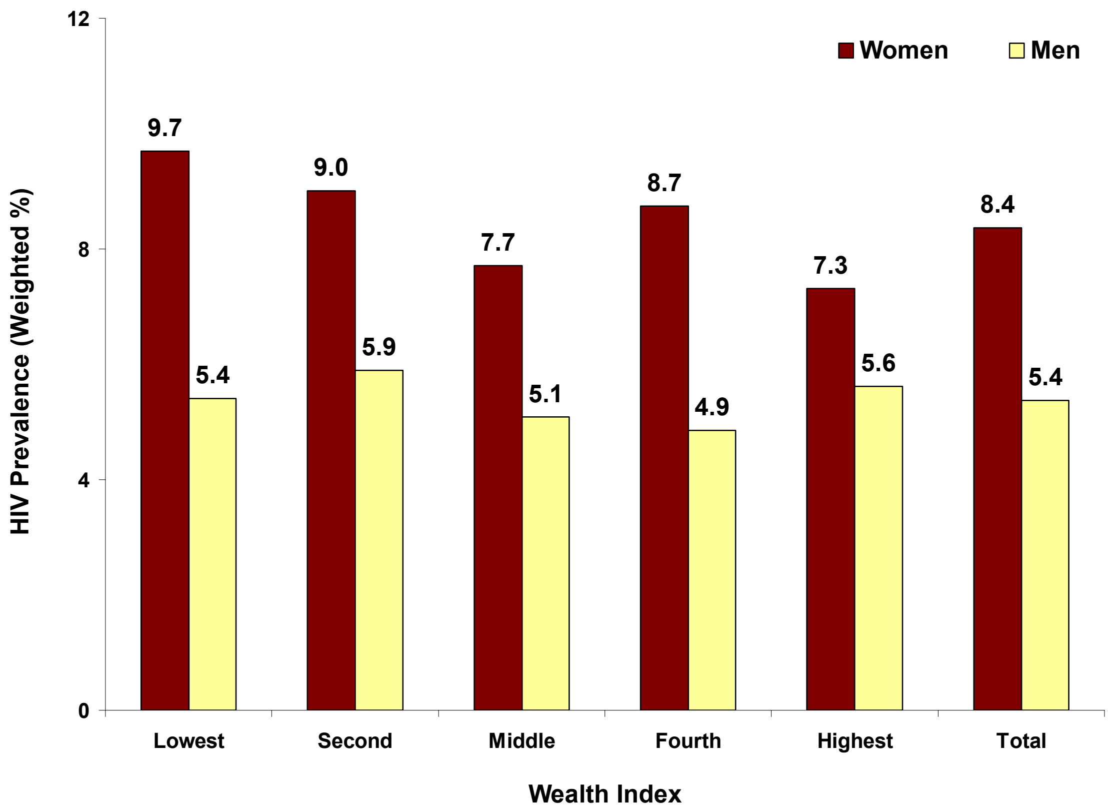


Figure 2.10a HIV prevalence did not vary significantly by wealth index for either women or men.

There was no association between household wealth index and HIV prevalence among women or men. Within each wealth quintiles, HIV prevalence appeared to be higher among women than men.

[1] The wealth index was a composite measure of the living standard of a household, calculated using data on a household's ownership of selected assets, materials used for housing construction, water access and sanitation facilities. The wealth index placed households on a continuous scale of relative wealth using principal components analysis. Individuals were ranked according to the score of the household in which they resided and the sample was divided into five groups, each with an equal number of individuals (quintiles), ranging from the lowest to highest level of wealth.

Figure 2.10b HIV prevalence among rural and urban residents aged 15-64 years by wealth index, Kenya 2007.

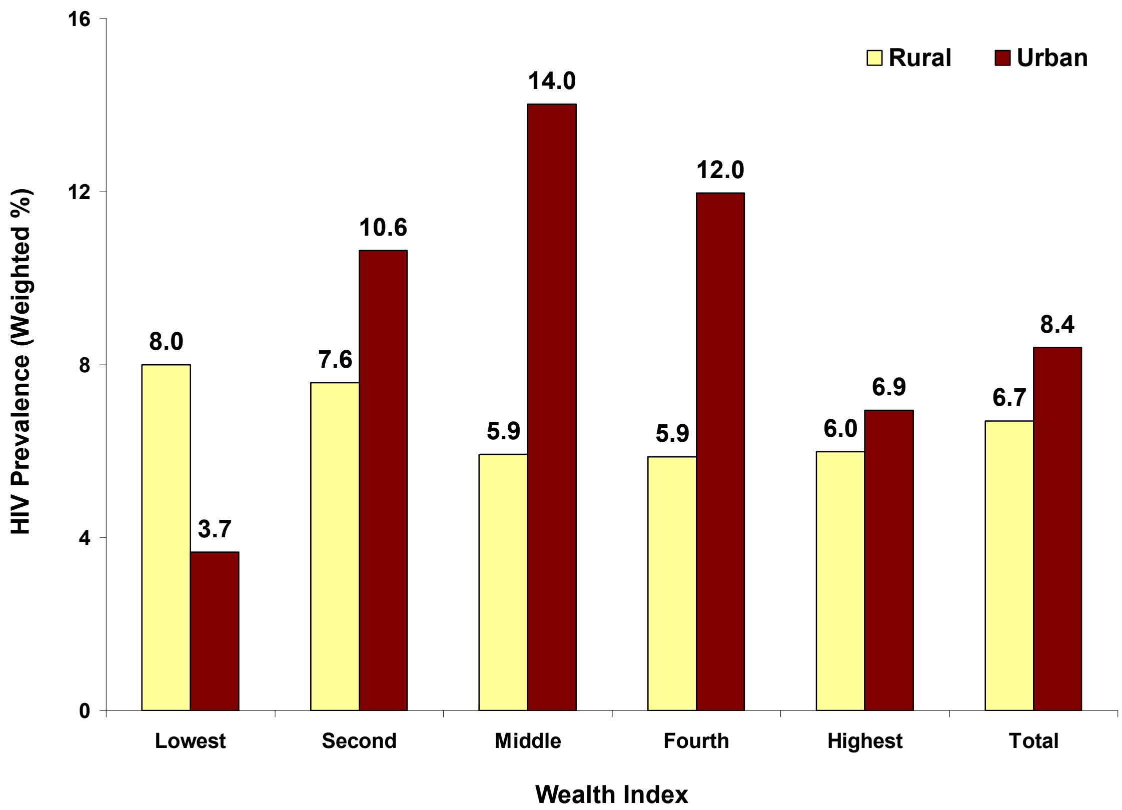


Figure 2.10b HIV prevalence varied significantly across wealth quintiles among urban but not rural residents.

In urban areas, HIV prevalence varied significantly by wealth index, although this was not the case in rural areas. In urban populations, HIV prevalence peaked among those in the middle wealth quintile. Those in the lowest wealth quintile had the lowest HIV prevalence (3.7%); however, there were relatively few participants in this category (n=101), so these results should be interpreted cautiously.

Figure 2.10c HIV prevalence among women and men aged 15-64 years by current employment status, Kenya 2007.

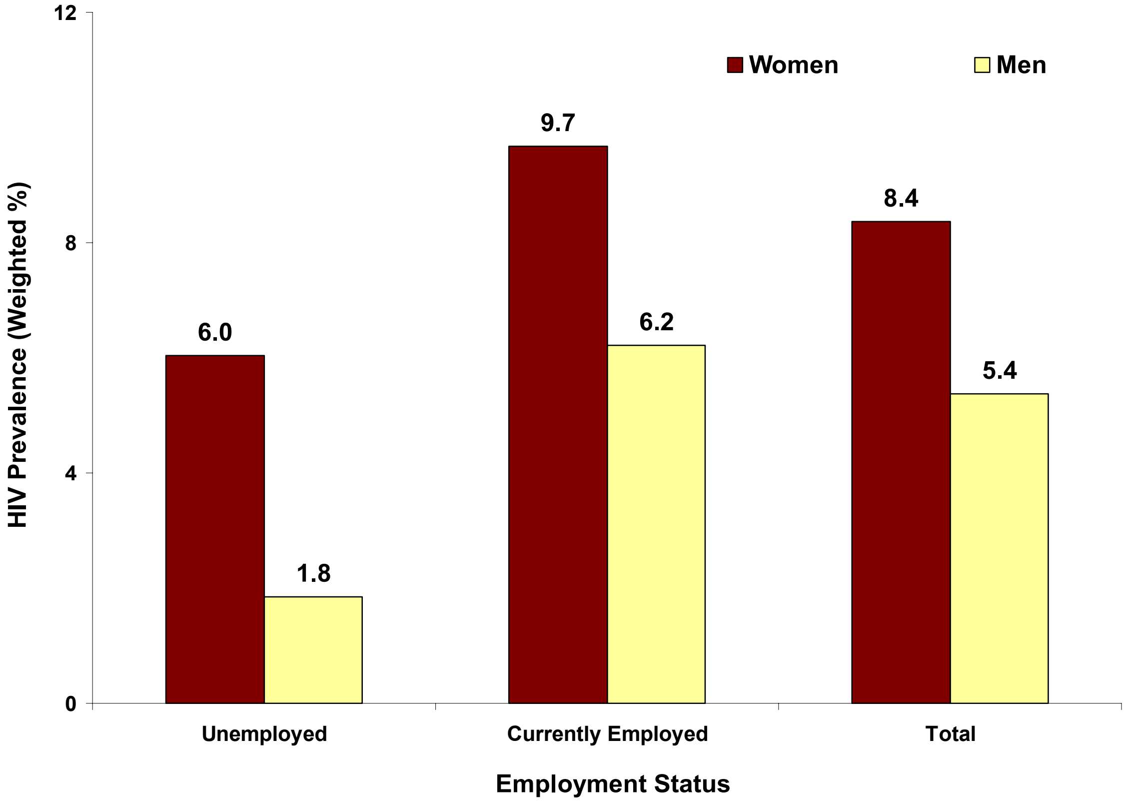


Figure 2.10c HIV prevalence among persons who were not currently employed was significantly higher than HIV prevalence among persons not currently employed.

Current employment was defined as having worked in the week prior to the survey. Women and men who were currently employed had significantly higher HIV prevalence rates (9.7% and 6.2%, respectively), compared to unemployed women and men (6.0% and 1.8%, respectively). Notably, HIV prevalence among employed men (6.2%) compared with unemployed men (1.8%) was three times greater.

2.11 HIV PREVALENCE BY TIME AWAY FROM HOME

Figure 2.11 HIV prevalence among women and men aged 15-64 years who travelled away from home in the 12 months preceding the survey by length of time away from home, Kenya 2007.

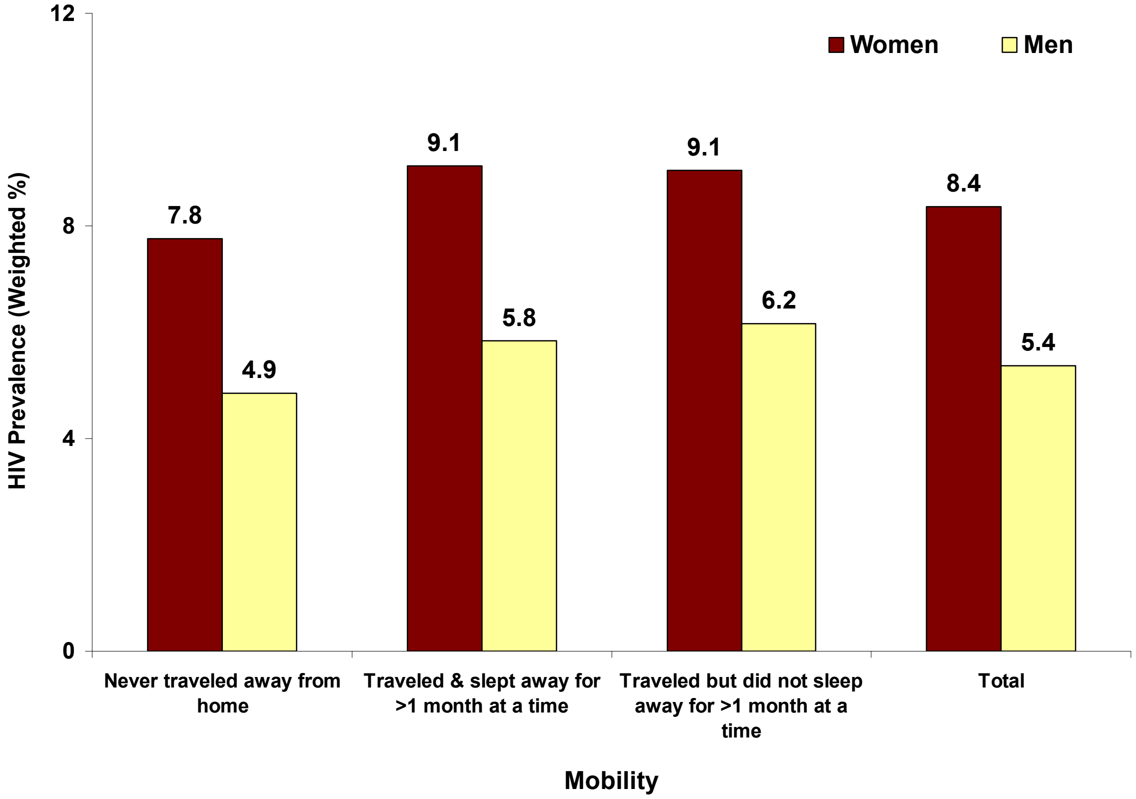


Figure 2.11 HIV prevalence did not vary significantly by travel among men or women.

HIV prevalence among women and men who never travelled away from home in the 12 months before the survey was 7.8% and 4.9%, respectively. There was no significant difference in prevalence between those respondents who never travelled and for those who did travel, regardless of the duration of their stay away from home.

2.12 HIV Prevalence by Religious Affiliation

Figure 2.12 HIV prevalence among women and men aged 15-64 years by religion, Kenya 2007.

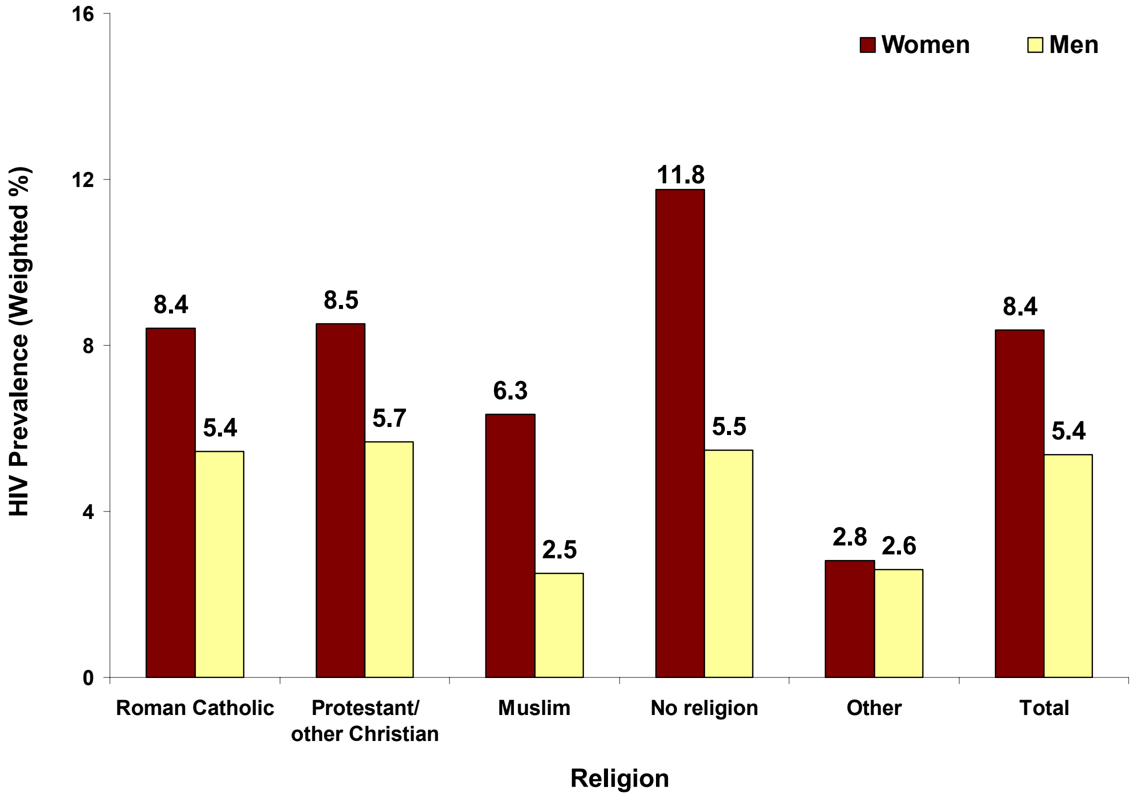


Figure 2.12 HIV prevalence was not associated with religious affiliation among women and marginally associated with religious affiliation among men.

HIV prevalence did not vary significantly among women across religious affiliations. Among men, respondents identifying themselves as Roman Catholic, Protestant or other Christian, or as having no religious affiliation had similar levels of HIV (5.4%, 5.7% and 5.5%, respectively). HIV prevalence estimates among Muslim men (2.5%) and men reporting other, unspecified religions (2.6%) were marginally lower than among men who reported being Roman Catholic, Protestant or having no religious affiliation.

2.13 Male Circumcision and Association with HIV Infection

Figure 2.13a Circumcision among men aged 15-64 years by province, Kenya 2007.

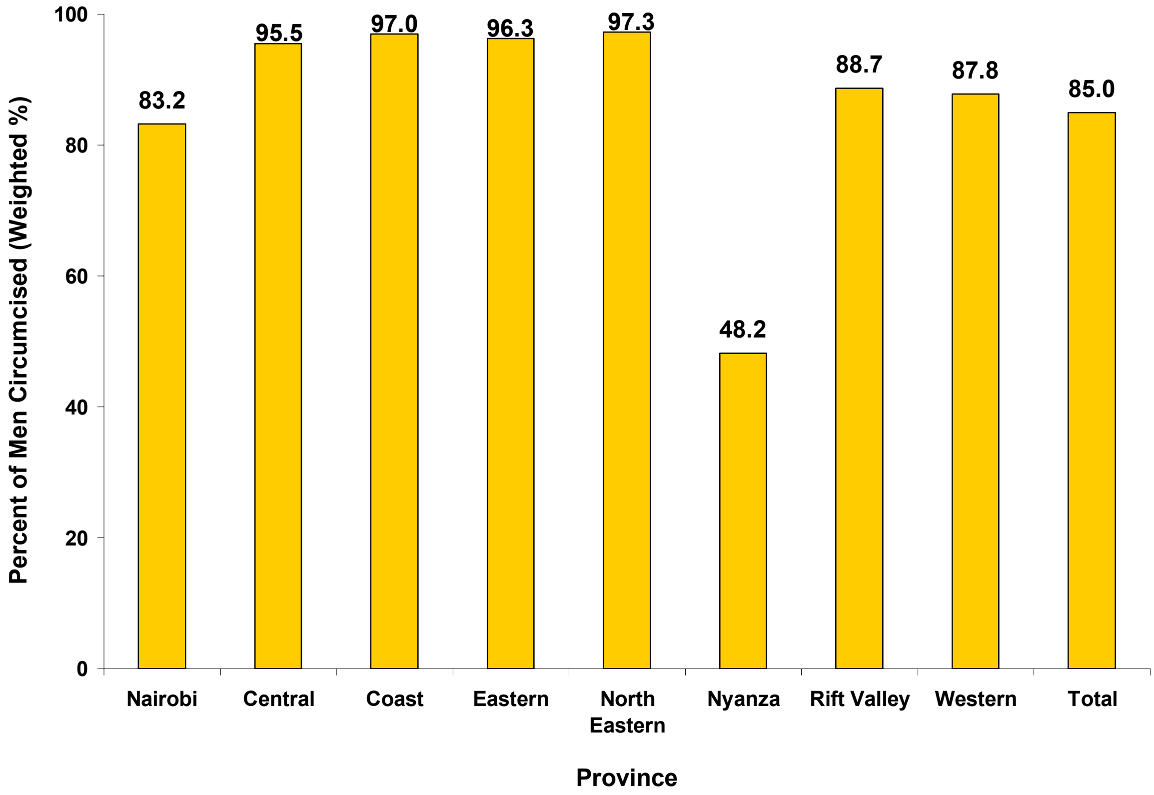


Figure 2.13a Reported rates of circumcision were high except for in Nyanza province.

Overall, 85.0% of men aged 15-64 years reported being circumcised at the time of the 2007 KAIS. Coast (97.0%) and North Eastern (97.3%) provinces had the highest rates of male circumcision, while Nyanza province had the lowest rate of circumcision (48.2%).

Data in Context

Male Circumcision

Male circumcision is practiced in many communities in Kenya and often serves as a right of passage to adulthood. Some ethnic groups with ancestral homes in Nyanza, Rift Valley and Western provinces, however, are traditionally non-circumcising communities. Recently, the efficacy of medical male circumcision in preventing HIV has been established in several randomised controlled trials in sub-Saharan Africa. To investigate this relationship, men interviewed in the 2007 KAIS were asked if they were circumcised and their responses were linked to biological outcomes. Findings on intention to circumcise sons and the HIV status of female partners among circumcised and uncircumcised men are reported in Chapter 6.

Figure 2.13b HIV prevalence among circumcised and uncircumcised men aged 15-64 years by province, Kenya 2007.

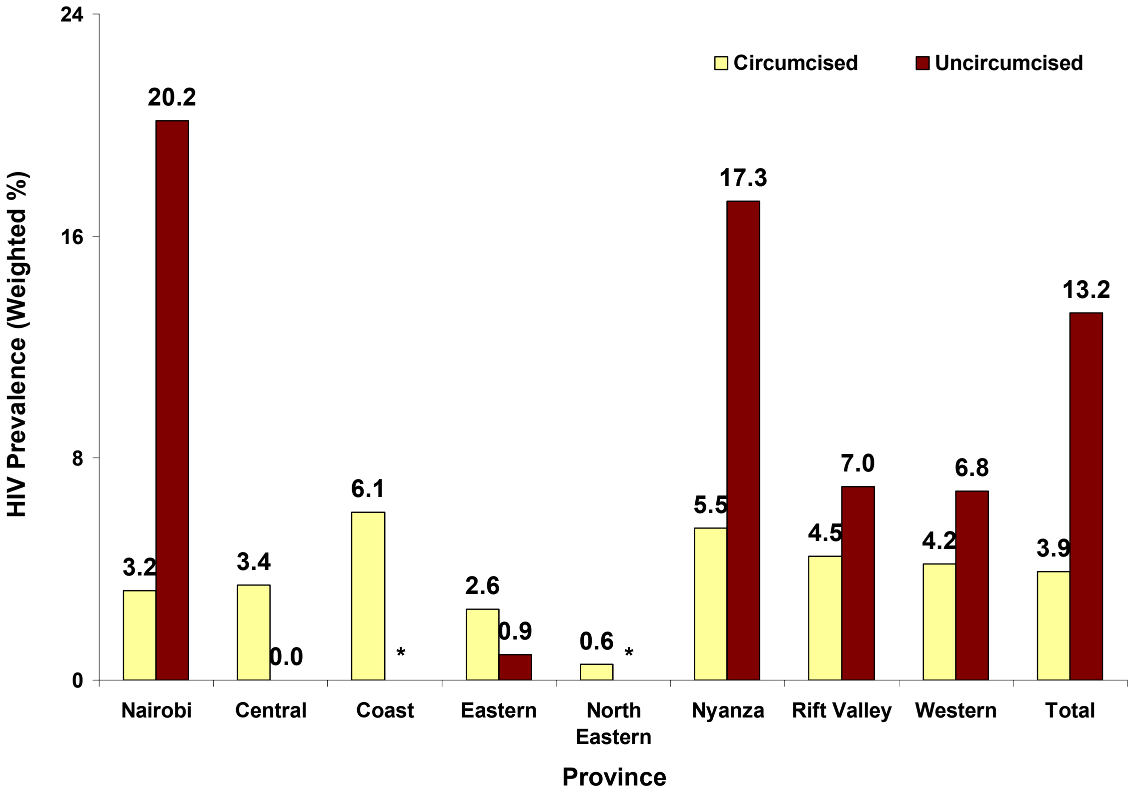


Figure 2.13b Nationally, HIV prevalence among uncircumcised men was more than three times greater than among circumcised men; in some provinces this difference was not observed.

*Estimates not presented due to small denominators of less than 25 observations in this category.

At the national level, prevalence was significantly higher among uncircumcised men (13.2%) than among circumcised men (3.9%). A similar pattern was observed at the provincial level in Nairobi, Nyanza, Rift Valley and Western provinces. Due to the small number of uncircumcised participants in Coast (n=24) and North Eastern (n=9) provinces, conclusions cannot be drawn about the association between HIV prevalence and male circumcision in these provinces from these data.

Figure 2.13c HIV prevalence among circumcised and uncircumcised men by age group, Kenya 2007.

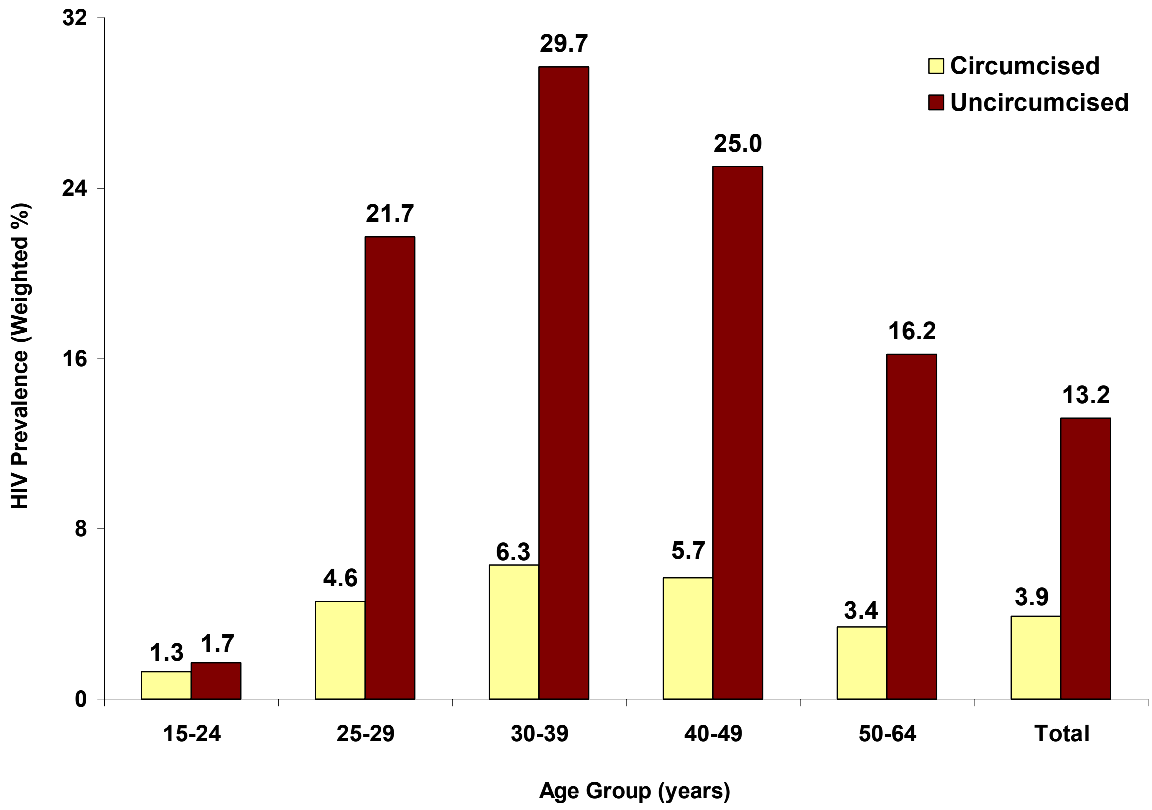


Figure 2.13c Among uncircumcised men, HIV prevalence increased with age until the 50-54 year age group and decreased thereafter.

HIV prevalence differed significantly by age group among circumcised and uncircumcised men. Prevalence among uncircumcised men was approximately five times greater than among circumcised men in all age groups except for the youngest (15-24 years of age) where prevalence was similar for circumcised (1.3%) and uncircumcised (1.7%) men. Peak HIV prevalence among uncircumcised men was observed among men aged 30-39 years (29.7%).

2.14 GAPS AND UNMET NEEDS

- **The epidemiology of HIV in Kenya cannot be fully described without information on populations that are at particular risk for infection, including men who have sex with men, persons who inject drugs and persons that pay or receive money or gifts in exchange for sex. These behaviors were not captured in the 2007 KAIS.**

- **The burden of HIV infection among children under the age of 15 years is unknown and was not captured in the 2007 KAIS, presenting a challenge for planning for HIV care and treatment programs for children.**

- **Future surveys should consider expanding data collection efforts to include these groups to ensure a comprehensive understanding of the HIV epidemic.**

Comparison of HIV Prevalence in the 2003 KDHS and 2007 KAIS

chapter 3

3.1 Key Findings

- **The national HIV prevalence estimate in 2007 was 7.4% among adults aged 15-49 years, compared with 6.7% in 2003. This difference was not statistically significant.**
- **HIV prevalence significantly increased among men living in rural populations between 2003 and 2007.**
- **HIV prevalence tended to increase in five of the eight provinces; these increases were marginally significant or significant.**
- **Significant changes in HIV prevalence by wealth index and education level were observed between 2003 and 2007. Individuals of lower socioeconomic status had significantly higher prevalence in 2007 than in 2003.**

3.2 Introduction

Previous demographic and health surveys were conducted in Kenya in 1989, 1993, 1998 and 2003. The 2003 KDHS was the first to include HIV testing in a nationally representative sample of women aged 15-49 years and men aged 15-54 years. The 2007 KAIS included HIV testing for women and men aged 15-64 years. Thus, to understand changes in HIV prevalence between 2003 and 2007, we compared HIV prevalence between women and men in the age groups covered in both surveys. Most of the comparisons presented in this chapter are among women and men aged 15-49 years.

Appendix B.3 provides sample sizes and 95% confidence intervals for estimates presented in this chapter. The z-test statistic was used to compare the two weighted estimates from the 2003 KDHS and the 2007 KAIS and to determine if differences were statistically significant. Methods used for calculating the z-test statistic are described in Appendix A. Throughout the chapter, the term significant indicates a p-value less than 0.05; marginally significant indicates a p-value between 0.05 and 0.10, inclusive; and not significant indicates a p-value greater than 0.10.

DATA IN CONTEXT

UNDERSTANDING STATISTICAL SIGNIFICANCE

Whenever a population is sampled for a survey, there is some degree of uncertainty associated with the results obtained; results from samples of human populations are always estimates. Standard errors represent the degree of uncertainty around an estimate, including each estimate in 2003 KDHS and 2007 KAIS. The formula for calculating standard errors is descrubed in Appendix C. Because of the uncertainty of survey estimates, statistical tests using standard errors can provide a range of potential values of the true estimate; this range is referred to as the confidence interval (CI). A 95% CI, for example, means that if a survey was repeated 100 times in the same population, the CI would be expected to contain the true estimate 95 times out of 100. The 95% CIs presented in this chapter are shown as lines at the top and bottom of each bar in the figures.

When comparing an estimate between two surveys in the same population, there are formal statistical methods to test the probability that the differences seen between the two surveys are real and not due to chance. When comparing estimates from 2003 KDHS to estimates from the 2007 KAIS, we used the z-test, which computes the probability that the difference was due to chance alone. We used a conservatively low probability, less than 5%, to determine whether these differences were likely to be real and not due to chance. If the probability that chance caused the differences was less than 5%, we said the results were statistically significant. If the probability was between 5% and 10%, we said the results were marginally significant. Visually, one way to approximate whether point estimates from the 2003 KDHS and the 2007 KAIS are different is to visually assess whether the 95% CIs for the two estimates overlap; that is, the CI of one survey overlaps with the CI of the other. If so, the estimates are likely to not be different, and conversely, if they do not overlap, the difference is most likely significant.

3.3 SEX

Figure 3.3a HIV prevalence among women and men aged 15-49 years, 2003 KDHS and 2007 KAIS.

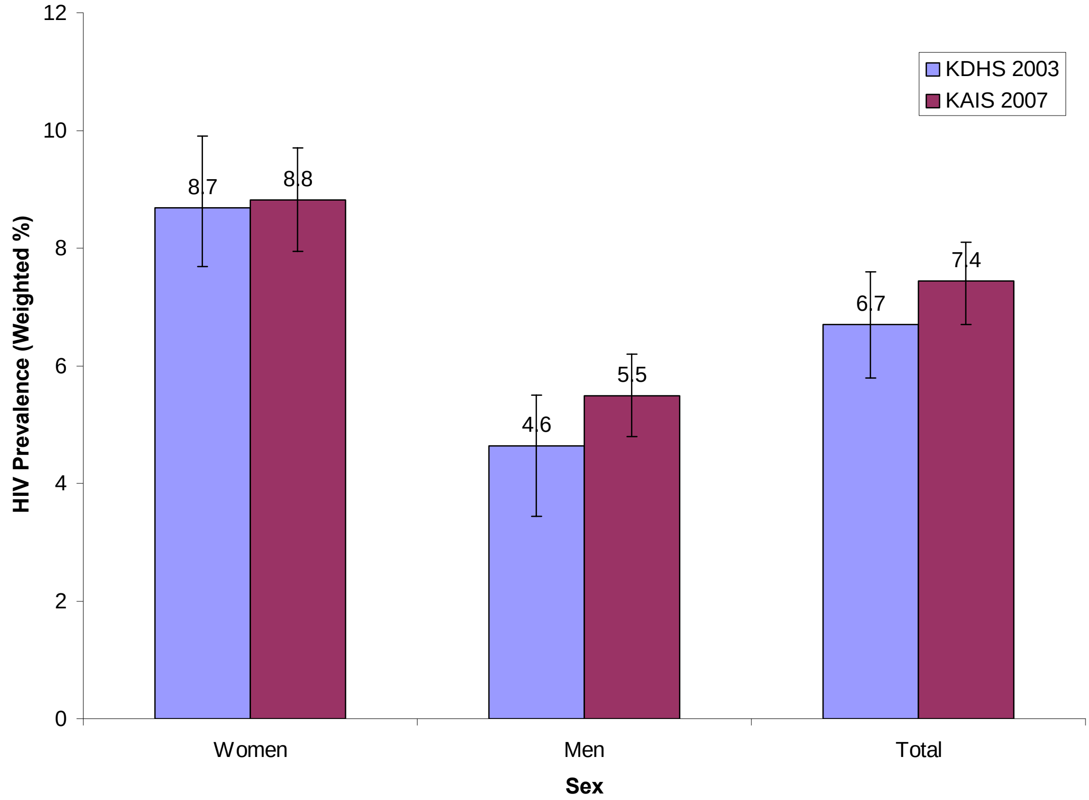


Figure 3.3a. HIV prevalence was not significantly different in 2003 and 2007.

The 2007 KAIS estimate of national HIV prevalence for adults aged 15-49 years was 7.4% (95% CI: 6.7% - 8.1%). The 2003 KDHS estimated that 6.7% (95% CI: 5.8% - 7.6%) of adults in this age group were infected with HIV. The 2007 KAIS national prevalence was not significantly higher than the 2003 KDHS national prevalence. The overlapping confidence intervals indicate that HIV prevalence remained more or less stable between 2003 and 2007. In the 2003 KDHS, 8.7% of women and 4.6% of men were infected compared to 8.8% of women and 5.5% of men in the 2007 KAIS.

DATA IN CONTEXT

HIV Serologic Testing in 2003 KDHS and 2007 KAIS

In the 2007 KAIS, HIV testing was performed using antibody/antigen assays, compared to antibody-only assays in the 2003 KDHS. The antibody/antigen approach is more sensitive for capturing recent infections and was utilized in KAIS for consistency with Government of Kenya HIV testing programs at the time of the survey. Differences between these assays are small in populations with relatively low incidence such as Kenya, which had an estimated HIV incidence of 0.83% (95% CI: 0.80% and 0.85%) in 2007, according to GOK estimates using UNAIDS Estimation and Projection Package (EPP)/Spectrum software. Point estimates calculated from results of the two testing approaches may differ but are likely to fall within similar 95% confidence intervals.

When comparing HIV prevalence by five-year age groups in the 2007 KAIS to the 2003 KDHS, it is important to consider that a majority of the people aged 15-24 years in the 2003 KDHS joined the 25-29 year old age group in the 2007 KAIS due to the four-year time period between the two surveys. Thus, to determine if prevalence in the cohort of 15-19 year olds in the 2003 KDHS had changed in 2007 KAIS, one would need to compare the prevalence for this age group in 2003 to that of the 20-24 age group in 2007. Changes in prevalence for a particular age group between the two surveys were influenced by the number of newly infected persons, number of deaths, and access to antiretroviral therapy (ART), among other factors.

Figure 3.4a HIV prevalence among women by five-year age group, 2003 KDHS and 2007 KAIS.

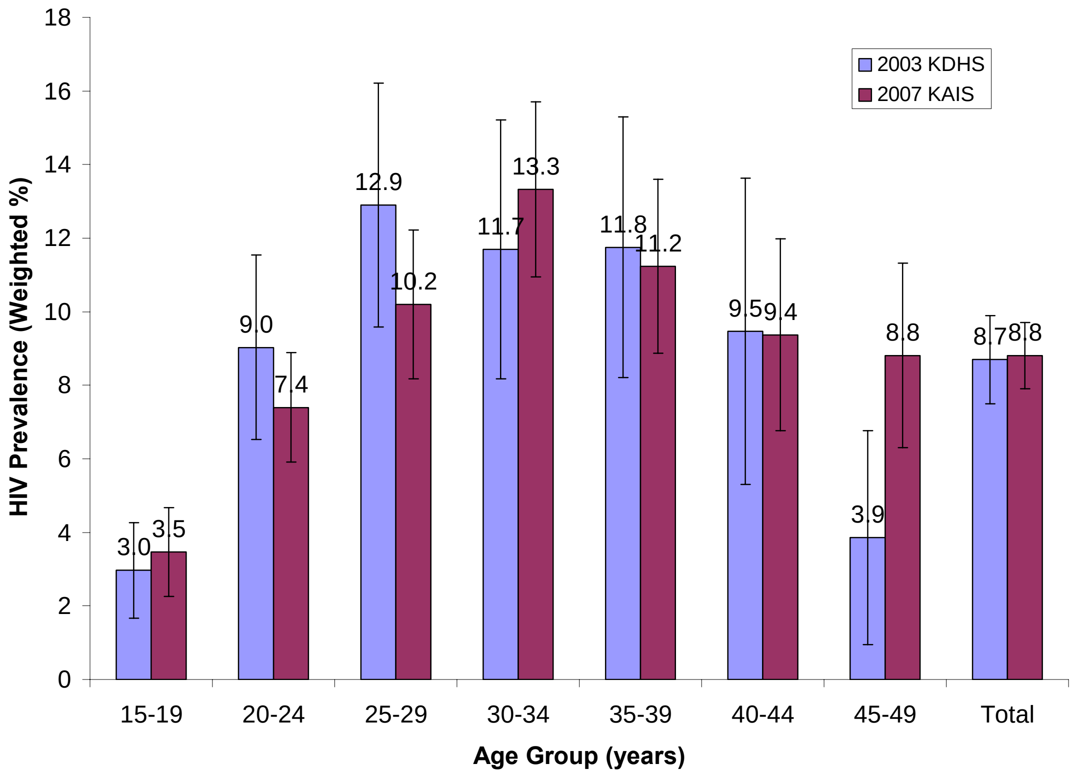


Figure 3.4a. Comparing 2003 and 2007, there were no significant differences in HIV prevalence across all age groups of women.

In the 2003 KDHS, the HIV prevalence peaked among women aged 25-29 years (12.9%), while in the 2007 KAIS prevalence peaked in women aged 30-34 years (13.3%). This was probably because most of the women in 2003 who were 25-29 years old and HIV-infected moved into the 30-34 year age group in 2007. There was a significant increase in HIV prevalence among women who were 15-19 years old in the 2003 KDHS and 20-24 years old in the 2007 KAIS from 3.0% to 7.4%, which indicates that some women in this cohort may have become newly infected between 2003 and 2007. Other changes in five-year age cohorts, such as apparent increases in HIV prevalence from the 20-24 year age group in the 2003 KDHS to the 25-29 year age group in the 2007 KAIS and decreases in HIV prevalence from the 35-39 year age group in the 2003 DHS to the 40-44 year age group in the 2007 KAIS were not significant.

Figure 3.4b. HIV prevalence among men by five-year age group, 2003 KDHS and 2007 KAIS.

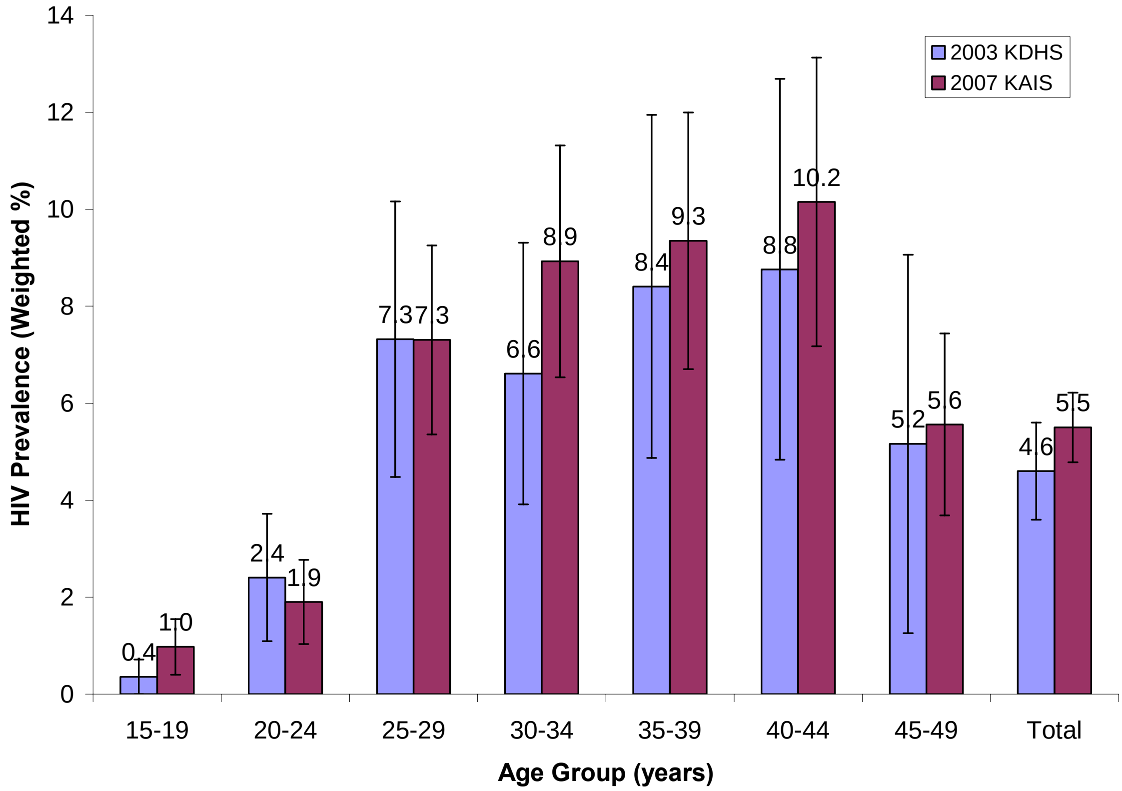


Figure 3.4b. HIV prevalence peaked among men age 40-44 years in both 2003 and 2007.

Among men aged 15-49 years, HIV prevalence was 4.6% in 2003 and 5.5% in 2007. There were no significant differences in prevalence for men within all age groups between 2003 and 2007; however, for those aged 15-19 years, there was a marginally significant difference. A significant increase in prevalence occurred as the 15-19 year age group in the 2003 KDHS (0.4%) moved into the 20-24 year age group in the 2007 KAIS (1.9%). Prevalence also increased rapidly and significantly among men aged 20-24 years in the 2003 KDHS to men aged 25-29 years in 2007 KAIS. HIV prevalence peaked in the 40-44 year age group in 2003 (8.8%) and 2007 (10.2%).

3.5 YOUTH

HIV prevalence in youth aged 15-24 years was 3.6% in 2003 and 3.8% in 2007, with no significant difference between these two estimates. Young women aged 15-24 years had significantly higher prevalence than young men aged 15-24 years in both 2003 and 2007. HIV prevalence in young men aged 15-19 years rose from 0.4% in 2003 to 1.0% in 2007, while in the 20-24 year age group prevalence was similar (2.4% in 2003 and 1.9% in 2007).

3.6 Residence

Figure 3.6a HIV prevalence by residence among women and men aged 15-49 years, 2003 KDHS and 2007 KAIS.

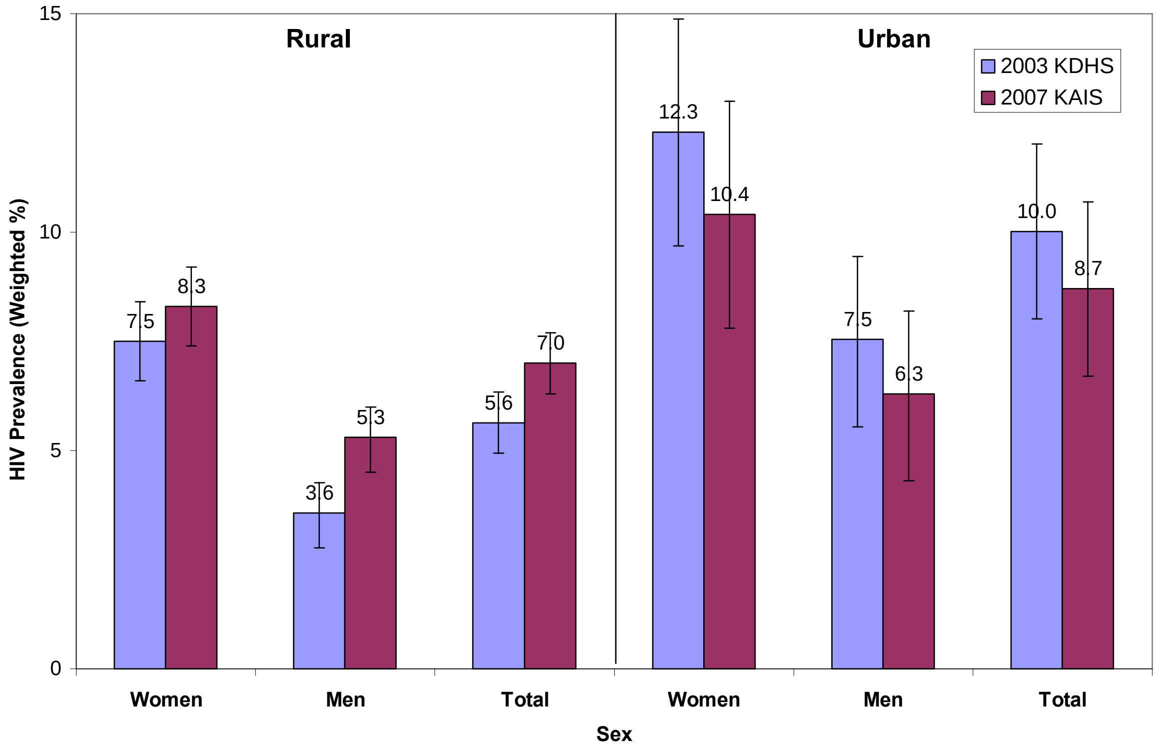


Figure 3.6a. HIV prevalence varied significantly from 2003 to 2007 among rural men but not rural women or among urban residents of either sex.

HIV prevalence among rural residents was higher for both women and men in the 2007 KAIS compared to the 2003 KDHS although the difference was significant only among men. In contrast, urban HIV prevalence appeared lower, though not significantly, among women and men.

In 2003, HIV prevalence among urban residents compared with rural residents was significantly greater for both women and men. HIV prevalence was marginally greater among urban compared to rural residents overall; however among women and men separately, there were no significant differences observed in prevalence between women in areas compared to women in rural areas, or between men in urban areas compared to men in rural areas. This result indicates that prevalence levels in rural populations may be approaching that of urban populations, reflecting an expansion in the HIV epidemic toward rural areas. Because an estimated three in four adults aged 15-49 years live in rural areas[1], this increase has a larger impact on the total estimated number of HIV-infected persons in Kenya, more so than any apparent declines observed in HIV prevalence in urban areas.

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[1] The Kenya National Bureau of Statistics approximates that 75% of indivuals in Kenya are living in rural areas. Because exact proportions are not available, this number should be cited with caution. Although all estimates in this chapter are described in more detail (with 95% confidence intervals and appropriate sample sizes) in Appendix B.2, this estimate is not included in the appendix.

3.7 PROVINCE

Figure 3.7a HIV prevalence by province among adults aged 15-49 years, 2003 KDHS and 2007 KAIS.[2]

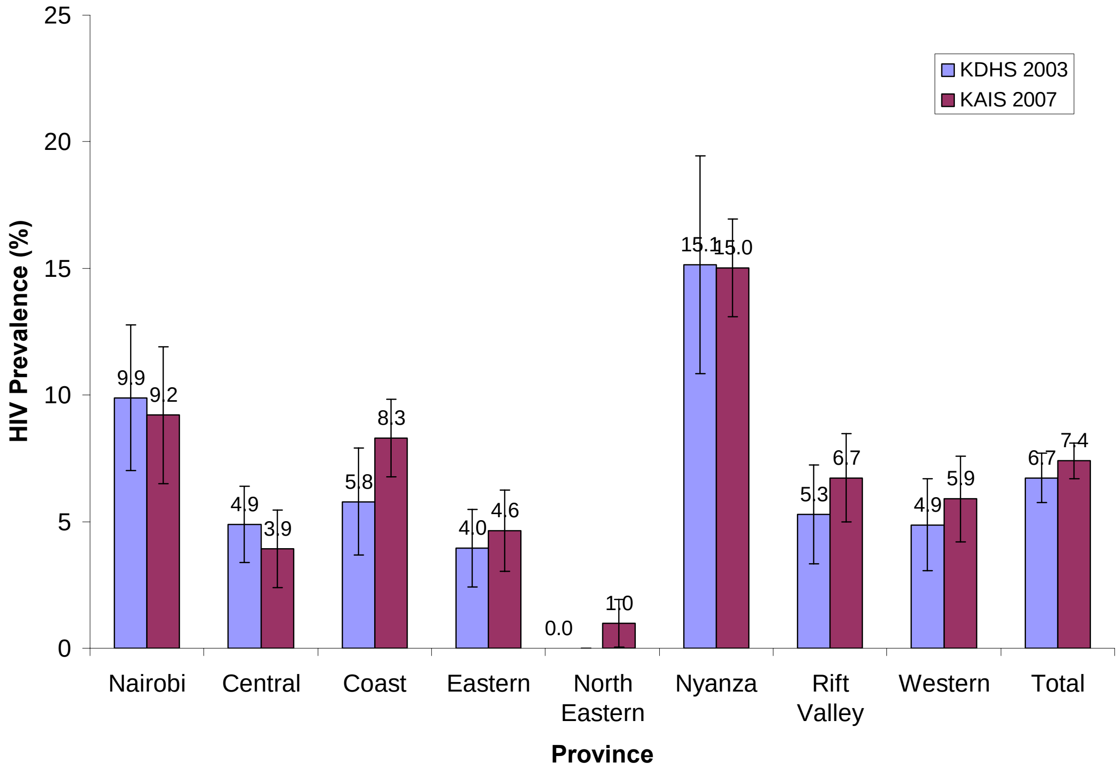

Figure 3.7a. No significant change in HIV prevalence was observed for provinces except for North Eastern province where HIV prevalence increased significantly from 2003 to 2007, and in Coast province where the increase was marginally significant.

Between 2003 and 2007, there were no significant changes in HIV prevalence at the provincial level except in two provinces: Coast, where the difference was marginally significant, and North Eastern, where the difference was significant. In both 2003 and 2007, Nyanza province, followed by Nairobi, had the two highest levels of HIV prevalence, whereas North Eastern province had the lowest prevalence in both 2003 and 2007.

3.8 MARITAL STATUS

[2] Standard survey procdures do not provide 95% confidence intervals for estimates of 0%. Therefore, 95% confidence intervals were not calcuated for North Eastern province in the 2003 KDHS.

Figure 3.8a HIV prevalence by current marital status among adults aged 15-49 years, 2003 KDHS and 2007 KAIS.

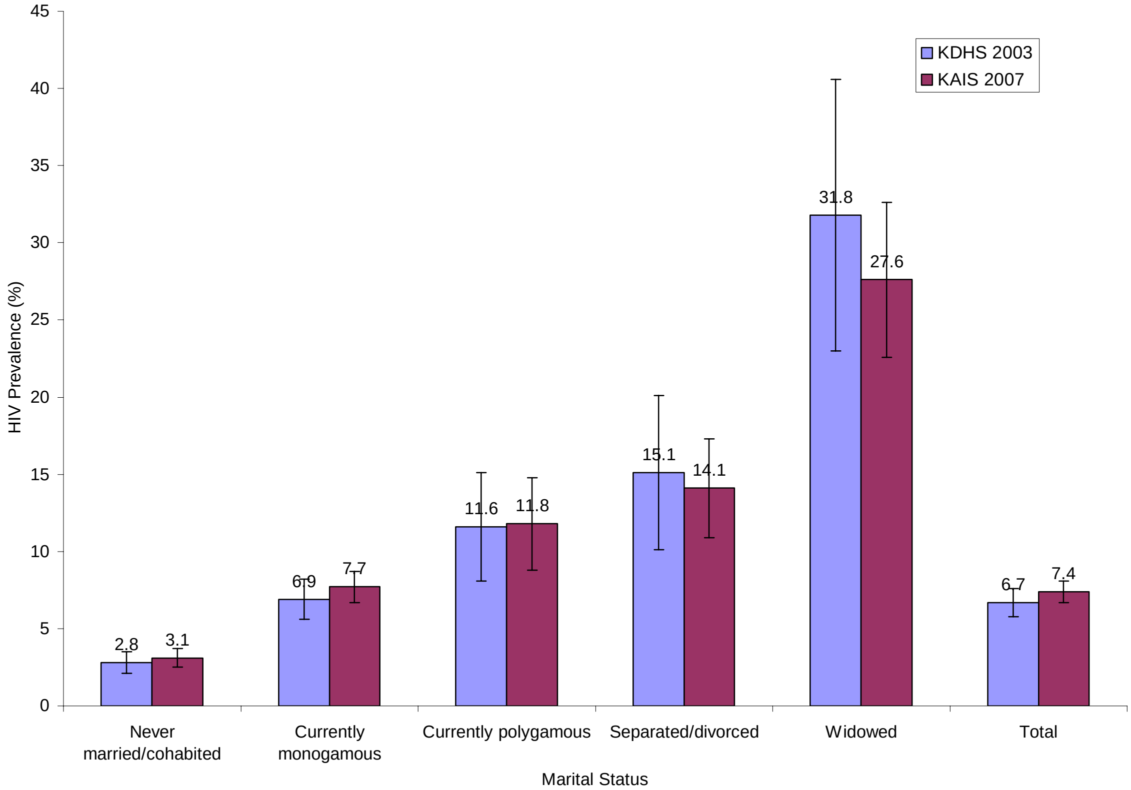

Figure 3.8a. HIV prevalence rates by marital status remained similar from 2003 to 2007.

The term "currently monogamous" refers to respondents that are married or cohabiting in a union with only one wife or one female partner.

HIV prevalence did not differ significantly by marital status from 2003 to 2007. Persons who were widowed had the highest HIV prevalence in both 2003 and 2007, with levels approximately three times higher than currently polygamous persons, four times higher than currently monogamous persons and six times higher than persons who were never married/cohabitated in both surveys.
The distribution of marital status in the population at the time of the 2003 KDHS and 2007 KAIS are compared in Table 3.8a..

Table 3.8a Marital status among women and men aged 15-49 years, 2003 KDHS and 2007 KAIS.

Marital status	2003 KDHS[1] Women (Weighted %)	2003 KDHS[1] Men (Weighted %)	2007 KAIS[2] Women (Weighted %)	2007 KAIS[2] Men (Weighted %)
Never married/cohabitated	29.8	45.0	23.1	37.1
Currently monogmous	48.7	45.8	54.4	52.7
Currently polygamous	9.9	5.0	8.3	4.6
Separated/divorced	4.2	0.7	6.8	4.2
Widowed	5.9	3.5	7.4	1.4
Total	100.0	100.0	100.0	100.0

[1] Estimates abstracted from Table 3.5 in the 2003 KDHS report.

[2] Weighted estimates and 95% confidence intervals for the 2007 KAIS data are presented in Appendix B.1 of this report
The term "currently monogamous" refers to respondents that are married or cohabiting in a union with only one wife or one female partner.

No significant changes in marital status was observed from 2003 to 2007 for women and men, with the exception of currently monagmous women, where the percent of women increased significantly from 44.8% in 2003 to 55.1% in 2007.

3.9 Education Level

Figure 3.9a HIV prevalence by education level among adults aged 15-49 years, 2003 KDHS and 2007 KAIS.

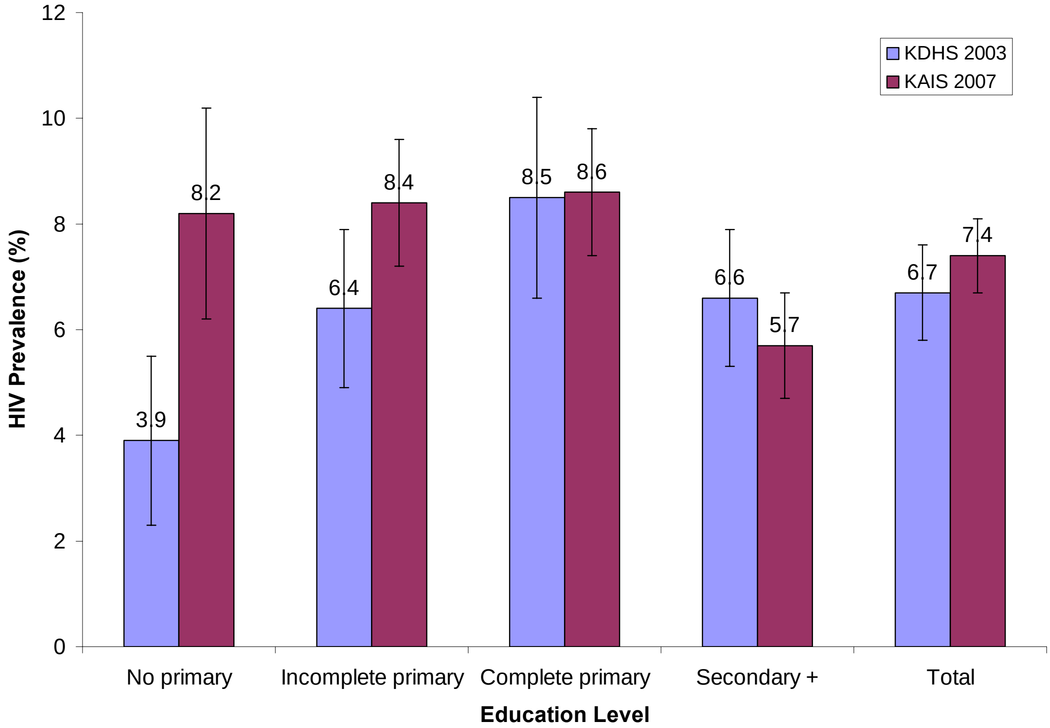

Figure 3.9a. Among persons who reported no education or incomplete primary education, HIV prevalence increased significantly from 2003 to 2007.

In both 2003 and 2007, HIV prevalence varied significantly by education level. From 2003 to 2007, HIV prevalence increased significantly among persons reporting no education (3.9% in 2003 versus. 8.2% in 2007) and incomplete primary education (6.4% in 2003 versus 8.4% in 2007, respectively).

3.10 Wealth Index

Figure 3.10a HIV prevalence by wealth index[1] among adults aged 15-49 years, 2003 KDHS and 2007 KAIS.

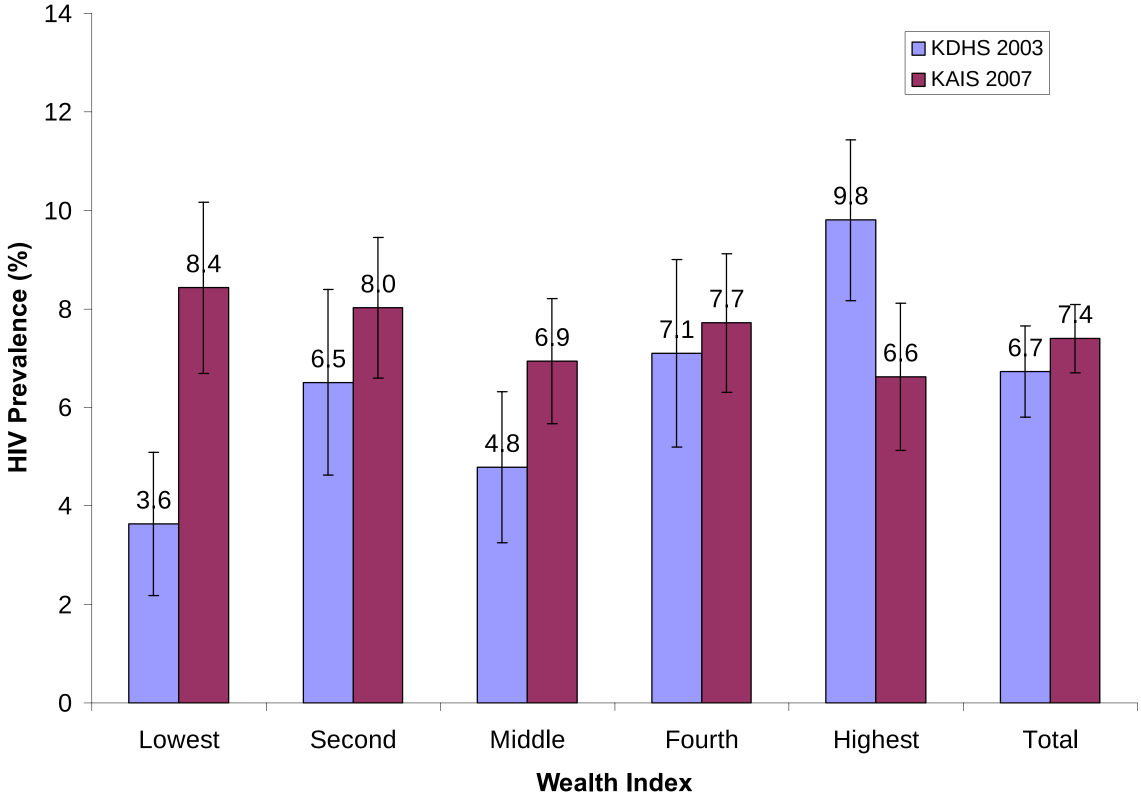

Figure 3.10a. From 2003 to 2007, HIV prevalence significantly increased among persons in the lowest wealth quintile and significantly decreased among persons in the highest wealth quintile.

HIV prevalence varied significantly by wealth index in the 2003 KDHS but not in the 2007 KAIS. Persons in the lowest quintiles of wealth had the lowest HIV prevalence in 2003 but the highest HIV prevalence in 2007. The differences in HIV prevalence between 2003 and 2007 were significant among all wealth quintiles except the second and fourth quintiles. Most persons aged 15-49 years (97.5%) in the lowest quintile lived in rural areas, supporting the apparent trend toward increased prevalence in rural areas, particularly among men, from 2003 to 2007 (see figure 3.6).

[1] The wealth index was a composite measure of the living standard of a household, calculated using data on a household's ownership of selected assets, materials used for housing construction, and water access and sanitation facilities. The wealth index placed households on a continuous scale of relative wealth using principal components analysis. Individuals were ranked according to the score of the household in which they resided and the sample was divided into five groups, each with an equal number of individuals (quintiles), ranging from the lowest to highest level of wealth.

3.11 Age of Sexual Debut

Figure 3.11a HIV prevalence by age of sexual debut among adults aged 15-49 years, 2003 KDHS and 2007 KAIS.

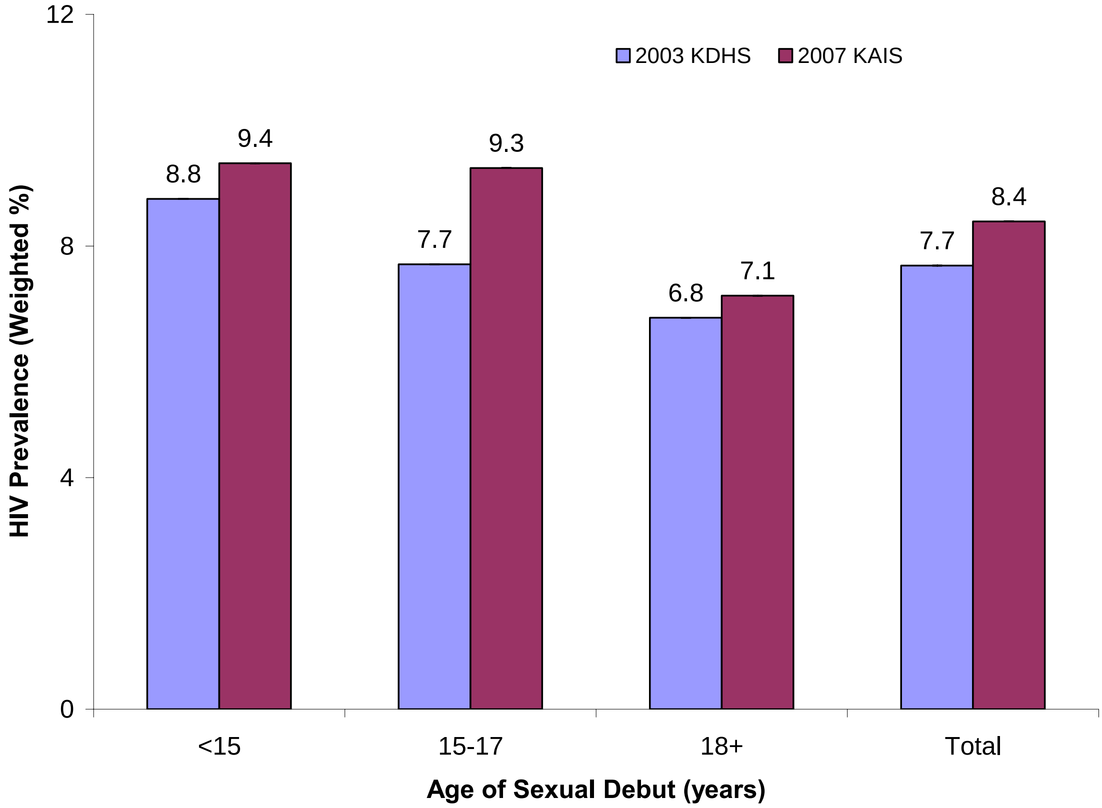

Figure 3.11a. HIV prevalence did not vary significantly by age of sexual debut from 2003 to 2007.

There were no significant changes in HIV prevalence by reported age of sexual debut between 2003 and 2007. In both 2003 KDHS and 2007 KAIS, respondents reporting younger age at sexual debut (<15 years of age) had higher HIV prevalence compared to those reporting later age of sexual debut (≥15 years of age), but this difference was not statistically significant.

DATA IN CONTEXT: APPROACHES TO HIV SURVEILLANCE

National estimates of HIV prevalence in Kenya are estimated using several approaches: 1) general population-based surveys with HIV testing and 2) annual sentinel surveillance among pregnant women attending antenatal clinics (ANCs). Population-based surveys are based on large, nationally representative samples of adult women and men, while ANC surveillance is based on a sample of pregnant women attending ANCs considered to be a proxy for the general population.

Due to high costs, population-based surveys with HIV testing are conducted, on average, every five years in a country. Therefore, ANC surveillance which is conducted more regularly (every one to two years) remains an important, cost-effective source of information to monitor HIV prevalence trends in the population. ANC surveillance data are incorporated into the UNAIDS EPP/Spectrum model and calibrated using data from population-based surveys to arrive at national estimates. According to the modelled estimates, national HIV prevalence among adults aged 15-49 years has been decreasing from 6.1% in 2004, to 5.9% in 2005 and 5.1% in 2006.

In contrast, Kenya's two national populations based surveys with HIV testing suggest that HIV prevalence has remained relatively stable. Among adults aged 15-49 years in the 2003 KDHS, HIV prevalence was 6.7% and not significantly different from the HIV prevalence estimate of 7.4% in the 2007 KAIS. The precise reasons for why trends in the modelled estimates are different from the population-based survey estimates require further investigation though a number of factors may have played a contributing role. In the EPP/Spectrum model, ANC estimates were calibrated using 2003 KDHS data on the female-to-male ratio of HIV prevalence and the rural/urban population distribution. However, the 2007 KAIS supports important shifts in both of these factors since 2003. In addition, ANC sites may not be representative of the general population. For example, ANC surveillance has a disproportionately larger number of urban ANC sites compared to rural ANC sites; however, the majority of adults in Kenya are living in rural areas. Declining ANC prevalence may therefore be more reflective of declining urban prevalence among pregnant women. Further, It is also possible that trends in HIV prevalence among pregnant women attending ANCs differ in some ways from trends in the general population.

3.12 GAPS AND UNMET NEEDS

- **Young women aged 15-24 years remain especially vulnerable to HIV infection. Further research is needed to assess the factors that contribute to risk of infection in the younger population so that effective interventions targeting youth may be developed and implemented.**
- **Prevalence among rural populations, particularly rural men, increased between 2003 and 2007. This shift in the HIV epidemic highlights the need for increased services and programs to these regions.**
- **People with no primary level education and those in the lowest wealth index quintile have significantly higher HIV prevalence in 2007 than in 2003 highlighting the vulnerability of this group. HIV programs should plan to adapt education and behaviour change strategies to reach these groups.**

HIV Testing

chapter 4

4.1. Key findings

- **Overall, 33.9% of adults aged 15-64 years reported that they had been tested for HIV at least once in their lifetime.**
- **Women were more likely to have ever been tested than men (40.7% vs. 24.9%, respectively).**
- **Of respondents who had never been tested for HIV, 47.2% reported that they had not sought testing because of their self-perceived low risk for HIV.**

4.2. Introduction

HIV testing and counselling are critical measures in a comprehensive response to the HIV epidemic. HIV testing is only way to learn one's HIV status and can provide appropriate linkages for HIV-infected persons to access life-saving HIV care and treatment interventions. In addition, the post-test counselling session offers focused counselling for HIV prevention to help reduce behaviours which may lead to acquisition or transmission of HIV.

The Government of Kenya has set a national goal to provide HIV testing to at least 80% of all adolescents and adults by 2010. To reach this goal, a thorough understanding of access to and use of HIV testing is needed to scale up national HIV testing and counselling efforts.

Since 2004, "opt-out" HIV testing has been offered as part of the routine package for all pregnant women attending antenatal clinics (ANC). In this approach, women receive pre-test counselling for HIV testing and can choose to "opt-out" of testing should they not wish to get tested. This policy change, in line with the national Prevention of Mother-to-Child Transmission (PMTCT) guidelines, has led to substantial increases in HIV testing among women. Further discussion of "opt-out" HIV testing in the context of PMTCT services is provided in Chapter 8 of this report.

In this chapter, we present coverage of HIV testing and counselling at the time of the survey and identify disparities and barriers to testing. **Appendix B.4** provides sample sizes and 95% confidence intervals for estimates presented in this chapter. Throughout the chapter, the term significant indicates a chi-square p-value less than 0.05; marginally significant indicates a p-value between 0.05 and 0.10, inclusive; and not significant indicates a p-value greater than 0.10.

Population estimates reported in this chapter were calculated based 2007 projected population by province, age and sex reported in *Revised Population Projections for Kenya 2000-2020. Kenya National Bureau of Statistics (August 2006)*. Weighted national estimates for selected indicators from the 2007 KAIS were used in these calculations. Methods used for calculating population estimates are described in Appendix A.

For any analysis that compared the 2003 KDHS and the 2007 KAIS data in this chapter, the z-test statistic was used compare the two weighted estimates from 2003 and 2007 and determine if differences were statistically significant. Methods used for calculating the z-test statistic are described further in Appendix A.

4.3. HIV testing behaviour

Figure 4.3a Ever been tested for HIV among women and men aged 15-64 years, Kenya 2007.

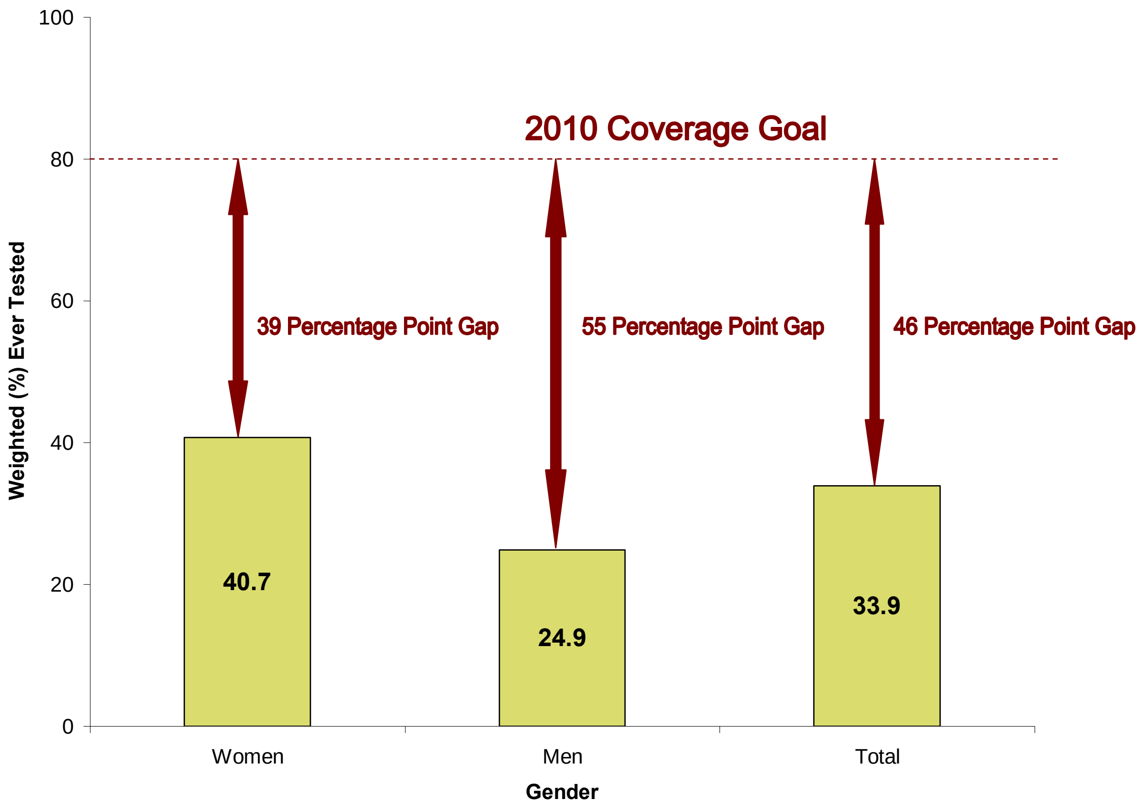

Figure 4.3a More women have had an HIV test than men; more testing will be needed for both sexes to reach Kenya's 2010 goal of testing 80% of all adolescents and adults in the country at least once.

By the end of 2007, 33.9% of women and men aged 15-64 years had been tested for HIV and had received results at least once in their lifetimes. Significantly more women (40.7%) reported having ever been tested compared to men (24.9%).

Among all respondents, the percent that had ever been tested for HIV but did not receive their test results was 1.8%. In total, 75.1% of men and 59.3% of women had never been tested for HIV or had been tested but never received their test results, translating into a gap of 46 percentage points in achieving the national HIV testing goal of 80%. To reach the goal, an estimated 9.2 million additional adolescents and adults will need to be tested for HIV between 2007 and 2010.

Figure 4.3b Ever been tested for HIV among women and men aged 15-49 years, 2003 KDHS and 2007 KAIS.

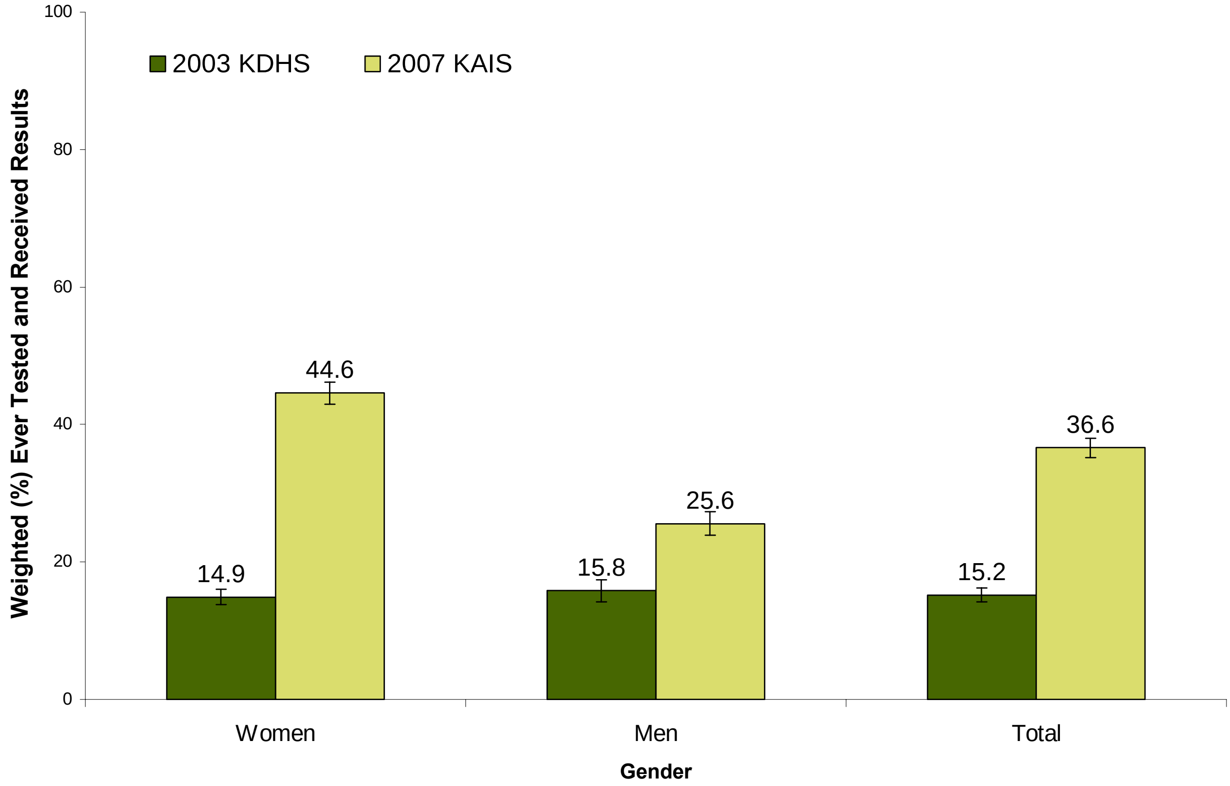

Figure 4.3b The percent of women aged 15-49 years who have ever been tested for HIV has more than tripled since 2003, and the proportion of men has nearly doubled.

For consistency with the 2003 KDHS, this analysis included only adults aged 15-49 years. The percent of all adults aged 15-49 years who have ever been tested for HIV increased significantly from 15.2% in 2003 to 36.6% in 2007. Although the differences between 2003 and 2007 are significant for both women and men, the increase was much more pronounced in women (14.9% to 44.6%, respectively) than in men (15.8% to 25.6%, respectively).

Figure 4.3c Ever been tested for HIV among women and men aged 15-64 years, by residence, Kenya 2007.

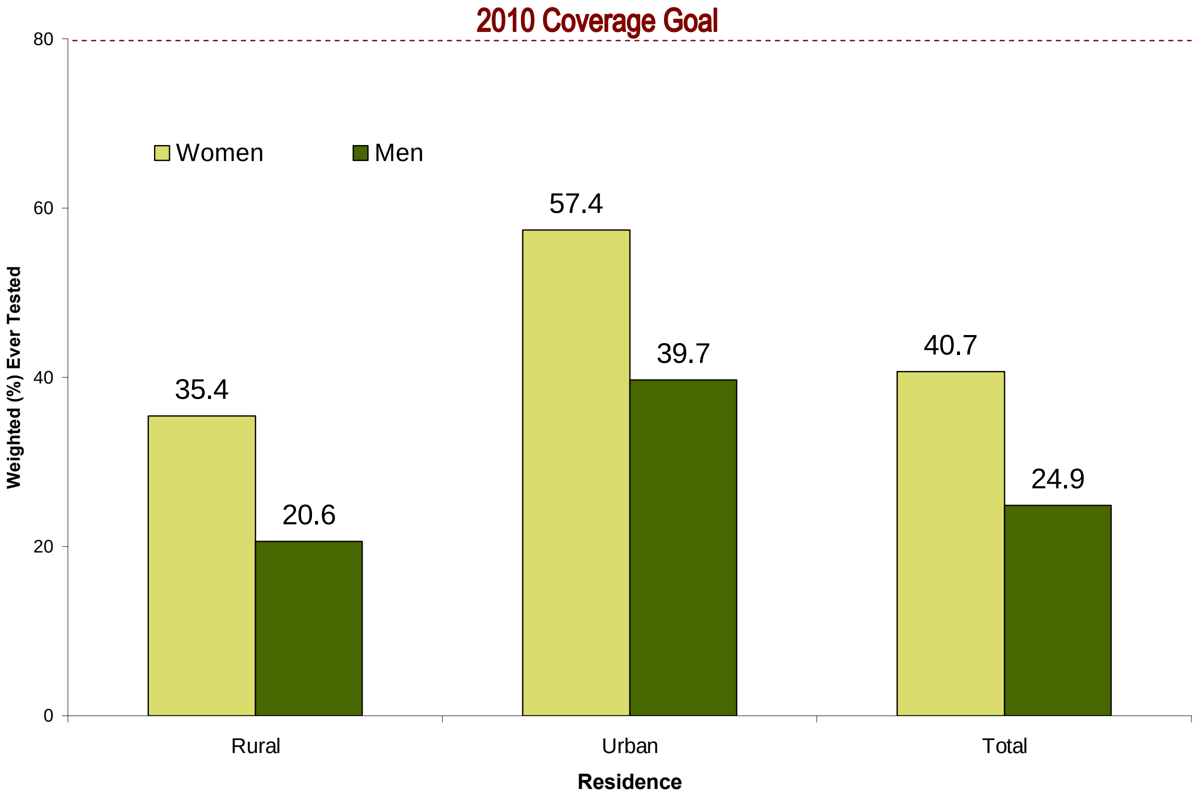

Figure 4.3c Women and men living in urban areas were more likely to have ever been tested for HIV than those in rural areas.

Significantly higher HIV testing rates were observed among urban residents (57.4% for women and 39.7% for men) compared to rural residents (35.4% for women and 20.6% for men). Testing rates were significantly higher among women compared to men in both urban and rural areas.

Figure 4.3d Ever been tested for HIV among adults aged 15-64 years, by province, Kenya 2007.

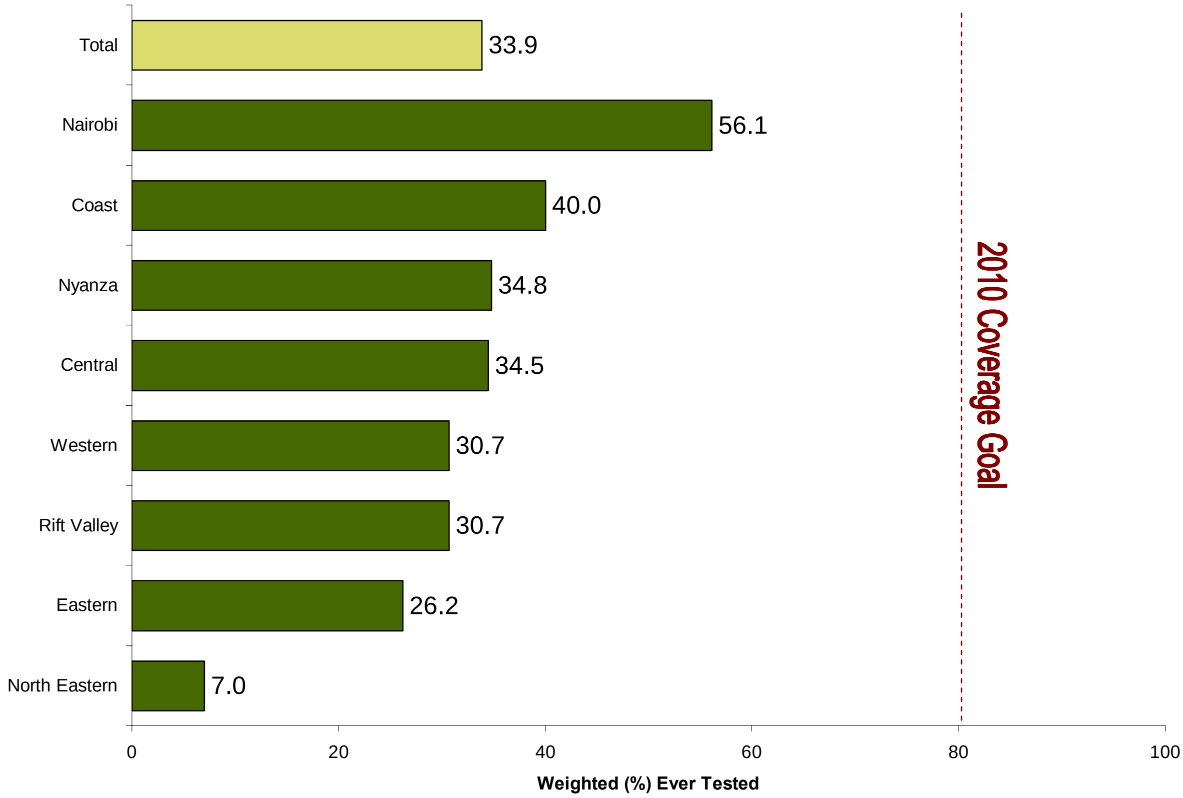

Figure 4.3d HIV testing was highest in Nairobi province and lowest in North Eastern province.

The percent of adults that have ever been tested for HIV varied significantly across provinces, with the highest percent in Nairobi (56.1%) and the lowest in North Eastern province (7.0%). In Nyanza, the province with the highest overall HIV prevalence (14.9%) in the country, 34.8% of residents had been tested previously, which was similar to the national average of 33.9%. A significantly higher percent of women than men had ever been tested for HIV across all provinces except for North Eastern province, where the estimates were not significantly different between women (8.1%) and men (5.6%).

Figure 4.3e Ever been tested for HIV among women and men aged 15-64 years, by wealth index[12], Kenya 2007.

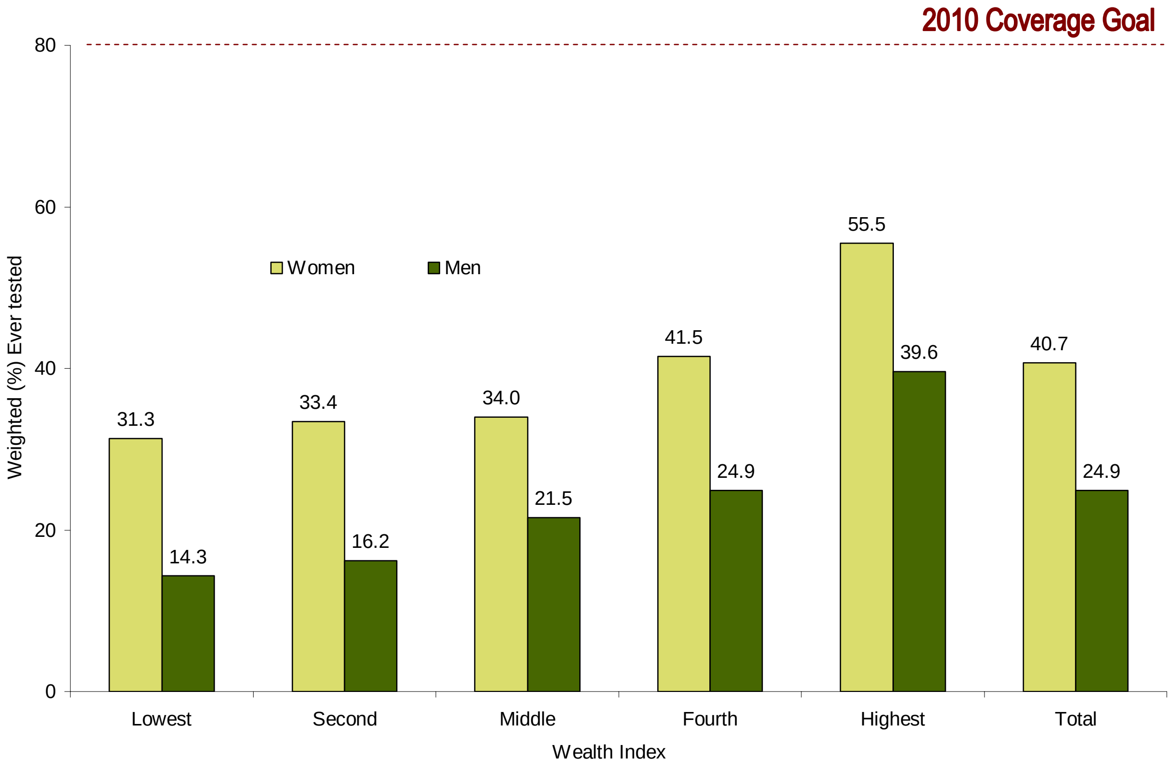

Figure 4.3e Wealthier women and men were more likely to have been tested for HIV than poorer women and men.

Women and men in the highest wealth quintile were significantly more likely to have ever been tested for HIV (55.5% and 39.6%, respectively) than those in the lowest wealth quintile (31.3% and 14.3%, respectively). Testing rates were significantly higher among women compared to men for all income levels.

In the following section (Figures 4.3f-h) we focus on testing behaviour by age and marital status. Because potential exposure to HIV is most commonly associated with sexual experience, we limited analyses only to those who reported ever having sex. Overall, among adults aged 15-64 years, 88.7% of women and 86.0% of men reported they ever had sex. The percentage of women and men who had ever been tested for HIV was significantly higher among those who had ever had sex (44.7% and 27.6%, respectively) compared to those who had not had sex (9.8 and 8.1%, respectively).

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[12] The wealth index was a composite measure of the living standard of a household, calculated using data on a household's ownership of selected assets, materials used for housing construction, water access and sanitation facilities. The wealth index placed households on a continuous scale of relative wealth using principal components analysis. Individuals were ranked according to the score of the household in which they resided and the sample was divided into five groups, each with an equal number of individuals (quintiles), ranging from the lowest to highest level of wealth.

Figure 4.3f Ever been tested for HIV among women and men aged 15-64 years who ever had sex by five-year age group, Kenya 2007.

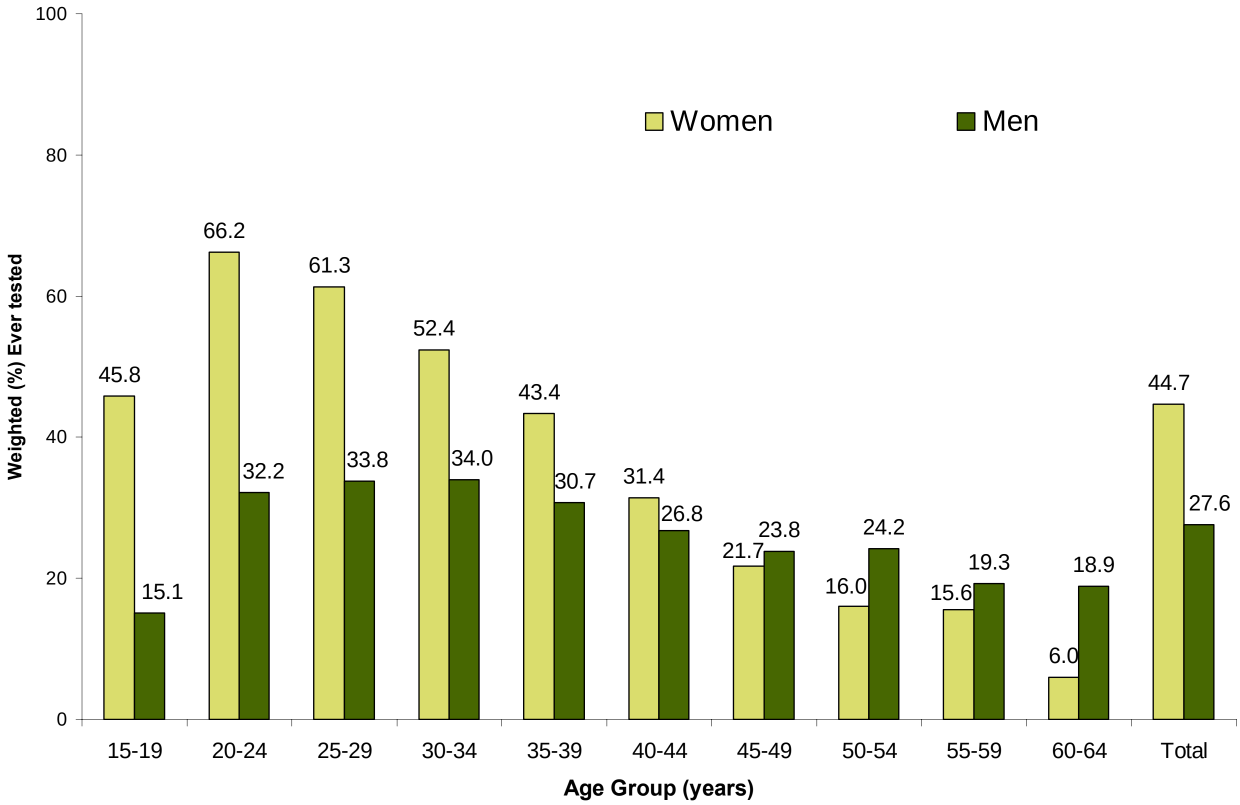


Figure 4.3f HIV testing rates were highest among younger women aged 20-24 years.

Among women who ever had sex, peak HIV testing rates were observed among those aged 20-24 years (66.2%). Testing rates decreased steadily thereafter with increasing age. Among men, the highest rate of testing was among men aged 30-34 years (34.0%), and similar to women, test rates decreased thereafter with increasing age, with the exception of men aged 50-54 years where HIV testing rates were similar to men aged 45-49 years. HIV testing rates were significantly higher among women of reproductive age (15-49 years) compared to men in the same age group. Among older adults (aged 50-64 years), however, HIV testing was significantly higher in men compared to women.

Figure 4.3g Women aged 15-49 years who reported ever having sex, by testing behaviour and location of last HIV test, Kenya 2007.

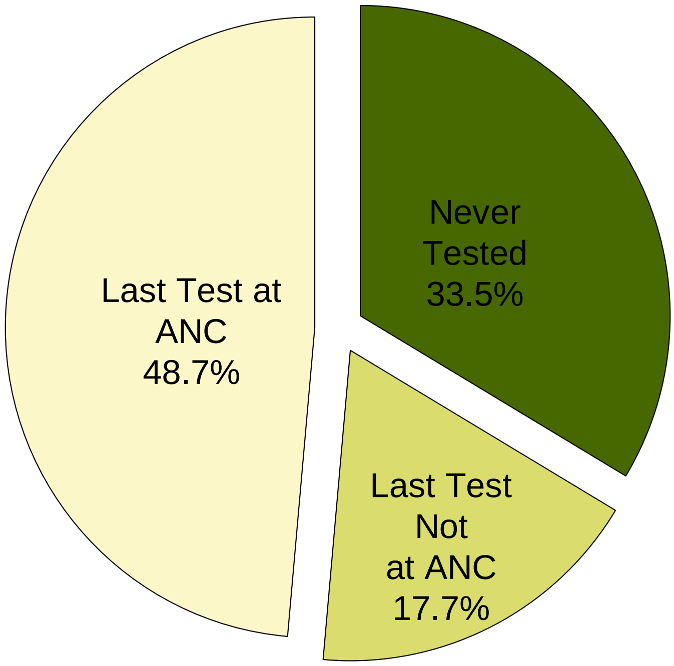
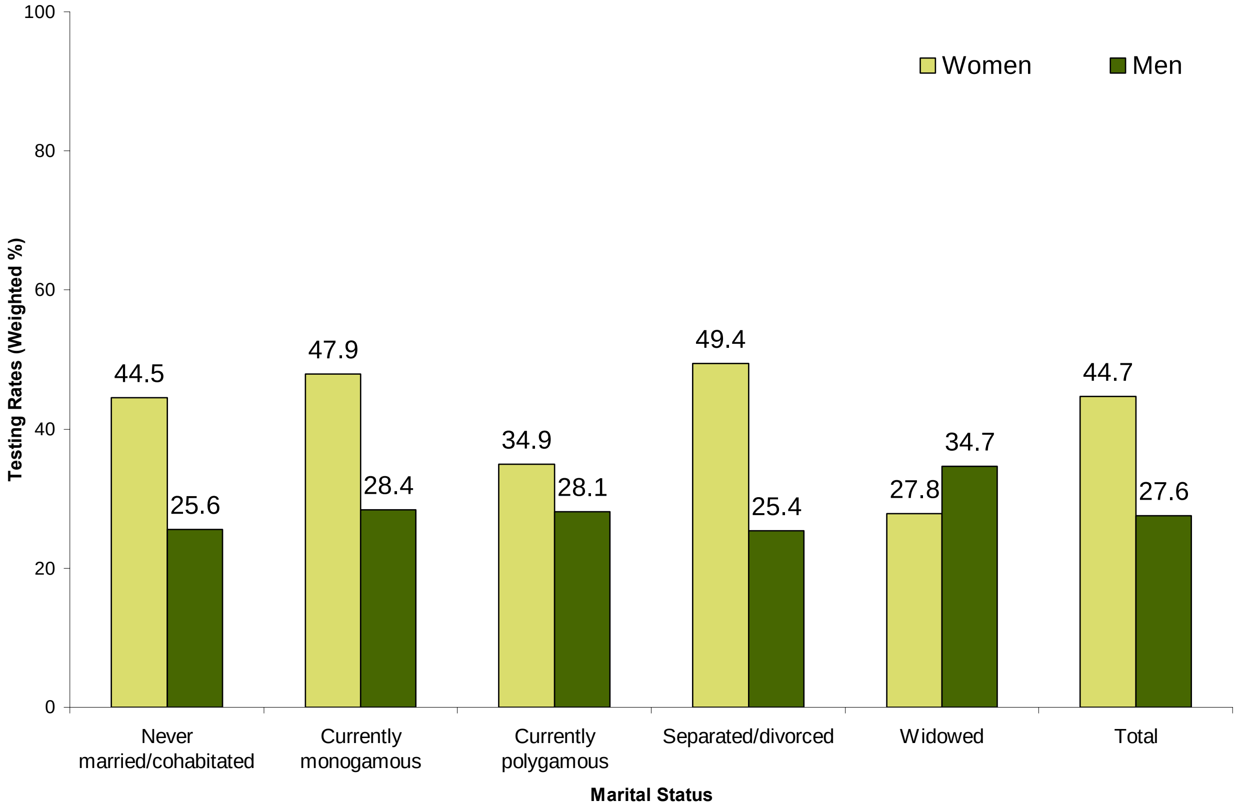


Figure 4.3g The majority of women aged 15-49 years that had ever been tested for HIV reported that their last test was at an antenatal clinic (ANC).

The following analysis focused only on women of reproductive age (15-49 years). Among women aged 15-49 years who reported ever having sex, 33.5% had never been tested for HIV, 48.7% had their last HIV test during antenatal care, and an additional 17.7% had their last HIV test elsewhere. Among those who had ever been tested for HIV, 66.1% reported that their last HIV test was conducted as part of routine antenatal care at an ANC highlighting the impact of "opt-out" testing in these settings. Further information on ANC testing and PMTCT can be found in Chapter 8.

Figure 4.3h Ever been tested for HIV among women and men aged 15-64 years who ever had sex, by marital status, Kenya 2007.



The term "currently monogamous" refers to respondents that are married or cohabiting in a union with only one wife or one female partner.

Figure 4.3h Widowed and women in polygamous relationships were less likely than other women to have ever had an HIV test.

Among women who had ever had sex, HIV testing rates were significantly lower among those who were widowed (27.8%) or currently in a polygamous relationship (34.9%) compared to women who were never married or cohabiting (44.5%), currently monogamous (47.9%), or separated or divorced (49.4%). No significant differences in HIV testing rates were observed among men by marital status, with rates ranging from 25.4% to 34.7% across marital status categories.

4.4. Testing experiences among persons who had ever been tested for HIV

In this section, we assess the timing of the most recent HIV test and the reasons people provided for having tested on a subset (33.9%) of 2007 KAIS respondents that had been tested and received results at least once in their lifetimes.

Figure 4.4a Time since last HIV test among women and men aged 15-64 years who had ever been tested for HIV, Kenya 2007.

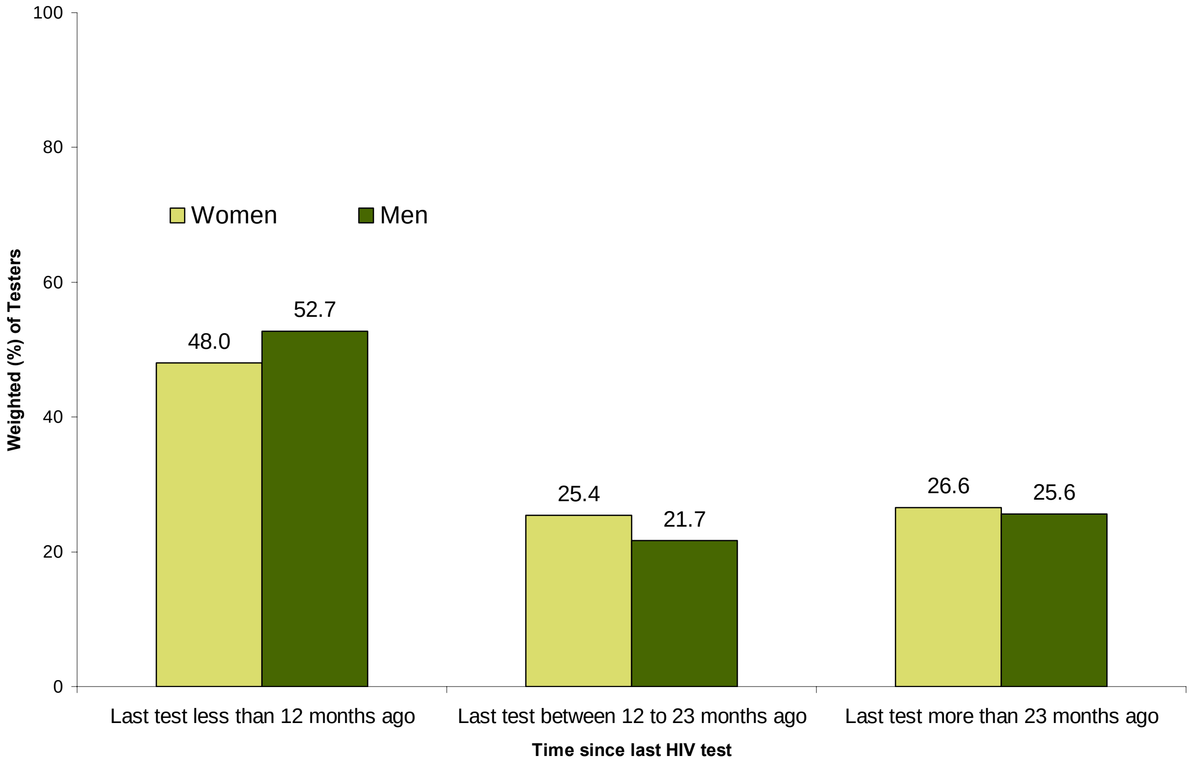


Figure 4.4a Approximately half of all women and men who reported ever having been tested for HIV had tested in the 12 months prior to the 2007 KAIS.

Among women and men who had ever tested for HIV, approximately half (49.5.%) had their last HIV test less than 12 months prior to the survey; 24.2% were tested between 12-23 months prior, and 26.3% were tested more than 23 months prior. Women and men differed significantly in reported time since last HIV test, with men tending to have tested more recently (within the last 12 months) than women.

Figure 4.4b Ever been tested among women and men aged 15-64 years, by location of last HIV test, Kenya 2007.

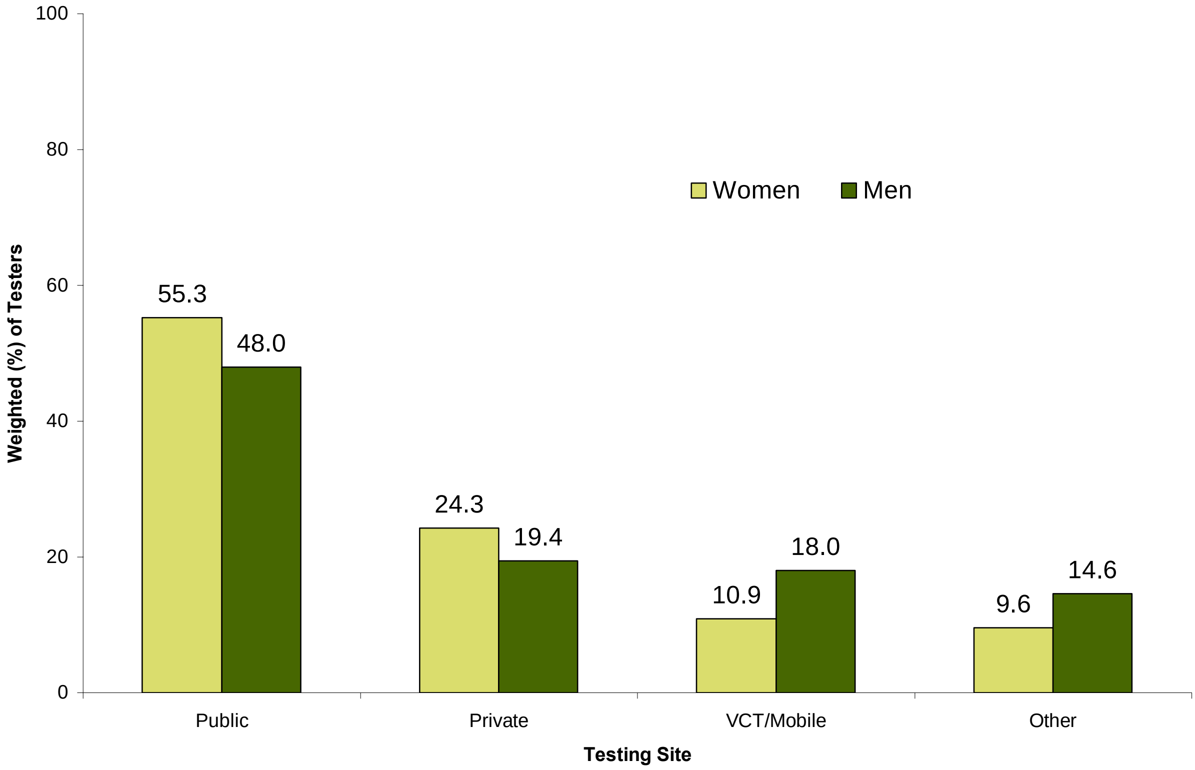


Figure 4.4b Most HIV testing occurred in public sites, especially among women.

More women and men (55.3% and 48.0%, respectively) reported that their last HIV test was conducted in a public facility[1] compared to other testing sites including private health facilities , voluntary counselling and testing (VCT) stand-alone and mobile clinics, and other locations (9.6%-24.3%). In contrast, men (18.0%) were significantly more likely than women (10.9%) to have gone to VCT stand-alone sites and mobile clinic sites for their last HIV test.

4.5. Reasons for not testing

Understanding the different barriers to HIV testing is helpful for improving HIV testing coverage in the general population. Analyses in this section were restricted to the 66.1% of adults that had never been tested for HIV.

[1] Public facilities include government hospital, government health centre/clinic, government dispensary, or other public facilities. Private facilities includes missions, church hospitals and clinics, private hospitals and clinics, voluntary counselling and testing clinics, and other private medical facilities. Other locations were not specified.

Figure 4.5a Reasons for not testing for HIV among adults aged 15-64 years who had never been tested for HIV, Kenya 2007.

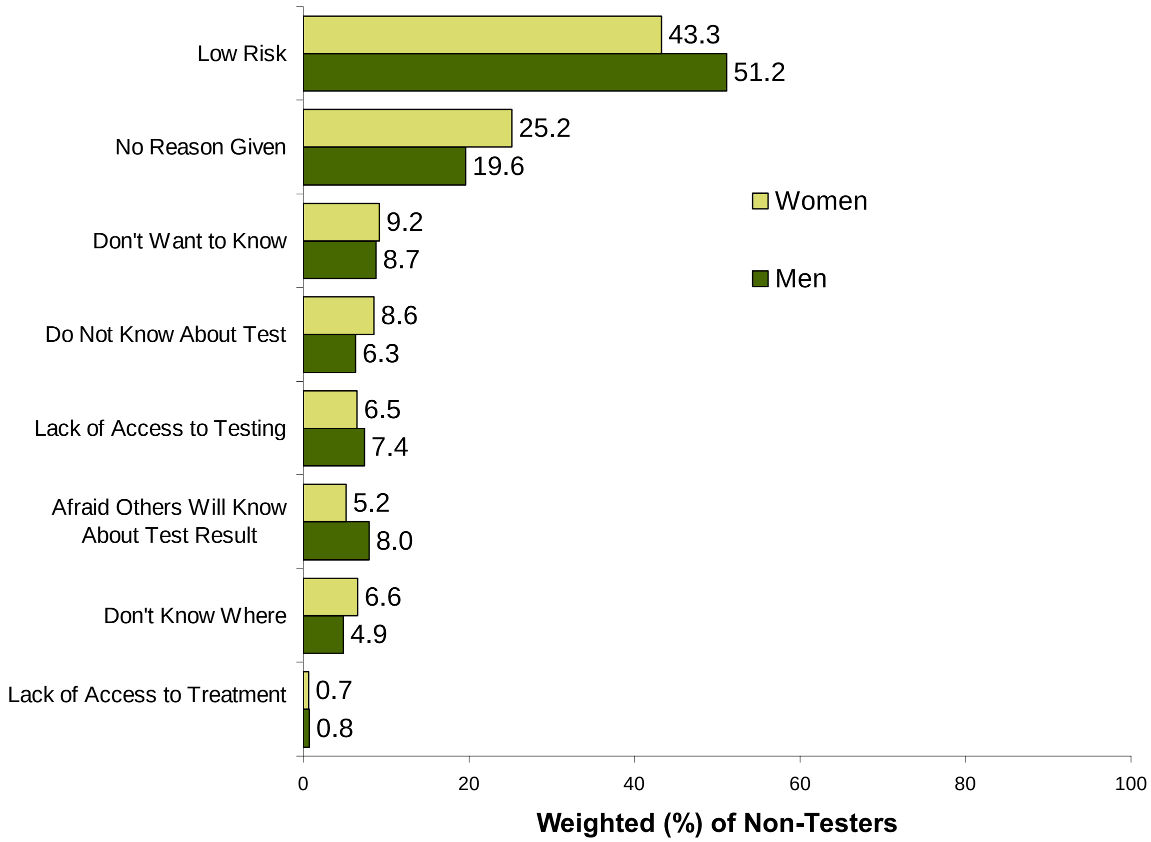


Figure 4.5a Perception of low risk was the most common reason among women and men for not having been tested for HIV.

Among all adults aged 15-64 years who had never been tested for HIV, 43.3% of women and 51.2% of men reported they had not been tested because they perceived themselves to be at low risk for HIV infection; 25.2% of women and 19.6% of men provided no reason for not testing. Less than 10% of respondents reported lack of access to testing, fear of others knowing about the test result, not knowing where to go to get tested and lack of access to treatment as the reasons for not getting tested. Men were significantly more likely than women to report low risk for HIV (51.2% and 43.3%, respectively) and fear that others would find out about the test results (8.0% and 5.2%, respectively) as reasons for not testing. Women were significantly more likely than men to report not knowing about the test (8.6% and 6.3%, respectively), lack of knowledge about where to get tested (6.6% and 4.9%, respectively) or no reason (25.2% and 19.6%, respectively) as their barriers to getting tested.

Respondents could provide more than one reason for not testing; reasons for not testing were not mutually exclusive.

Figure 4.5b HIV prevalence among women and men aged 15-64 years who had never been tested for HIV by reason for not testing, Kenya 2007.

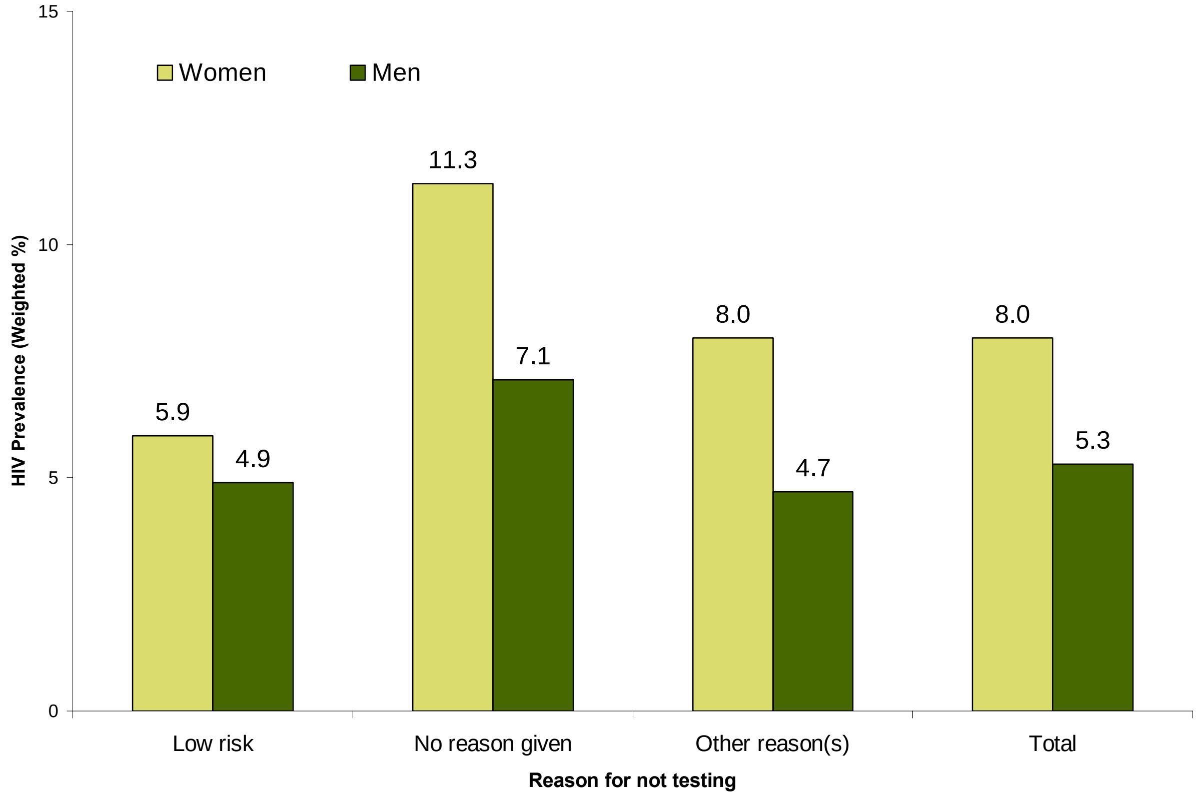


Figure 4.5b Among women who had never been tested but had ever had sex, those who reported no reason for not being tested were significantly more likely to be infected with HIV than those that provided other reasons.

Significant differences in HIV prevalence were observed among both women and men who had never been tested for HIV by different reported reasons for not being tested. Among both women and men, those who provided no reason for not testing for HIV had higher prevalence (11.3% and 7.1%, respectively) than those who said they were at low risk for HIV (5.9% and 4.9%, respectively) and those who gave other reasons for not testing (8.0% and 4.7%, respectively).

4.6. Attitudes toward home testing

Increasing access to HIV testing will be necessary to help meet the country's 2010 objective of achieving 80% testing coverage nationally. "Opt-out" testing appears to have made an impact in increasing testing rates among women[1]. Another approach to improving access to HIV testing is home-based HIV testing, which may be particularly useful for populations that have limited access to regular testing and counselling services. In addition, the privacy associated with home-based testing might increase testing, particularly testing of couples who reside in the same household.

Figure 4.6 Percent of adults aged 15-64 years that are willing to be tested for HIV at home, Kenya 2007.

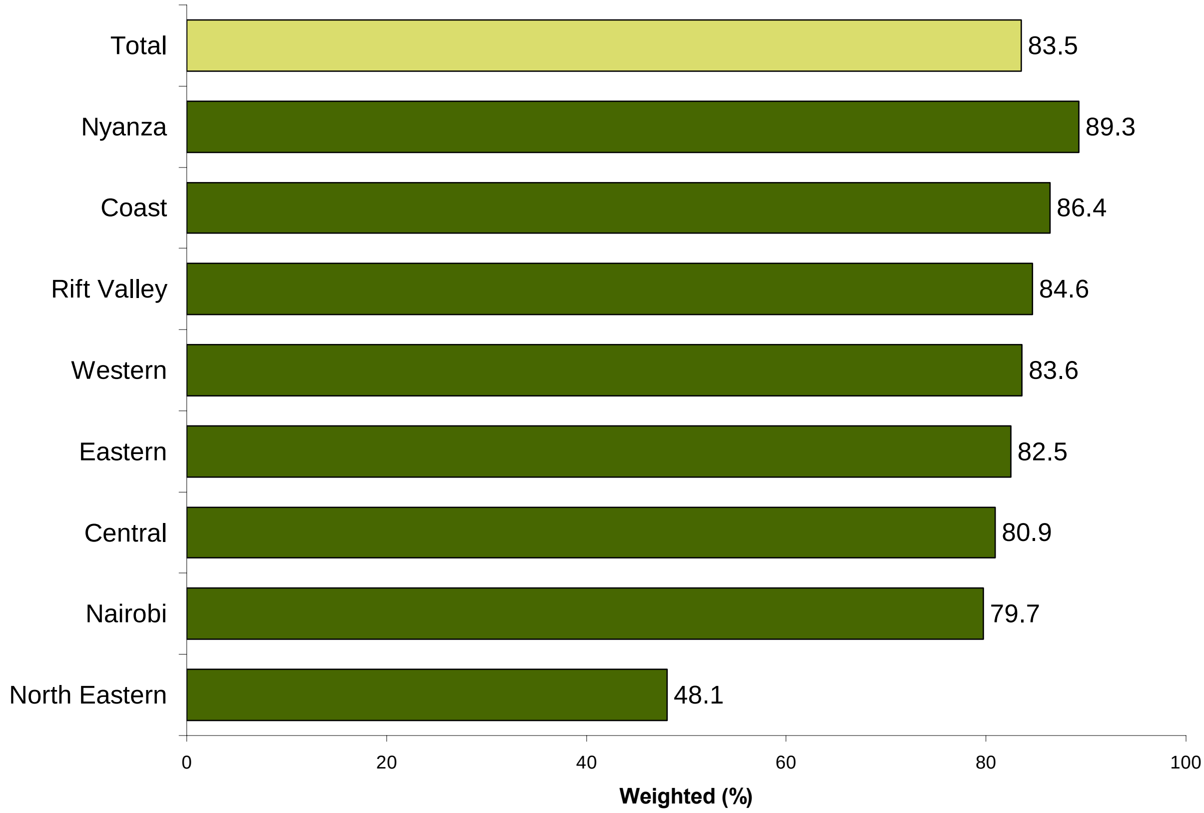


Figure 4.6 Rate of willingness to be tested at home was high throughout Kenya, except for North Eastern province.

Respondents who self-reported HIV-infected (approximately 1%) would not be eligible for re-testing for HIV and were therefore excluded from this analysis. The analysis was limited to those who had never been tested for HIV or those who had been tested and self-reported uninfected with HIV.

A total of 83.5% nationally agreed that they would be willing to be tested for HIV at home, which was similar across sex, age, wealth and rural/urban residence. There was little variation in response across provinces except for North Eastern province, where only 48.1% of people stated that they would be willing to be tested at home. Willingness to test at home was high among those who had ever been

[1] Bolu O, Allread V, Creek T, et al. Approaches for scaling up human immunodeficiency virus testing and counseling in prevention of mother-to-child human immunodeficiency virus transmission settings in resource-limited countries. Am J Obstet Gynecol 2007; 197:S83-9.

tested for HIV (86.0%) and those who had never been tested (82.4%), suggesting that home-based testing could be a promising option for improving HIV testing coverage in the general population.

4.7. Gaps and unmet needs

- **Two-thirds of adults aged 15-64 years have not been tested for HIV; testing coverage needs to increase substantially to reach the national goal of testing 80% of all adolescents and adults.**
- **Special efforts are needed to bring HIV testing to men, in whom coverage is particularly low. Routine provider initiated opt-out testing in outpatient and inpatient settings should be considered.**
- **The major reason for not testing is low perception of risk, which should be addressed in HIV testing campaigns.**
- **Home testing is considered acceptable to 83.5% of persons aged 15-64 years and may help achieve the national testing goal.**

Knowledge and Disclosure of HIV Status chapter 5

5.1. Key findings

- **Nearly all (98.2%) respondents who had ever been tested for HIV were willing to share the results of their last HIV test.**
- **Overall, 83.6% of respondents found to be HIV-infected in the 2007 KAIS were not aware of their HIV infection.**
- **Respondents disclosed their HIV status to their partners in 35.1% of the partnerships that were reported in the year prior to the survey.**
- **Respondents reported a partner of unknown HIV status in 77.9% of their partnerships in the year prior to the survey.**
- **Among married and cohabiting couples, 5.9% of couples were HIV-discordant, that is, one partner was HIV-infected and the other was not.**
- **Among HIV-infected adults who were married or cohabiting, 43.4% of women and 44.4% of men had an HIV-uninfected primary partner.**

5.2. Introduction

Knowledge of one's HIV status is essential for accessing HIV care, treatment and prevention services. HIV-infected persons who know their status can benefit from life-saving care and treatment services, including daily cotrimoxazole (an antibiotic that prevents many common opportunistic infections that affect people with advanced HIV), antiretroviral (ARV) medications for treating HIV and HIV-related primary care services. In addition, HIV-infected persons who know they are infected and are appropriately counseled on risk reduction behaviour may be less likely to engage in unprotected sex with their sex partners. Moreover, couples in HIV discordant relationships, in which one person is HIV-infected and the other person is HIV-uninfected, may have a reduced chance of transmitting HIV if the couple knows their HIV status and is counseled appropriately on how to reduce the risk of transmitting HIV to the uninfected partner. This chapter presents findings from the 2007 KAIS on knowledge of HIV infection, disclosure of HIV status to sexual partners and HIV concordance and discordance among couples.

Appendix B.5 provides sample sizes and 95% confidence intervals for estimates presented in this chapter. Throughout the chapter, the term significant indicates a chi-square p-value less than 0.05; marginally significant indicates a p-value between 0.05 and 0.10, inclusive; and not significant indicates a p-value greater than 0.10.

Population estimates reported in this chapter were calculated based 2007 projected population by province, age and sex reported in *Revised Population Projections for Kenya 2000-2020. Kenya National Bureau of Statistics (August 2006)*. Weighted national estimates for selected indicators from the 2007 KAIS were used in these calculations. Methods used for calculating population estimates are described in Appendix A.

5.3. Knowledge of HIV infection

In this section we focus on respondents who were found to be HIV-infected in the 2007 KAIS based on laboratory test results from the survey. We present information on those who knew and those who did not know they were infected with HIV.

DATA IN CONTEXT

Self-reported HIV status based on most recent HIV test and 2007 KAIS HIV test results

98.1% of respondents were willing to share the results of their last HIV test.

Self-reported HIV status allows us to compare what people believed their HIV status to be based on their last HIV test to actual HIV status based on laboratory testing results in the 2007 KAIS. The following categories are used in this report:

- **Self-reported positive**: respondent reported that he/she had ever had an HIV test and that the most recent test result was positive.
- **Self-reported negative**: respondent reported that he/she had ever had an HIV test and that the most recent test result was negative.
- **HIV-infected**: respondent consented to testing in KAIS and result was positive.
- **HIV-uninfected**: respondent consented to testing in KAIS and result was negative.

Figure 5.3a Self-reported HIV status among HIV-infected persons aged 15-64 years, Kenya 2007.

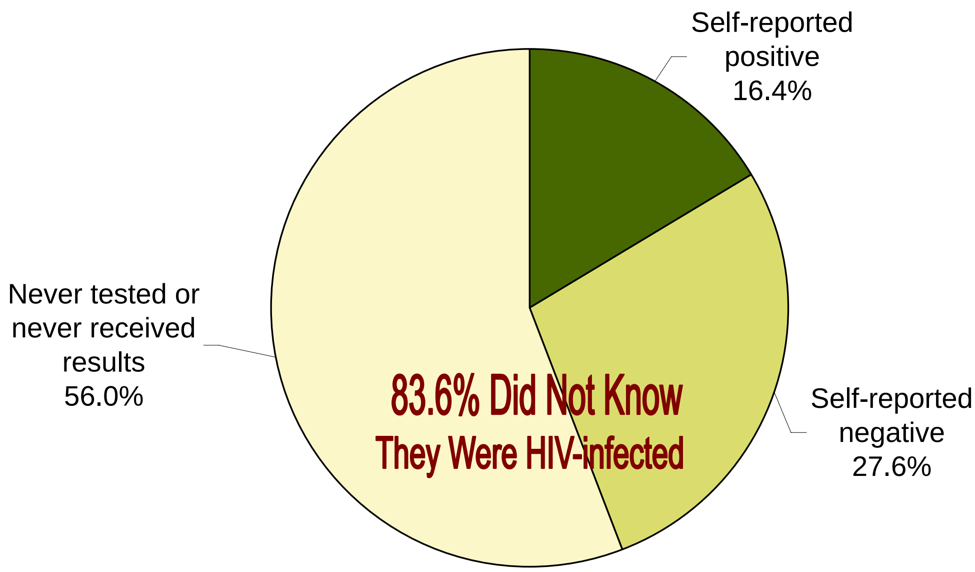
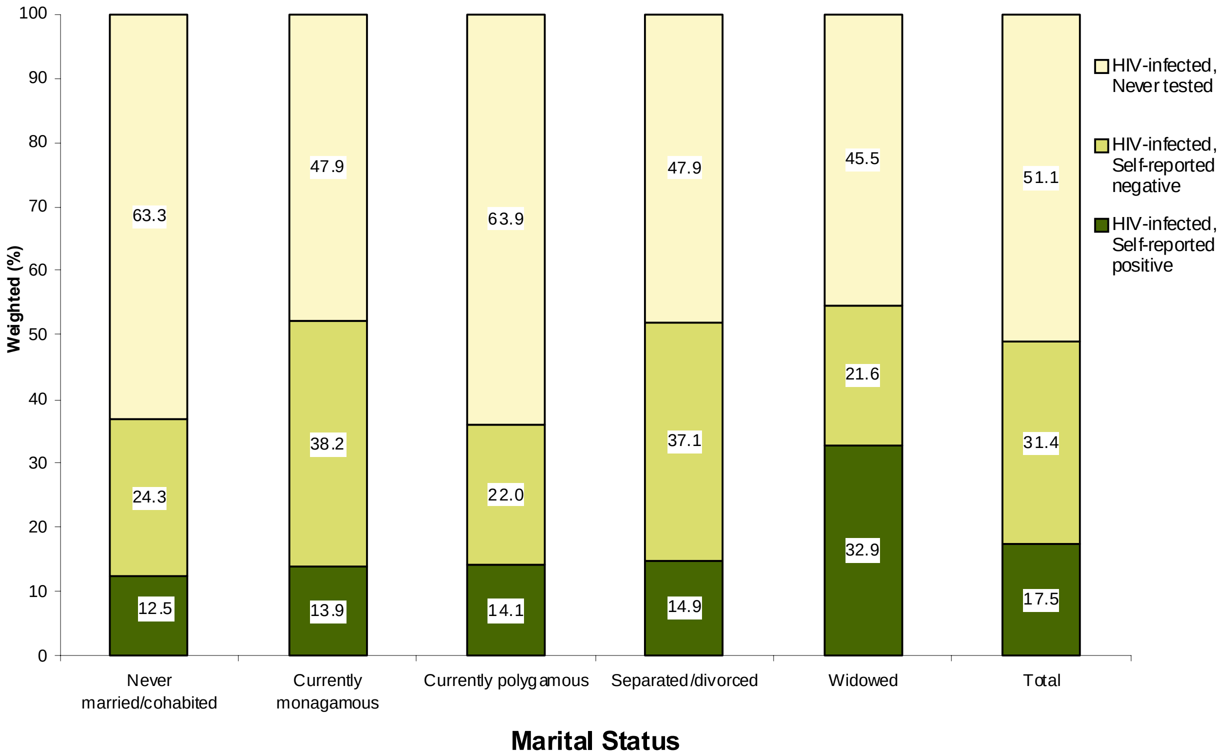


Figure 5.3a The majority of HIV-infected persons did not know they were HIV-infected.

Among all HIV-infected persons in the 2007 KAIS, only 16.4% self-reported positive based on their last HIV test. Overall, 27.6% of HIV-infected persons self-reported negative, that is, these participants believed themselves to be HIV-uninfected based on the results of their last HIV test. The remaining 56.0% reported that they had either never been tested or had been tested but never received a test result. HIV-infected women (31.4%) were significantly more likely than men (19.5%) to self-report negative based on their last test result. In total, 83.6% of HIV-infected adults aged 15-64 years were unaware of their HIV infection because they had never been tested, had been tested but never received a test result, or believed themselves to be uninfected based on their last test. Based on these findings, in 2007, an estimated 1.1 million HIV-infected adults nationwide were unaware of their HIV status, including an estimated 700,000 women and 400,000 men.

Although 45.0% of HIV-infected persons reported having had a previous HIV test before the 2007 KAIS, the majority (62.8%) of these persons self-reported negative based on their last test result. Many of these people may have become HIV-infected since their previous test. Most respondents (56.4%), for example, reported that their last HIV test was performed over 12 months prior to the 2007 KAIS. These persons may have been exposed and infected since their last negative test. In addition, the median CD4 cell count was higher in this group (595.0 cells/μL) suggesting possible recent infection, as compared to HIV-infected respondents who self-reported positive (412.0 cells/μL), 51.4% of whom were currently on antiretroviral therapy. It is also possible that some of these individuals knew they were HIV-infected but did not answer the question about their HIV status accurately, although they were given a special opportunity to opt-out of answering this question and only 1.9% declined to answer.

Figure 5.3b Self-reported HIV status among HIV-infected women aged 15-64 years by marital status, Kenya 2007.



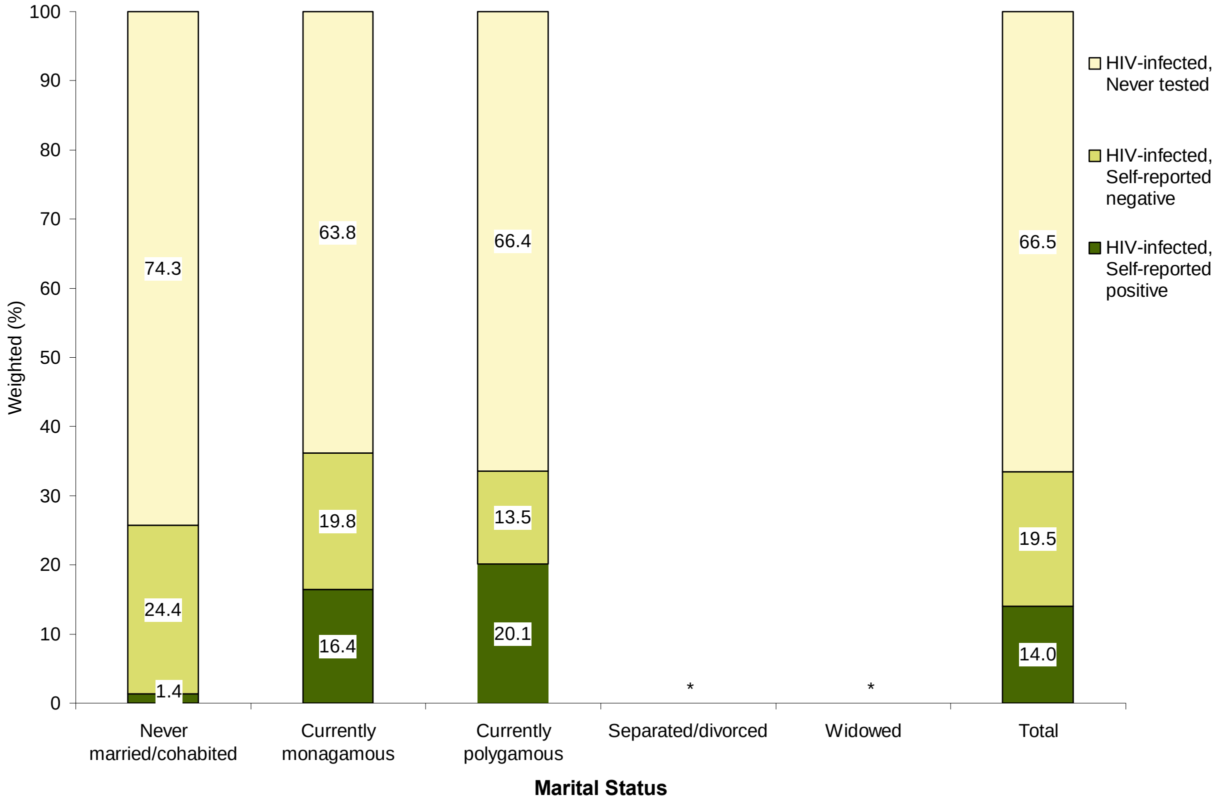
The term "currently monogamous" refers to respondents that are married or cohabiting in a union with only one wife or one female partner.

Figure 5.3b Significantly more HIV-infected widowed women were aware of their HIV infection compared to HIV-infected women who were currently married (monogamous or polygamous), separated, or divorced.

Among HIV-infected women, 12.6% had never been married or cohabited, 45.2% were currently monogamous, 10.3% were currently polygamous, 13.0% were separated or divorced and 18.8% were widowed (data not shown). In comparison to HIV-infected men, HIV-infected women were significantly less likely to be in a married or cohabiting relationship (55.5% in women vs. 77.7 % in men) and significantly more likely to be separated, divorced or widowed (31.8% in women vs. 9.4% in men) (data not shown).

A significantly higher percentage of HIV-infected widowed women (32.9%) were aware of their HIV-infection compared to HIV-infected women who were never married or cohabiting (12.5%), currently monogamous (13.9%), currently polygamous (14.1%), or separated or divorced (14.9%).

Figure 5.3c Self-reported HIV status among HIV-infected men aged 15-64 years by marital status, Kenya 2007.



The term "currently monogamous" refers to respondents that are married or cohabiting in a union with only one wife or one female partner.
*Estimates not presented due to small denominators of less than 25 observations in these categories.

Figure 5.3c A higher percent of monogamous and polygamous HIV-infected men were aware they were HIV-infected compared to never married/cohabited men; however, this difference was not statistically significant.

Among HIV-infected men, 12.9% had never been married or cohabited, 77.7% were currently married or cohabiting (68.4% had one marital partner and 9.2% were in polygamous relationships), 4.7% were separated or divorced and 4.7% were widowed (data not shown).

Although not statistically significant, a higher percentage of currently monogamous (16.4%) and currently polygamous HIV-infected men (20.1%) were aware of their HIV infection compared to never married or never cohabited HIV-infected men (1.4%).

5.4. Disclosure of HIV status to sexual partners

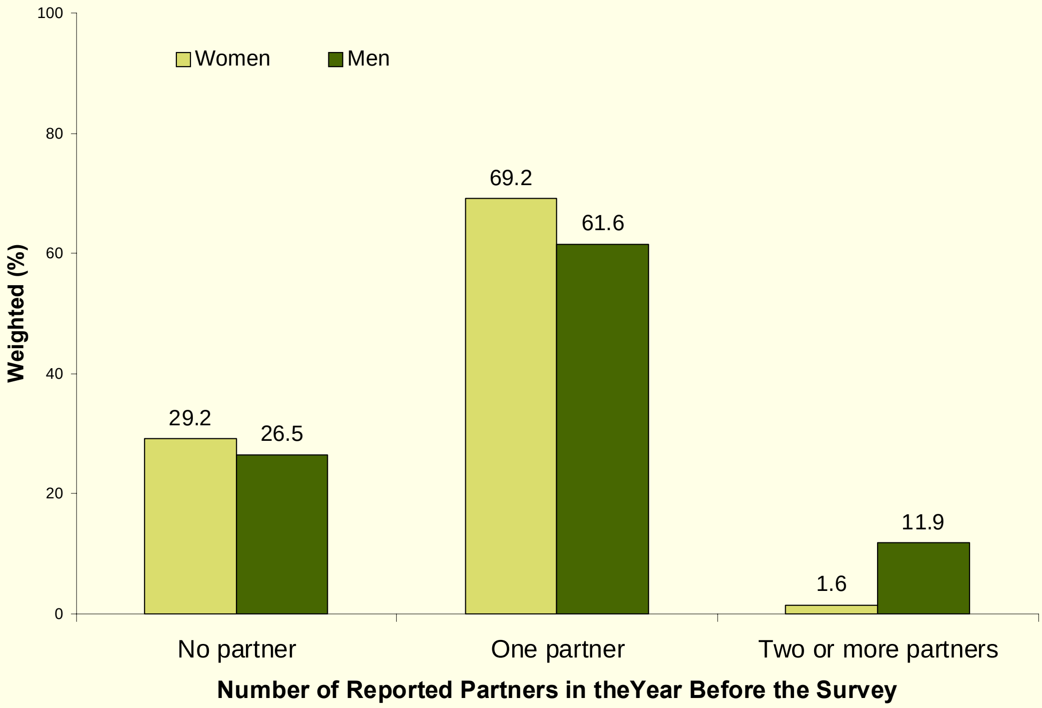
This section examines participants who disclosed their HIV status to the sexual partners they had in the year prior to the survey. Analyses in this section are limited to a subset of KAIS respondents who reported one or more sexual partners in the year prior to the survey.

DATA IN CONTEXT

Sexual partnership data in the 2007 KAIS

Respondents were asked to provide behavioral information for up to three sexual partners during the 12 months prior to their KAIS interview. This subset of data was used to create a separate sexual partnership database with each partnership contributing one unit of observation.

The majority of respondents (69.2% of all women and 61.6% of all men) reported only one partner in the 12 months before the survey. In contrast, 29.2% of women and 26.5% of men reported no partners, and 1.6% of women and 11.9% of men reported two or more partners in the 12 months before the survey.



Because individuals could report more than one sexual partner during the year before the survey, estimates in sections 5.4 and 5.5 of this report should be interpreted as percentages of all partnerships rather than percentage of all individuals. That is, if a person had three partners, each of these partnerships would be counted separately as one unit of observation in the analyses.

Figure 5.4a Partnerships in which adults aged 15-64 years disclosed their HIV status to their partners by partnership type, Kenya 2007.

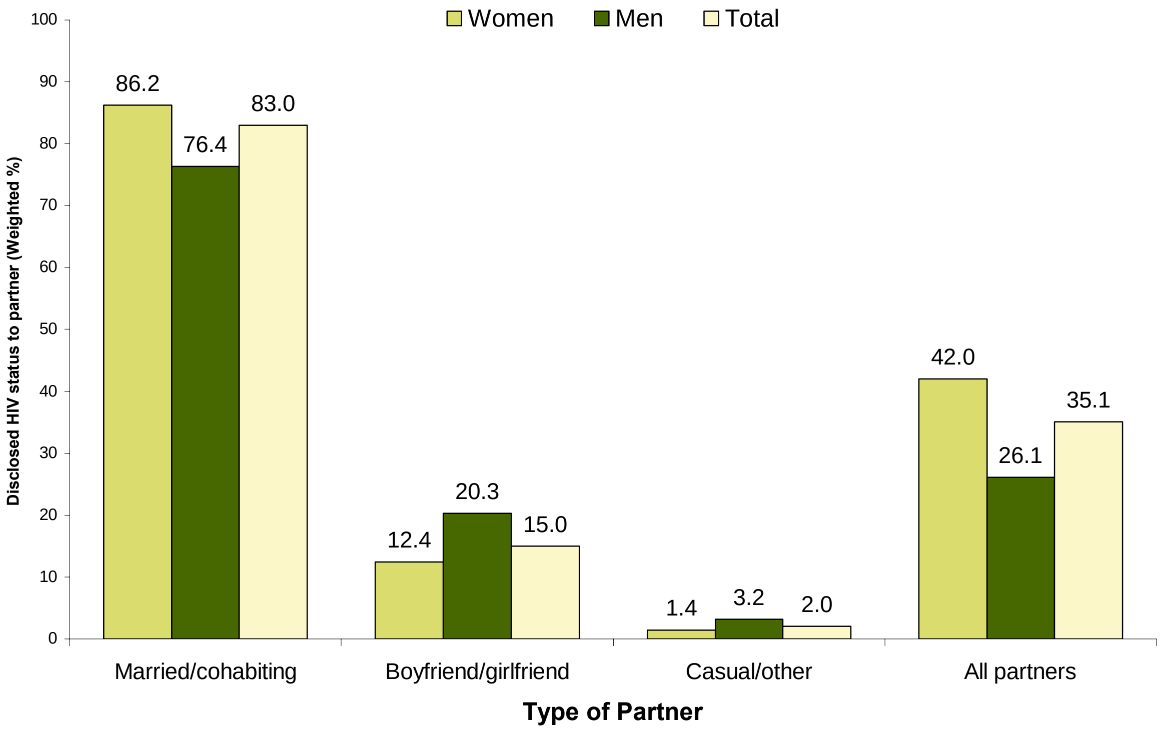


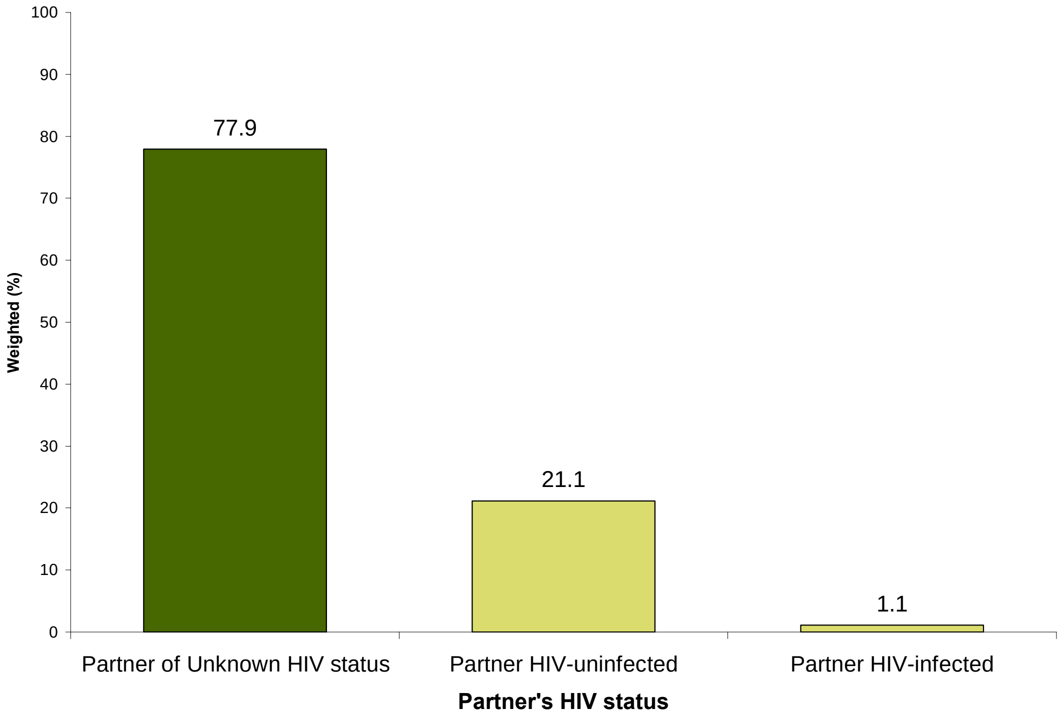
Figure 5.4a Respondents reported disclosing their HIV status to partners more frequently in married/cohabiting partnerships compared to boyfriend/girlfriend or casual partnerships.

Among respondents who had ever tested for HIV and reported at least one sexual partner in the year before to the survey, respondents disclosed their last HIV test result in 35.1% of all partnerships. Respondent disclosure rates to their partners were significantly higher among women compared to men. Additionally, respondent disclosure rates to partners differed significantly by partnership type. The percent of respondents who disclosed their HIV status to their partners was highest in married or cohabiting partnerships (83.0%) and lower in boyfriend/girlfriend partnerships (15.0%) and casual partnerships (2.0%).

5.5. Knowledge of HIV infection in partnerships

In this section, analyses focus on respondents' knowledge of the HIV status of their partners in the year before the survey. Analyses are limited to adults who reported at least one partner in the year prior to the survey. In this section a "partner of unknown status" refers to a partner who had never been tested for HIV, whose testing history was unknown to the respondent, or whose HIV test result was unknown to the respondent.

Figure 5.5a Knowledge of HIV status of partners among adults aged 15-64 years, Kenya 2007.



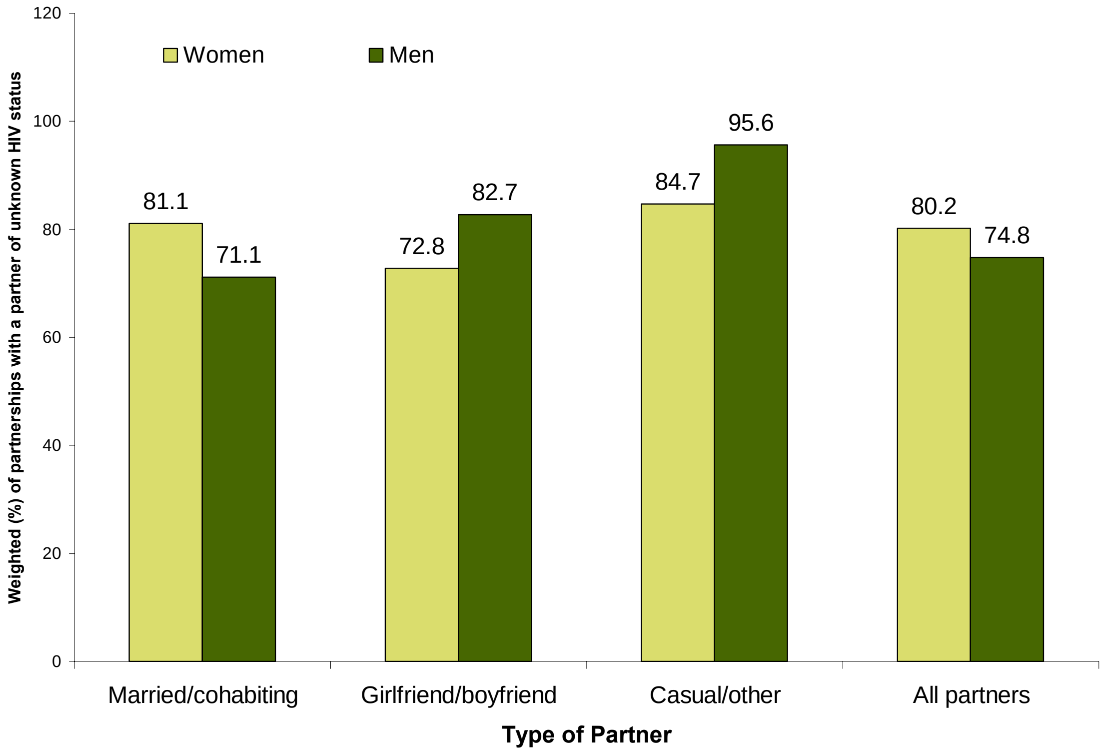
A "partner of unknown status" refers to a partner who had never been tested for HIV, whose testing history was unknown to the respondent, or whose HIV test result was unknown to the respondent.

Figure 5.5a In most partnerships (77.9%), the respondent reported having a partner of unknown HIV status.

In general, very few people were aware of their partner's HIV status. Overall, in 77.9% of partnerships, the respondent reported a partner of unknown HIV status. This was similar between women (80.2%) and men (74.8%).

A subset of respondents provided information on knowledge of their HIV status (that is, whether they believed themselves to be HIV positive or HIV negative). Based on this self-reported information, of all partnerships reported by this subset, 1.5% were thought to be HIV-discordant.

Figure 5.5b Percent of partnerhips with a partner of unknown HIV status by partnership type, , Kenya 2007.



A "partner of unknown status" refers to a partner who had never been tested for HIV, whose testing history was unknown to the respondent, or whose HIV test result was unknown to the respondent.

Figure 5.5b Women and men in casual partnerships were more likely to report a partner of unknown HIV status compared to women and men who reported other types of partnerships.

Women in married or cohabiting partnerships (81.1%) were more likely to report a partner of unknown HIV status compared to men in married or cohabiting partnerships (71.1%). In contrast, men with girlfriends (82.7%) or in casual partnerships (95.6%) were more likely than women with boyfriends (72.8%) or in casual partnerships (84.7%) to report a partner of unknown HIV status. These differences by sex were significant for all partnership types.

Figure 5.5c Percent of partnerships in which respondent was unaware of partner's HIV status by the respondent's actual HIV status and knowledge of HIV infection, Kenya 2007.

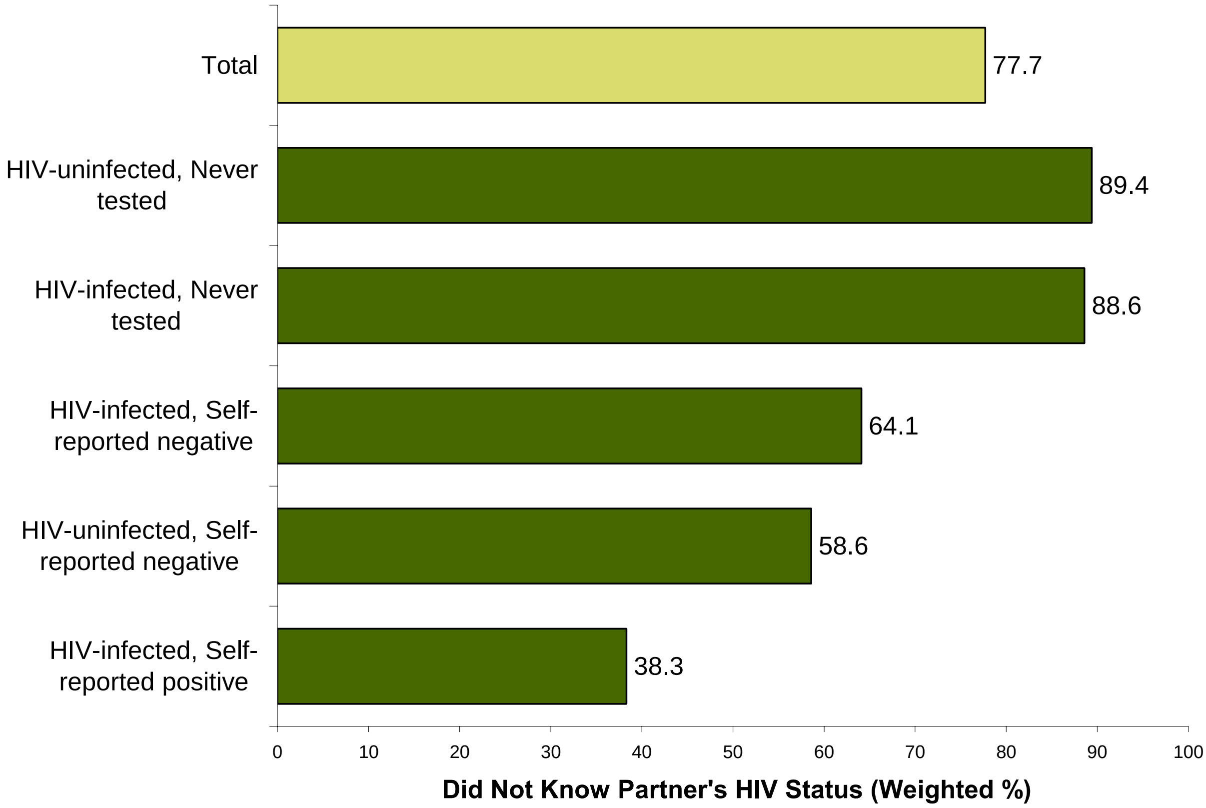


Figure 5.5c HIV-uninfected and HIV-infected respondents who had never been tested for HIV reported the highest rates of partners of unknown HIV status.

The percent of partnerships in which the respondent reported a partner of unknown HIV status varied significantly by the respondent's actual HIV status and knowledge of HIV infection. HIV-infected respondents that self-reported positive had the lowest percentage of partners of unknown HIV status (38.3%). In contrast, respondents who had never been tested, regardless of actual HIV status, had the highest percentage of partners of unknown HIV status (89.4% for respondents who were HIV-uninfected and 88.6% for respondents who were HIV-infected). Compared to those who had never been tested for HIV, HIV-infected and HIV-uninfected persons who self-reported negative had lower rates of partners of unknown HIV status (64.1% for HIV-infected and 58.6% for HIV-uninfected respondents).

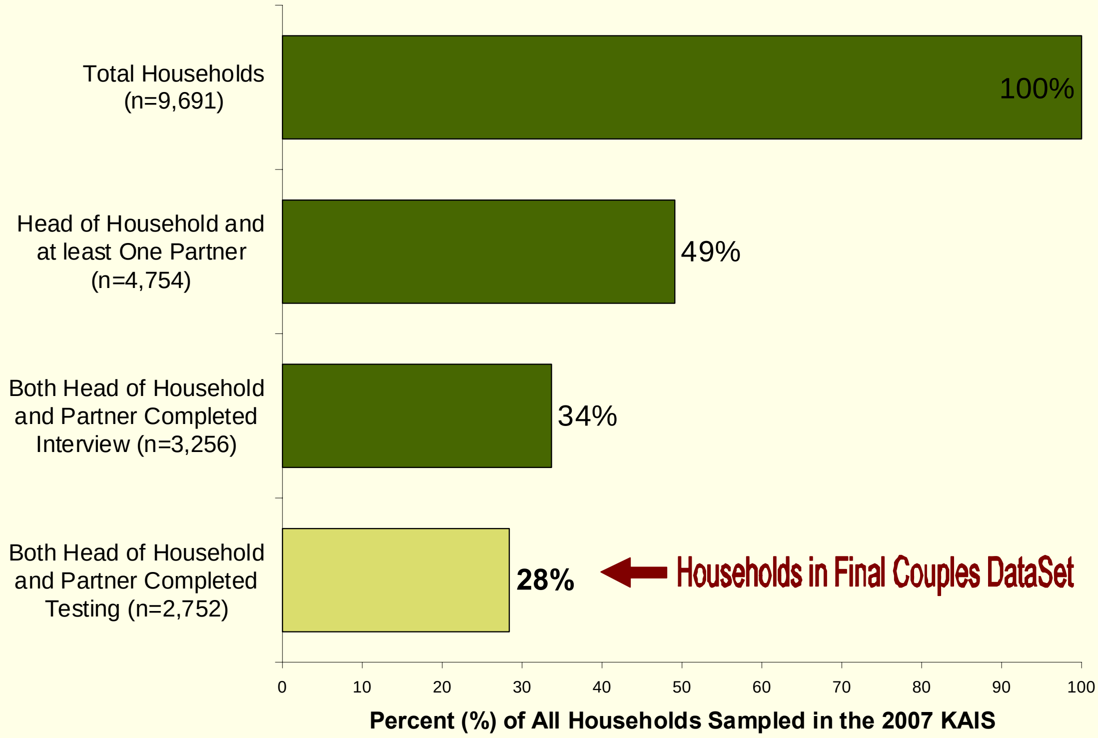
5.6. HIV-concordance and -discordance among married and cohabiting couples

In this section we examine married or cohabiting couples living in the same household who both consented to HIV testing. Households with two partners who both were tested for HIV in KAIS accounted for 28% of all households surveyed.

DATA IN CONTEXT

Married and Cohabiting Couples in KAIS: The Couples Dataset

The “couples” dataset in the 2007 KAIS was constructed by matching respondents with their primary sexual partners who resided in the same household. Because only 0.1% of male heads of household reported a second wife, only primary couples were included in the couples’ dataset. Additionally, since HIV status of couples was the main focus of these analyses, only households for which there were complete HIV test results available for both partners were included in the couples’ dataset. Of the 9,691 eligible households, 2,752 (28% of all households, or 58% of households with at least one sexual partner) met these criteria and were included in the final analyses.



HIV-discordant couples in married or cohabiting partnerships are a target group for HIV prevention because they may have more frequent sexual contact and report lower condom use compared to partners in other types of relationships. Understanding key characteristics of HIV-discordant couples has important policy and programmatic implications for HIV prevention. In the 2007 KAIS, a couple was considered HIV-discordant if one partner was HIV-infected and the other partner was HIV-uninfected. A couple was considered to be concordant HIV-uninfected if both partners were HIV-uninfected, and concordant HIV-infected if both partners were HIV-infected.

Figure 5.6a HIV-concordance and discordance among couples aged 15-64 years, Kenya 2007.

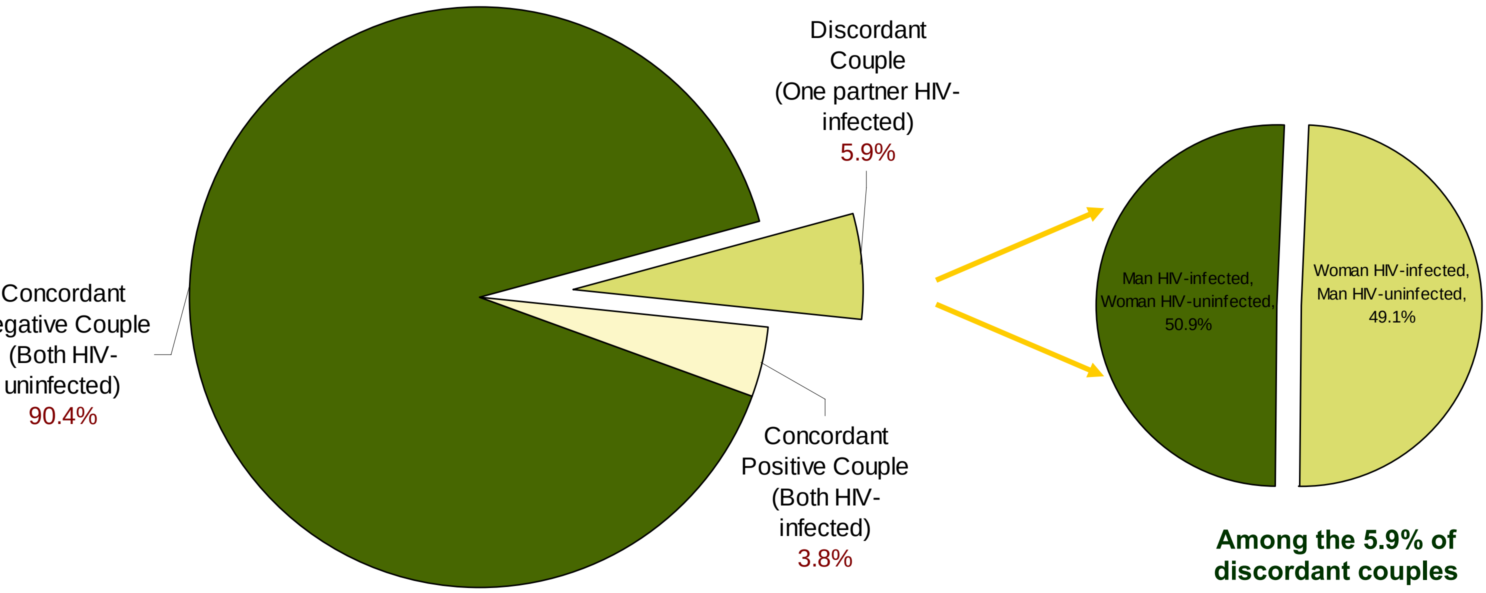
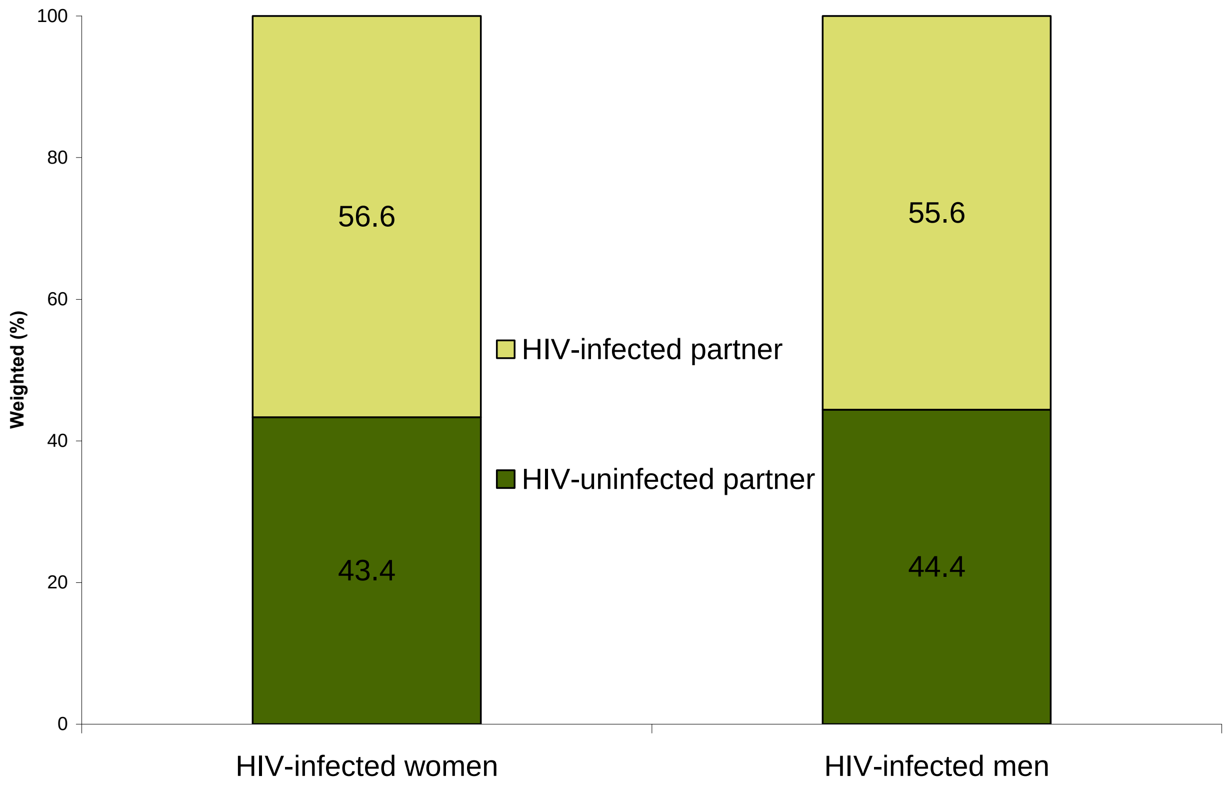


Figure 5.6a Among couples, 9.7% had at least one HIV-infected partner, and 5.9% were HIV-discordant.

The large majority (90.4%) of married or cohabiting couples were concordant HIV-uninfected. In 3.8% of married or cohabiting couples, partners were concordant HIV-infected. In 5.9% of couples, partners were HIV-discordant; that is, either only the male partner (3.0%) or the female partner (2.9%) was HIV-infected. In 50.9% of HIV-discordant couples, the man was HIV-infected and the woman was HIV-uninfected.

Figure 5.6b HIV status of primary partners among HIV-infected women and men aged 15-64 years in a couples relationship, Kenya 2007.

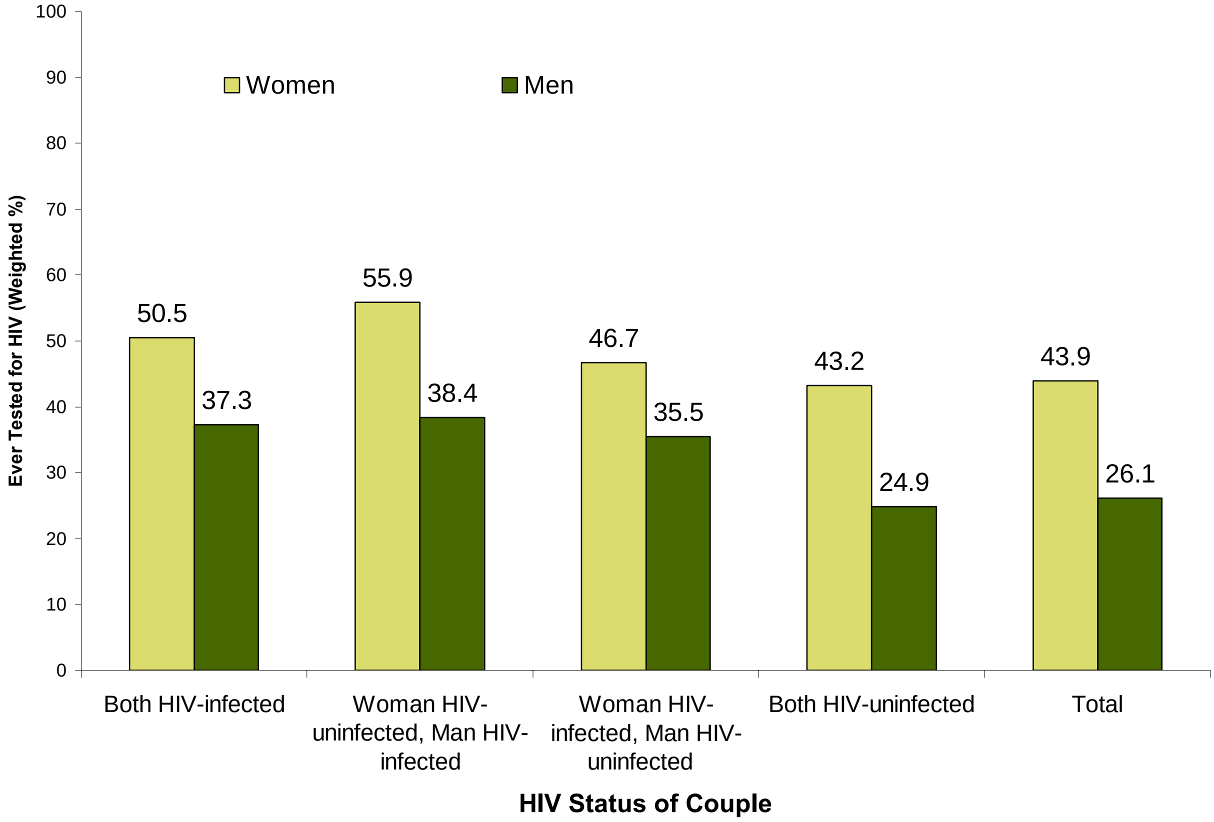


The term "couples relationship" is defined as married or cohabiting respondents residing in the same household and included in the couple's dataset.

Figure 5.6b Almost half of all HIV-infected married or cohabiting women (43.4%) and men (44.4%) were in an HIV-discordant relationship.

Among HIV-infected women in a couples relationship, 43.4% had an HIV-uninfected primary partner. Similarly, among HIV-infected men in couples relationships, 44.4% had an HIV-uninfected primary partner.

Figure 5.6c Women and men aged 15-64 years in a couples relationship that had ever been tested for HIV by HIV status of couple, Kenya 2007.



The term "couples relationship" is defined as married or cohabiting respondents residing in the same household and included in the couple's dataset.

Figure 5.6c HIV testing rates were significantly lower among men who were in relationships where both partners were HIV-uninfected compared to men in other relationships. Among women, HIV testing rates differed only marginally by the couple's actual HIV status.

Within a couples relationship, HIV testing rates were significantly higher among women compared to men. Among HIV-discordant couples, HIV testing rates were higher in women compared to men, regardless of whether the man was HIV-infected (55.9% for women compared to 38.4% for men) or the woman was HIV-infected (46.7% for women compared to 35.5% for men). Among women, HIV testing rates differed marginally by the couple's HIV-infection status; however among men, HIV testing rates differed significantly by the couple's HIV-infection status, with lowest testing rates among men in relationships where both partners were HIV-uninfected (24.9%). Overall, the vast majority (73.5%) of these men and women in HIV-discordant couple relationships were unaware of their HIV-discordant couple status.

5.7. Gaps and unmet needs

- LACK OF KNOWLEDGE OF ONE'S OWN AND ONE'S PARTNER'S HIV STATUS REMAINS AN IMPORTANT OBSTACLE TO PREVENTION.
- HIV TESTING SHOULD BE EXPANDED TO INCREASE THE NUMBER OF HIV-INFECTED ADULTS WHO DO NOT KNOW THEIR HIV STATUS.
- SPECIAL EFFORTS ARE NEEDED TO SCALE-UP HIV TESTING IN MARRIED AND COHABITING RELATIONSHIPS TO IDENTIFY HIV-DISCORDANT COUPLES AND TARGET PREVENTION WITHIN THESE RELATIONSHIPS
- RETESTING AND COUNSELLING OF PERSONS WITH CONTINUED RISK FOR HIV INFECTION SHOULD BE ENCOURAGED
- SUPPORT FOR DISCLOSURE OF HIV STATUS AND PARTNER TESTING IN MARRIED OR COHABITING PARTNERSHIPS SHOULD BE EXPANDED, ESPECIALLY FOR HIV-INFECTED INDIVIDUALS

Sexual Partners, Sexual Debut and Circumcision

chapter 6

6.1. Key findings

- **Most women (52.2%) and men (73.1%) reported more than one sexual partner in their lifetimes; 1.7% of women and 11.9% of men reported two or more sexual partners in the last year.**

- **Prevalence of HIV among both women and men varied significantly by number of lifetime sexual partners. Among those reporting 10 or more lifetime sexual partners, prevalence was 16.6% in women and 9.1% in men.**

- **Women and men reported consistent condom use in 25.7% and 42.5%, respectively, of sexual partnerships with non-marital and non-cohabiting partners in the year prior to the survey,**

- **An estimated 20.0% of women and 22.4% of men reported having had sex at least once by the age of 15 years.**

- **Overall, 85.0% of men reported being circumcised; however, less than half (48.2%) of men reported being circumcised in Nyanza province. Nationally 13.2% of uncircumcised men were HIV-infected compared to 3.9% of circumcised men.**

6.2. Introduction

This chapter describes the prevalence of factors that can be associated with sexual transmission and acquisition of HIV. These factors include the number of sexual partners, condom use, age of sexual debut and male circumcision.

Appendix B.6 provides sample sizes and 95% confidence intervals for estimates presented in this chapter. Throughout the chapter, the term significant indicates a chi-square p-value less than 0.05; marginally significant indicates a p-value between 0.05 and 0.10, inclusive; and not significant indicates a p-value greater than 0.10.

For any analysis that compared the 2003 KDHS and the 2007 KAIS data in this chapter, the z-test statistic was used compare the two weighted estimates from 2003 and 2007 and determine if differences were statistically significant. Methods used for calculating the z-test statistic are described further in Appendix A.

6.3. Number of lifetime sexual partners

Figure 6.3a. Women and men aged 15-64 years by number of lifetime sexual partners, Kenya 2007.

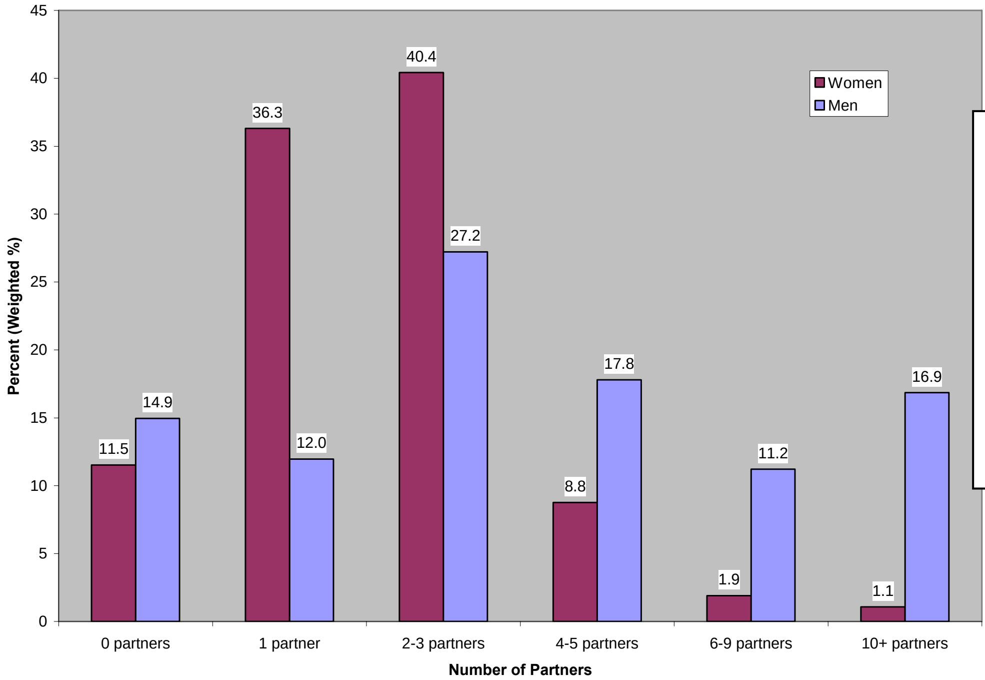


Figure 6.3a. Women and men reported significantly different numbers of sexual partners over their lifetimes.

The number of lifetime sexual partners varied significantly by sex. Nearly half (45.9%) of men reported four or more lifetime sexual partners compared to 11.8% of women. Conversely, more women (36.3%) than men (12.0%) reported having only one lifetime sexual partner.

Figure 6.3b. HIV prevalence among women and men aged 15-64 years by number of lifetime sexual partners, Kenya 2007.

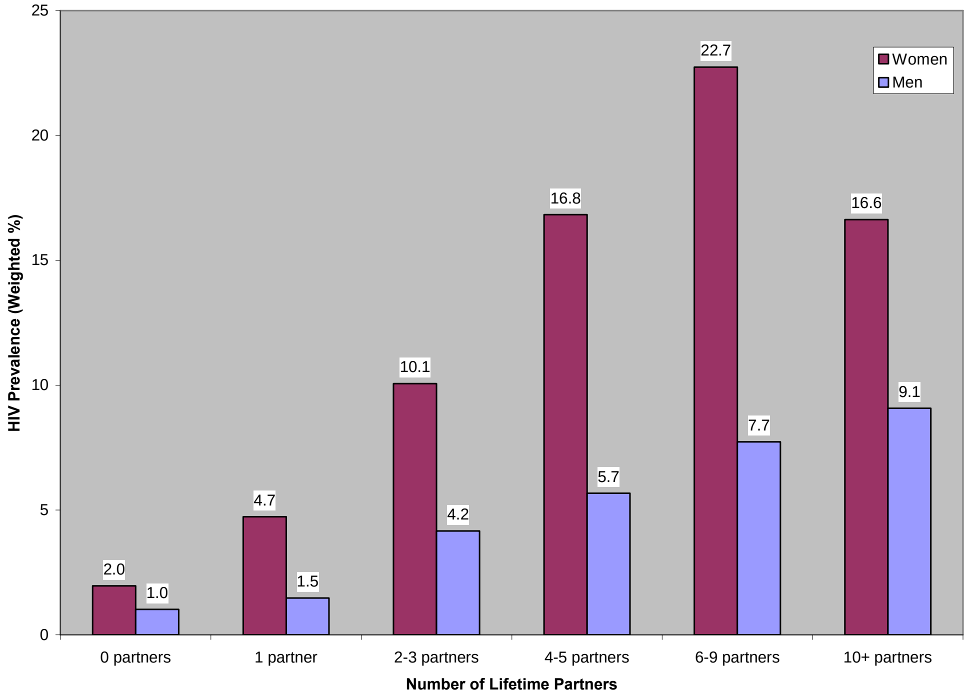


Figure 6.3b. HIV prevalence varied significantly by number of lifetime partners among both women and men.

Among both women and men, HIV prevalence increased steadily with increasing number of lifetime sexual partners. HIV prevalence peaked among women who reported having six to nine lifetime sexual partners (22.7%). Among men, prevalence increased monotonically with increasing lifetime partners, with the highest HIV prevalence among men who reported 10 or more lifetime sexual partners (9.1%).

Figure 6.3c. Women and men aged 15-64 years by number of sexual partners in the year before the survey, Kenya 2007.

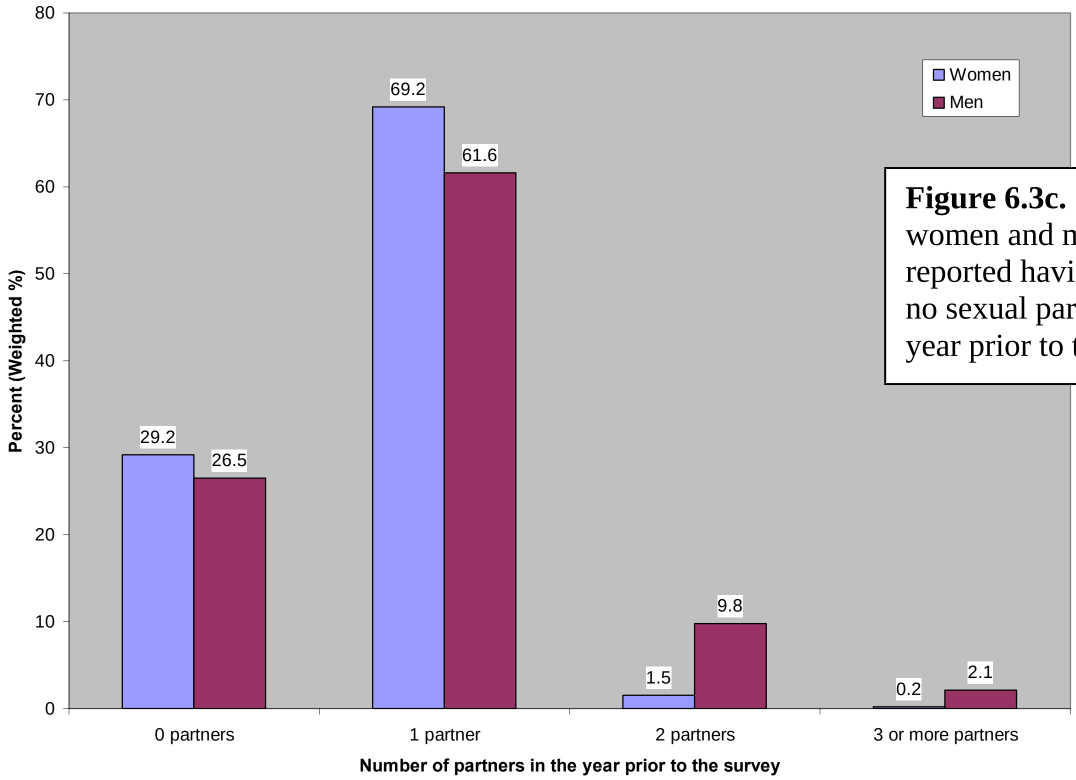


Figure 6.3c. Most women and men reported having one or no sexual partner in the year prior to the survey.

Women and men varied significantly by number of sexual partners in the year prior to the survey. Most respondents reported having one sexual partner in this time frame (69.2% for women and 61.6% for men). Significantly less women (1.7%) than men (11.9%) reported two of more partners in during this time.

DATA IN CONTEXT

Concurrent Partnerships

Concurrent partnerships are characterized by having multiple sexual partnerships that overlap in time, in contrast to engaging in partnerships that are sequential. Unprotected sex within concurrent partnerships allows HIV to spread rapidly through sexual networks, especially during the short time following new infection (a few weeks to one month) when viral load is high and people are likely to transmit HIV. Concurrent sexual partnerships with low condom use may expalin some of the spread of HIV in sub-Saharan Africa.

Measuring concurrent partnerships can be difficult in population-based surveys as it requires detailed information on the timing of sexual activity with each partner. Having two or more partners in the last year, while necessary for concurrency to occur, is not a perfect marker for this behaviour because the partnerships may not have overlapped in time. The 2007 KAIS was unable to accurately assess sexual concurrency due to limitations in the survey questionnaire.

Figure 6.3d. HIV prevalence among women and men aged 15-64 years by number of sexual partners in the year before the survey, Kenya 2007.*

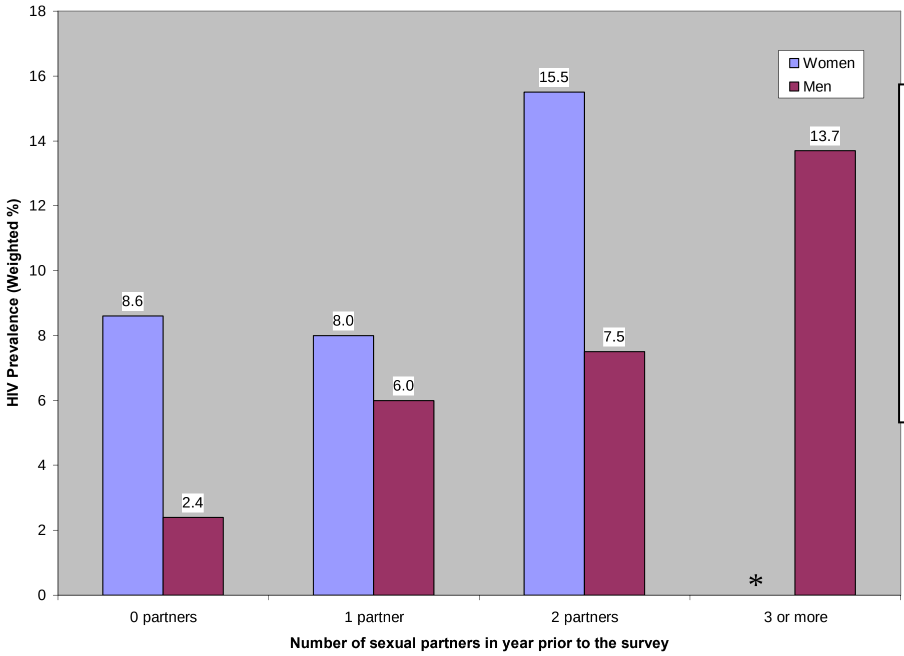
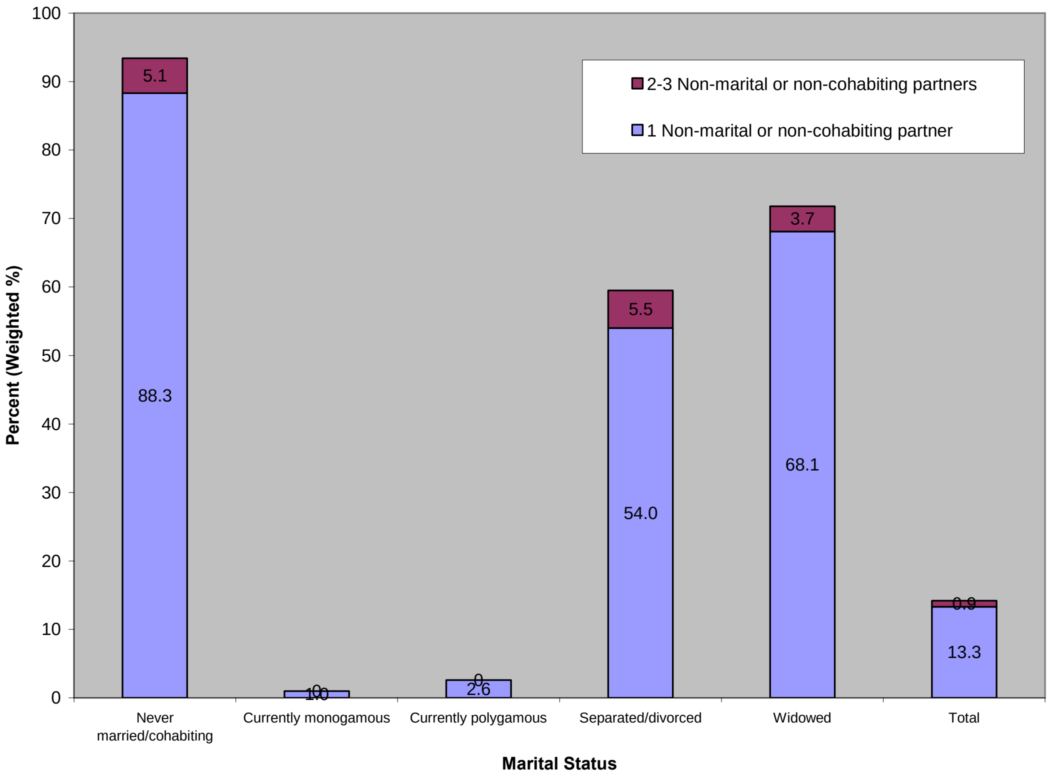


Figure 6.3d. HIV prevalence was highest among women and men reporting multiple partners (two or more sexual partners) in the past 12 months.

* Estimate not presented due to less than 25 observations in this category

HIV prevalence varied significantly by number of partners in the year prior to the survey for both women and men. Among men, HIV prevalence increased monotonically from 2.4% for those reporting no partners to 13.7% for men reporting three or more sexual partners in the year prior to the survey. Among women, HIV prevalence was highest among those reporting two sexual partners in the year prior to the survey (15.5%).

Figure 6.3e. Women aged 15-64 years reporting non-marital or non-cohabiting sexual partnerships in the year before the survey by marital status, Kenya 2007.

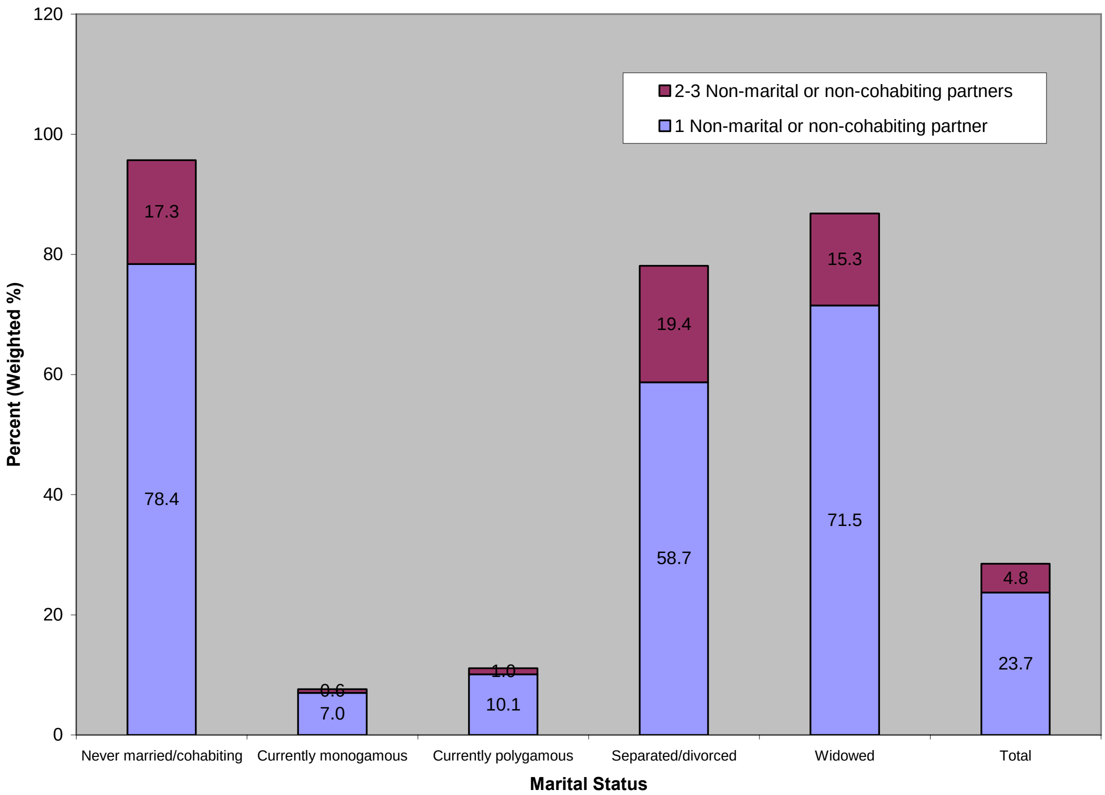


The term "currently monogamous" refers to respondents that are married or cohabiting in a union with only one wife or one female partner.

Figure 6.3e. Women who were currently married (either monogamous or polygamous) reported very low levels of partnerships outside of the marriage.

The percent of women reporting non-marital or non-cohabiting partners in the year before the survey varied significantly by marital status. Among women who had never married or cohabited, 93.4% reported at least one non-marital or non-cohabiting partner during this time frame, while among women who were separated or divorced, 59.5% reported at least one non-marital or non-cohabiting partner. Extramarital relationships were not common among women, with only 1.0% of currently monogamous women and 2.6% of currently polygamous women reporting at least one non-marital or non-cohabiting partner.

Figure 6.3f. Men aged 15-64 years reporting non-marital or non-cohabiting sexual partnerships in the year before the survey by marital status, Kenya 2007.



The term "currently monogamous" refers to respondents that are married or cohabiting in a union with only one wife or one female partner.

> **Figure 6.3f.** Overall, 28.5% of men reported at least one non-marital or non-cohabiting partner in the year before the survey. Similar to women, currently married men reported the lowest level of non-marital or non-cohabiting partnerships.

The percent of men reporting non-marital or non-cohabiting partners in the year before the survey varied significantly by marital status. Among men who had never married or cohabited, 95.7% reported at least one non-married or non-cohabiting partner; among men who were separated or divorced at the time of the survey, 78.1% reported at least one non-married or non-cohabiting partner. Of currently monogamous men, 7.6% reported having at least one non-marital or non-cohabiting partner, while among polygamous men, 11.1% reported this behaviour.

Figure 6.3g. Women and men aged 15-64 years who reported one or more non-married or non-cohabiting sexual partnerships in the year before the survey by five-year age group, Kenya 2007.

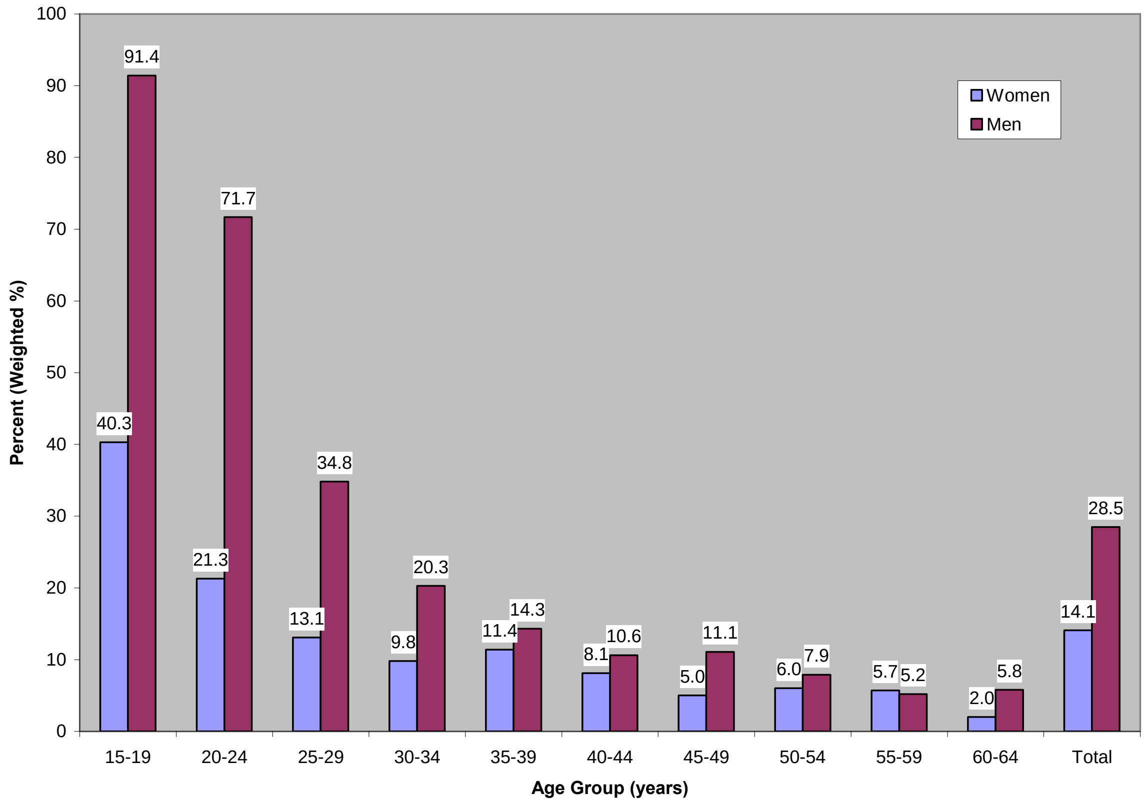


Figure 6.3g. Young women and men aged 15-19 years had the highest level of non-marital or non-cohabiting partnerships compared to other age groups. The level of non-marital or non-cohabiting partnerships decreased significantly with increasing age.

The percent of women and men reporting non-marital or non-cohabiting partners significantly decreased with increasing age, with women and men aged 15-19 years reporting the highest levels of non-marital and non-cohabiting partnerships (40.3% compared to 91.4%, respectively). After 50 years of age, less than 10% of respondents reported having one or more non-marital or non-cohabiting partner. Note, this association was not adjusted for possible confounders which may have biased the findings, such as marital status.

6.4. Condom use

This section reports on condom use with sexual partners, among the 70.9% of women and 73.5% of men who reported having sex in the year before the survey. Since respondents could report more than one partner in the year before the survey, estimates should be interpreted as percentages of all partnerships rather than percentages of all individuals. That is, if a respondent had three partners, each partnership was counted separately in the analysis.

In this section, "consistent condom use" is defined as condom use every time the respondent had sexual intercourse with a partner in the 12 months prior to the survey. A "partner of unknown status" refers to a partner who had never been tested for HIV, whose testing history was unknown to the respondent, or whose HIV test result was unknown to the respondent.

Figure 6.4a. Partnerships in which respondents aged 15-64 years reported consistent condom use in the year before the survey, by partnerships type, Kenya 2007

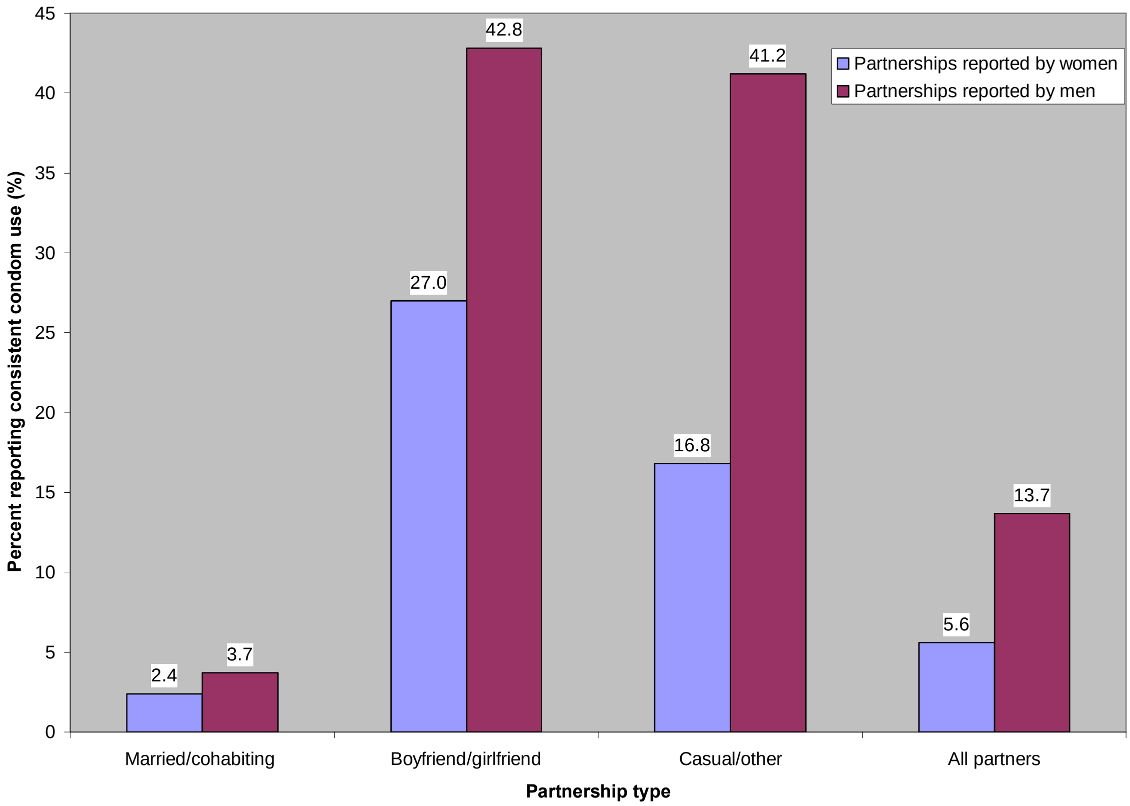


Figure 6.4b. Consistent condom use in the year before the survey was significantly lower among married or cohabiting partnerships compared to other partnership types.

Overall, consistent condom use was significantly higher among partnerships reported by men compared to those reported by women. Within partnerships, consistent condom use was lowest in married or cohabiting partnerships, with only 2.4% of women and 3.7% of men reporting this behaviour in the year before the survey. Consistent condom use was higher, but still relatively low, with boyfriends (27.0%), girlfriends (42.8%), and casual partnerships reported by women (16.8%) and men (41.2%).

Figure 6.4b. Partnerships in which respondents aged 15-64 years reported consistent condom use with a partner of unknown HIV status in the year before the survey, by partnership type, Kenya 2007.

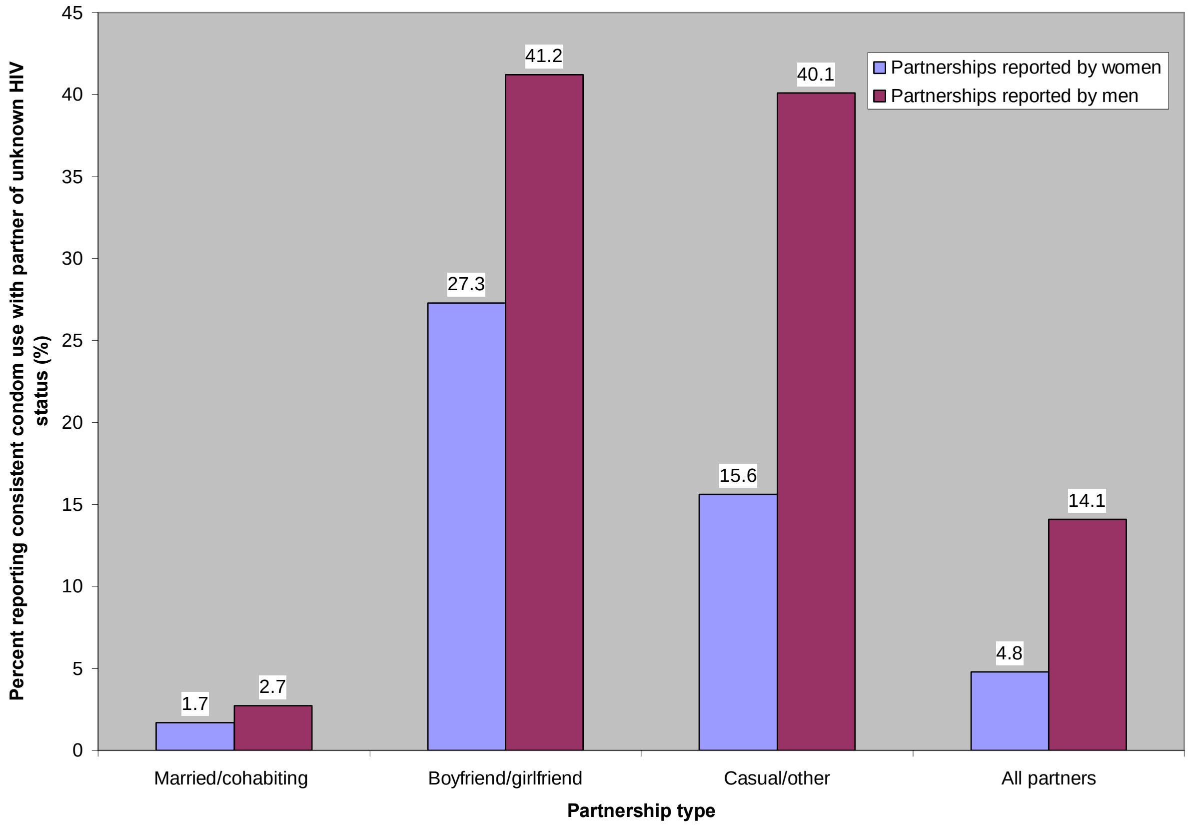


Figure 6.4c. Consistent condom use with partners of unknown HIV status was significantly higher in non-marital or non-cohabiting partnerships such as boyfriends, girlfriends, or casual partners. Still, condom use levels were low in these groups.

As described in Chapter 5, most sexual partnerships in the year before the survey (77.9%) were with partners of unknown HIV status. Consistent condom use with partners of unknown HIV status varied significantly by sex and partnership type. Men were three times more likely than women to use condoms consistently in their partnerships with partners of unknown HIV status. Consistent condom use with partners of unknown HIV status was lowest among women and men who reported being in married or cohabiting partnerships (1.2% for women and 2.7% for men) and higher among boyfriends (27.3%), girlfriends (41.2%), and casual partners (15.6% for women and 40.1% for men).

Figure 6.4c. Marital or cohabiting partnerships in which respondents aged 15-64 years reported consistent condom use in the year before the survey, by self-reported HIV status, Kenya 2007.

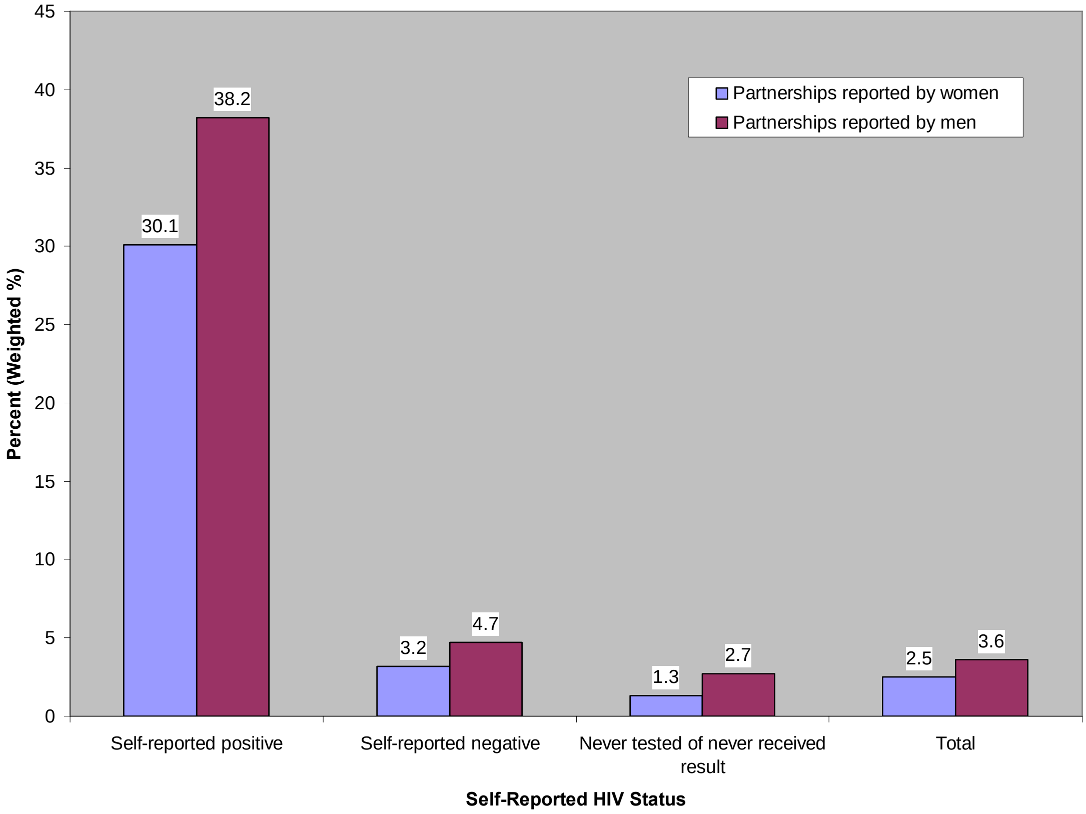


Figure 6.4c. Persons who were aware of their HIV infection had significantly higher levels of consistent condom use in their marital or cohabiting partnerships compared to persons who were unaware of their status. Still, rates of consistent condom use in this group were relatively low.

In marital or cohabiting partnerships, consistent condom use was highest in partnerships reported by women and men who self-reported positive (30.1% and 38.2%, respectively) compared to those who self-reported negative (3.2% and 4.7%, respectively) or had never been tested for HIV (1.3% and 2.7%, respectively). Too few persons who self-reported positive also reported having non-marital or non-cohabiting partnerships; thus, these results are not shown.

6.5. Age at First Sex among Youth Aged 15-24 Years

Figure 6.5a. Young women and men aged 15-24 years who reported having sex at least once by age in years, Kenya 2007.

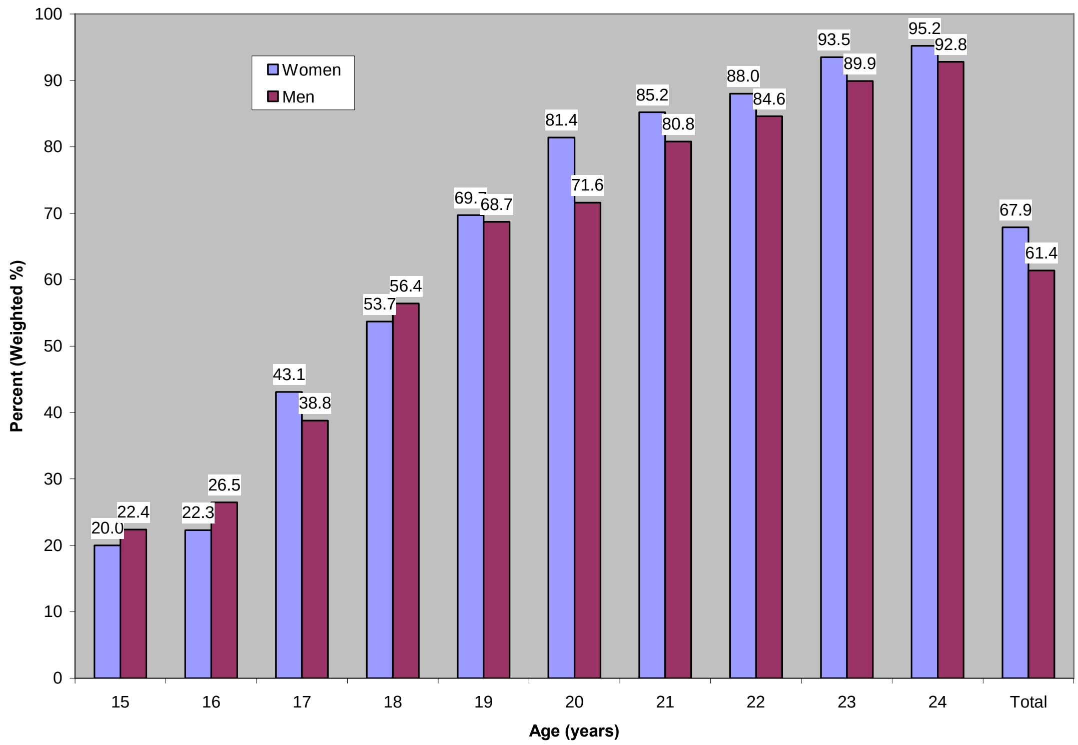


Figure 6.5a. By 15 years of age, 20.0% of young women and 22.4% of young men reported that they had already had sex at least once in their lifetime.

At the time of the survey, 20.0% and 22.4%, respectively, of young women and men 15 years of age had had sex at least once. By contrast, 53.7% of women and 56.4% of men aged 18 years reported having had sex. By 24 years of age, nearly all women (95.2%) and men (92.8%) have had sex at least once.

Figure 6.5b. Young women and men aged 15-24 years who reported sexual debut before 15 years of age, 2003 KDHS and 2007 KAIS.

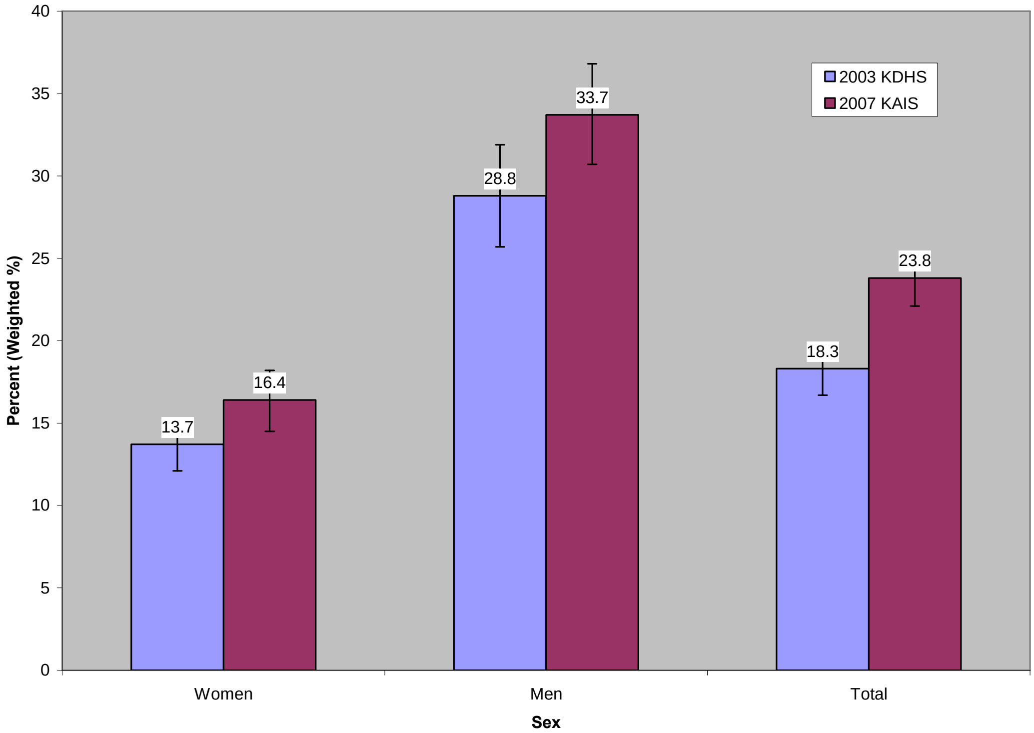


Figure 6.5b. In the 2007 KAIS, a significantly higher percent of youth aged 15-24 years reported having had their sexual debut before 15 years of age compared to the 2003 KDHS.

Between 2003 and 2007, the percent of all youth (women and men combined) reporting sexual debut before 15 years of age was significantly different in 2003 (18.3%) compared to 2007 (23.8%). This difference was not observed for young women and men separately but suggests that youth may be delaying initiation of sexual activity.

Figure 6.5c. Young women and men aged 15-24 years who reported using condoms at first sex by age of sexual debut, Kenya 2007.

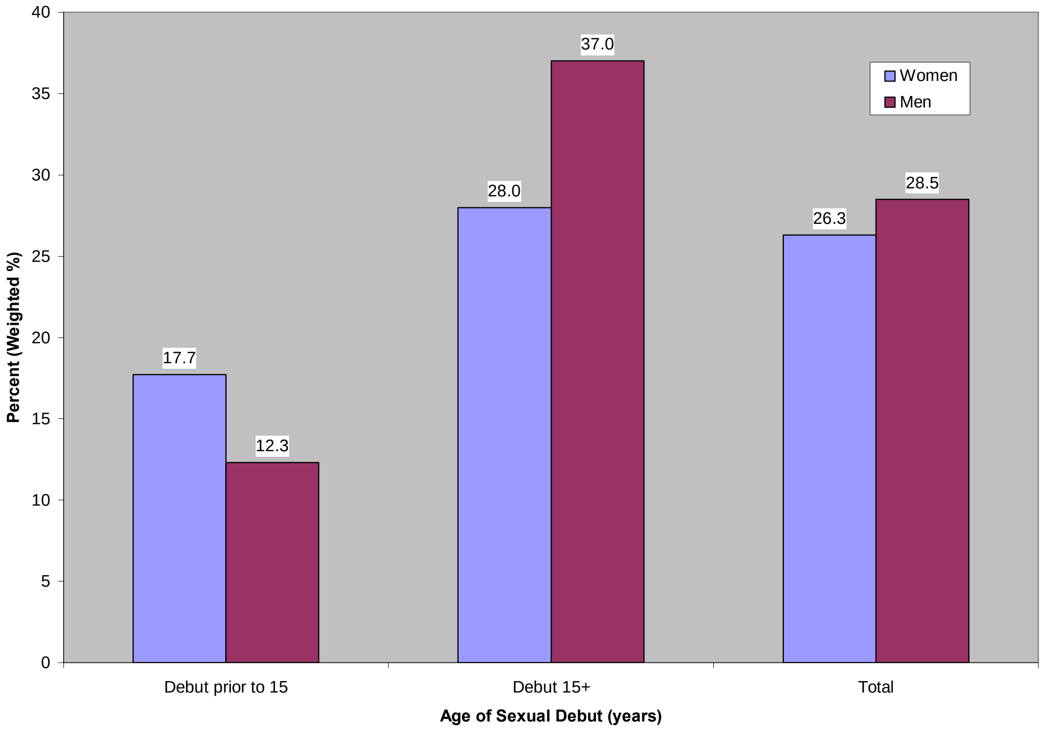


Figure 6.5c. Youth who reported that they first had sex before the age of 15 years were significantly less likely to use condoms at first sex than youth who reported sexual debut at an older age.

Among youth aged 15-24 years, condom use at first sex was significantly lower for women and men who had their sexual debut before age 15 years (17.7% and 12.3%, respectively) compared to those who had sexual debut after age 15 years (28.0% and 37.0%, respectively). Overall, condom use at first sex was low for young women (26.3%) and men (28.5%) aged 15-24 years.

Figure 6.5d. Young women and men aged 15-24 years who used a condom at first sex, Kenya 2003 and 2007.

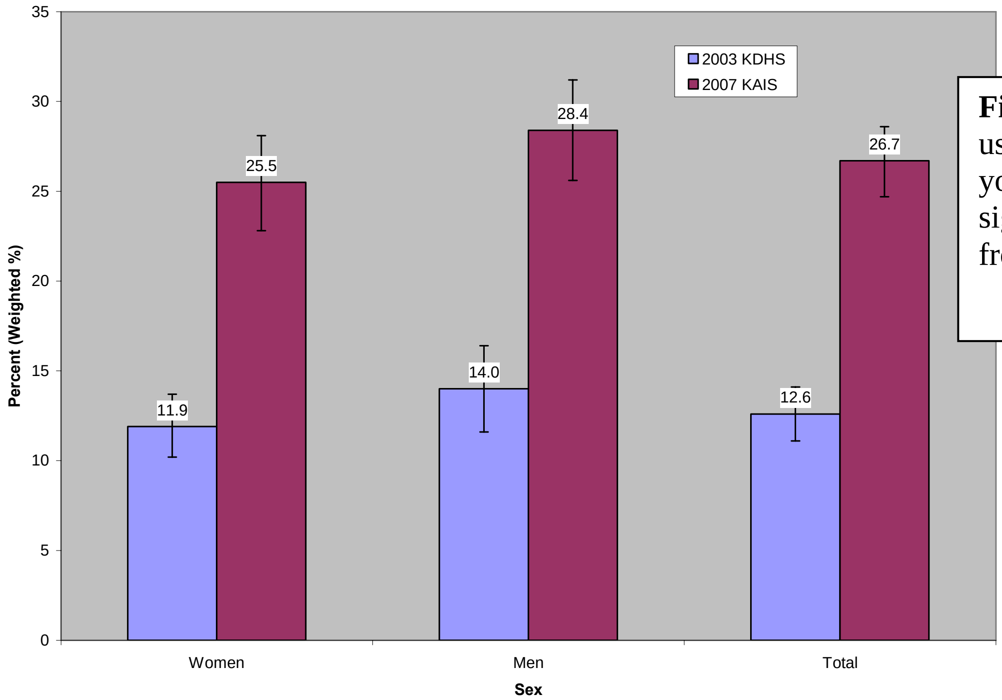


Figure 6.5d. Condom use at first sex by young women and men significantly increased from 2003 to 2007.

The percent of young women and men aged 15—24 years who reported using a condom the first time they had sex significantly increased from the 2003 KDHS to the 2007 KAIS. In the 2003 KDHS, 11.9% of young women and 14.0% of young men reported using a condom at first sex. In the 2007 KAIS the rate of condom use at first sex doubled to 25.5% of young women and 28.4% of young men.

Figure 6.5e. HIV prevalence among young women and men aged 15-24 years by age of sexual debut, KAIS 2007.

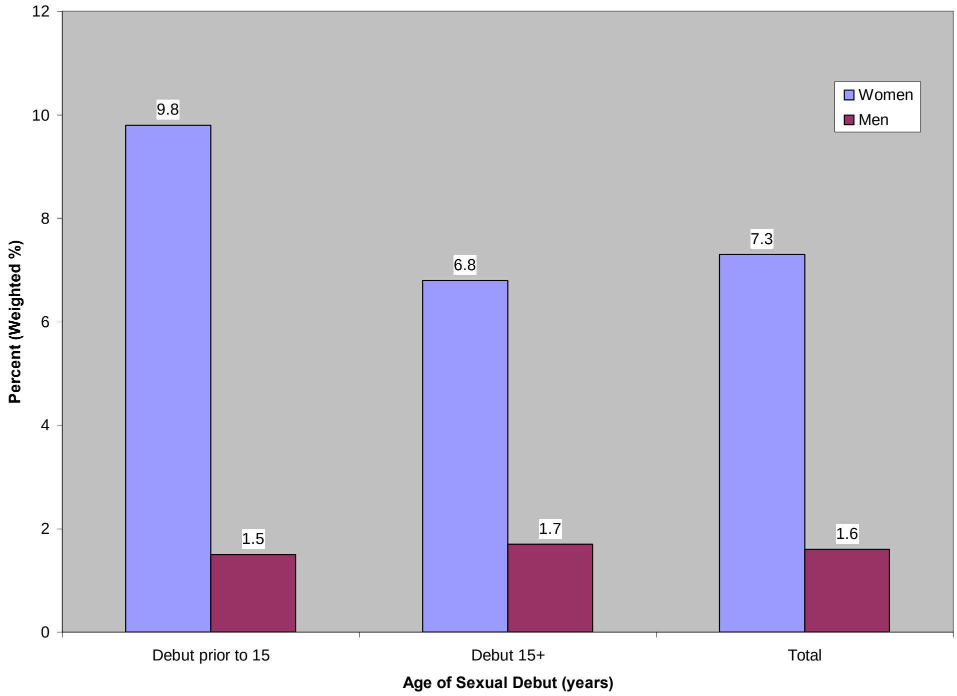


Figure 6.5e. HIV prevalence did not significantly differ by age of sexual debut for young women or young men. .

Among youth aged 15-24 years who had ever had sex, HIV prevalence did not differ significantly by age of sexual debut. Among those who reported first sex before 15 years of age, HIV prevalence was 9.8% among young women and 1.5% among young men. Among those who reported they first had sex at 15 years old or older, HIV prevalence was 6.8% among women and 1.7% among men.

6.6. Male circumcision

Figure 6.6a. Male circumcision among men aged 15-64 years by province, Kenya 2007.

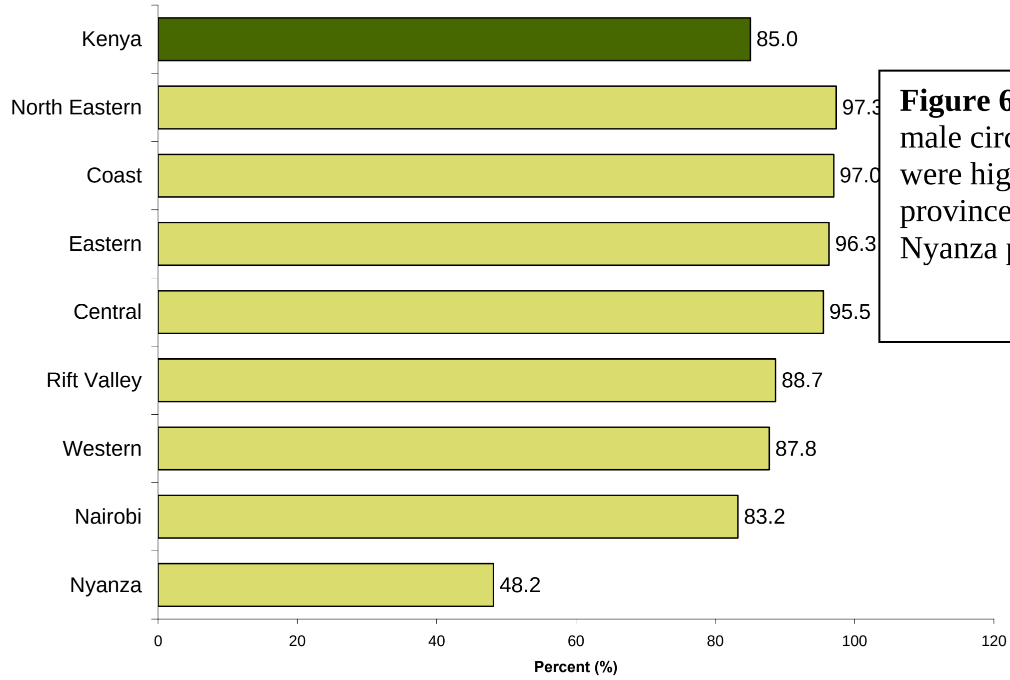


Figure 6.6a. Rates of male circumcision were high in all provinces except for Nyanza province.

Overall, 85.0% of all men in the 2007 KAIS had been circumcised. In North Eastern, Coast, Eastern and Central provinces 95.5% to 97.3% of men had been circumcised, while in Nyanza province, 48.2% of men had been circumcised.

Figure 6.6b. HIV prevalence among men aged 15-64 years by circumcision status, Kenya 2007.

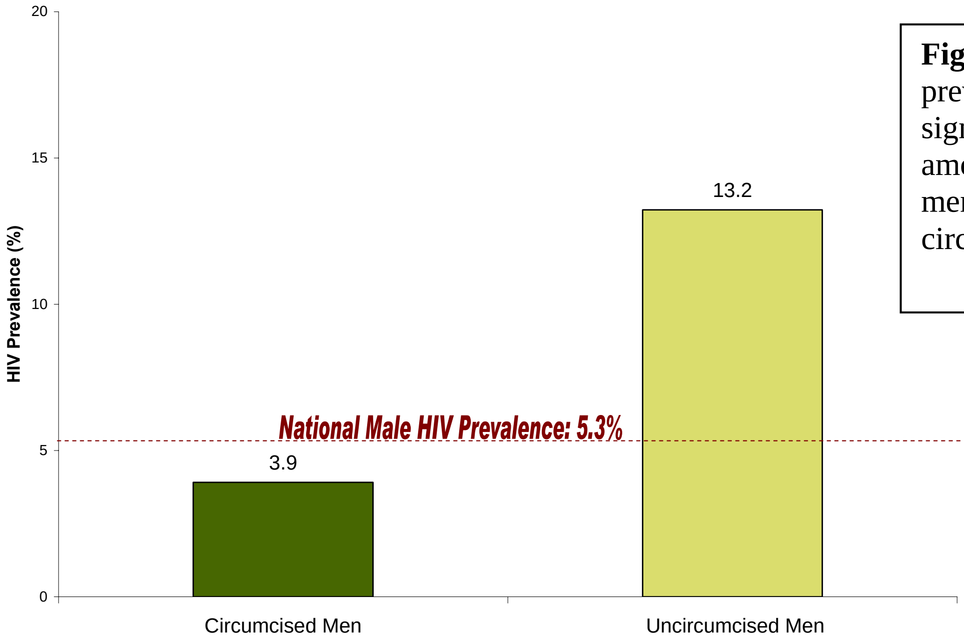


Figure 6.6b. HIV prevalence was significantly higher among uncircumcised men compared to circumcised men.

HIV status was significantly associated with circumcision status among men. Men aged 15-64 years who had not been circumcised had an HIV prevalence of 13.2%, a level over two times higher than the national male HIV prevalence of 5.3%. In contrast, among men who had been circumcised, 3.9% were infected with HIV.

Figure 6.6c. HIV prevalence among men aged 15-64 years who had ever had sex by circumcision status and five-year age group, Kenya 2007.

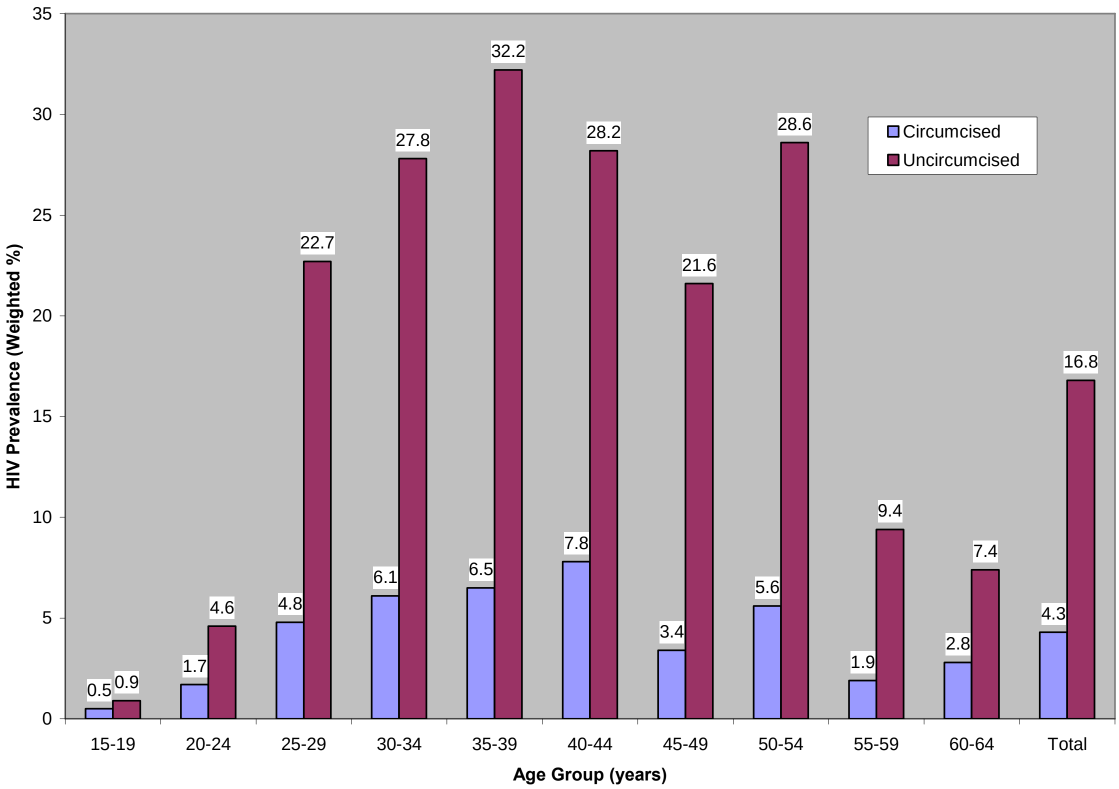
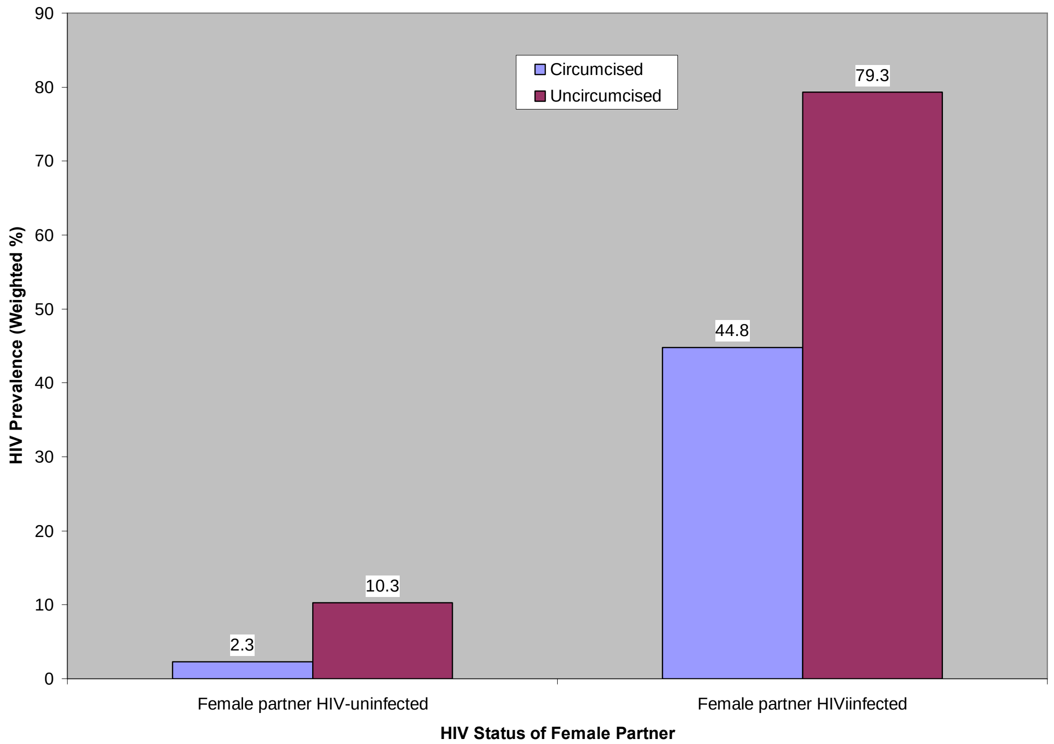


Figure 6.6c. Among uncircumcised men, HIV prevalence peaked among men aged 35-39 years at 32.2%.

HIV prevalence among circumcised and uncircumcised men varied significantly by age group, with the lowest prevalence for both groups observed in men aged 15-19 years. HIV prevalence rapidly rose thereafter to peak at 32.2% among uncircumcised men aged 35-39 years. In contrast, the peak in HIV prevalence among circumcised men was significantly lower than that of uncircumcised men at 7.8% among men aged 40-44 years. With the exception of the youngest age group (15-19 years) where HIV prevalence was similar between circumcised (0.5%) and uncircumcised men (0.9%), prevalence among circumcised men in each age group was approximately three to seven times lower than among uncircumcised men of the same age group.

Figure 6.6d. HIV prevalence among married or cohabiting men by circumcision status and HIV status of female sexual partner, Kenya 2007.



HIV status of the primary female partner was based on the 2007 KAIS test results for HIV.

Figure 6.6f. Men who had an HIV-infected primary female partner were significantly more likely to be HIV-infected compared to men whose primary female partner was HIV-uninfected. The prevalence of HIV among uncircumcised men with an HIV-infected primary female partner was substantial at 79.3%.

HIV prevalence among married and cohabiting men varied significantly by their circumcision status and by the HIV status of their female primary sexual partner. Among uncircumcised men whose primary partner was HIV-infected, 79.3% were also HIV-infected. In comparison, 44.8% of circumcised men with an infected primary partner were also HIV-infected. Men whose primary female partners were HIV-uninfected had much lower rates of HIV infection, though HIV prevalence was still high at 10.3% among uncircumcised men.

6.7. Gaps and unmet needs

- Few multiple partnerships were reported, and the extent of their concurrency is not well known. A better understanding of the role of concurrency in the HIV epidemic is necessary to determine whether interventions targeting multiple concurrent partnerships may be important for prevention.

- The relationship between age of sexual debut and HIV infection appears complex; more information is needed on this topic.

- Encouraging partner testing and condom use among persons with multiple partners and partners of unknown HIV status remains a challenge and a priority.

- Areas with low levels of male circumcision may need culturally sensitive ways to increase acceptability and uptake of this prevention method along with other safer sex behaviours.

Knowledge, Attitudes and Beliefs about HIV/AIDS

chapter 7

7.1 Key findings

- **Overall, 98.3% of adults aged 15-64 years had heard about AIDS.**
- **Knowledge about HIV/AIDS increased since 2003; knowledge was highest among respondents who reported higher education and among urban residents**
- **Overall, 76.9% of women and men agreed that people with the AIDS virus should not be ashamed of themselves and 91.5% were willing to care for an HIV-infected family member in their home.**
- **Of persons who did not self-report HIV positive, 70.7% believed they had small or no risk of acquiring HIV; of these, 6.2% were HIV-infected and 76.7% cited having only one sexual partner as the reason for having small or no risk.**

7.2 Introduction

Knowledge of HIV and perceptions of risk for HIV infection are essential for making behavioural choices that reduce risk of acquiring and transmitting HIV. For more than 10 years, educational campaigns in Kenya have aimed to disseminate information about the disease, how it is acquired, and how to prevent new infections. This chapter summarises data on knowledge, attitudes and beliefs about HIV/AIDS and examines factors associated with knowledge of HIV transmission, stigma related to HIV, perceptions of risk for HIV.

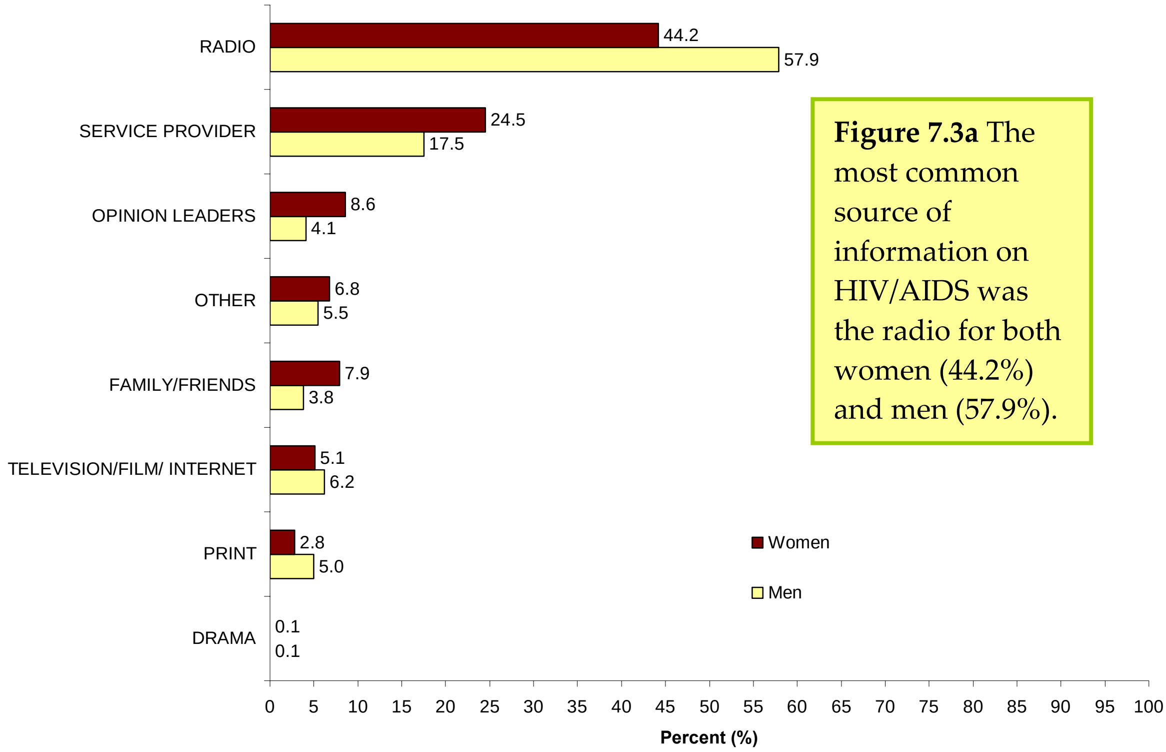
Appendix B.7 provides sample sizes and 95% confidence intervals for estimates presented in this chapter. Throughout the chapter, the term significant indicates a chi-square p-value less than 0.05; marginally significant indicates a p-value between 0.05 and 0.10, inclusive; and not significant indicates a p-value greater than 0.10.

For any analysis that compares weighted estimates from the 2003 KDHS and the 2007 KAIS in this chapter, a z-test was used to determine if differences between the two estimates were statistically significant. Methods used for calculating the z-test statistic are described further in Appendix A.

7.3 Knowledge of HIV/AIDS

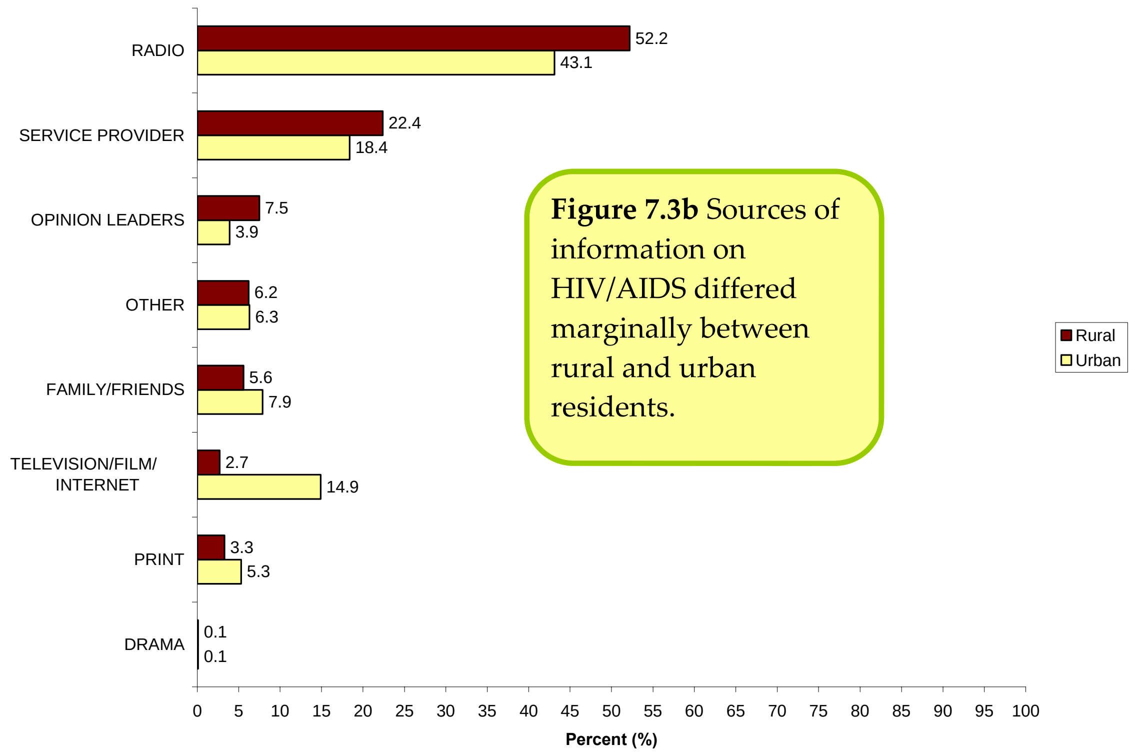
Nearly all respondents aged 15-64 years reported having heard of AIDS (98.3%). No significant differences were observed by sex, age group, wealth index or education level.

Figure 7.3a Most common source of HIV/AIDS information among women and men aged 15-64 years who had heard of AIDS, Kenya 2007.



Among those who had heard of AIDS, 44.2% of women and 57.9% of men reported the radio was their most common source of information on HIV/AIDS. An additional 24.5% of women and 17.5% of men reported they most often gathered information from service providers (e.g. health workers and teachers). Opinion leaders (e.g. traditional, religious and political), family, and friends were less common sources of information as were television, film, Internet, dramas and print media (e.g. newspapers, magazines, brochures, billboards, community notices).

Figure 7.3b. Most common source of HIV/AIDS information among rural and urban residents aged 15-64 years who had heard of AIDS, Kenya 2007.



Rural and urban residents reported receiving information about HIV/AIDS from different sources. More rural than urban residents rely on radio (52.2% and 43.1%, respectively), service providers (22.4% and 18.4%, respectively) and opinion leaders (7.5% and 3.9%, respectively) for information on HIV/AIDS. By contrast, more urban than rural residents gathered HIV/AIDS information from television, film and Internet (14.9% and 2.7%, respectively) and from print media (5.3% and 3.3%, respectively). These differences in sources of information were marginally significant.

Data in Context: HIV transmission knowledge

Assessment of HIV/AIDS transmission knowledge was based on correct responses to the following 12 questions regarding HIV/AIDS transmission:

Question	Correct response	Newly added question since the 2003 KDHS
▪ Can people reduce their chance of getting the AIDS virus by having just one uninfected sex partner who has sexual intercourse with no other partners?	Yes	
▪ Can people get the AIDS virus from mosquito or other insect bites?	No	
▪ Can people reduce their chance of getting the AIDS virus by using a condom every time they have sex?	Yes	
▪ Can people get the AIDS virus by sharing utensils with a person who has AIDS?	No	
▪ Can people reduce their chance of getting the AIDS virus by not having sexual intercourse at all?	Yes	
▪ Can people get the AIDS virus because of witchcraft or other supernatural means?	No	
▪ If a <u>man</u> has the virus that causes AIDS, does his sexual partner always have the AIDS virus, almost always, or only sometimes?	Sometimes	X
▪ If a <u>woman</u> has the virus that causes AIDS, does her sexual partner always have the AIDS virus, almost always, or only sometimes?	Sometimes	X
▪ Is it possible for a healthy-looking person to have the AIDS virus?	Yes	
▪ Can the virus that causes AIDS be transmitted from a mother to her baby:		
o By breastfeeding?	Yes	X
o During delivery?	Yes	X
o During pregnancy?	Yes	X

Figure 7.3c Women and men aged 15-64 years who had heard of AIDS and correctly answered questions on HIV transmission, Kenya 2007.

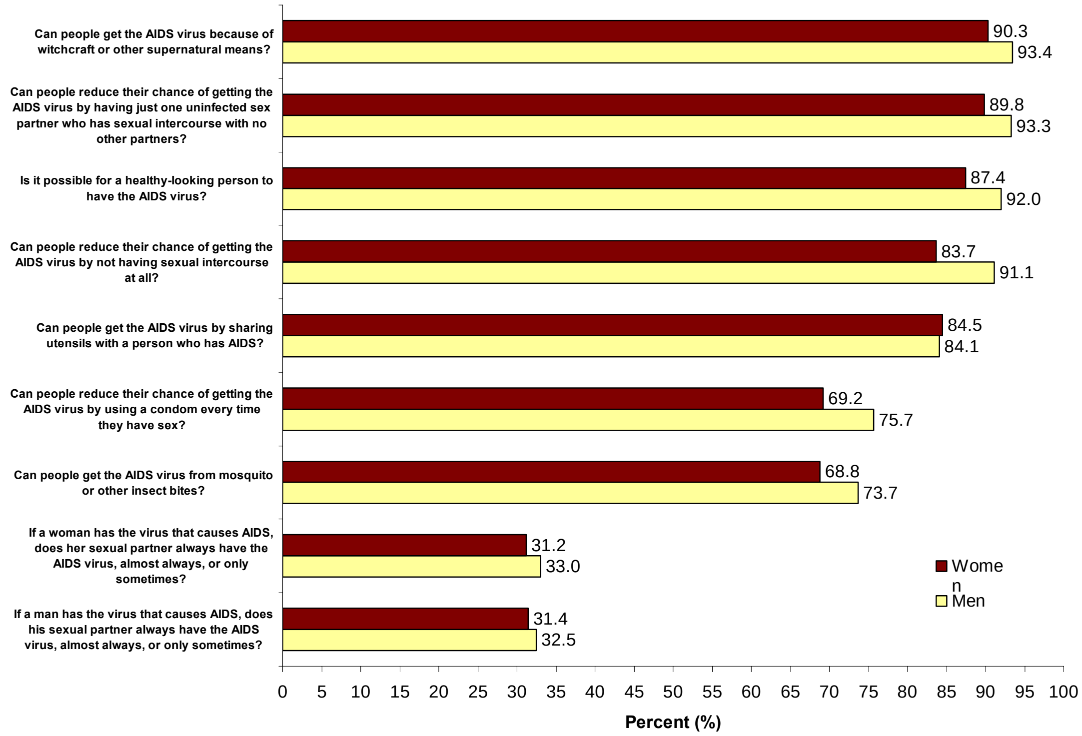


Figure 7.3c Knowledge about HIV/AIDS transmission varied significantly by the specific knowledge question asked. Almost all adults correctly answered that not having sex can reduce the chances of acquiring HIV and some adults knew that a sexual partner of a HIV-infected woman or man does not always have the virus.

Of all respondents, 89.8% of women and 93.3% of men correctly reported that one could reduce the risk of acquiring HIV by having one uninfected partner who does not have sex with others. Most women and men understood that a healthy-looking person could have HIV infection (87.4% and 92.0%, respectively) and that abstaining from sex was one way to reduce chances of acquiring HIV (83.7% and 91.1%, respectively). A lower percentage of women and men were aware that consistent condom use was a way to reduce the risk of HIV infection (69.2% and 75.7%, respectively).

Several questions were asked for the first time in the 2007 KAIS that were not asked in the 2003 KDHS. For the two new questions that asked about the possibility of HIV discordance between sexual partners[1], the percent responding correctly was low. Among women and men, the percent responding correctly that a sexual partner of an HIV-infected person is only sometimes HIV-infected ranged from 31.2% to 33.0%; most women and men believed that a sexual partner of an HIV-infected person is always or almost always infected.

[1] Two new questions were: 1) "If a man has the virus that casuses AIDs, does his sexual partner always have the AIDS virus, almost always, or only sometimes?"; 2) If a woman has the virus that causes AIDS, does her sexual parter always have the AIDS virus, almost always, or only sometimes?"

The percent of women providing correct answers was significantly less than men for six of the nice questions, with the greatest differences evident for reducing HIV infections through consistent condom use (69.2% for women and 75.7% for men) and reducing HIV by abstaining from sex (83.7% and 91.1%, respectively).

Figure 7.3d Women and men aged 15-64 years who had heard of AIDS and correctly answered questions on mother-to-child transmission, Kenya 2007.

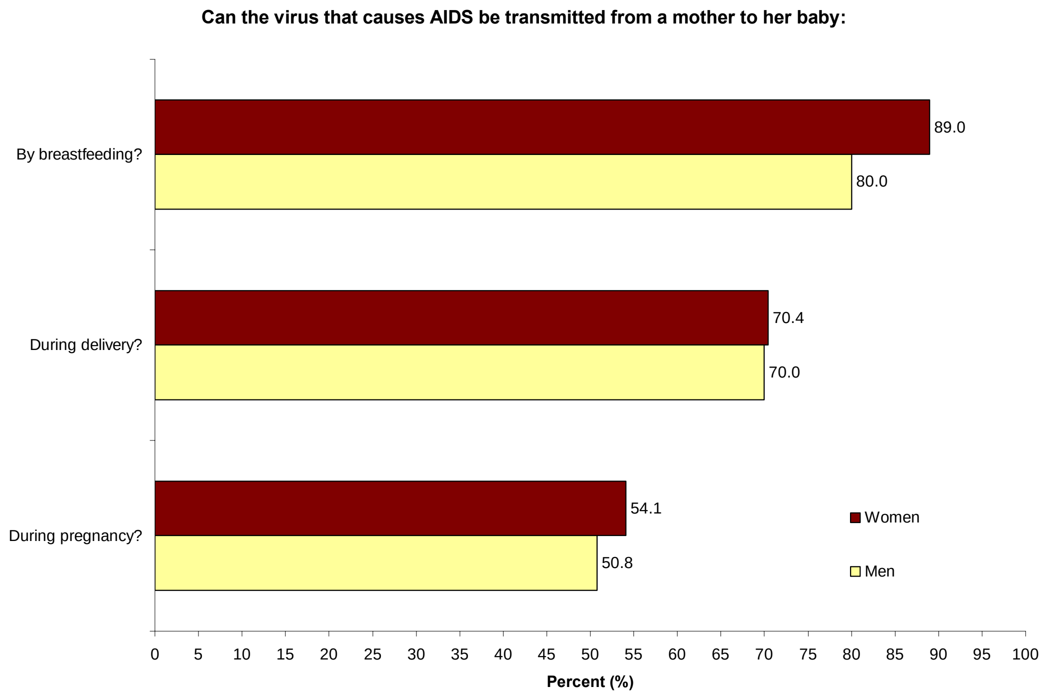


Figure 7.3d More than half of women and men knew that HIV could be transmitted from mother to child through breastfeeding, delivery and pregnancy.

The three questions presented in Figure 7.3d on mother-to-child transmission were asked for the first time in the 2007 KAIS. Most respondents were aware that HIV could be transmitted from mother to child during breastfeeding (85.1% overall, data not shown), and women were significantly more likely than men to provide a correct response to this question (89.0% and 80.0%, respectively). Similar percentages of women (70.4%) and men (70.0%) were aware that transmission could occur during delivery. Only about half of participants were aware that transmission could occur during pregnancy, and women were significantly more likely than men to provide a correct response to this question (54.1% and 50.8%, respectively).

Figure 7.3e Overall scores for 12 questions on HIV transmission among women and men aged 15-64 years who had heard of AIDS, Kenya 2007.

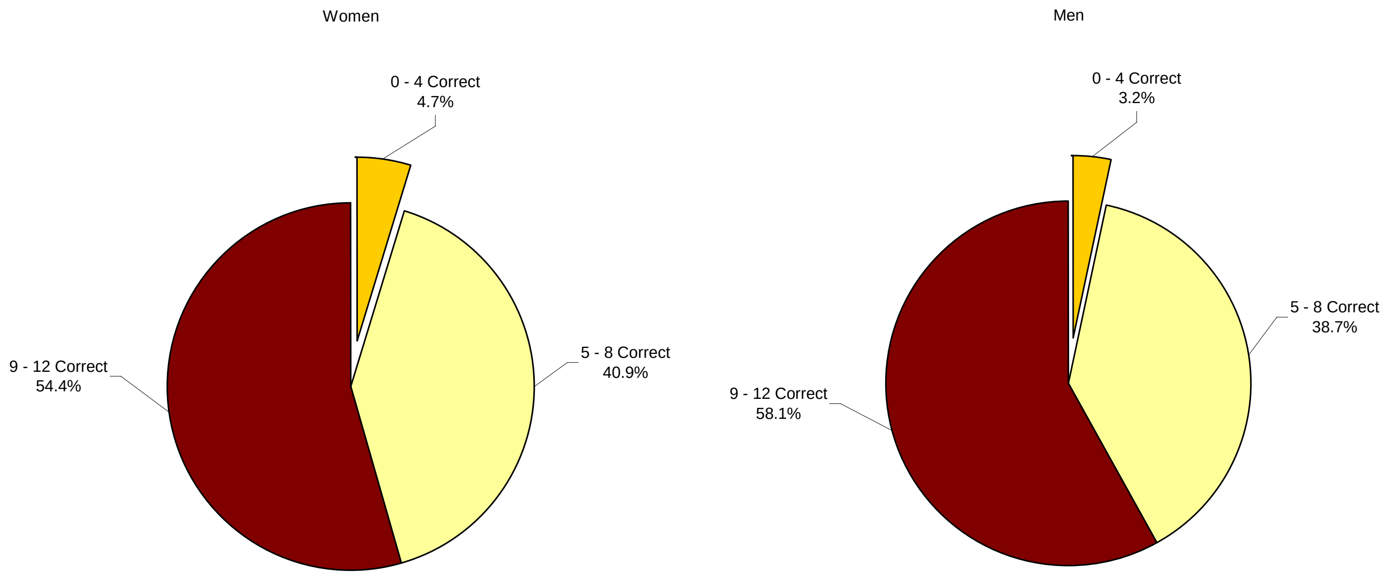


Figure 7.3e More than half of respondents correctly answered at least nine of 12 knowledge questions on HIV.

All 12 questions on HIV transmission were combined to get an overall score for each respondent. Total scores were divided into three categories: 0-4 questions (one third) correct, 5-8 questions (two thirds) correct and 9-12 questions (over two thirds) correct. Overall, more than half of adults (56.0%, data not shown) correctly answered nine or more of the knowledge questions. Women and men were significantly different in their scores: 54.4% percent of women answered nine or more questions correctly compared to 58.1% of men. Urban residents scored significantly higher than rural residents, with 64.0% of urban residents answering nine or more questions correctly compared to 53.5% of rural residents (data not shown).

Figure 7.3f Women and men aged 15-64 years who had heard of AIDS and correctly answered at least nine of 12 questions on HIV transmission, by education level, Kenya 2007.

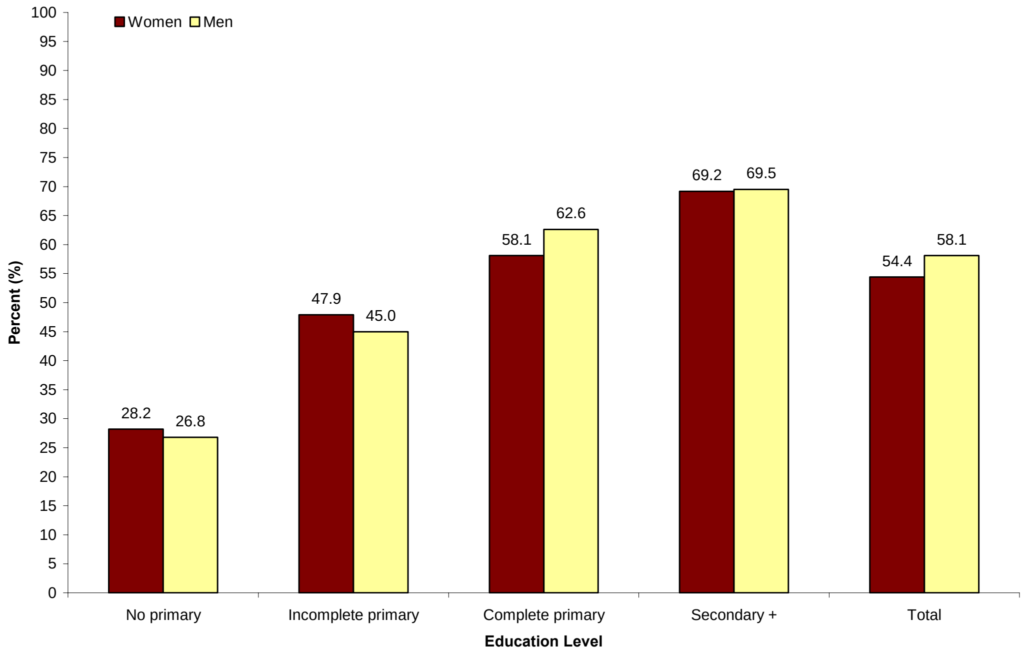


Figure 7.3f The percent of people answering nine or more questions correctly increased significantly with level of education.

Knowledge of HIV, defined as correctly answering at least nine of the 12 questions on HIV transmission, increased significantly with education level: 28.2% of women and 26.8% of men with no primary education answered nine or more items correctly compared to 69.2% of women and 69.5% of men with secondary education or above.

Figure 7.3g Women and men aged 15-64 years who had heard of AIDS and correctly answered at least nine of 12 questions on HIV transmission, by self-reported HIV status, Kenya 2007.

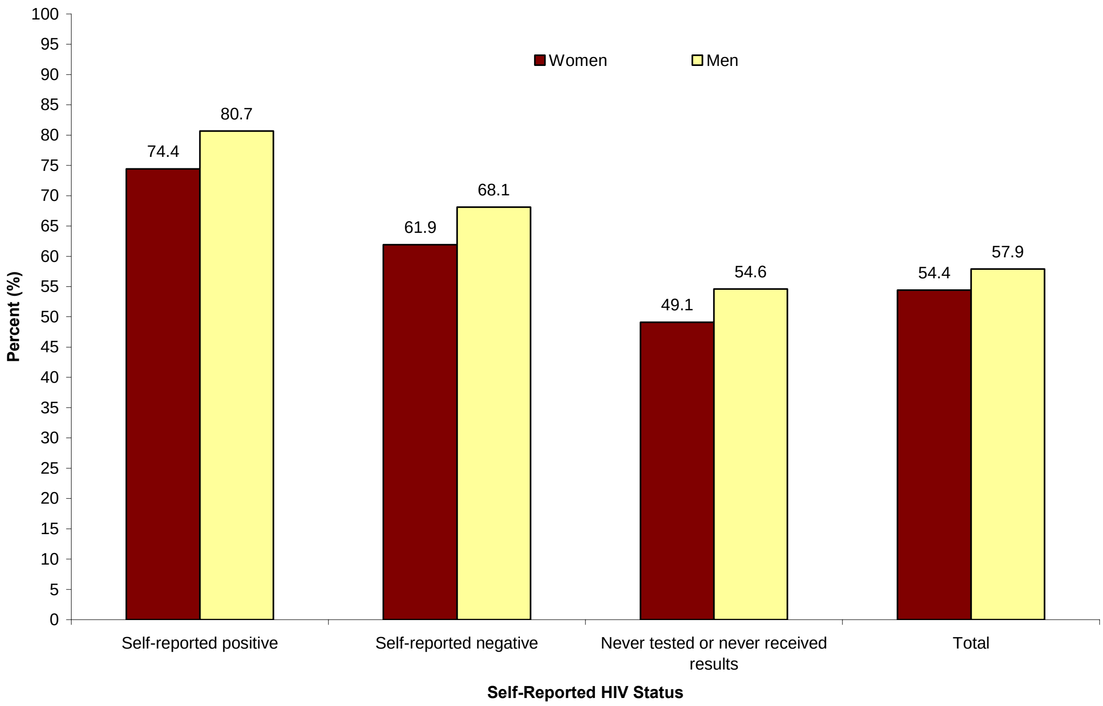
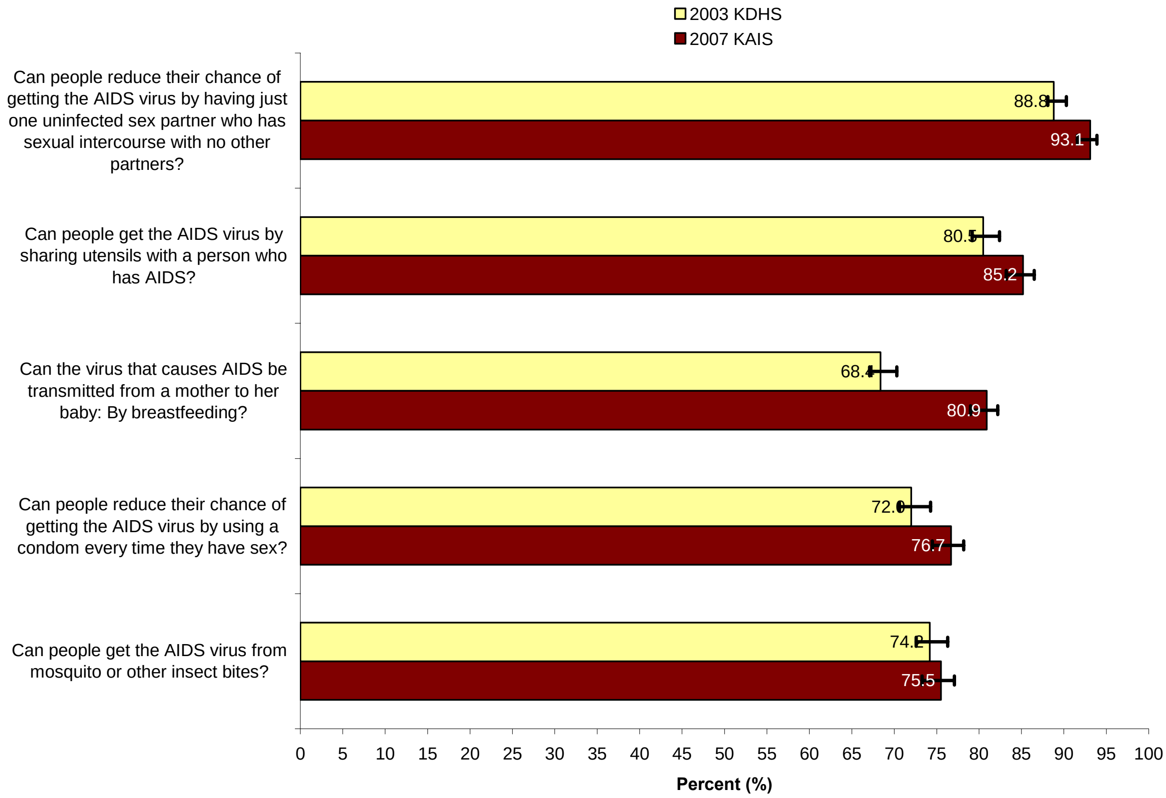


Figure 7.3g The percent answering nine or more questions correctly was significantly lower among those who had never tested for HIV or never received their test results compared to those that reported they were positive or negative based on their last HIV test.

The percent of adults answering nine or more knowledge questions correctly differed significantly by self-reported HIV status for both women and men. Among those who self-reported positive, 74.4% of women and 80.7% of men answered nine or more questions correctly. Among those who self-reported negative, 61.9% of women and 68.1% of men answered nine or more questions correctly. By contrast, among those who never tested or never received their test results, 49.1% of women and 54.6% of men answered nine or more questions correctly.

Figure 7.3h Correct responses to selected questions on HIV transmission among women aged 15-49 years who had heard of AIDS, 2003 KDHS and 2007 KAIS.

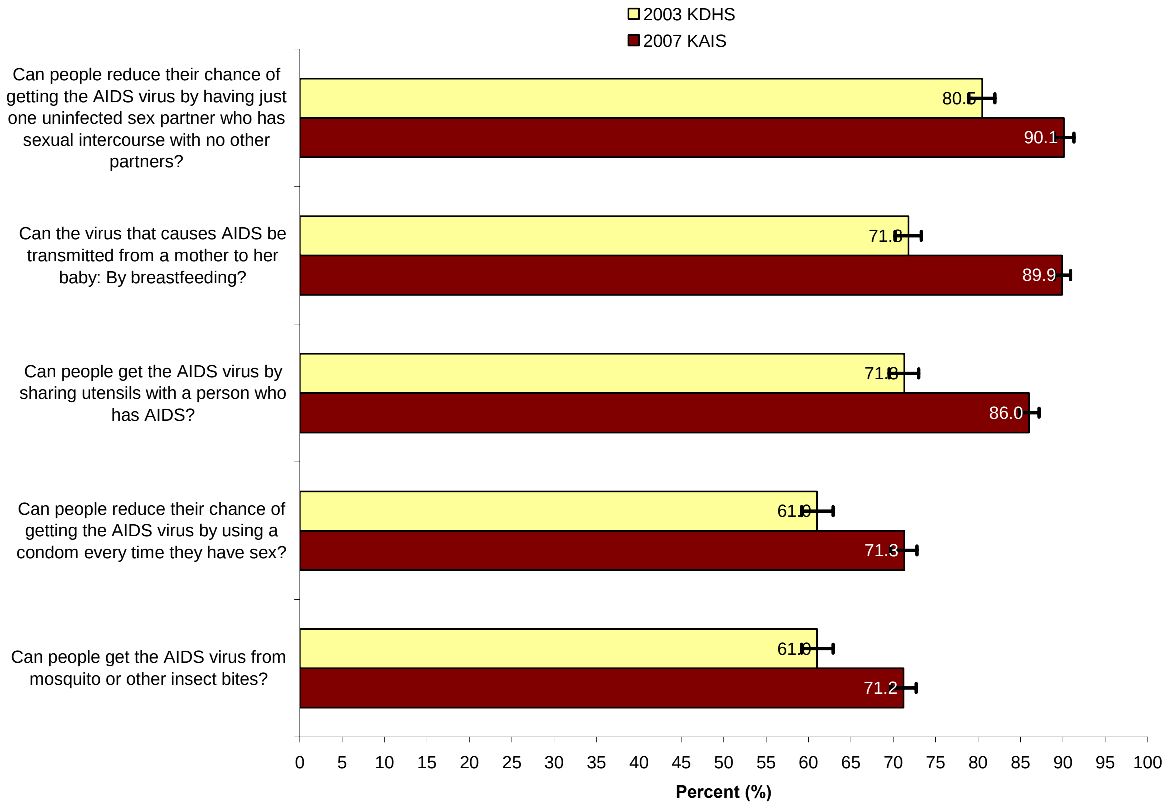


For consistency with the 2003 KDHS, this analysis focuses only on adults aged 15-49 years.

Figure 7.3h Correct knowledge of HIV transmission risks significantly increased among women from 2003 to 2007.

Responses to five questions that appeared in the 2003 KDHS and the 2007 KAIS were compared to assess whether correct knowledge of HIV transmission changed between the two surveys. Among women, the percent of women with correct knowledge increased significantly since 2003 for each question with the exception of the question regarding insects as a means of transmission, for which there was no change. The magnitude of the increase was approximately five percentage points for each question. The greatest increase was in the percent of women who correctly answered that HIV could be transmitted from an infected mother to her child during breastfeeding (68.4% to 80.9%).

Figure 7.3i Correct responses to selected questions on HIV transmission among men aged 15-49 years who had heard of AIDS, 2003 KDHS and 2007 KAIS.



For consistency with the 2003 KDHS, this analysis focuses only on adults aged 15-49 years.

Figure 7.3i. Correct knowledge of HIV transmission risks significantly increased among men from 2003 to 2007.

Among men, the percent with correct knowledge of HIV transmission significantly increased for each question from 2003 to 2007. In particular, the percent correctly answering that an infected mother could transmit HIV to her baby during breastfeeding significantly increased from 71.8% in 2003 to 89.9% in 2007.

7.4. Stigma toward HIV-infected persons

Figure 7.4a Women and men aged 15-64 years with accepting attitudes towards persons with HIV/AIDS by stigma question, Kenya 2007.

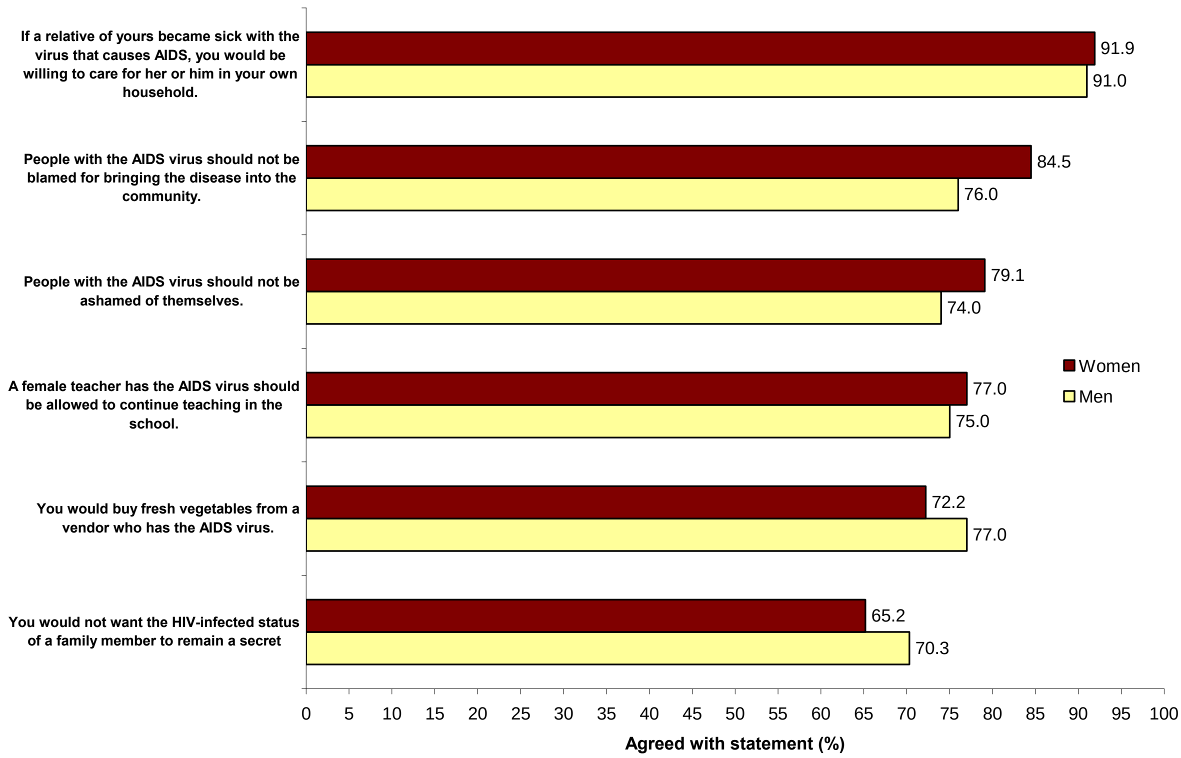


Figure 7.4a Nine out of 10 respondents would be willing to care for an HIV-infected relative at home.

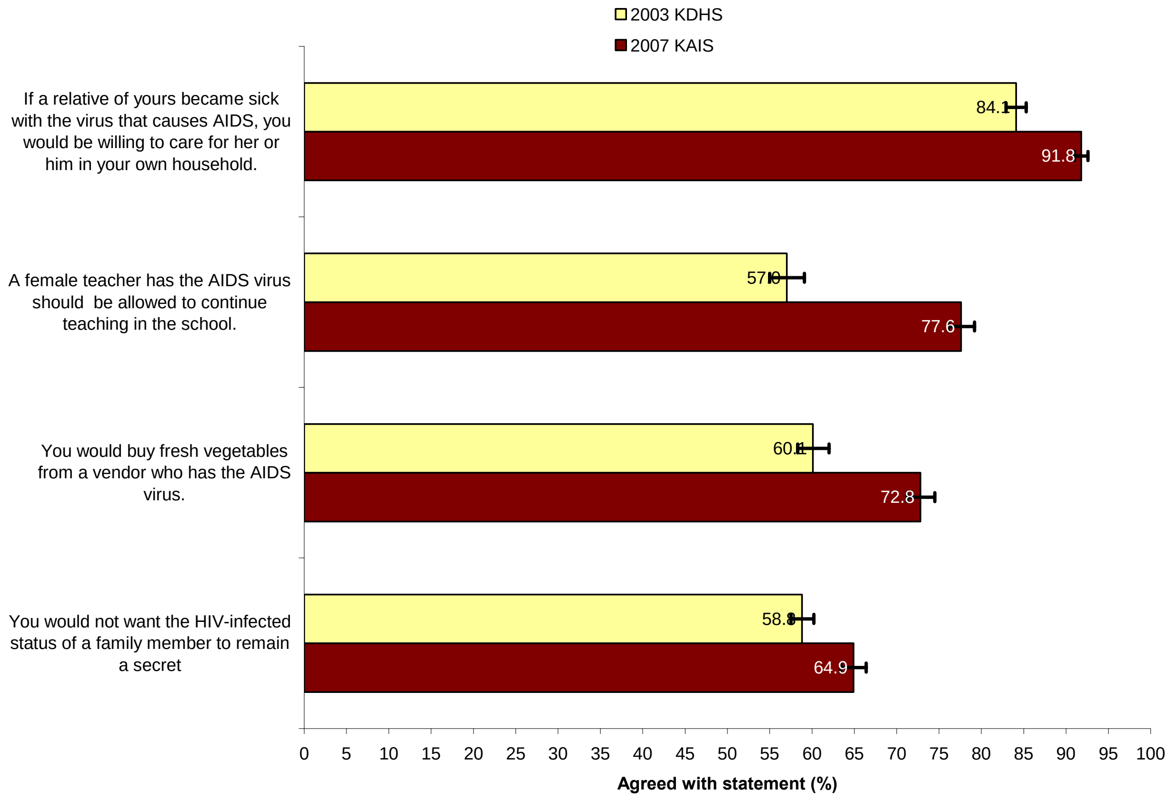
Most respondents reported they would be willing to care for a HIV-infected relative at home; estimates were similar for women and men (91.9% and 91.0%, respectively). A significantly greater percent of women (84.5%) than men (76.0%) agreed that people with AIDS should not be blamed for bringing disease into the community. By contrast, a significantly greater percent of men (77.0%) than women (72.27%) reported they would buy produce from an HIV-infected vendor. There was somewhat less support for being open about a family member's HIV status although the percent with accepting attitudes was still moderately high; if a family member became infected with HIV, 65.2% of women and 70.3% of men would not want it to remain a secret.

In the following two figures, we compare the percent of respondents with accepting attitudes towards persons with HIV/AIDS between the 2003 KDHS and the 2007 KAIS. The following four questions asked in both the 2003 and 2007 questionnaires were used in this comparison:

- If a relative of yours became sick with the virus that causes AIDS, would you be willing to care for her or him in your own household?
- Would you buy fresh vegetables from a vendor who has the AIDS virus?
- If a member of your family got infected with the virus that causes AIDS, would you want it to remain a secret or not?

- If a female teacher has the AIDS virus, should she be allowed to continue teaching in the school?

Figure 7.4b Accepting attitudes toward persons with HIV/AIDS among women aged 15-49 years by stigma question, 2003 KDHS and 2007 KAIS.

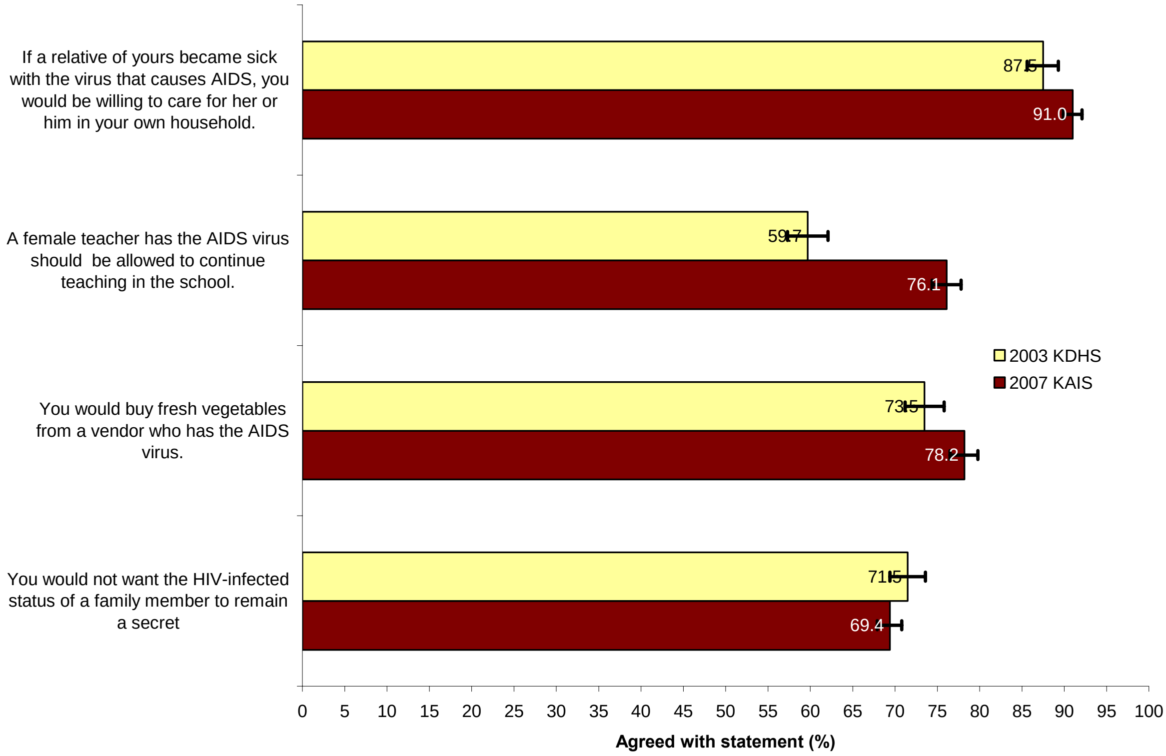


For consistency with the 2003 KDHS, this analysis focuses only on adults aged 15-49 years.

Figure 7.4b Among women, accepting attitudes towards people with HIV/AIDS significantly increased between 2003 and 2007 across all indicators.

In 2007, significantly more women reported accepting attitudes towards persons with HIV/AIDS than in 2003. A greater percent of women in 2007 (77.6%) compared to 2003 (57.0%) believed an HIV-infected female teacher should be allowed to continue teaching. Accepting attitudes about purchasing vegetables from an HIV-infected vendor also significantly improved from 60.1% to 72.8%. The percent willing to care for a relative with HIV at home increased significantly from 84.1% to 91.8%; openness about a relative's HIV infected status also significantly increased from 58.8% (2003) to 64.9% (2007).

Figure 7.4c Accepting attitudes toward persons with HIV/AIDS among men aged 15-49 years by stigma question, 2003 KDHS and 2007 KAIS.



For consistency with the 2003 KDHS, this analysis focuses only on adults aged 15-49 years.

Figure 7.4c Among men, three of the four markers for accepting attitudes towards people with HIV/AIDS significantly increased between 2003 and 2007.

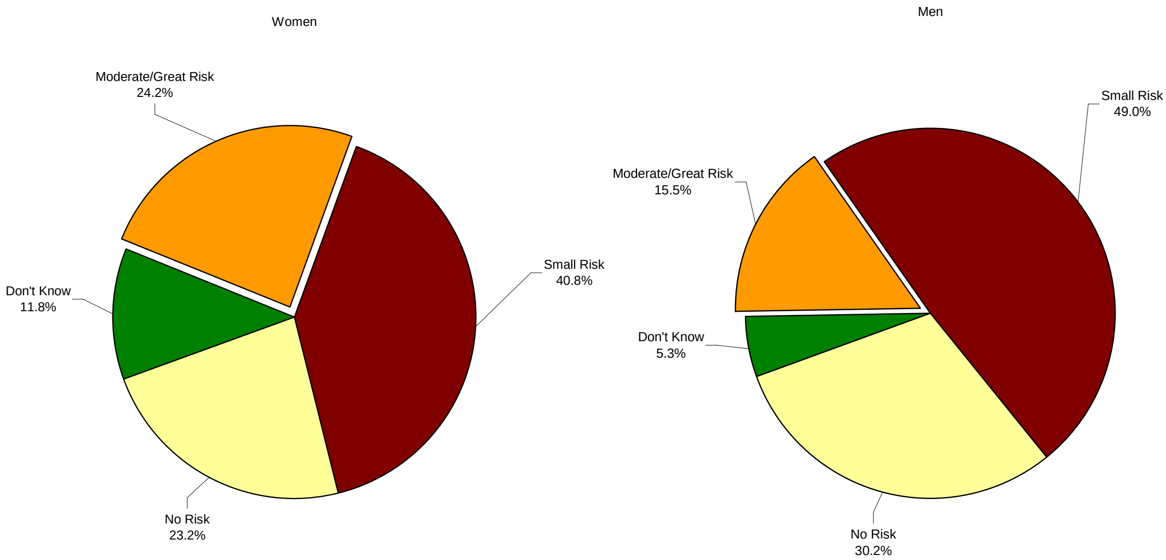
Among men, there was a significant increase between 2003 and 2007 in the percent with accepting attitudes towards persons with HIV/AIDS. The largest improvement observed was in the percent of men accepting HIV-infected female teachers, which increased from 59.7% in 2003 to 76.1% in 2007. Willingness to buy vegetables from a vendor with HIV increased an estimated five percentage points from 73.5% to 78.2%. The percent willing to care for a relative with HIV infection in their homes remained high from 2003 (87.5%) to 2007 (91.0%); this increase was also statistically significantly. The percent that would not want the HIV-infected status of a family member to remain a secret did not differ significantly between 2003 and 2007.

7.5. Perceived risk of HIV infection

In Chapter 4, we established that the primary reason for never having been tested for HIV was that respondents perceived their risk of HIV infection to be low. This section examines perceptions of risk for HIV in the subset of 97.4% of participants who provided information on testing history and who did not self-report HIV positive, regardless of their actual HIV status; those who self-reported positive would not be expected to perceive themselves at risk for HIV infection.

On a national level it is important to have an understanding of people's perceptions of risk and the accuracy of these perceptions to better guide prevention efforts for the general population. At an individual level, perceptions of risk can have an important effect on HIV test-seeking behaviour and sexual behaviours.

Figure 7.5a Perceived risk of HIV infection among women and men aged 15-64 years, Kenya 2007.*

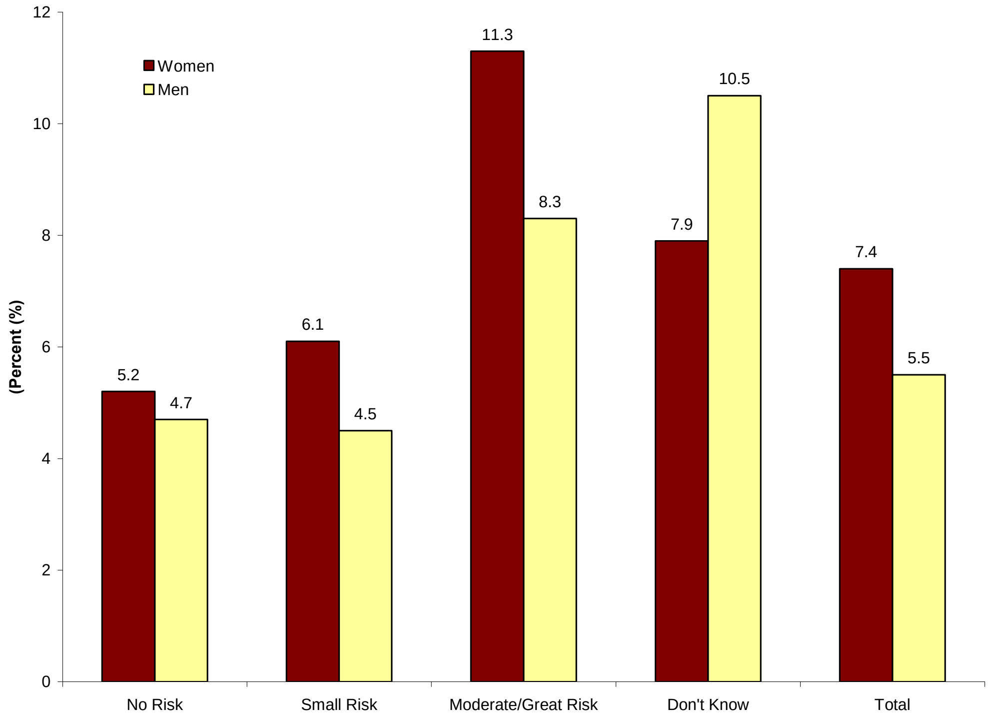


*Respondents who had previously tested for HIV and self-reported positive based on the results of the last HIV test (approximately 1%) were excluded from this analysis.

Figure 7.5a More men than women perceived themselves to have small or no risk for HIV.

KAIS respondents were asked "Do you think that your chance of getting AIDS is small, moderate or great or is there no risk at all?" Of all respondents aged 15-64 years who had been tested for HIV but did not self-report positive based on their last HIV test, 70.7% of respondents believed they had small or no risk of acquiring HIV, 20.4% of respondents reported themselves to be at moderate or great risk and 9.0% did not know (data not shown). Perceived risk differed significantly by sex: 79.2% of men believed themselves to be at small or no risk of HIV compared to 64.0% of women.

Figure 7.5b HIV prevalence among women and men aged 15-64 years by perceived risk of HIV infection, Kenya 2007.*



*Respondents who had previously tested for HIV and self-reported positive based on the results of the last HIV test (approximately 1%) were excluded from this analysis.

Figure 7.5b Women and men who perceived themselves to have moderate or great risk for HIV and those who did not know their risk level had the highest HIV prevalence.

HIV prevalence and perceived risk of HIV infection were significantly associated. Women who reported moderate or great risk or who did not know their HIV risk had higher HIV prevalence rates (11.3% and 7.9%, respectively) compared to women who reported no risk or small risk (5.2% and 6.1%, respectively). HIV prevalence among men who reported moderate or great risk of HIV infection or did not know their risk was 8.3% and 10.5%, respectively. HIV prevalence was 4.7% among men who perceived themselves to be at no risk, and 4.5% among men who perceived themselves to be at small risk. Overall, HIV prevalence was substantial among respondents who believed themselves to be at no risk (4.9%) or small risk (5.3%) for acquiring HIV (data not shown).

Figure 7.5c examines the subset of respondents who reported no risk or small risk for HIV infection. This constitutes 70.7% of all KAIS respondents who had been tested for HIV and did not self-report positive based on their last HIV test.

Figure 7.5c Reasons given for having no or small risk of HIV infection among women and men aged 15-64 years, Kenya 2007.

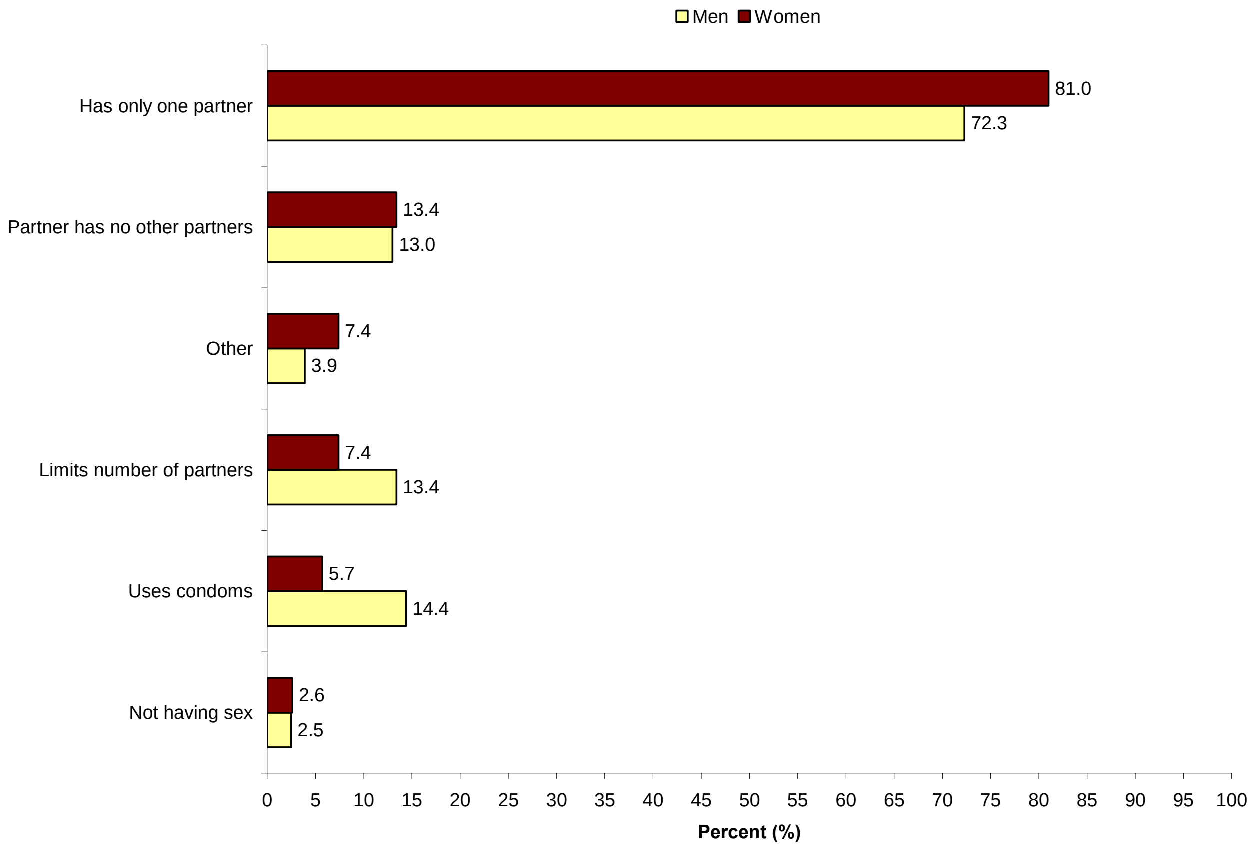


Figure 7.5c. Most women and men attributed their self perception of no or small risk for HIV to having only one sexual partner.

Having only one partner was the most common reason given for perceiving no or small risk of HIV infection, with a significantly lower percent of men (72.3%) citing this behaviour as a reason compared to women (81.0%). Some women (7.4%) and men (13.4%) believed that limiting their number of partners or using condoms (5.7% of women and 14.4% of men) resulted in no or small risk for HIV; these differences by sex were statistically significant.

Figure 7.5d Reasons given for having moderate or great risk of HIV infection among women and men aged 15-64 years, Kenya 2007.

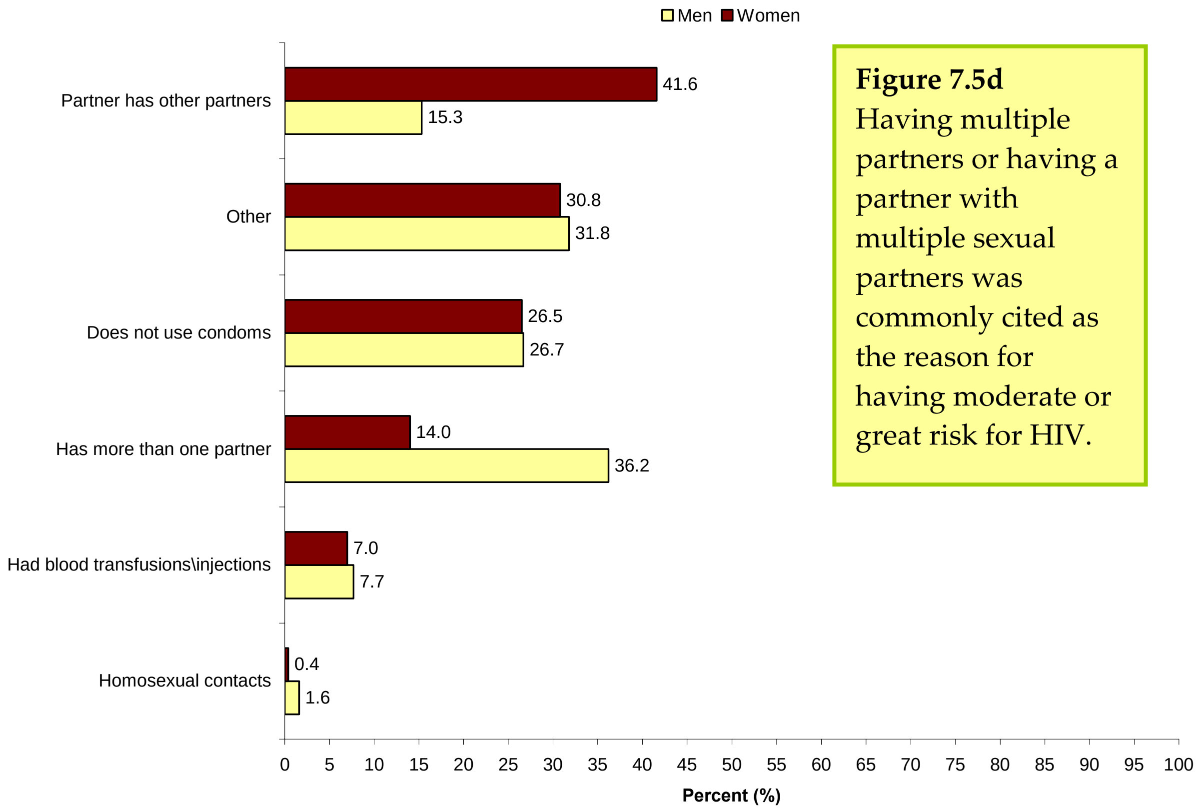


Figure 7.5d
Having multiple partners or having a partner with multiple sexual partners was commonly cited as the reason for having moderate or great risk for HIV.

Among participants who did not self-report positive, 20.4% reported that they perceived themselves to be at moderate or great risk for HIV infection. The three most commonly cited reasons were that their sexual partner had other partners; that they did not use condoms with their sexual partner; or that they had more than one sexual partner. The percent of women and men citing non-use of condoms was similar (26.5% and 26.7%, respectively). Significantly more women (41.6%) than men (15.3%) cited their partner having other partners as a reason for perceiving themselves to have moderate or great risk for HIV. Significantly more men (36.2%) than women (14.0%) cited having more than one partner as the reason for being at moderate or great risk for HIV. It is worth noting that 1.6% of men stated they perceived themselves to be at moderate or great risk for HIV because they had had sex with other men.

7.6. Attitudes toward women's roles in sexual decision making

In the 2007 KAIS, women had a significantly greater HIV infection rate than men (8.4% vs. 5.4%, respectively). An important component of a comprehensive HIV prevention strategy is to ensure that women are empowered within their sexual relationships to help reduce the risk of HIV acquisition and transmission. This section explores women's and men's attitudes toward the power women have to make decisions about their sexual relationships. These analyses included all respondents, regardless of testing history or reported HIV status.

Responses to the following four specific statements were used to assess attitudes toward women's roles in sexual decision making:

- A wife is justified in refusing to have sex with her husband if she knows he has a sexually transmitted disease;
- A wife is justified in asking her husband to use a condom when she knows he has a sexually transmitted disease;
- A wife is justified in refusing to have sex with her husband if she knows he has sex with other women; and
- A wife is justified in refusing to have sex with her husband if she is tired or not in the mood.

Figure 7.6a Attitudes toward negotiating safer sex among women and men aged 15-64 years, Kenya 2007.

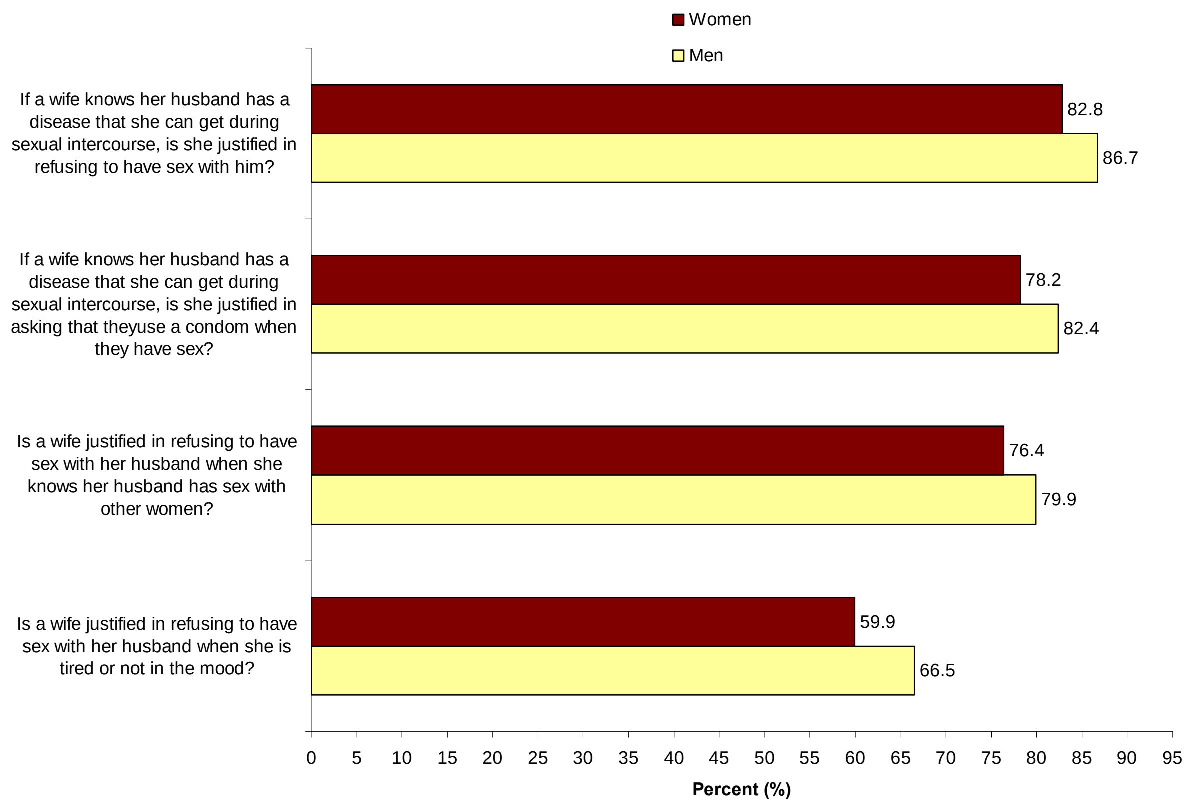


Figure 7.6a The majority of women and men believed that a wife is justified in refusing sex under specific circumstances.

The majority of men agreed that if a husband has a STI, his wife is justified in refusing sex (86.7%) or insisting on using a condom (82.4%) and that if a husband was having sex with other women, his wife was justified in refusing sex with him (79.9%). Most women also agreed with these statements though at a significantly lower level than men (82.8%, 78.2% and 76.4%, respectively). For both women and men, there was significantly less agreement that being tired or not in the mood was justification for a wife refusing to have sex with her husband (59.9% and 66.5%, respectively).

Figure 7.6b Agreement with three empowerment statements among women and men aged 15-64 years by self-reported HIV status, Kenya 2007.

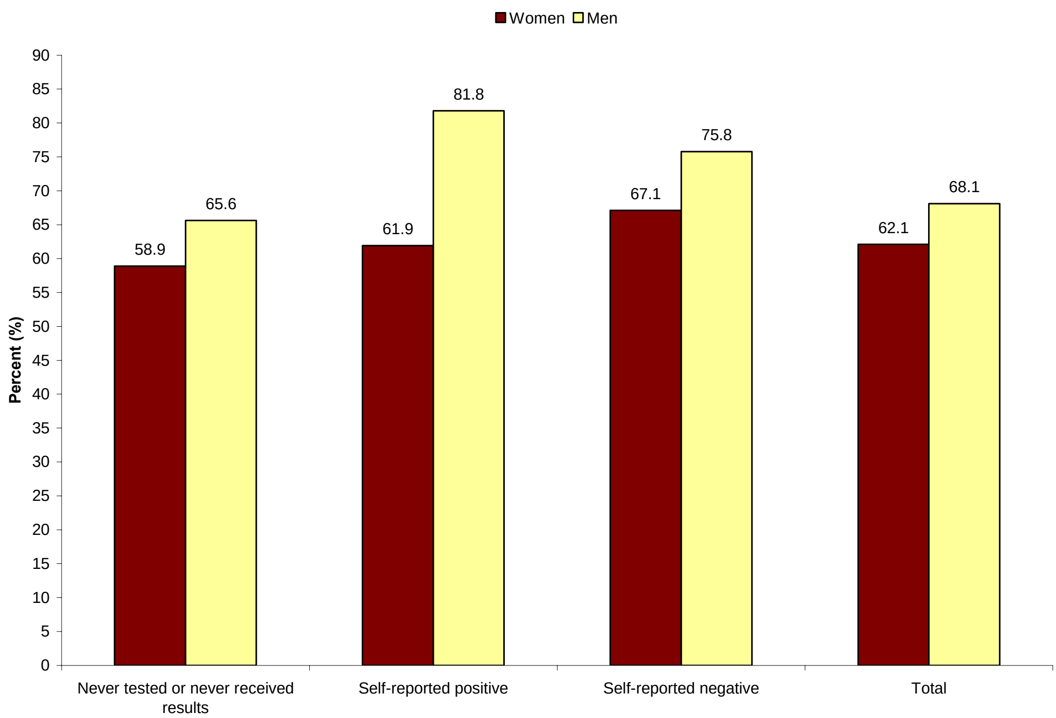


Figure 7.6b Women and men who had previously tested for HIV (regardless of their self-reported status) were more likely than those who had never tested or never received results to believe a wife was justified in refusing sex or insisting on condom use in specific circumstances.

The three referenced empowerment statements were:

- Is a wife justified in refusing to have sex with her husband when she knows her husband has sex with other women?
- If a wife knows her husband has a disease that she can get during sexual intercourse, is she justified in asking that they use a condom when they have sex?
- If a wife knows her husband has a disease that she can get during sexual intercourse, is she justified in refusing to have sex with him?

In all, 62.1% of women agreed with all three empowerment statements, which was significantly lower than the 68.1% among men. A significantly higher percent of women (61.9%-67.1%) and men (75.8%-81.8%) who had been tested for HIV agreed with the three statements compared to women and men who had never been tested for HIV or never received the test result (58.9% and 65.6%, respectively). In general, significantly more men reported being supportive of women's empowerment, as measured by the three statements above, than women themselves.

7.7. Gaps and unmet need

- **Knowledge about the potential for HIV discordance in sexual partnerships was low, as was knowledge of mother-to-child transmission during pregnancy, and knowledge about the efficacy of condoms. These are specific gaps in educational campaigns that need to be addressed.**
- **HIV/AIDS knowledge was lowest among people who reported lower education levels, residents of rural areas, and those who had not been tested for HIV. There is a need for more targeted, creative educational materials and campaigns to reach these populations.**
- **Despite reductions in HIV stigma since 2003, efforts to encourage acceptance of persons with HIV/AIDS should continue, especially in terms of embracing an attitude of openness and disclosure about a relative's HIV status.**
- **Among participants who perceived themselves to have no or small risk for HIV infection, 6.2% were confirmed to have HIV. Improving people's ability to self-assess their risks for HIV and promoting routine HIV testing and counseling would help to address this gap.**
- **An estimated one in five adults perceived themselves to have moderate or great risk of infection; of these, most attributed their risk for HIV infection to not using condoms, having multiple sexual partners, or to their partners having multiple partners. Behavioural interventions need to be intensified.**
- **An estimated one in three adults did not indicate comprehensive support for a wife's rights to refuse sex or request a condom if her husband had another sexual partner or an STI. The promotion of women's rights to protect their sexual health could help fill this gap.**

8

Prevention of Mother-to-Child Transmission and Family Planning

8.1 Key Findings

- **Of women whose last birth was between 2003-2007, 89.6% attended an antenatal clinic (ANC) at least once during pregnancy.**
- **HIV testing at ANCs increased from 50.4% of all ANC attendees in 2003 to 78.6% in 2007.**
- **ANC testing accounted for a substantial proportion of HIV testing among women: 61.5% of women aged 15-49 years were tested for HIV at an ANC between 2003-2007, and of these women, 63.8% had only ever tested at an ANC.**
- **HIV prevalence was 9.0% among women who reported being pregnant at the time of KAIS.**
- **Among HIV-uninfected pregnant or breastfeeding women who reported having unprotected sex in the 12 months before the survey, 72.7% and 77.6% of their sexual relationships, respectively, were with partners of unknown HIV status.***
- **Of women aged 15-49 years, 50.9% did not want a child ever in the future and 19.6% did not want a child in the next two years; when these two groups of women were combined for analysis, results showed that only 45.0% were using modern contraception.**
- **Of women self-reporting a positive HIV test, 76.3% did not want a child ever in the future and 10.5% did not want a child in the next two years; when these two groups of women were combined for analysis, results showed that only 52.0% were using modern contraception.**

* A "partner of unknown status" refers to a partner who had never been tested for HIV, whose testing history was unknown to the respondent, or whose HIV test result was unknown to the respondent.

8.2 INTRODUCTION

In the absence of intervention, an estimated 20%-45% of babies born to HIV-infected mothers will acquire HIV infection from their mothers. Mother-to-child transmission (MTCT) of HIV may occur at any stage during pregnancy (5%-10%), labour and delivery (10-15%), or breastfeeding (5%-20%).[14] Interventions, including use of antiretroviral drugs, optimal appropriate infant feeding practices, and safer obstetrical practices, can reduce the risk of MTCT to less than 5%.

There are four approaches for prevention of MTCT (PMTCT):

1. Primary prevention among women and girls to keep them uninfected
2. Family planning for prevention of unwanted pregnancies among HIV-infected women
3. Antiretroviral prophylaxis and treatment (ART) for PMTCT
4. Care and treatment for HIV-infected pregnant women and their families.

Kenya's target for PMTCT services, as set out in the 2005/6 – 2009/10 Kenya National AIDS Strategic Plan[2] (KNASP), is to increase coverage of PMTCT services to reach 80% of pregnant women by the end of 2008 and reduce pediatric HIV infections by 50%. This is in line with the goal set out at the United Nations General Assembly Special Session on HIV/AIDS[3] (UNGASS) in 2001 to reduce the proportion of infants infected with HIV by 20% by the year 2005 and 50% by 2010.

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[14] WHO and CDC. Prevention of mother-to-child transmission of HIV Generic Training Package, Draft. January 2008. Available at: http://www.womenchildrenhiv.org/wchiv?page=pi-60-00.

[2] National AIDS Control Council, Office of the President, Kenya. *Kenya National AIDS Strategic Plan 2005/6-2009/10*. NACC, Nairobi.

[3] United Nations General Assembly Special Session on HIV and AIDS, 25-27 June 2001. Declaration of Commitment on HIV and AIDS.

This chapter describes the findings from the 2007 KAIS related to antenatal clinics (ANCs), PMTCT and family planning services. The questions in the 2007 KAIS focused on previous deliveries, ANC attendance, HIV testing in ANCs and family planning services. The chapter describes two types of HIV results: self-reported prior test results and test results from HIV testing done for KAIS.

- Only women aged 15-54 years who had given birth to their lastborn child between 2003 and 2007 were asked about ANC services and breastfeeding practices with respect to their lastborn child. This group comprised 43.3% of all women participating in KAIS.

- All women aged 15-49 years were asked about current pregnancy (that is, pregnancy at the time of the interview), ANC attendance during the current pregnancy and use of contraception. Women aged 15-49 years and currently pregnant at the time of the survey comprised 6.1% of all women participating in KAIS.

- Only women who were married or cohabiting with a man and had not been sterilized (tubal ligation or hysterectomy) were asked about their desires for a child* in the future. For analysis purposes, the following decisions were made:

    - Analysis of fertility desires was limited to women of reproductive age (15-49 years)
    - Women who were sterilized were assumed to not want a child ever in the future
    - Women who could not have a child for reasons other than female sterilization were excluded from analysis.

  Overall, women included in the fertility desires analysis comprised 53.6% of all women participating in KAIS.

- To quantify unmet need for contraception, current contraceptive use was calculated for women who met all of the following criteria: not pregnant at the time of the interview, did not want a child in the next two years or ever in the future, and married or cohabiting with a man. In all, 33.6% of women who participated in KAIS met these criteria.

Appendix B.8 sample sizes and 95% confidence intervals for estimates presented in this chapter. Throughout the chapter, the term significant indicates a chi-square p-value less than 0.05; marginally significant indicates a p-value between 0.05 and 0.10, inclusive; and not significant indicates a p-value greater than 0.10.

Population estimates reported in this chapter were calculated based on the 2007 projected population by province, age and sex reported in the *Revised Population Projections for Kenya 2000-2020, Kenya National Bureau of Statistics (August 2006).* Weighted national estimates for selected indicators from the 2007 KAIS were used in these calculations. Detailed methods used for calculating population estimates are described in Appendix A.

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* Throughout the chapter, "a child" refers to both a first-born child for women who have never had a child before and a subsequent child for women who have had one or more children before.

8.3 ANTENATAL CLINIC ATTENDANCE, 2003-2007

This section examines ANC attendance and utilization of PMTCT services among women aged 15-54 years whose last live birth was between 2003 and 2007. Although the PMTCT program was launched in 2000, scale-up accelerated from 2003 onwards.

Figure 8.3a. ANC attendance among women aged 15-54 years with last live birth between 2003 to 2007, by province, Kenya 2007.

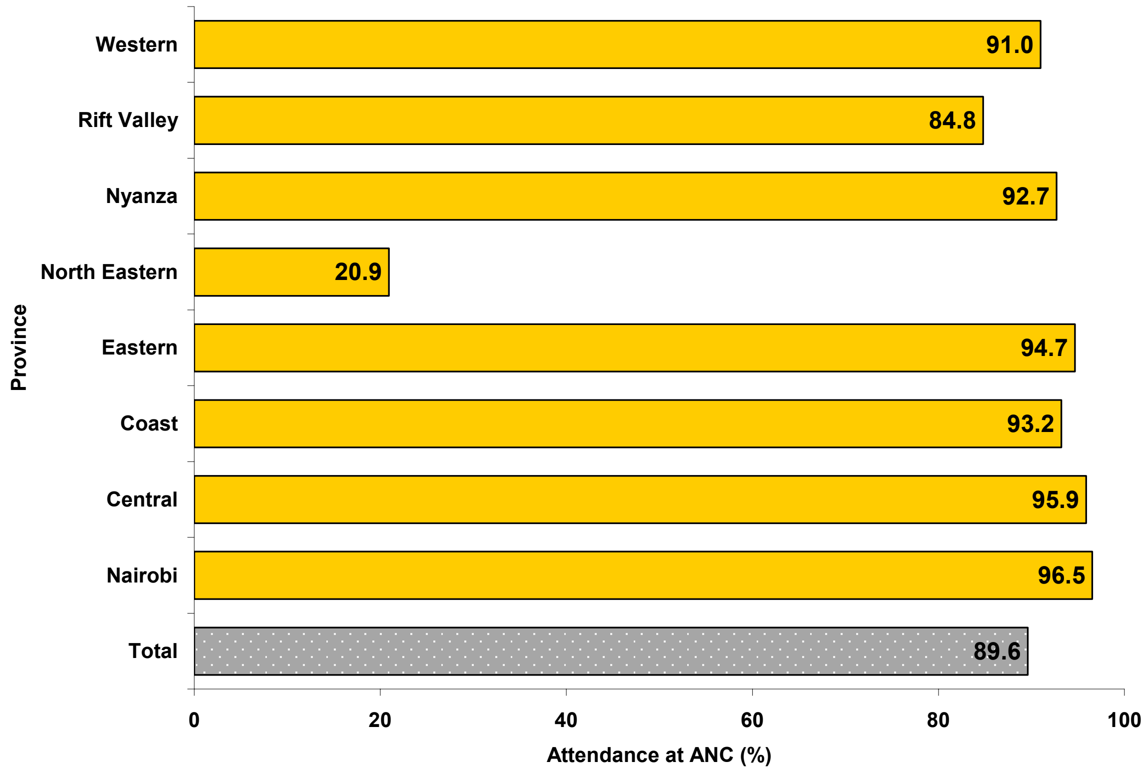


Figure 8.3a Seven of the eight provinces reported ANC attendance rates between 84.8% and 96.5%.

Among women aged 15-54 years who had their last live birth between 2003 and 2007, 89.6% reported attending an ANC at least once during pregnancy. ANC attendance rates during this time period were similar across year of birth. ANC attendance rates (at least one visit) were greater than 84% in seven of the eight provinces, with substantially lower attendance in North Eastern province at 20.9%.

ANC attendance rates were high among all age groups, ranging from 85.4% among women aged 40-49 years to 90.8% among women aged 25-29 years. ANC attendance rates were significantly lower among women with no primary education (61.3%), when compared to women with at least some primary education or higher (90.8%-96.2%). ANC attendance progressively increased with increasing wealth quintile, from 76.7% in the lowest quintile to 96.3% in the highest quintile; this association was also significant (data not shown).

Figure 8.3b Place of ANC attendance for last live birth between 2003 to 2007 among women aged 15-54 years with at least one ANC visit,* Kenya 2007.

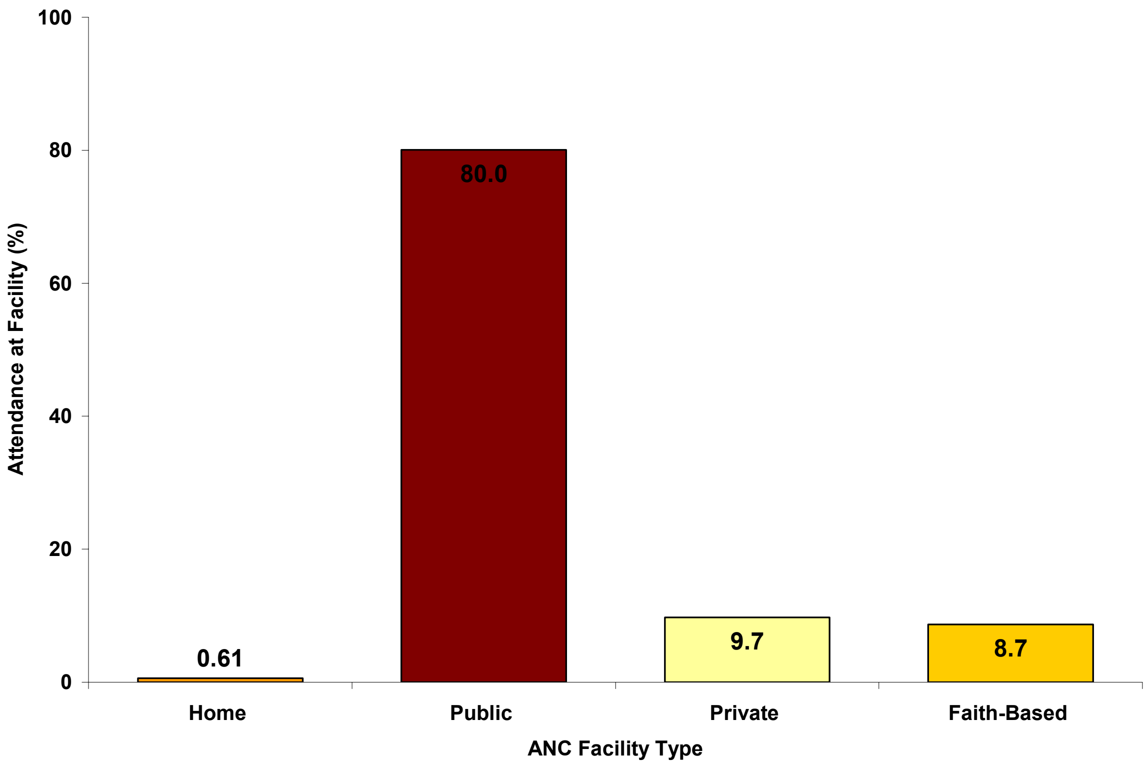


Figure 8.3b The majority of pregnant women attended public facilities for ANC.

*Categories are not mutually exclusive. Some women attended more than one type of ANC facility during their last pregnancy and are included more than once in the analysis.

Of women whose last live birth was between 2003 and 2007 and who attended ANC for that pregnancy, 80.0% attended public facilities, 8.7% accessed ANC services provided by a faith-based organization (FBO), and 9.7% attended non-FBO private facilities. Only 0.61% of women reported receiving home-based antenatal care.

8.4 Knowledge of Mother-to-Child Transmission and Antiretroviral Therapy for PMTCT

This section examines knowledge of MTCT and ART for PMTCT among women aged 15-54 years whose last live birth was between 2003 and 2007. For this analysis, knowledge of MTCT and ART among women who attended an ANC is compared to that of women who did not attend an ANC.

Figure 8.4a Knowledge of modes of MTCT among women aged 15-54 years with last live birth between 2003 to 2007, by ANC attendance, Kenya 2007.

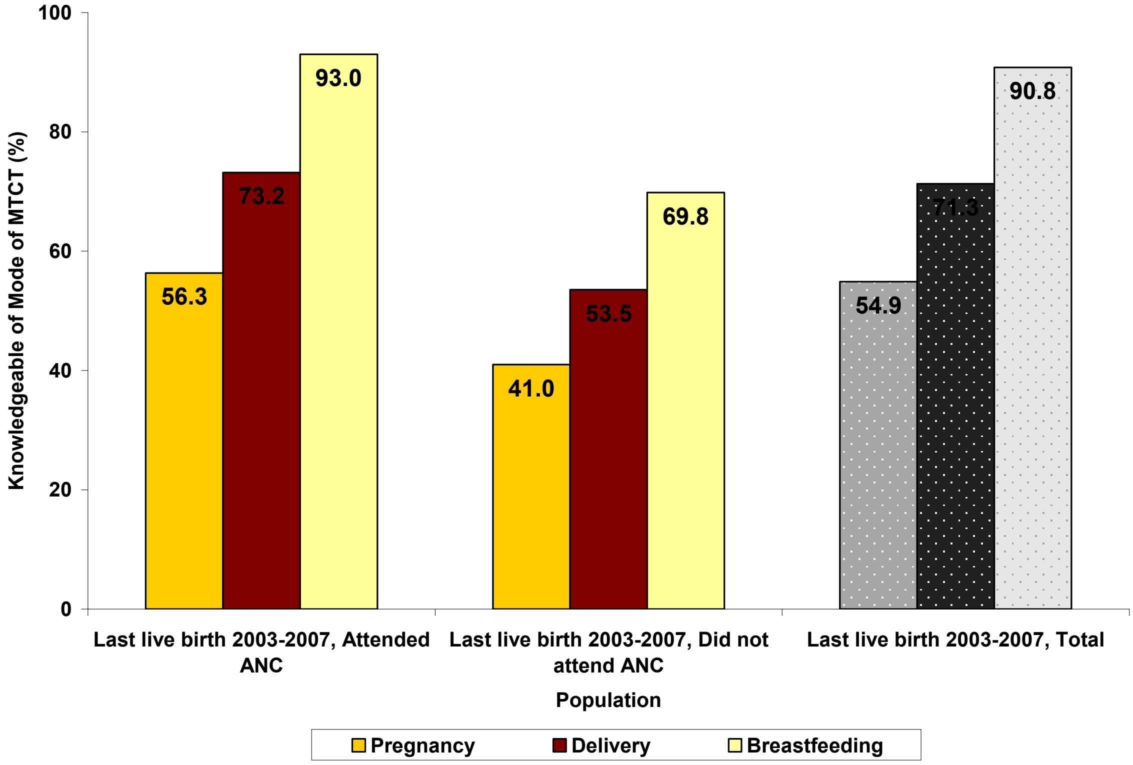


Figure 8.4a Knowledge of modes of MTCT was higher among women who had attended an ANC compared to women who had not.

Among women whose last live birth was between 2003 and 2007, knowledge of each mode of MTCT was significantly higher among women who attended ANC compared to those who had not, suggesting that counseling at an ANC on PMTCT is effective. Among all respondents, knowledge of MTCT during breastfeeding was greater than knowledge of MTCT during either pregnancy or delivery.

Figure 8.4b Knowledge of ART for PMTCT* among women aged 15-54 years with last live birth from 2003 to 2007, by ANC attendance, Kenya 2007.

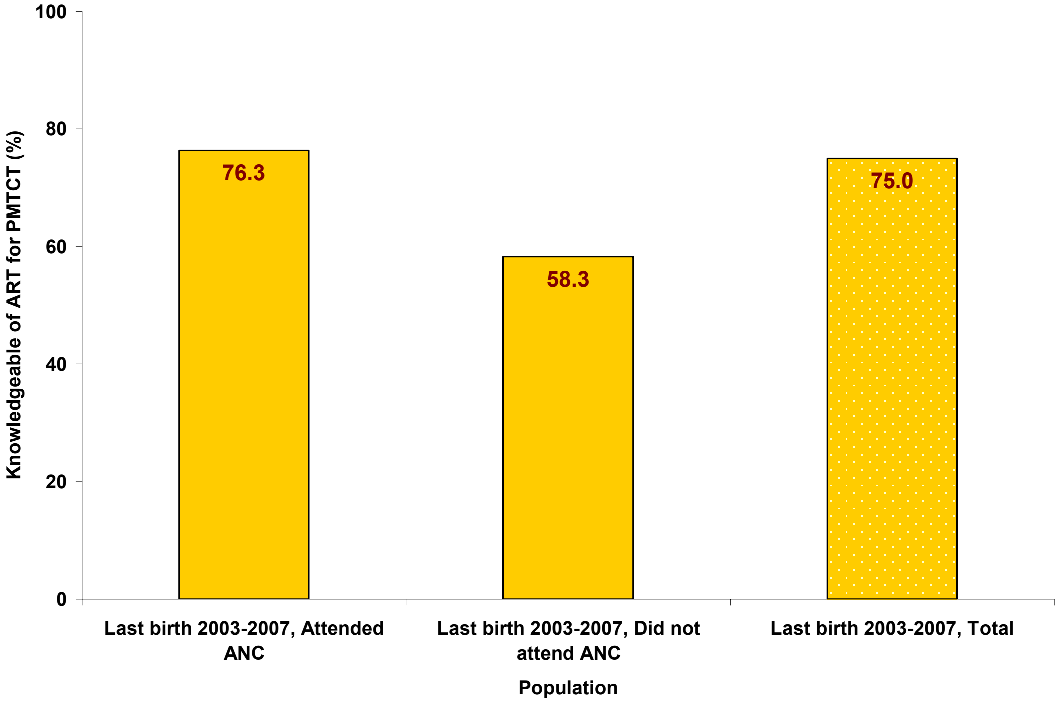


Figure 8.4b. Knowledge of ART for PMTCT was greater among women who attended an ANC as compared to women who did not.

*Among those women who correctly identified at least one mode of MTCT

Women whose last live birth was between 2003 and 2007 and who had correctly identified at least one mode of MTCT were asked about their knowledge of ART for PMTCT. Knowledge of antiretroviral preventive therapy for PMTCT was significantly greater among women who attended an ANC (76.3%) compared to women who had not (58.3%).

8.5 HIV Counseling and Testing at ANC Clinics, 2003-2007

"Opt-out" HIV testing is offered as part of the standard package of care for all pregnant women attending maternal-child health services, in line with the Kenya's national PMTCT guidelines, following a policy change in 2004.

The approach consists of:

- Group pre-test counseling of all women attending an ANC
- After counseling, women can choose to "opt-out" and not take an HIV test
- HIV testing using a rapid-testing method with same day results for those who opt to take the test
- Individual post-test counselling for all those who have taken the test.

The analysis in this section considers women aged 15-54 years whose last live birth was between 2003 and 2007 and who attended ANC at least once during that pregnancy.

Figure 8.5a Women aged 15-54 years attending an ANC from 2003 to 2007 by year of last live birth and whether the woman was offered, tested, or not offered or tested at the ANC, Kenya 2007.

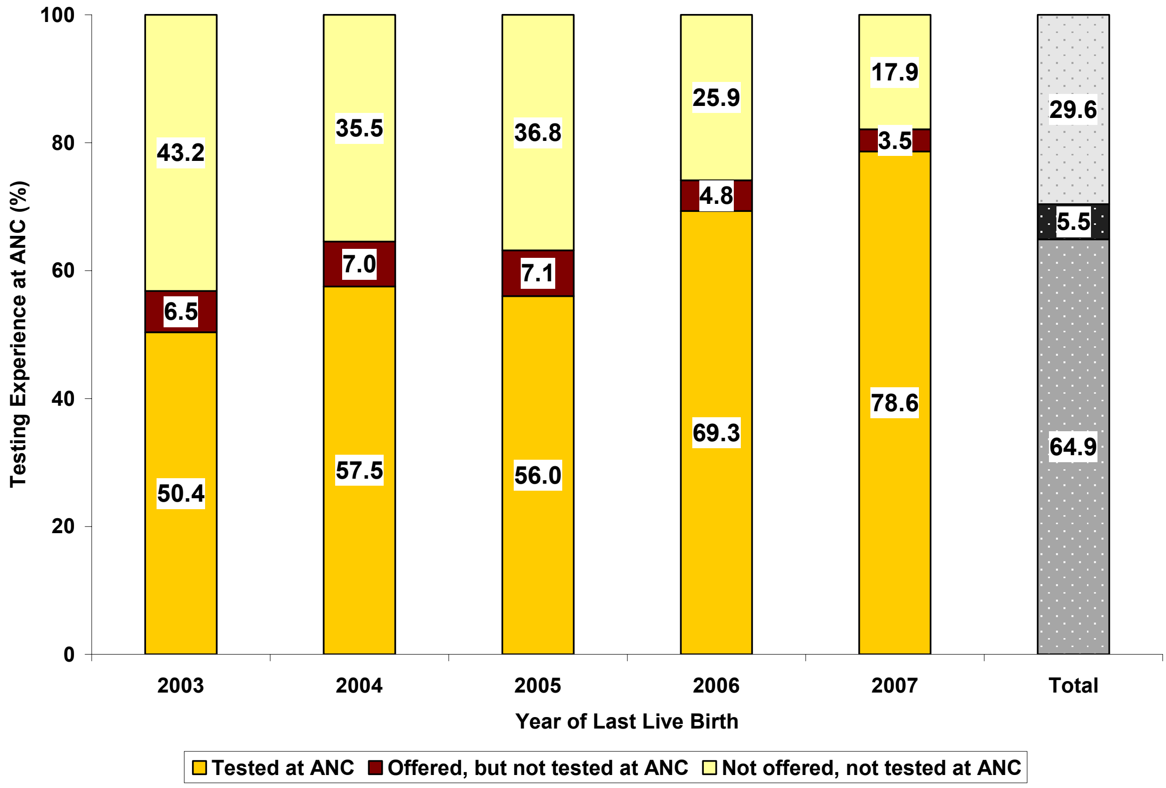


Figure 8.5a A significantly higher percent of ANC attendees received an HIV test if their last live birth was in 2007 than if their last live birth was in 2003.

The percent of ANC attendees offered an HIV test increased from 56.9% in 2003 to 82.1% in 2007, resulting in a significantly greater percent of ANC attendees being tested in 2007 (78.6%) compared to 2003 (50.4%). The proportion of women offered a test but not tested was small (3.5% in 2007), and may be attributable to test kit stock-outs, absence or unavailability of testing staff, or refusal ("opt-out") when offered an HIV test.

Of women attending public ANCs between 2003 and 2007, 69.8% were offered HIV testing and 64.4% received a test (data not shown). Similar rates were seen at other types of ANC facilities and among women receiving antenatal care at home. These estimates are provided in table 8.5 in Appendix B.8.

DATA IN CONTEXT

ANC Sentinel Surveillance[4]

HIV sentinel surveillance is carried out at sites throughout Kenya using unlinked anonymous HIV testing of leftover blood samples routinely collected for other purposes. Sentinel surveillance data are used to track trends in HIV prevalence in specific populations over time and to identify disparities in infection. One of the populations surveyed is women aged 15-49 years attending ANC for the first time during their current pregnancy. ANC clinic attendees are believed to represent healthy, sexually active women of reproductive age and represent a proxy for the general population. In 2005, approximately 12,800 women were sampled from 43 sites over a three-month period for ANC surveillance.

National ANC sentinel surveillance reports show that HIV prevalence among pregnant women aged 15-49 years decreased from 9.4% in 2003 to 6.9% in 2006. ANC sentinel surveillance is one of several sources of national HIV data. Because it uses anonymous testing, it is free from participation and self-reporting biases. As the proportion of women who are tested in ANC rises and gets closer to 100%, however, the need for anonymous testing decreases because the population being tested routinely for clinical purposes approximates the population that would have been tested anonymously.

In a few countries, such as Botswana and Thailand, anonymous testing has been dropped from ANC sentinel surveillance, and data from routine clinical testing are being used. In Kenya, where more than 90% of young pregnant women (aged 25-29 years) came to ANC for care in 2007 and 80% were offered testing, ANC sentinel surveillance will soon be able to transition from anonymous surveys to reportable, routine testing to gather HIV surveillance data among pregnant women.

Please refer to the “Data in Context” section in Chapter 3 for more on ANC sentinel surveillance and alternate approaches to national HIV surveillance.

[4] NASCOP, Sentinel Surveillance of HIV and STDs in Kenya Report, 2006.

Figure 8.5b Women aged 15-49 years who ever received an HIV test by whether they were tested at an ANC for their last live birth between 2003 and 2007, Kenya 2007.

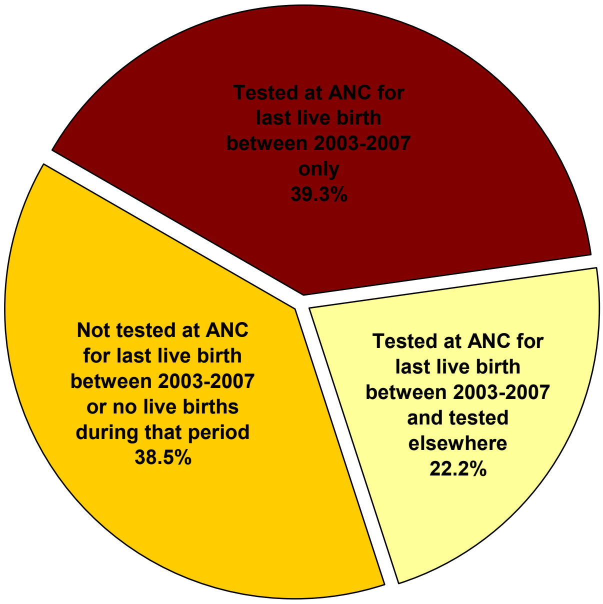


Figure 8.5b Most women (61.5%) that had ever received an HIV test had done so at an ANC between 2003 and 2007.

Of all women aged 15-49 years who ever received an HIV test, 61.5% had received an HIV test at an ANC between 2003 and 2007; of these, 63.8% had only ever been tested at an ANC (data not shown). This result reflects the substantial contribution that ANCs have made towards expanding HIV testing among women.

The next figure focuses on HIV-infected women who had their last live birth between 2003 and 2007 and attended ANC.

Figure 8.5c HIV-infected women aged 15-54 years with last live birth between 2003 and 2007 by whether they received an HIV test at an ANC*, Kenya 2007.

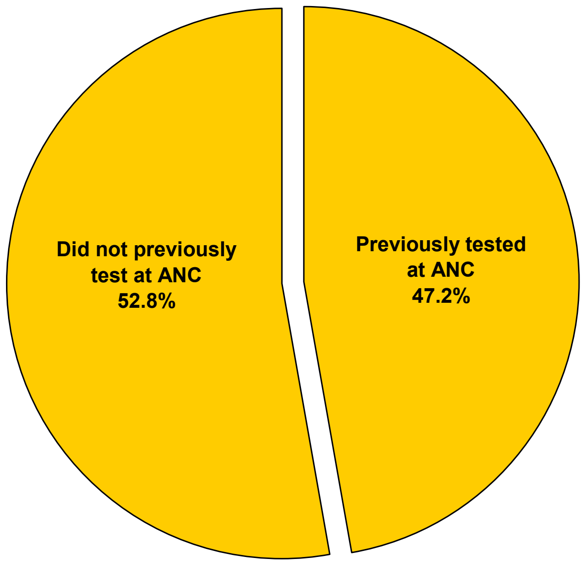


Figure 8.5c More than half of HIV-infected women who attended ANC for their last live birth between 2003 and 2007 had not previously tested at an ANC.

* Analysis limited to those who attended an ANC at least once for their last live birth between 2003 and 2007; HIV infection is based on laboratory confirmed test results from the 2007 KAIS.

Overall, of women aged 15-54 years who were found to be HIV-infected in KAIS, whose last live birth was between 2003 and 2007 and who attended ANC at least once, 47.2% had previously had an HIV test at an ANC and 52.8% had not. Of those who had received a previous HIV test at an ANC, 13.1% self-reported their previous ANC test result as positive and 86.9% as self-reported as negative, that is, these participants believed themselves to be HIV-uninfected based on the results of their previous ANC test (data not shown). Significantly more women receiving an HIV test at ANC in 2007 self-reported a positive ANC HIV test result when compared to women tested in earlier years at an ANC; however, the sample size was too small to allow conclusions to be drawn about reported ANC test results.

Possible explanations for this difference between the KAIS HIV test result and a self-reported test result from the ANC testing include:

- Seroconversion or HIV infection since the previous test
- Unreliability of self-reporting of the test results
- Quality assurance/quality control issues related to HIV testing and counseling in the ANC testing program which resulted in an incorrect result

- Incorrect communication or understanding of test results.

DATA IN CONTEXT

National PMTCT Services and PMTCT Program Data[5]

PMTCT services in Kenya are free and integrated into Maternal and Child Health (MCH) services. PMTCT interventions include:

- **HIV testing and counseling**
- **Preventive treatment with antiretrovirals (maternal and infant)**
- **Counseling and support for appropriate infant feeding**
- **Access to safe obstetric care**
- **Family planning services**

The national PMTCT program has undergone a substantial and successful scale-up over the last five years. At the end of 2003, PMTCT services were offered in 463 health facilities. By the time KAIS was completed in December 2007, this number had increased to more than 2,000 (40%) of all health facilities in the country. By the end of 2008, more than 3,000 health facilities were offering PMTCT services (60% of all health facilities).

During the period between October 2007 and September 2008, an estimated 900,000 pregnant women accessed HIV testing and counseling in MCH facilities and approximately 50,000 HIV-infected women received ART prophylaxis.

8.6 BREASTFEEDING PRACTICES

Kenya has adopted the 2006 WHO recommendation on infant and young child feeding in resource-constrained settings: HIV-infected mothers should practice exclusive breastfeeding until the infant is at least six months of age unless replacement feeding is affordable, feasible, acceptable, sustainable and safe (AFASS) for the mother and her infant before that time. At six months, if replacement feeding is still not AFASS, continuation of breastfeeding with additional complementary foods is recommended, while mother and baby continue to be regularly assessed. All breastfeeding should stop once a nutritionally adequate and safe diet without breast milk can be provided.

Knowledge of HIV status may affect a woman's breastfeeding practices. In the 2007 KAIS, women whose last live birth was between 2003 and 2007 were asked about breastfeeding practices after their last live birth. Given the small number of breastfeeding women who self-reported positive based on their last HIV test, however, it was not possible to examine breastfeeding practices by knowledge of status.

[5] Ministry of Health, Division of Reproductive Health.

8.7 Currently Pregnant Women: ANC Clinic Attendance

The next three sections (sections 8.7 – 8.9) consider the 7.0% of women aged 15-49 years who were pregnant at the time of KAIS. These findings provide the most current data on behaviours, HIV serology and CD4 counts among pregnant women.

Figure 8.7 ANC attendance among currently pregnant women aged 15-49 years, by gestational age, KAIS 2007.

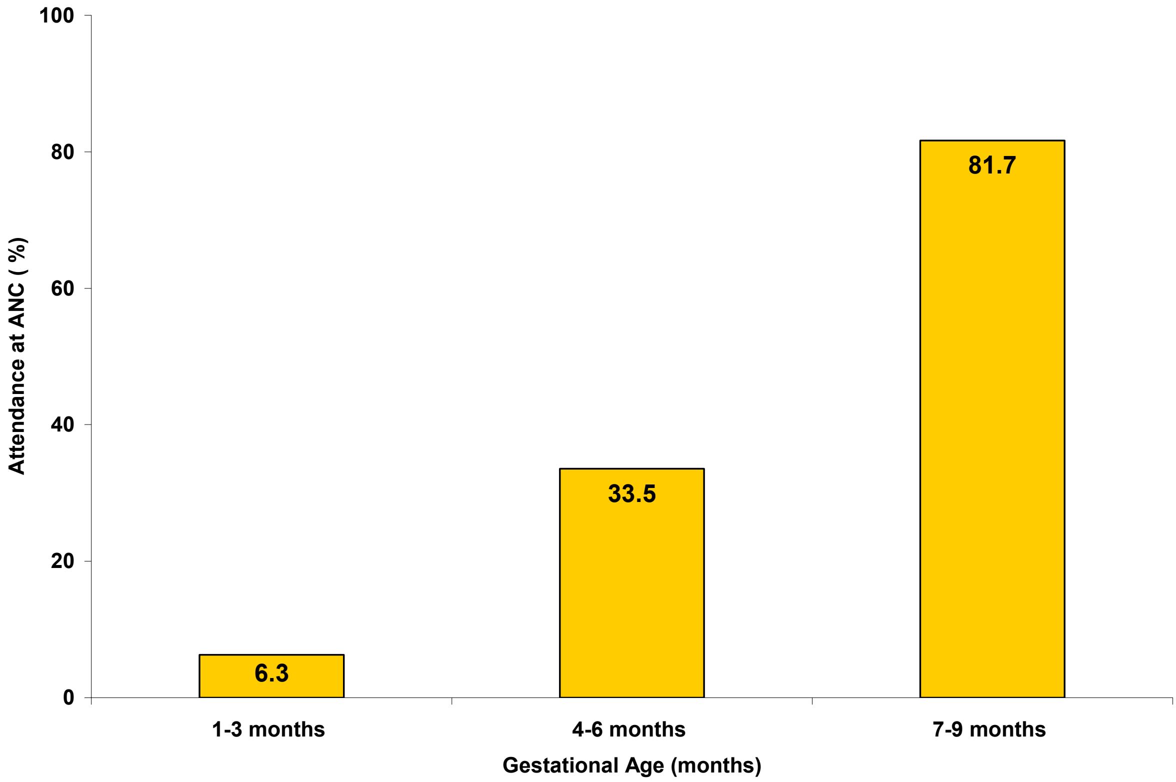


Figure 8.7 Among women in their third trimester of pregnancy, 81.7% had attended an ANC at least once.

ANC attendance rates among currently pregnant women increased with gestational age from 6.3% of women in the first trimester to 81.7% in the third.

8.8 Currently Pregnant Women: HIV Testing, HIV Status and CD4 Counts

Among currently pregnant women, 66.1% reported to have ever been tested for HIV, while 33.9% had never been tested. Of the currently pregnant women who were tested in the 2007 KAIS, 9.0% were HIV infected, corresponding to an estimated 58,000 HIV-infected pregnant women nationally. Of those who were HIV-infected, 8.2% self-reported being HIV positive, 38.7% self-reported being HIV negative and 53.1% had never been tested for HIV.

Figure 8.8 HIV-infected pregnant women aged 15-49 years by CD4 count (cells/μL), Kenya 2007.

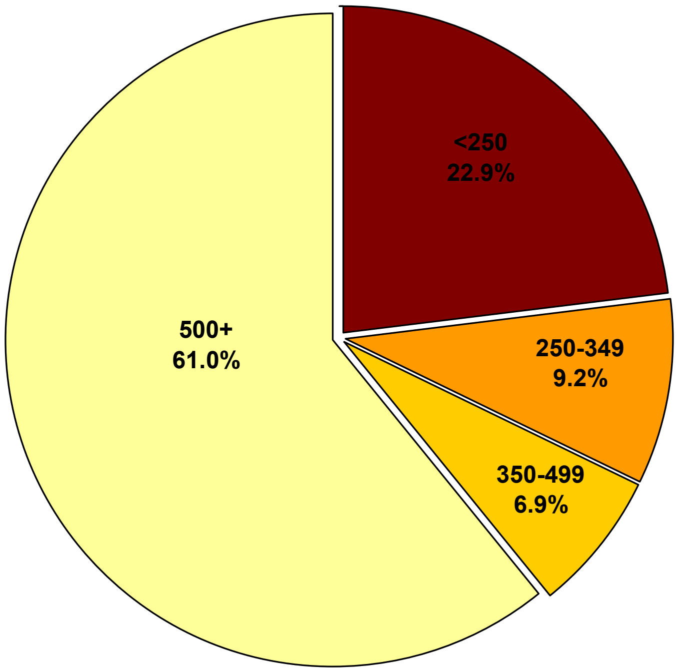


Figure 8.8 About a third of currently pregnant and HIV-infected women had a CD4 count of <350 cells/μl and were thus eligible for ART.

Among pregnant, HIV-infected women, 32.1% had a CD4 count of less than 350 cells/μl and were thus eligible for ART; 61.0% had CD4 counts greater than 500 cells/μl.

8.9 Currently Pregnant Women: HIV, HSV-2 and Syphilis

HSV-2 and syphilis infection are known to increase the risk of acquisition and transmission of HIV. Additionally, maternal genital HSV-2 infection can result in neonatal herpes encephalitis with an infant mortality rate in excess of 50% despite treatment. Babies born to mothers subclinically shedding virus, after acquiring genital herpes in the their third trimester, have a 30-50% risk of developing neonatal herpes.[6,7,8]

Figure 8.9a HIV and HSV-2 co-infection among currently pregnant women aged 15-49 years, Kenya 2007.

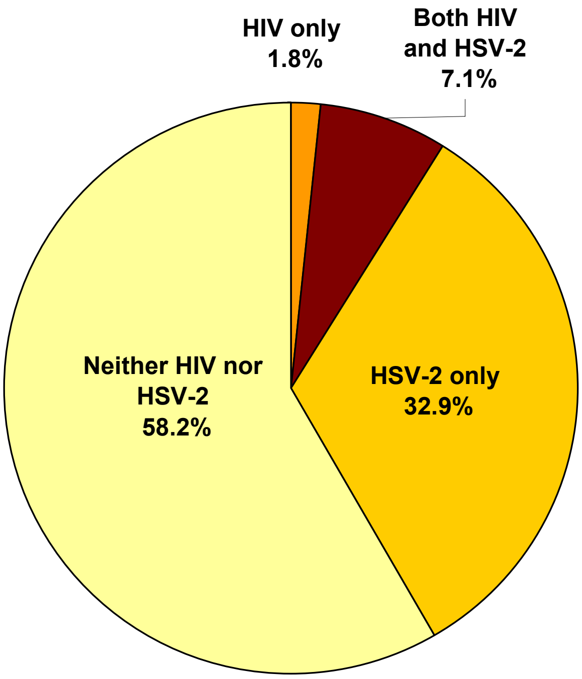


Figure 8.9a Forty percent of currently pregnant women were infected with HSV-2.

[6] Boucher FD, Yasukawa LL, Bronzan RN, Hensleigh PA, Arvin AM, Prober CG. A prospective evaluation of primary genital herpes simplex virus type 2 infections acquired during pregnancy. **Pediatr Infect Dis J** 1990;9:499–504.

[7] Brown ZA, Benedetti J, Ashley R, Burchett S, Selke S, Berry S, et al. Neonatal herpes simplex virus infection in relation to asymptomatic maternal infection at the time of labor. **N Engl J Med** 1991;324:1247–52.

[8] Brown ZA, Wald A, Morrow RA, Selke S, Zeh J, Corey L. Effect of serologic status and cesarean delivery on transmission rates of herpes simplex virus from mother to infant. **JAMA** 2003;289:203–9.

Among currently pregnant women, 7.1% were co-infected with HIV and HSV-2, 1.8% were infected with HIV only, 32.9% were infected with HSV-2 only and 58.2% were not infected with either HSV-2 or HIV.

HSV-2 prevalence was significantly higher (2.2 times) among HIV-infected pregnant women compared to pregnant women with no HIV infection (80.1% vs. 36.1%, respectively). These estimates were similar to the 2007 KAIS findings for HSV-2 in the general population, which are discussed in Chapter 12. Among all women aged 15-49 years, HSV-2 prevalence was 39.8% and HSV-2 prevalence was 2.4 times higher among HIV-infected women compared to HIV-infected women (84.1% vs. 35.5%, respectively) (data not shown).

Figure 8.9b HIV and syphilis among currently pregnant women aged 15-49 years, Kenya 2007.

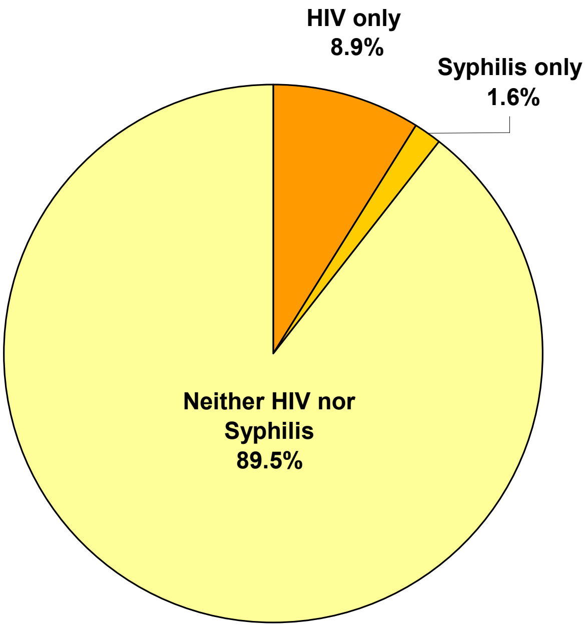


Figure 8.9b Among currently pregnant women, 1.6% were seropositive for syphilis; none of these women were co-infected with HIV.

Syphilis is most transmissible in the primary and secondary stages, but pregnant women can transmit the infection to fetuses at any point in the course of their disease, causing congenital syphilis.

Among women currently pregnant at the time of KAIS, 1.6% were seropositive for syphilis. This estimate matches the overall prevalence of syphilis seropositivity found in the 2007 KAIS for the general population (1.8%) and among all women aged 15-49 years (1.6%). The 2007 KAIS findings for syphilis infection in the general population, which are presented in Chapter 13, suggest a strong correlation between HIV and syphilis seropositivity; however, no pregnant women were found to be seropositive for both HIV and syphilis in the 2007 KAIS. This may be due to the small number of pregnant respondents infected with syphilis.

8.10 HIV STATUS AND SEXUAL PARTNERSHIPS

In the absence of treatment, women who become infected with HIV during pregnancy or breastfeeding have a very high risk of transmitting the virus to their infants (73% and 36%, respectively).[9] This section examines the role that sexual partners may play in increasing risk for HIV infection among HIV-uninfected women in these groups.

Respondents were asked to provide information for up to three partners with whom they had sexual intercourse in the 12 months prior to the survey (see Data in Context, Chapter 5.4). Most women (69.2%) reported having only one partner in the year before the survey. Because individuals could have had more than one partner during this time, partnership results should be interpreted as a percent of all partnerships rather than the percent of all individual KAIS participants.

Figure 8.10a Knowledge of partners' HIV status* among HIV-uninfected currently pregnant or breastfeeding women aged 15-49 years who reported having unprotected sex in the 12 months preceding the survey, Kenya 2007.

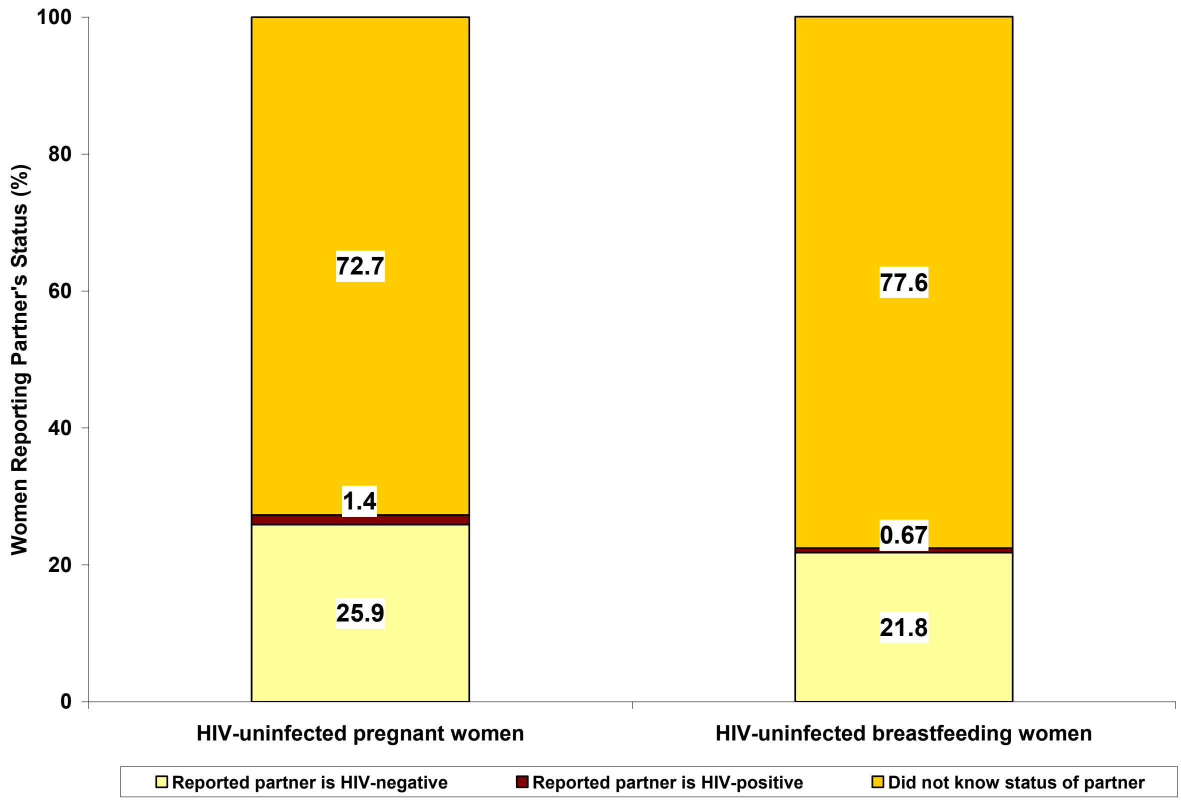


Figure 8.10a An estimated three fourths of sexual partnerships among HIV-uninfected pregnant and breastfeeding women were with men whose HIV status was unknown.*

*A "partner of unknown status" refers to a partner who had never been tested for HIV, whose testing history was unknown to the respondent, or whose HIV test result was unknown to the respondent.

[9] Humphrey, JH, et al: Mother to child transmission of HIV among Zimbabwean women who had their primary HIV infection during pregnancy or while breastfeeding. XVI International AIDS conference, Toronto, Canada, August 14, 2006.

Among pregnant, HIV-uninfected women who reported unprotected sex with their sexual partner(s) in the year before the survey, 72.7% of their partnerships were with partners of unknown status, and 1.4% were with men whom they reported to be HIV-infected. Knowledge of partner's HIV status among HIV-uninfected breastfeeding women was similarly low; 77.6% of their sexual partnerships were with men of unknown HIV status and 0.7% were with men whom they reported to be HIV-infected.

Figure 8.10b considers a partnership dataset of married or cohabiting partners in the 2007 KAIS (described in Data in Context, Chapter 5.6) and determines the proportion of HIV-uninfected pregnant or breastfeeding women with cohabiting partners who were HIV-infected based on the 2007 KAIS laboratory results, as opposed to the self-reported HIV status recorded by KAIS interviewers.

Figure 8.10b HIV-uninfected women aged 15-49 years who were pregnant or breastfeeding and had an HIV-infected* primary partner, Kenya 2007.

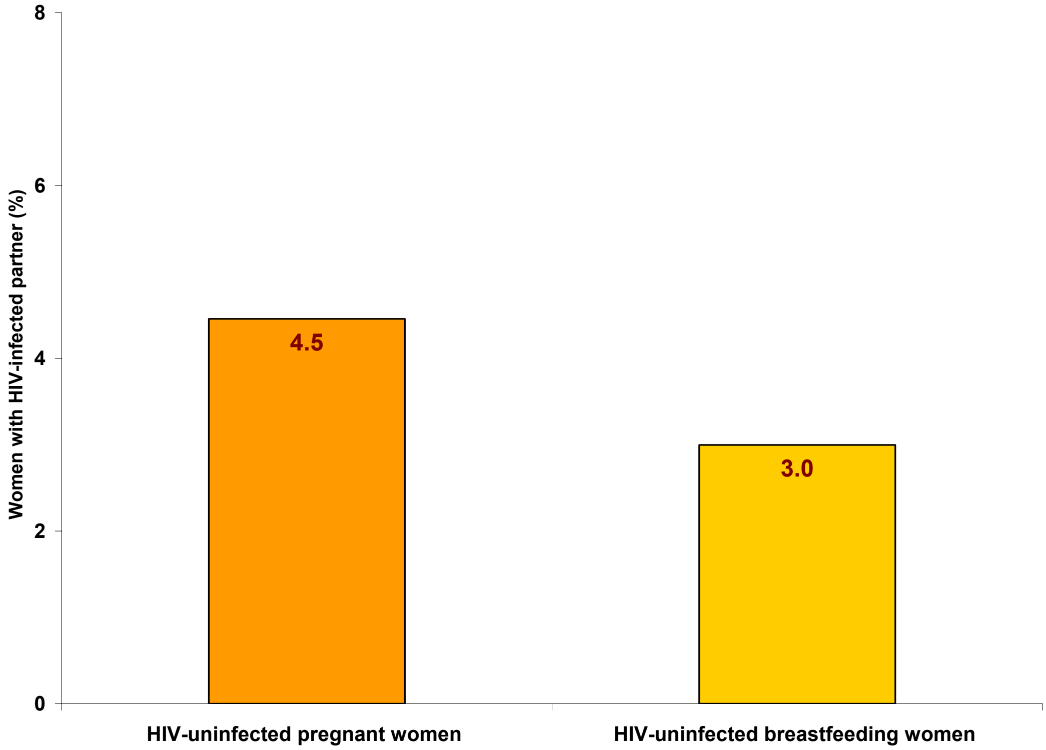


Figure 8.10b Overall, 4.5% of HIV-uninfected pregnant women and 3.0% of HIV-uninfected breastfeeding women were in HIV-discordant relationships

*HIV status of primary partner is based on the 2007 KAIS laboratory test result.

Among currently pregnant HIV-uninfected women, 4.5% had a cohabiting sexual partner who was HIV-infected. Among currently breastfeeding HIV-uninfected women, 3.0% had an HIV-infected cohabiting sexual partner.

8.11 Fertility Desires

Only women who were married or cohabiting with a man and had not been sterilized by tubal ligation or hysterectomy were asked about their desires for children in the future. For analysis purposes, this group was then limited to women of reproductive age (15-49 years). Although sterilized women were not asked about desire for children in the 2007 KAIS, for purposes of analysis they were assumed to not want a child ever in the future. Women who could not have a child for reasons other than female sterilization (i.e. infertility, partner infertility, or partner sterilization) were excluded from analysis.

Figure 8.11a Desire for a child in the future among married or cohabiting women aged 15-49 years, Kenya 2007.

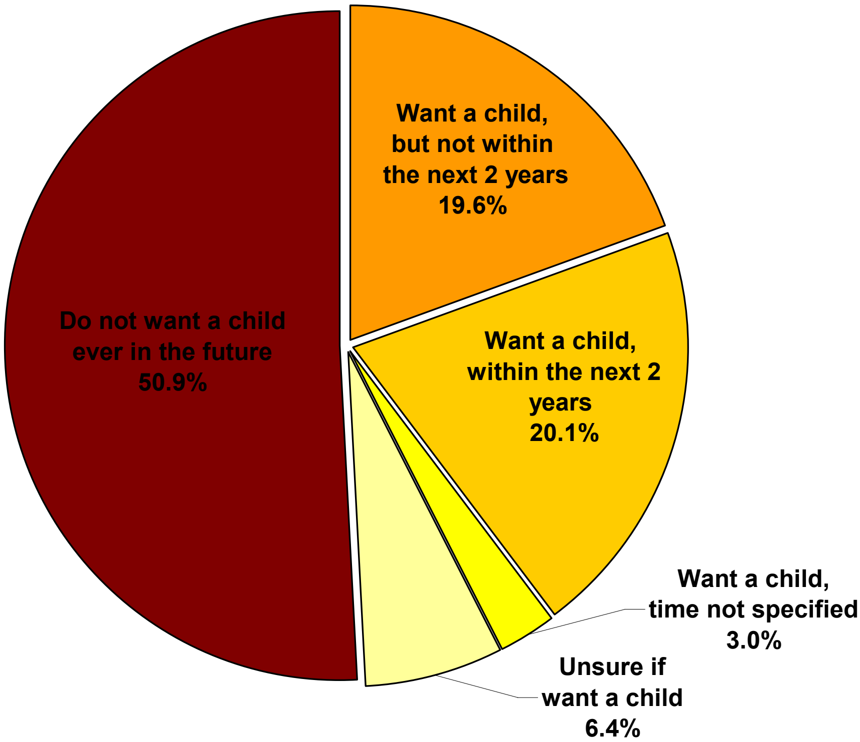


Figure 8.11a About half (50.9%) of all women aged 15-49 years did not want a child ever in the future.

Among women aged 15-49 years who were married or cohabiting with a man, 50.9% did not want a child ever in the future and 19.6% wanted a child but not within the next two years.

Figure 8.11b Desire for a child in the future among married or cohabiting women aged 15-49 years, by self-reported HIV status, Kenya 2007.

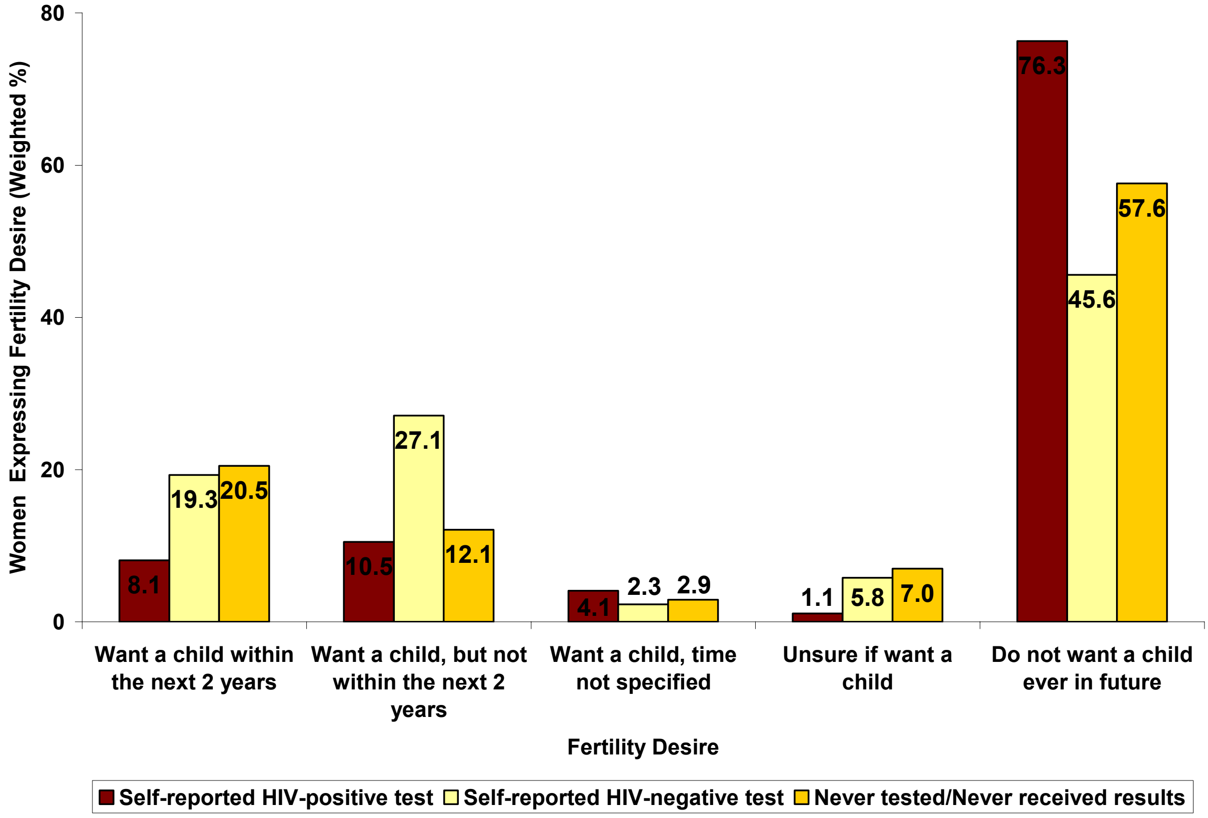


Figure 8.11b Significantly more women who self-reported positive did not want a child ever in the future compared with women who self-reported negative.

Fertility desires were significantly associated with self-reported HIV status. Among women who self-reported positive, 8.1% wanted a child within the next two years; 10.5% wanted a child, but not within the next two years; and 76.3% did not want a child ever in the future. Among women who self-reported negative, that is, believed themselves to be HIV-uninfected based on the results of their last HIV test, 19.3% wanted a child within the next two years; 27.1% wanted a child, but not within the next two years; and 45.6% did not want a child ever in the future. Fewer women who self-reported positive wanted a child either in the next two years or in more than two years time when compared to women who self-reported negative. More women who self-reported positive did not want another child ever in the future when compared to women who self-reported negative.

Only 44.6% of women aged 15-49 years reported ever having been tested for HIV (see Chapter 4), suggesting that many fertility decisions made by women may be independent of knowledge of their own HIV status. Therefore, to quantify the need for PMTCT program services, we also examined fertility desires among women by their actual HIV infection status (based on laboratory confirmed 2007 KAIS test results).

Figure 8.11c Desire for a child in the future among women aged 15-49 years by actual HIV status,* Kenya 2007.

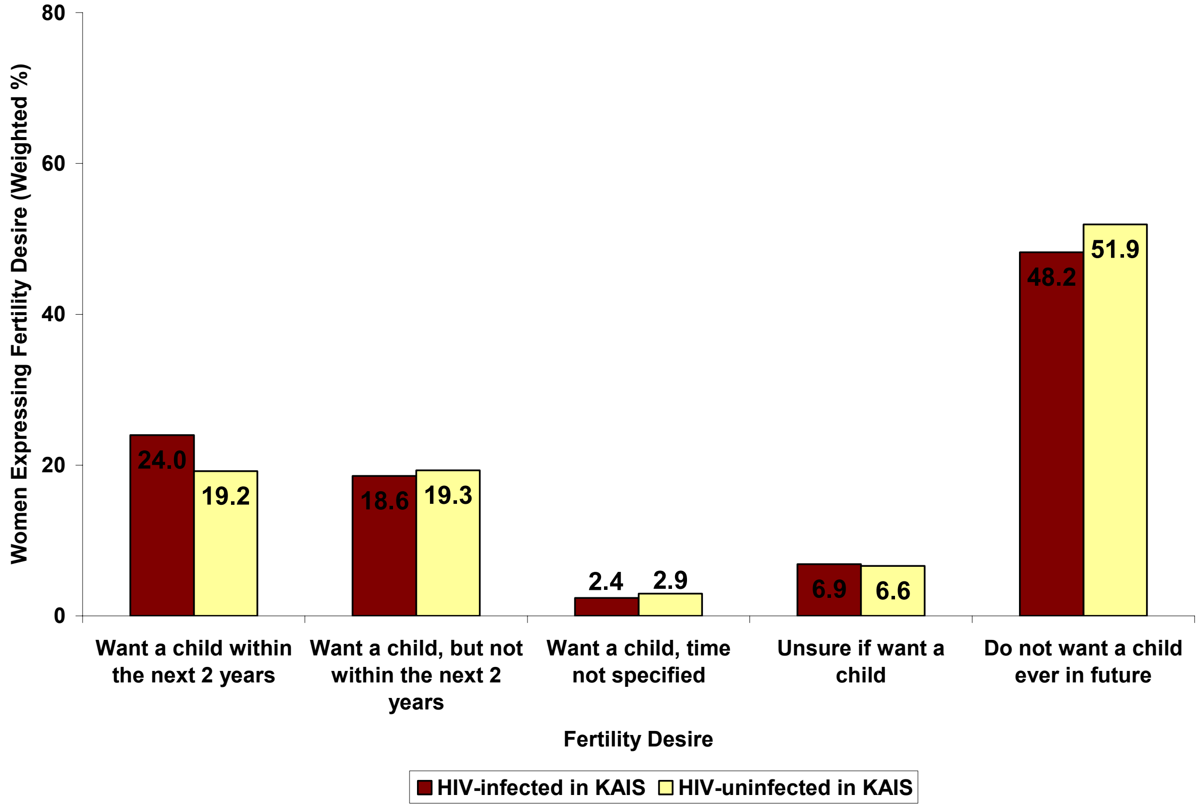


Figure 8.11c Fertility desires were not significantly different between HIV-infected women and HIV-uninfected women.

*HIV status is based on the 2007 KAIS laboratory test result.

Among women who were HIV-infected based on the 2007 KAIS test results, 24.0% wanted a child in the next two years; 18.6% wanted a child but not within the next two years and 48.2% did not want a child ever in the future. Fertility desires did not differ significantly by actual HIV infection status.

8.12 CONTRACEPTIVE USE

The next figure displays the unmet need for contraception among women aged 15-49 years in marital or cohabiting relationships who either did not want a child ever in the future or wanted a child but not in the next two years. This group comprised 33.6% of all women participating in the 2007 KAIS. The 6.1% of all women who were currently pregnant at the time of the survey were excluded from the analysis.

Figure 8.12a Contraceptive use* among women in marital or cohabiting relationships aged 15-49 years not wanting a child ever in the future or wanting a child but not in the next two years, Kenya 2007.

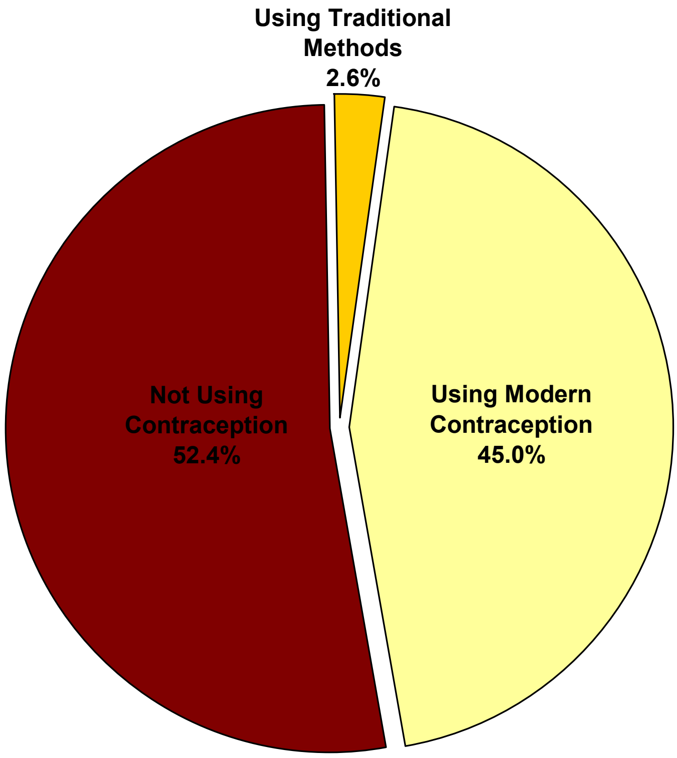


Figure 8.12a Almost half (45.0%) of women in marital or cohabiting relationships who did not want a child in the next two years or ever in the future were using modern contraception.

* Modern contraception includes male or female sterilization, oral pill, intrauterine device, injections, implant, condom, and female condom. Traditional methods include withdrawal and rhythm/natural methods.

Of all women aged 15-49 years who either did not want a child ever in the future or who wanted a child but not in the next two years, 45.0% were using modern contraceptive methods, and 52.4% were not using any contraception at all. These findings indicate a large unmet need for contraception.

Figure 8.12b Contraceptive use* among women in married or cohabiting relationships aged 15-49 years not wanting a child ever in the future or wanting a child but not in the next two years, by self-reported knowledge of HIV status, Kenya 2007.

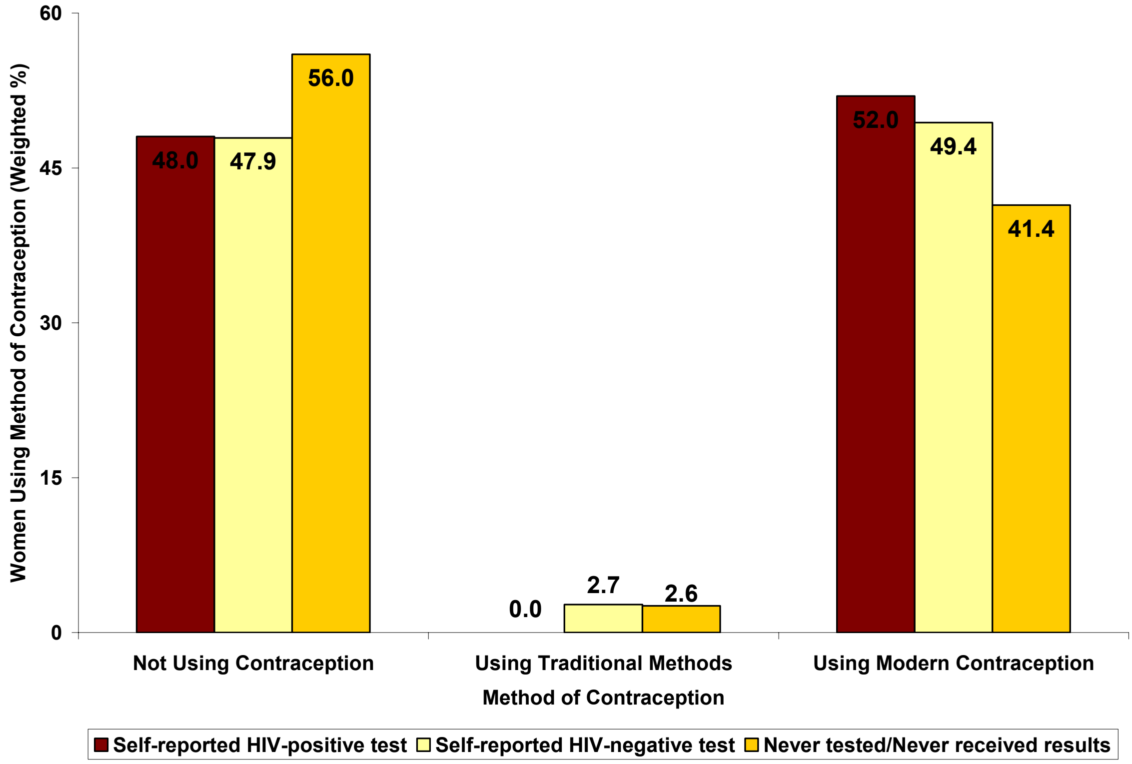


Figure 8.12b Contraceptive use was similar between women who self-reported positive and those those self-reported negative based on the result of their last HIV test.

* Modern contraception includes male or female sterilization, oral pill, intrauterine device, injections, implant, condom, and female condom. Traditional methods include withdrawal and rhythm/natural methods.

Contraceptive use was not significantly associated with self-reported HIV status. Similar proportions of women who self-reported positive and women who self-reported negative were using either modern contraception, traditional methods, or no contraception at all.

Given that less than half of women aged 15-49 years reported ever having been tested for HIV, we repeated the analysis, stratified by the actual HIV infection status of the women based on the 2007 KAIS HIV test result, to quantify the unmet need for contraception.

Figure 8.12c Contraceptive use* among married or cohabiting women aged 15-49 years who do not want a child ever in the future or in the next two years, by actual HIV status, Kenya 2007.

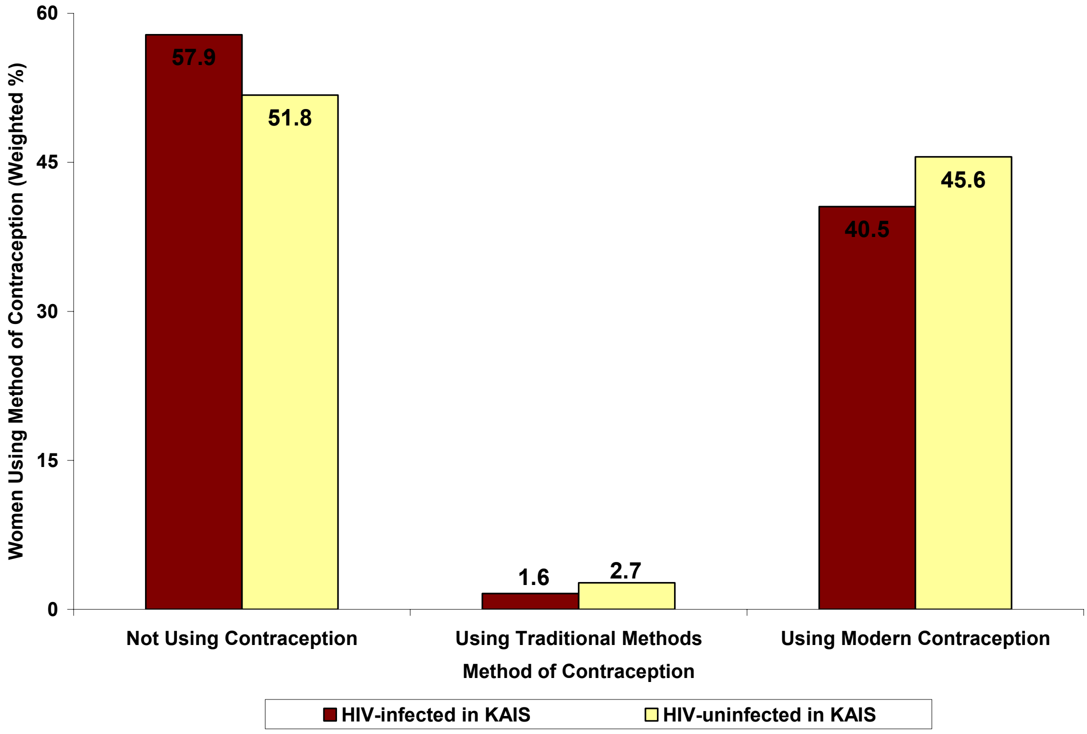


Figure 8.12c More than half (57.9%) of HIV-infected women in married or cohabiting relationships who had a need for contraception were not using any contraception.

* Modern contraception includes male or female sterilization, oral pill, intrauterine device, injections, implant, condom, and female condom. Traditional methods include withdrawal and rhythm/natural methods.

Of all married or cohabiting women aged 15-49 years, 70.5% did not want a child ever in the future or wanted a child but not in the next two years. Of these women for whom we also had an HIV test result, it appears that more HIV-infected women were not using any contraception (57.9%) compared to HIV-uninfected women (51.8%), though this difference was not significant. Fewer HIV-infected women were using modern contraception (40.5%) when compared to HIV-uninfected women (45.6%) but this difference was also not significant. More than 50% of women were not using any contraception at all, irrespective of actual HIV infection status.

8.12 Gaps and Unmet Needs

- **Although ANC attendance rates were high, one in 10 women did not attend an ANC and could not access PMTCT services. Efforts should be directed to reaching those women not attending an ANC.**
- **ANC testing increased over the years, but gaps still remain: some women attending ANC in 2007 were not offered HIV testing. Additional efforts are required to ensure "opt-out" HIV testing is offered to all ANC attendees as well as testing options for sexual partners.**
- **Most ANC attendees received testing and counseling for HIV; consideration should be given to the future use of PMTCT program data to replace ANC sentinel surveillance.**
- **ANC attendance was low among women in their first and second trimesters of pregnancy. A greater number of women may have exposure to HIV testing and PMTCT services if ANC begins earlier in pregnancy. Early prenatal care should be a priority.**
- **Prevention of HIV infections in pregnant and breastfeeding women must be addressed; among HIV-uninfected pregnant or breastfeeding women who reported having unprotected sex, the majority of their sexual relationships were with men whose HIV status was unknown to them.**
- **There is a large unmet need for family planning among all women; this need should be addressed most urgently among HIV-infected women. Fertility desires among women were significantly associated with knowledge of HIV status, but contraceptive use was not. Fertility desires should be considered in conjunction with contraceptive options.**

Blood and Injection Safety chapter 9

9.1 Key Findings

- **Among all respondents aged 15-64 years, 2.3% reported donating blood in the year before the survey; almost half of donors (48.3%) reported donating in response to a request from a blood transfusion service.**
- **Among adults who reported ever receiving a blood transfusion, 7.0% were HIV-infected. This figure was not significantly different from persons who did not receive a blood transfusion (7.1%).**
- **An estimated 33.1% of adults reported that they received at least one medical injection in the year before the survey. Though HIV prevalence was significantly higher among both women and men who reported medical injections in the past year compared to women and men who did not, causality cannot be determined and further adjustments are needed to control for possible confounders.**
- **The use of clean needle packets for medical injections appeared to be widely adopted in clinical settings.**

9.2 Introduction

Assuring a safe and adequate the blood supply is the priority of the Kenya National Blood Transfusion Service (KNBTS), which has evolved from individual hospital-based blood programs to a national network of regional blood collection, processing and distribution to transfusing facilities that provides coverage for much of the nation. However, coverage is not 100%. There are still some family/replacement donors (that is, persons who donate at the request of family or friends) in the KNBTS system and some hospitals continue to operate independently, such as Aga Khan, a private teaching hospital in Nairobi which has large labour and delivery services. Donations from volunteers and family/replacement donors are all subject to the same testing by the KNBTS and the quality of hospital programs ranges from basic to international standards with external quality assurance systems.

In November 2001 Kenya introduced its first blood safety policy and in January 2007 established National Standards for Blood Banks and Transfusion Services. KNBTS is structured to collect, screen and distribute blood from regular, voluntary, non-remunerated (that is, non-paid) donors based on international standards of quality management, testing algorithms and standardised procedures.

Regular, voluntary, non-remunerated blood donors are preferred over family/replacement donors or donors who are paid because the latter groups have been shown to have higher HIV prevalence worldwide.[1] All donated blood units are screened for HIV, hepatitis B and C, and syphilis. Blood units found to be positive for any of these infectious agents are discarded.

In this chapter, we report on the proportion and demographics of adults aged 15-64 years in the 2007 KAIS who reported donating blood in the past year, the source of their blood donation request and explore blood safety issues. We also report on the frequency of injections by medical personnel and traditional healers, and the use of safe injection equipment in clinical settings.

Appendix B.9 provides sample sizes and 95% confidence intervals for estimates presented in this chapter. Throughout the chapter, the term significant indicates a chi-square p-value less than 0.05; marginally significant indicates a p-value between 0.05 and 0.10, inclusive; and not significant indicates a p-value greater than 0.10.

Population estimates reported in this chapter were calculated based 2007 projected population by province, age and sex reported in *Revised Population Projections for Kenya 2000-2020. Kenya National Bureau of Statistics (August 2006)*. Weighted national estimates for selected indicators from the 2007 KAIS were used in these calculations. Methods used for calculating population estimates are described in Appendix A.

It is important to remind readers that as with other chapters in this report, the findings presented in this chapter are based on univariate and bivariate analyses only. Findings should be interpreted cautiously as potential confounders which may have biased associations were not controlled for in the analysis. In addition, the 2007 KAIS was based on cross-sectional data and therefore causality cannot be inferred.

[1] WHO Global Database on Blood Safety: Report 2001 – 2002. Accessible at :
http:\\www.who.int/bloodsafety\GDBS_Report_2001-2002.pdf.

DATA IN CONTEXT: NATIONAL BLOOD TRANSFUSION SERVICES

The Kenya National Blood Transfusion Service (KNBTS), established in 2001, ensures safe and adequate blood supplies for the country. It collects, tests, processes, and distributes blood and promotes its appropriate use. Previously, blood was collected from family and replacement donors at hospital-based transfusion units that lacked standard procedures. The 2001 policy guidelines on blood transfusion recommended a centralized system which would later be independent. In January 2007, Kenya established National Standards for Blood Banks and Transfusion Services. This system ensures standardization of procedures, improved quality of blood supplies and thus, reduced transmission of HIV and other infections. The KNBTS has raised the total number of blood units collected per year from 41,869 in the 2003 to 123,787 in 2007.[2]

[2] NBTS/MOH. Unpublished service statistics. Kenya: NBTS/MOH, 2007.

9.3 Blood donations

The section related to blood donation in the 2007 KAIS interview asked the following three questions:

- Have you been asked to donate blood in the last year?
- Who asked you to donate blood the last time? (blood transfusion service, family/friend, or other/unknown)
- Have you donated blood in the last year?

Among participants who reported that a family or friend asked them to donate blood in the last year, we assumed that the vast majority of these were family/ replacement donors outside of the KNBTS system. However, it is possible that some in this group may have been asked by family or friends to donate to a blood transfusion service as a voluntary non-remunerated blood donor. In addition, though the KNBTS is moving towards 100% voluntary, non-remunerated donations, it is possible that some of the participants that reported donating at the request of a blood transfusion centre included family/ replacement donors.

Overall, 2.3% of participants reported donating blood in the year before the survey. This projects to roughly 460,000 blood donors nationwide. A significantly higher percent of men (4.0%) compared to women (1.1%) surveyed in the 2007 KAIS reported that they donated blood in 2007.

Figure 9.3a Source of blood donation request among adults aged 15-64 years who reported donating blood in the year before the survey, Kenya 2007.

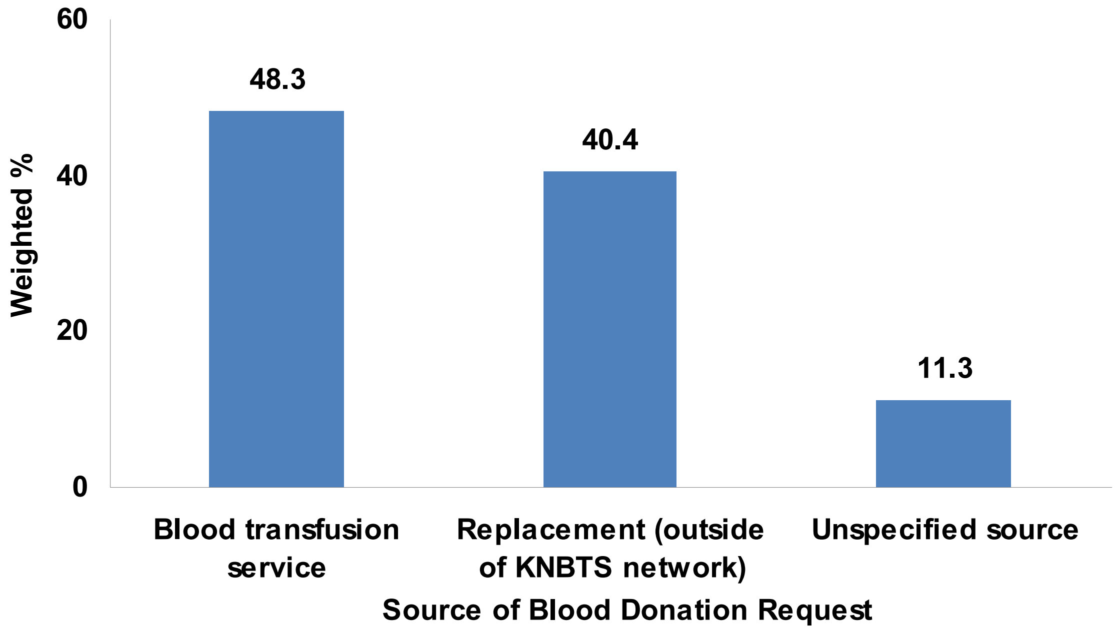


Figure 9.3a Of respondents who reported donating blood in the year before the survey, about half (48.3%) were requested to donate to a blood transfusion service.

Of all participants who reported donating blood in the past year, almost half (48.3%) reported that they donated based on a request from a blood transfusion service, and 40.4% reported that they donated at the request of a family or friend as a family/replacement donor outside of the KNBTS network. The remaining 11.3% did not report the specific source of their blood donation requests. Nationally, this represents an estimated 198,000 adults who donated in response to request from a blood transfusion and another 166,000 adults who reported donating at the request of a friend or family member. The remaining 46,000 donors came from unspecified sources.

DATA IN CONTEXT

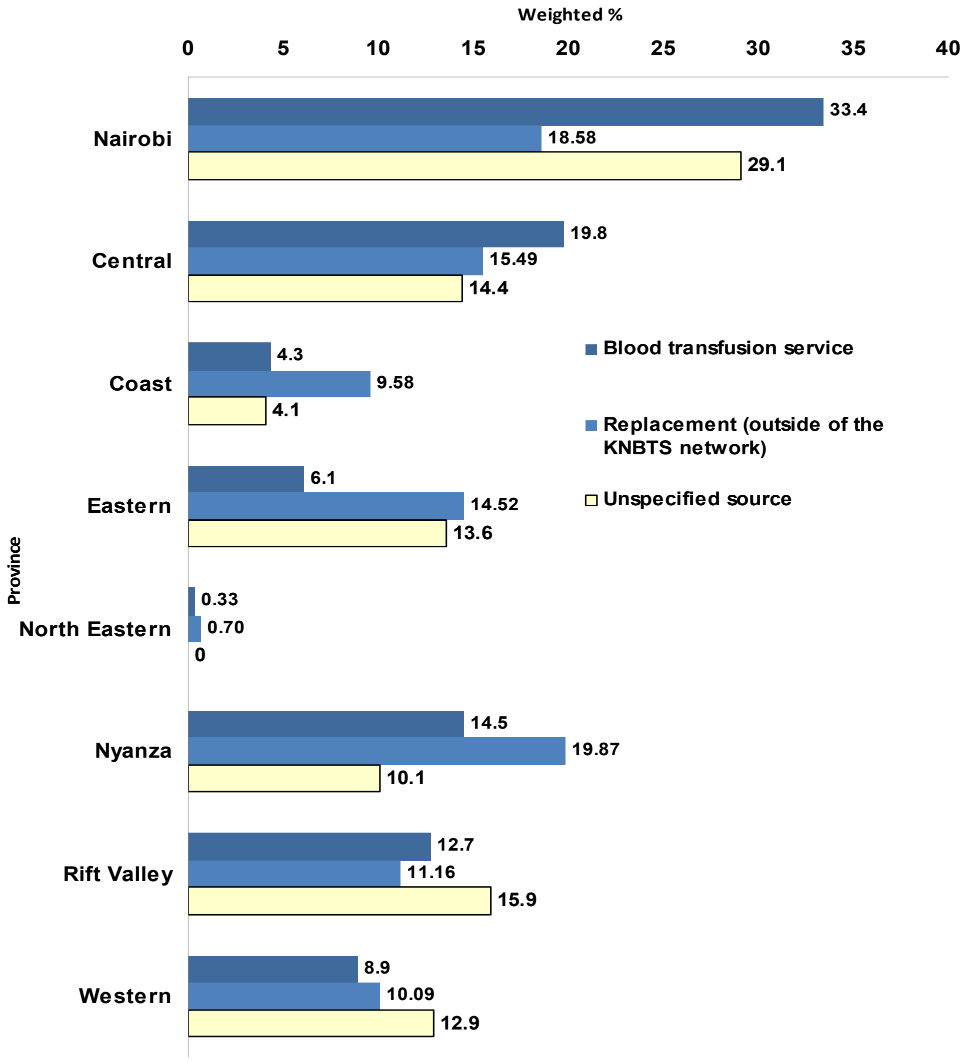
Differences in the 2007 KNBTS and KAIS national estimates for blood donation

Based on KNBTS statistics, approximately 124,000 blood units were collected by the KNBTS centres in 2007; this is roughly 62.6% of the 2007 KAIS national estimate of 198,000 [95% CI 160,000, 240,000] persons who reported donating to a blood transfusion service.

The reasons for the discrepancy in the two estimates need further evaluation, but may include the following possible explanations. The question in the 2007 KAIS that specifies source of blood donation request among donors in the year before the survey was limited to three possible sources: blood transfusion service, family/friend, or other/unknown. Though most persons who donate blood do so through the KNBTS network, it is still possible to voluntarily donate blood to a private hospital blood bank outside of this network. Therefore, the denominators for the KNBTS and KAIS estimate are not necessarily the same. Further, the 2007 KAIS data are based on participant self-report and are therefore subject to participant recall bias. In the 2007 KAIS, participants were asked if they had donated in the past year, though it is possible that the participant reported donations beyond the one year time frame. Finally, in contrast to the KNBTS estimate, the 2007 KAIS estimate is an extrapolated estimate based on the 2007 projected population aged 15-64 years in the 1999 Analytical Report on Population projections, Volume II, Kenya National Bureau of Statistics (KNBS). Because there are strict eligibility criteria for age, weight, and clinical ranges to donate blood in Kenya, not all persons aged 15-64 years are equally eligible to donate blood. Population projections used to calculate the national estimate for blood donation were based on age, sex and provincial distributions in the total general population of persons aged 15-64 years and not the eligible donor population. In addition, there is a possibility that KNBTS data were incomplete due to reporting lapses or inconsistencies across the country. These in combination would have likely contributed to an overestimation of the 2007 KAIS national estimate of reported blood donations in the year before the survey.

Though the discrepancy between the KNBTS and KAIS estimates is considerable, the 2007 KAIS estimate nonetheless gives some indication of the pool of potential blood donors that the KNBTS network may not reaching.

Figure 9.3b Source of blood donation request among adults aged 15-64 years who reported that they donated blood in the year before the survey by province, Kenya 2007.

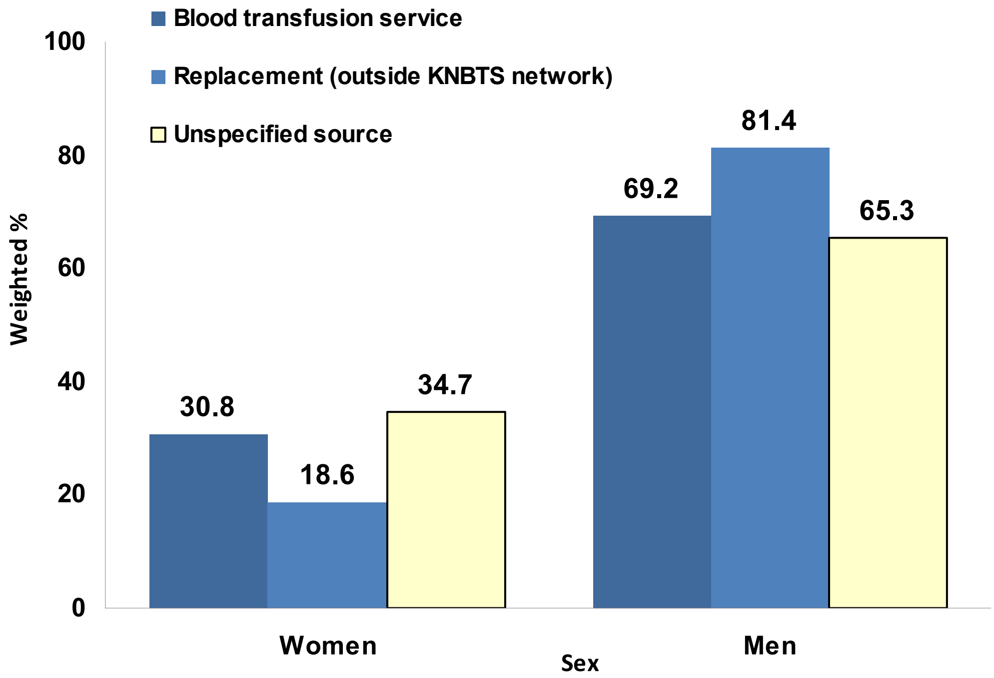


Note, in the figure the weighted percent illustrated for each category of source of donation request totals to 100% across province categories.

Figure 9.3b Among all persons that reported donating blood at the request of a blood transfusion service, the majority were from Nairobi and Nyanza province. Among those that reported donating at the request of family or friends (that is, as a replacement/family donor), most were from Nyanza and Nairobi provinces.

Among reported donors in the year before the survey, the source of donation request varied significantly by province. Donation requests from blood transfusion services were highest in Nairobi province (33.4%) followed by Central province (19.8%). In contrast, family/replacement donor requests were highest in Nyanza (19.9%) and Nairobi (18.6%) provinces. Donation requests from unspecified sources were highest in Nairobi province (29.1%).

Figure 9.3c Source of blood donation request among women and men aged 15-64 years among those who reported donating blood in the year before the survey, Kenya 2007.

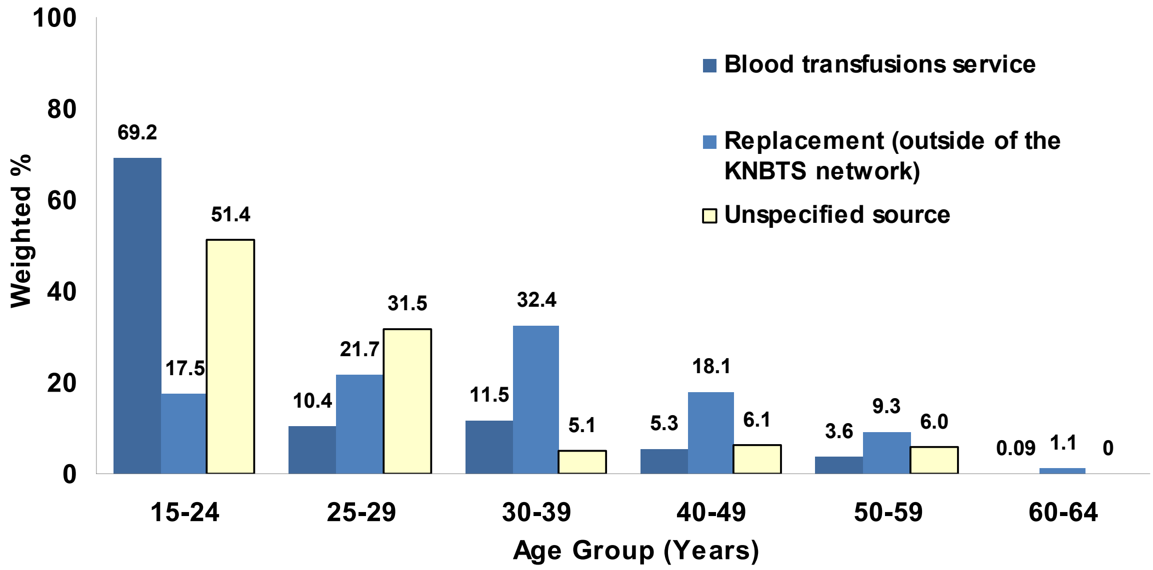


Note, in the figure the weighted percent illustrated for each category of source of donation request totals to 100% across sex category.

Figure 9.3c Most blood donors, regardless of the source of donation request, were men.

More men compared to women donated in response to donation requests from a blood transfusion service (69.2% compared to 30.8%, respectively), family or friends as a family/replacement donor (81.4% vs. 18.6%, respectively), or unspecified sources (65.3% vs. 34.7%, respectively).

Figure 9.3d Source of blood donation request among adults aged 15-64 years among those that reported donating blood in the past year by 5-year age group of donor, Kenya 2007.



Note, in the figure the weighted percent illustrated for each category of source of donation request totals to 100% across age groups.

Figure 9.3d The majority of donors who donated at the request of a blood transfusion service and unspecified places tended to be under the age of 25 years. In contrast, the majority of donors who donated on behalf of family or friends were older, with a peak among persons aged 30-39 years.

Persons who reported donating blood on behalf of a request from a blood transfusion service in the year before the survey were young; 69.2% of these donors were under 25 years of age, as were 51.4% of persons who donated in response to requests from unspecified places (51.4%). In comparison, 60.9% of those who reported donating on behalf of family and friends as a family/replacement donor were 30 years or older.

Figure 9.3e HIV prevalence among adults aged 15-64 years among those who reported donating blood in the past year by source of blood donation request, Kenya 2007.

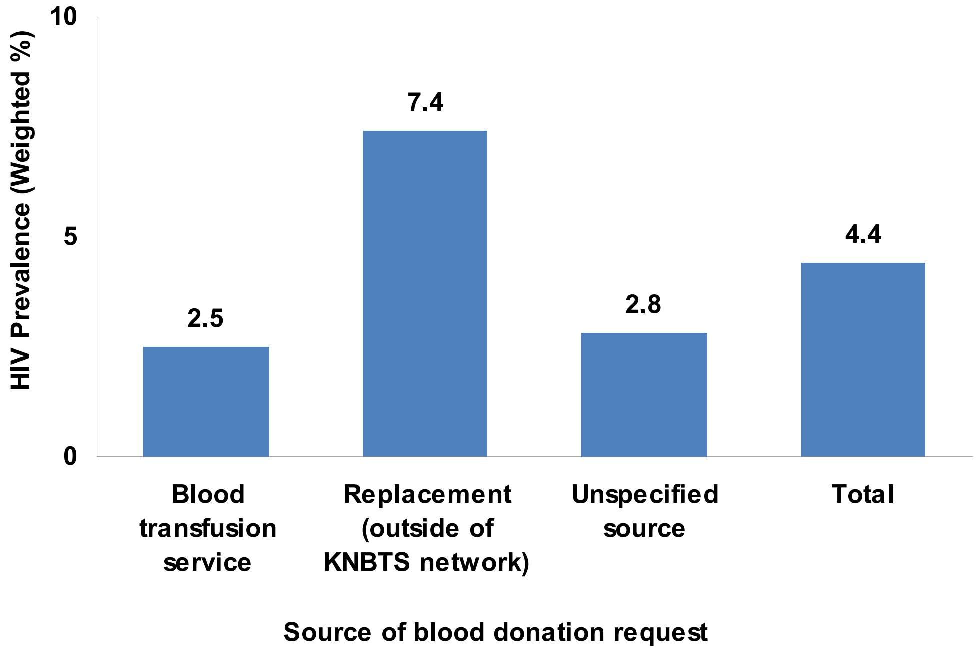


Figure 9.3e HIV prevalence among donors who reported that they donated based on a request from a blood transfusion service in the year before the survey was significantly lower than donors who reported that they donated based on a request from family or friends as a replacement donor.

HIV prevalence was 7.4% among donors who reported donating based on a request from family or friends in the year prior to the survey. This was marginally higher than HIV prevalence among persons who reported that they had donated on behalf of a request from a blood transfusion service (2.5%) and persons who had donated based on a request from an unspecified source (2.8%) in the year before the survey.

Although the difference in HIV prevalence by source of donation request was marginally significant, lower HIV prevalence among persons who donated on behalf of a request from a blood transfusion service may suggest that a volunteer-based blood supply is safer. It is important to note that these data were not adjusted for possible confounding factors such as age, which may have biased this finding. For example, persons who reported donating to a blood transfusion service were younger (median age: 21.5 years) than persons who reported donating as a family/replacement donor (median age: 33 years). Further, as described in Chapter 2 of this report, younger persons in the 20-24 year age group had lower HIV prevalence rates than older persons in the 30-34 year age group (5.2% vs. 11.6%, respectively).

According to 2007 KNBTS statistics, 1.2% of all units donated to the KNTBS network tested positive for HIV. This figure is made up of mostly volunteers and some family/replacement donors. This figure was not statistically different from the 2007 KAIS estimate of HIV prevalence among persons donating to blood transfusion services (2.5%).

9.4 Blood transfusions

Although the risk is very small, blood transfusions have the potential of transmitting infections caused by viruses, such as HIV, to the recipient. With improved testing, the rate of transfusion-transmitted HIV infection has reduced substantially. This section focuses on transfusion history among KAIS respondents and HIV prevalence among those who had ever received a blood transfusion.

Figure 9.4a Time since last blood transfusion among adults aged 15-64 years who reported ever receiving a blood transfusion, Kenya 2007.

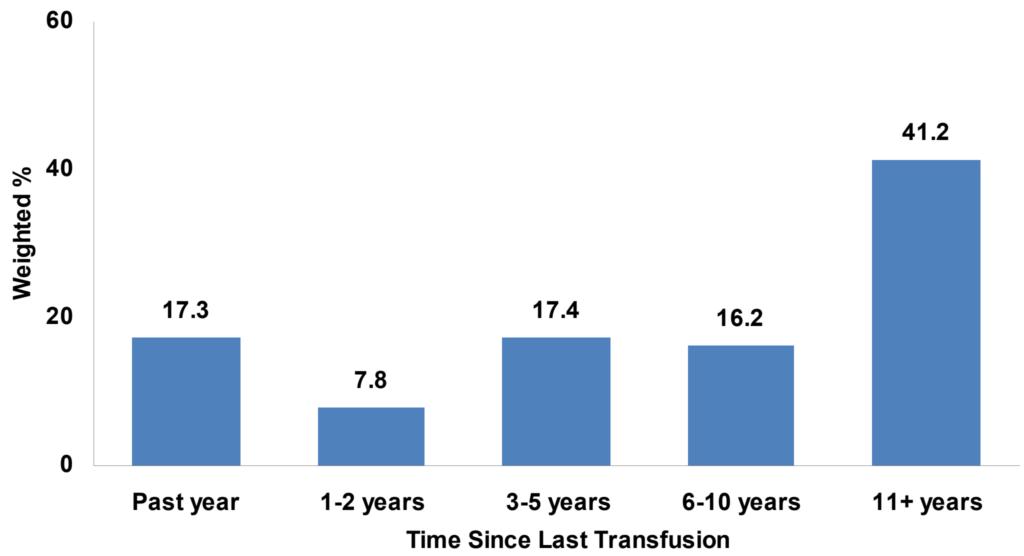


Figure 9.4a Most of the reported blood transfusions among participants occurred more than 10 years ago.

Overall, a total of 6.7% adults aged 15-64 years reported ever receiving a blood transfusion. Among this group, 41.2% received their last transfusion more than 10 years prior to the survey; 17.3% of adults with a transfusion history reported that their last transfusion occurred during the year before the survey. Nationally, an estimated 222,000 adults received a blood transfusion the year before the survey. As previously described, this national estimate is based on extrapolations from projected population sizes reported from the *Revised Population Projections for Kenya 2000-2020. Kenya National Bureau of Statistics (August 2006)* and therefore may not be representative of the population eligible for blood transfusion in the country.

Figure 9.4b HIV prevalence among adults aged 15-64 years who reported receiving a blood transfusion by time since last transfusion, Kenya 2007.

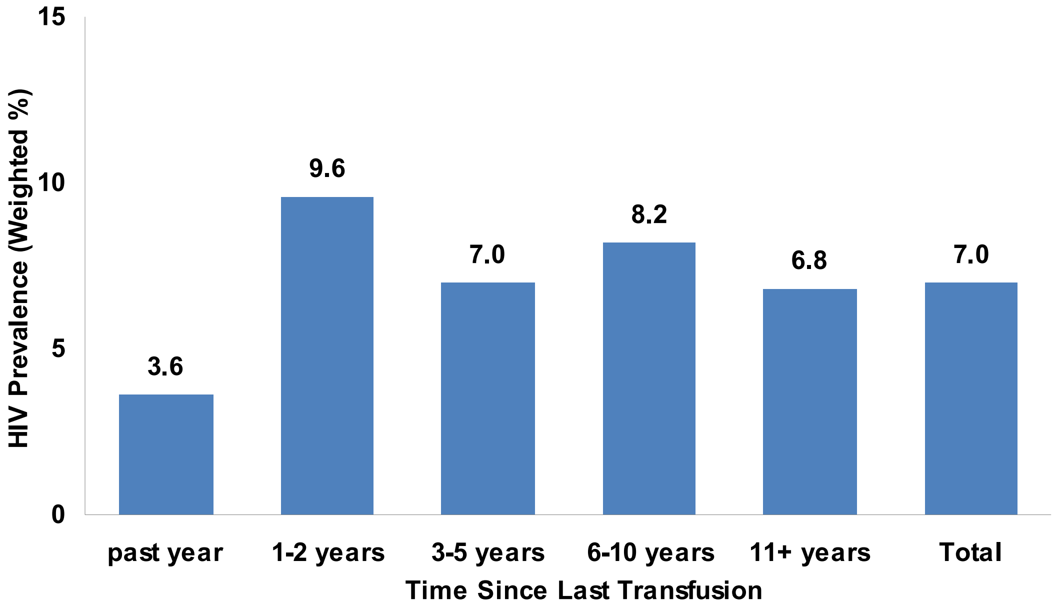


Figure 9.4b HIV prevalence appeared higher among those who reported receiving a blood transfusion one to two years ago, but this difference was not statistically significant.

HIV prevalence was similar among persons who reported ever receiving a blood transfusion and persons who did not (7.0% and 7.1%, respectively). Among those who reported receiving a transfusion in the year before the survey, HIV prevalence was 3.6%. For those reporting a transfusion more than a year before the survey, HIV prevalence ranged from 6.8% to 9.6%. The differences in these estimates were not statistically significant.

9.5 Medical injections

The 2007 KAIS collected data on the frequency of medical and traditional injections among adults. The risk of acquiring HIV from a medical injection is based on reuse or a needle stick due to improper disposal. Standard universal precautions, such as using single-use clean injection packages, remain critical in preventing medical transmission of HIV in all clinical settings.

Overall, 33.1% of adults aged 15-64 years reported receiving at least one medical injection from a doctor, nurse, pharmacist or dentist in the year before the survey. Significantly more women than men reported at least one medical injection (38.3% vs. 26.1%, respectively). Extrapolated to the national adult population aged 15-64 years, an estimated 6.6 million people received at least one injection in the year before the survey.

Figure 9.5a Preferred form of medication among women and men aged 15-64 years, Kenya 2007.

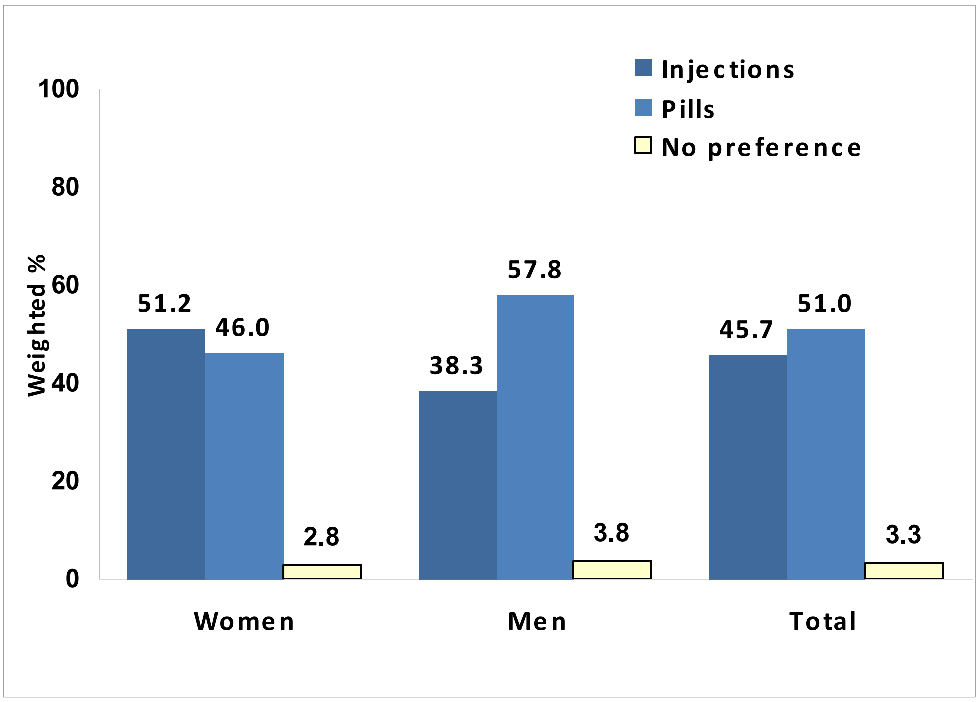


Figure 9.5a Men were significantly more likely to prefer pills and significantly less likely to prefer injections compared to women.

Overall, 51.0% of respondents reported that they preferred pills as a form of medication, 45.7% preferred pills, and 3.3% had no preference. Differences by sex were observed: men were significantly more likely to prefer pills than women (57.8% vs. 46.0%, respectively).

Figure 9.5b Number of reported medical injections in the year before the survey among adults aged 15-64 years, Kenya 2007.

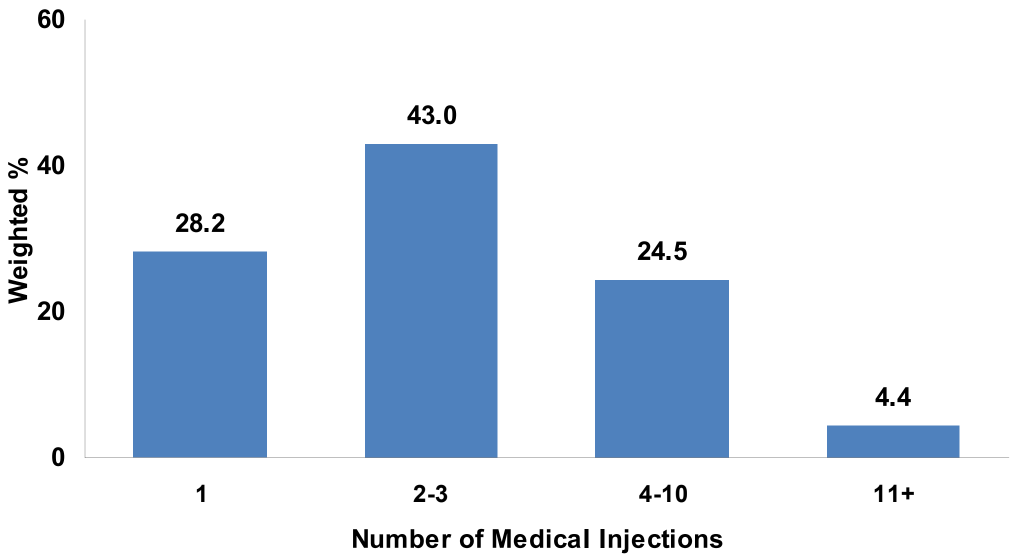


Figure 9.5b Most respondents who had reported medial injections in the past year had received two to three injections.

Of respondents who reported a medical injection in the year prior to the survey, 28.2% reported receiving only a single injection, 43.0% reported receiving two to three injections, 24.5% reported receiving four to 10 injections, and 4.4% reported receiving 11 or more injections. The number reporting injections in the year prior to the survey varied by sex, but only for those that reported one injection in the year before the survey (25.3% for women and 33.7% for men).

In total, 0.46% of all participants reported receiving at least one injection from a traditional practitioner or healer in the past year; 33.1% of all participants reported injections from doctors, nurses, pharmacists, dentists or other health workers. Among persons who reported medical injections from doctors, nurses, pharmacists, dentists or other health workers in the year before the survey, 95.3% reported that they observed the health worker take the needle and syringe for the injection from an unopened packet.

Figure 9.5c HIV prevalence among women and men aged 15-64 years by reported history of medical injection in the year before the survey, Kenya 2007.

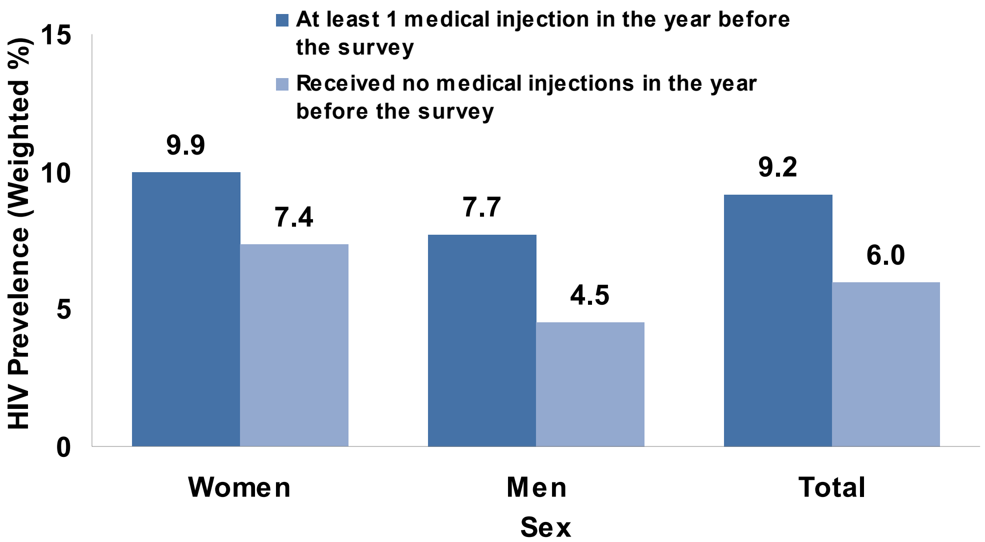


Figure 9.5c Among women and men who reported a medical injection in the year before the survey, the prevalence of HIV was significantly higher than those who reported no medical injection.

HIV prevalence among adults who reported medical injections in the year before the survey (9.2%) was significantly higher than among adults who did not (6.0%). This significant difference also was observed for both women and men separately (9.9% vs. 7.4% for women and 7.7% vs. 4.5% for men, respectively).

Caution should be used in interpreting these findings. The 2007 KAIS data are based on cross-sectional data for which causality cannot be inferred. Further, possible confounders, such as self-reported knowledge of HIV infection, may have biased this association and were not adjusted for in this analysis. Notably, HIV-infected persons tend to have more illness than HIV-uninfected persons and therefore may be more likely to receive injections as part of their medical care for HIV. In the 2007 KAIS, respondents who knew they were HIV-infected based on their last test result were significantly more likely to receive four or more injections in the year prior to the survey compared to persons who believed themselves to be HIV-uninfected based on their last HIV test (49.6% vs. 29.1%, respectively).

Figure 9.5d HIV prevalence among adults aged 15-64 years by reported number of medical injections in the year before the survey, Kenya 2007.

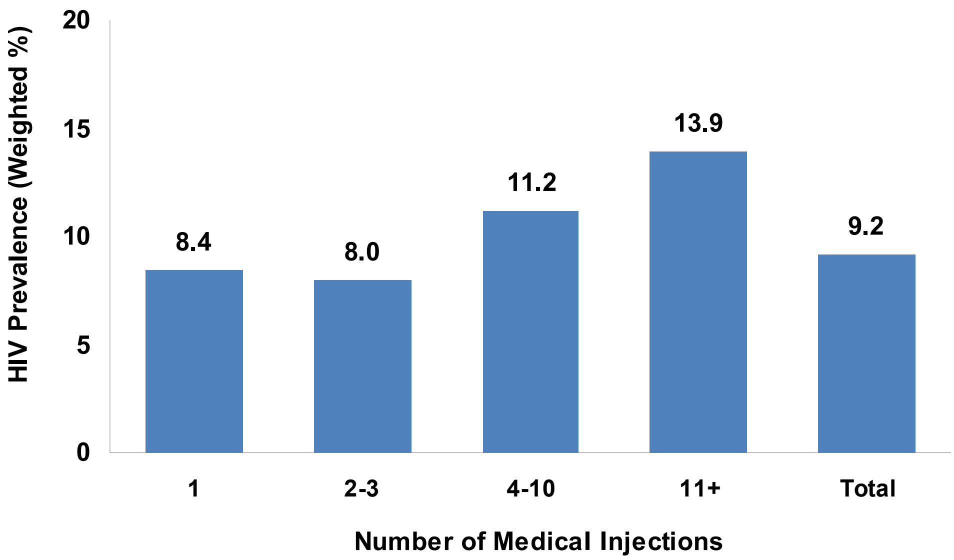


Figure 9.5d HIV prevalence significantly increased as the number of injections reported in the past year increased.

With increasing number of reported injections in the past year, HIV prevalence increased significantly from 8.4% among individuals receiving a single injection to 13.9% among individuals receiving 11 or more injections in the past year.

As described earlier, these findings should be carefully interpreted as causality cannot be determined from these cross-sectional data. In addition, possible confounders which could have substantially biased the observed association were not adjusted for in the analysis. As described in figure 9.5c, knowledge of HIV infection is a possible confounder as HIV-infected persons are more likely to experience illness and may be more likely to receive injections than HIV-uninfected persons. An additional confounder for this association may be sex, as women in the 2007 KAIS had significantly higher prevalence of HIV compared to men. Additionally, as stated earlier in this section, significantly more women reported receiving at least one medical injection in the year before the survey compared to men.

9.6 Gaps and unmet needs

- **HIV prevalence appeared to be lower among donors who reported donating in response to requests from the blood transfusion service compared to other donors. The pool of regular, repeat volunteer, non-remunerated blood donors to the KNBTS network should be increased to minimise the need for replacement donations requested by family and friends.**

- **Programmes designed to promote voluntary, non-remunerated donation to the KNBTS network should be expanded, especially in areas of the country still reliant on replacement donations.**

- **The potential for medical transmission of HIV requires continual support for the maintenance of safe injection practices and a quality blood transfusion system.**

10

Care and Treatment of Adults Infected with HIV

10.1 Key Findings

- **Nationwide, 12.1% of HIV-infected adults were taking cotrimoxazole or Septrin daily to prevent infections; more than 1.25 million HIV-infected people were in need of cotrimoxazole.**
- **Overall, 40.5% of ARV-eligible adults were taking ARVs. At the time of the survey, an estimated 214,000 people were eligible for daily ARVs but not taking any.**
- **Among those who knew they were infected with HIV, access to care and treatment was high: 76.1% were taking cotrimoxazole daily, and 91.6% of ARV-eligible adults were taking ARVs.**

10.2 Introduction

Daily cotrimoxazole and treatment with antiretroviral (ARV) medication, along with other HIV-specific care (see Chapter 11 of this report), prevent illness and disease and dramatically prolong the lives of people with HIV. In one prospective study, cotrimoxazole and ARV therapy combined were associated with a 92.0% reduction in mortality among HIV-infected participants after 16 weeks of follow-up compared to when these participants were not taking either therapy.[15] The Ministry of Medical Services recommends daily cotrimoxazole or a similar antibiotic, for everyone with HIV, regardless of CD4 count or disease stage. This recommendation is in line with World Health Organization (WHO) guidelines and is supported by currently available evidence.

ARVs target HIV at different sites to reduce or stop replication of the virus. They are the most effective intervention for prolonging survival and improving quality of life for people with HIV. Although the optimal time to begin ARVs remains unresolved, beginning treatment in patients with severe immunosuppression and/or symptoms indicative of immune damage is beneficial.

[15] Mermin J, Were W, Ekwaru JP, Moore D, Downing R, Behumbiize P, Lule JR, Coutinho A, Tappero J, Bunnell R. Mortality in HIV-infected Ugandan adults receiving antiretroviral treatment and survival of their HIV-un-infected children: a prospective study. Lancet 2008; 371: 352-59.

The Ministry of Medical Services recommends that adults with advanced HIV disease—defined as patients with WHO stage I or II disease (see Data in Context: WHO Clinical Staging) with a CD4 count of less than 250 cells/µL—should be started on ARV therapy.[2] These guidelines also state that anyone with WHO stage III disease with a CD4 cell count of less than 350 cells/µL or WHO stage IV disease regardless of CD4 count should begin treatment with ARVs. In some areas of Kenya, CD4 testing is not available; in these settings all patients with WHO stages III and IV are eligible to begin ARVs.

This chapter examines use of cotrimoxazole and ARVs among HIV-infected adults. In this report, **coverage** of care and treatment is defined as the proportion of all HIV-infected adults who may or may not have known their status and who reported receiving treatment or a service. Coverage was greatly influenced by the fact that only 16.4% of HIV-infected adults knew that they were infected (see chapter 4 on HIV testing). **Access** to care and treatment is defined as the proportion of HIV-infected adults who knew their status and who reported receiving treatment or a service. Access therefore reflects links to health care facilities.

There are a number of reasons why HIV-infected adults may not take daily cotrimoxazole or why eligible HIV-infected adults may not take daily ARVs; some may relate to the health care system, while others relate to the individual. Many have never been tested for HIV and are therefore not aware of their HIV status, which is a significant barrier. Among those aware, some adults may not take cotrimoxazole or ARVs because they lack knowledge on appropriate use or may be unwilling to take medications because they feel healthy or because they suffered from adverse side effects from medications. Additionally, while these medications should be available, wait times at health centres or stigma against HIV may prevent enrollment of HIV-infected adults in care and treatment. The 2007 KAIS did not capture reasons for not taking daily cotrimoxazole or ARVs (if eligible) among those aware of their HIV status.

[2] NASCOP, Kenya National Clinical Manual for ART Providers, 2nd Edition, 2007.

Appendix B.10 provides sample sizes and 95% confidence intervals for estimates presented in this chapter. Throughout the chapter, the term significant indicates a chi-square p-value less than 0.05; marginally significant indicates a p-value between 0.05 and 0.10, inclusive; and not significant indicates a p-value greater than 0.10.

Population estimates reported in this chapter were calculated based on the 2007 projected population by province, age and sex reported in the *Revised Population Projections for Kenya 2000-2020, Kenya National Bureau of Statistics (August 2006).*Weighted national estimates for selected indicators from the 2007 KAIS were used in these calculations. Detailed methods used for calculating population estimates are described in Appendix A.

DATA IN CONTEXT

WHO Clinical Staging[3]

WHO clinical staging of HIV-related disease for adults and children is designed to be used once HIV infection has been confirmed with an antibody or a virologic test. It is a universal four-stage system that includes simplified, standardized descriptors of clinical staging events related to survival, prognosis and progression of clinical disease without antiretroviral therapy. It assists in clinical management of HIV, especially where there is limited laboratory capacity.

The clinical stage is useful for assessment at baseline (first diagnosis of HIV infection) or entry into long-term HIV care and in the follow-up of patients in care and treatment programmes. It should be used, in conjunction with immunological classification whenever available, to guide decisions on when to start HIV-related interventions, including when to start ARVs and to assess clinical response to therapy in the absence of appropriate laboratory testing.

WHO Clinical Staging of Established HIV Infection.

WHO Clinical Stage	HIV-associated Symptoms
I	Asymptomatic
II	Mild symptoms
III	Advanced symptoms
IV	Severe symptoms

[3] WHO case definitions of HIV for surveillance, revised clinical staging, and immunological classification of HIV-related disease in adults and children, 2007.

10.3 Cotrimoxazole Prophylaxis for HIV-Infected Adults

Daily use of cotrimoxazole (trimethoprim-sulfamethoxazole) or Septrin® prevents certain bacterial and parasitic infections that cause pneumonia, diarrhoea and malaria and prolongs the lives of adults and children who have HIV (see Data in Context: Why Take Cotrimoxazole?). The Ministry of Medical Services recommends that all people infected with HIV, regardless of CD4 count, take cotrimoxazole, or a similar antibiotic, daily to reduce the risk of illnesses associated with HIV/AIDS.

Figure 10.3a Cotrimoxazole coverage and access among HIV-infected adults aged 15-64 years, Kenya 2007.

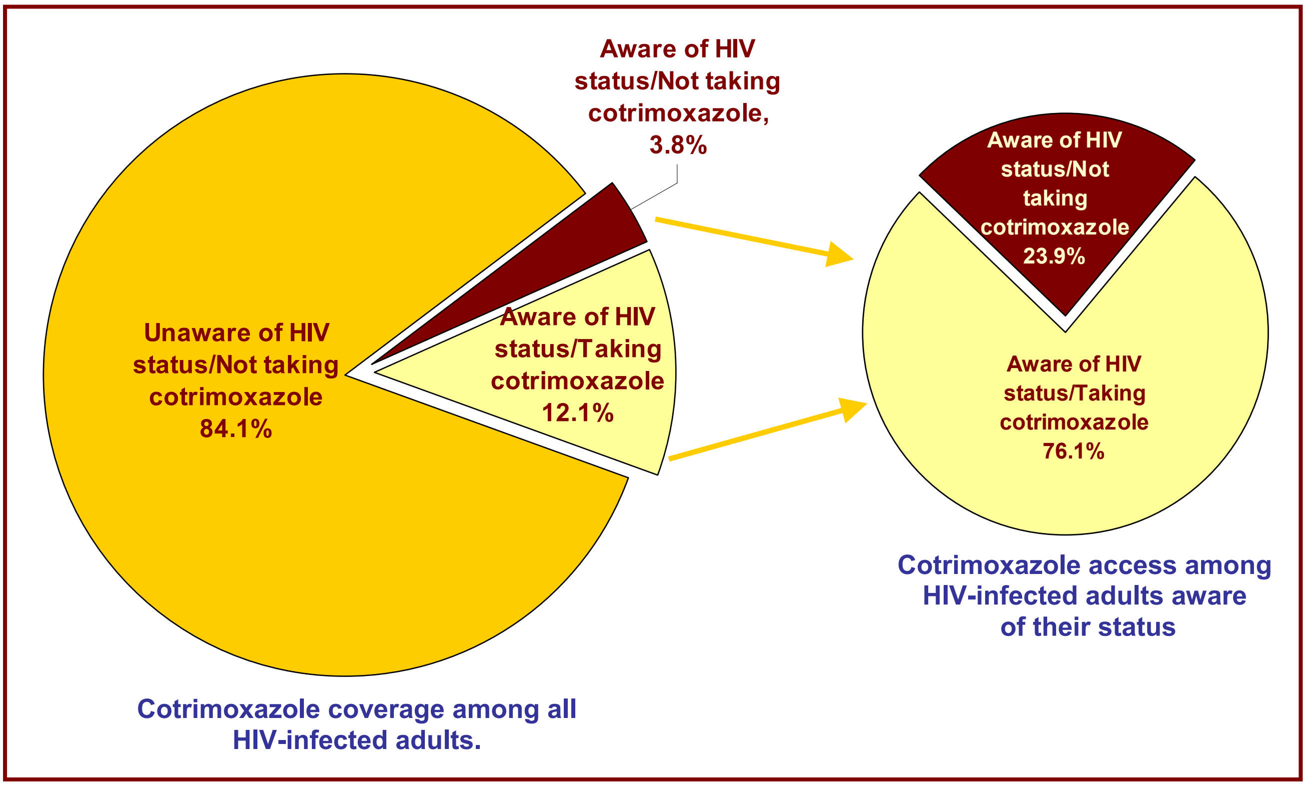


Figure 10.3a Coverage of cotrimoxazole among all HIV-infected adults was approximately one–tenth. Most people who did not take cotrimoxazole were unaware they were infected. Of those who knew their HIV status, about three fourths were taking cotrimoxazole.

KAIS estimates indicate that 12.1% of HIV-infected adults were taking daily cotrimoxazole at the time of the survey. This low coverage can be explained by the small proportion (16.4%) of HIV-infected adults in the survey who knew they were infected. With most adults reporting that they never had been tested for HIV, this likely reflects the lack of access to HIV testing. Among the 16.4% of HIV-infected adults who correctly reported knowing their HIV status, however, access to cotrimoxazole was significantly higher, with 76.1% reporting daily cotrimoxazole use. For a small percentage of HIV-infected persons, cotrimoxazole may cause severe adverse effects such as skin rash, bone marrow toxicity, and liver damage. However, for the vast majority of HIV-infected persons, cotrimoxazole is well tolerated. Not taking cotrimoxizale represents a missed opportunity to reduce the rates of morbidity and mortality among HIV-infected persons. No adjustment has been made to coverage and access estimates to account for not taking cotrimoxazole because of potential contraindications to cotrimoxazole or Septrin.

DATA IN CONTEXT: Why take cotrimoxazole?

People with HIV who take cotrimoxazole every day have decreased risk of malaria, pneumonia, diarrhoea and death and results in fewer hospitalizations. Cotrimoxazole is inexpensive (less than 500 Ksh per year) and relatively safe—only 3% of patients stop therapy due to toxic reactions, and for many of these patients, an alternate daily antibiotic can be prescribed. Because cotrimoxazole is recommended for all people with HIV infection, it does not require testing for CD4 cell count or WHO disease staging.

Figure 10.3b Cotrimoxazole coverage among HIV-infected adults aged 15-64 years by province, Kenya 2007.

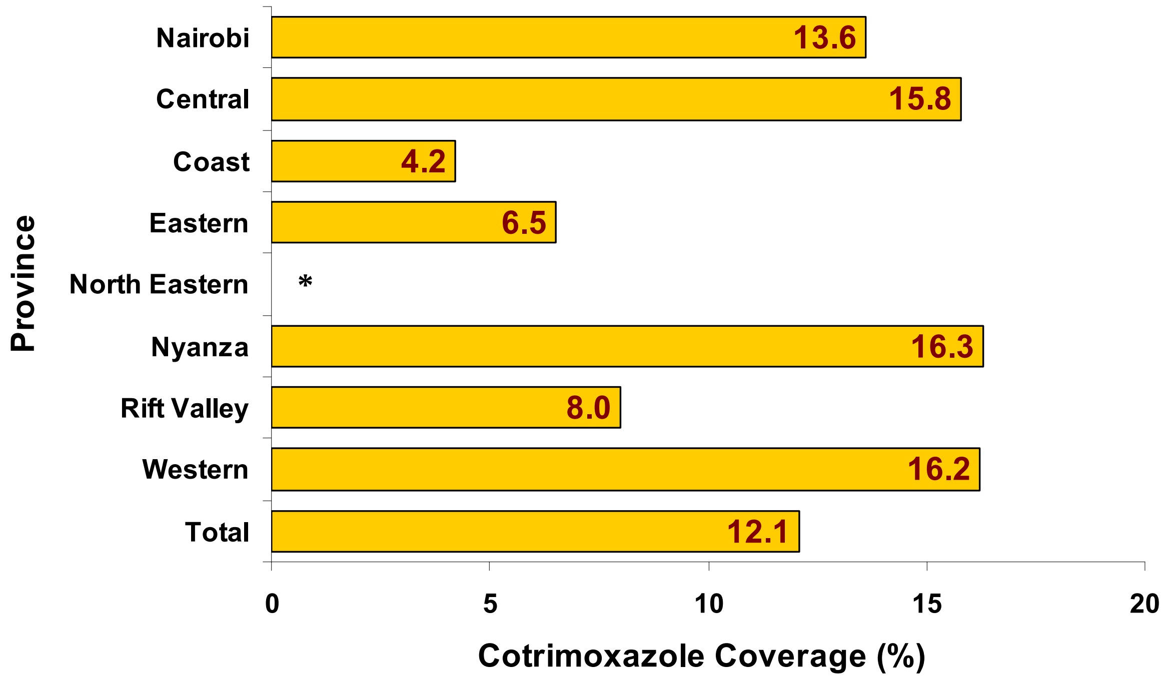


Figure 10.3b Cotrimoxazole coverage varied significantly by province and was highest in Nyanza province and lowest in Coast province.

*Estimates not presented due to small denominators of less than 25 observations in this category.

Coverage of cotrimoxazole varied significantly by province: from a high of 16.3% in Nyanza province to a low of 4.2% in Coast province. Cotrimoxazole coverage was greater among women than men (13.3% versus 9.7%, respectively) and this association was marginally significant.

Coverage also varied significantly by age group, education level, and marital status. These estimates are provided in Appendix B.10.

Figure 10.3c Estimated number of HIV-infected adults aged 15-64 years taking and not taking cotrimoxazole by province, Kenya 2007.

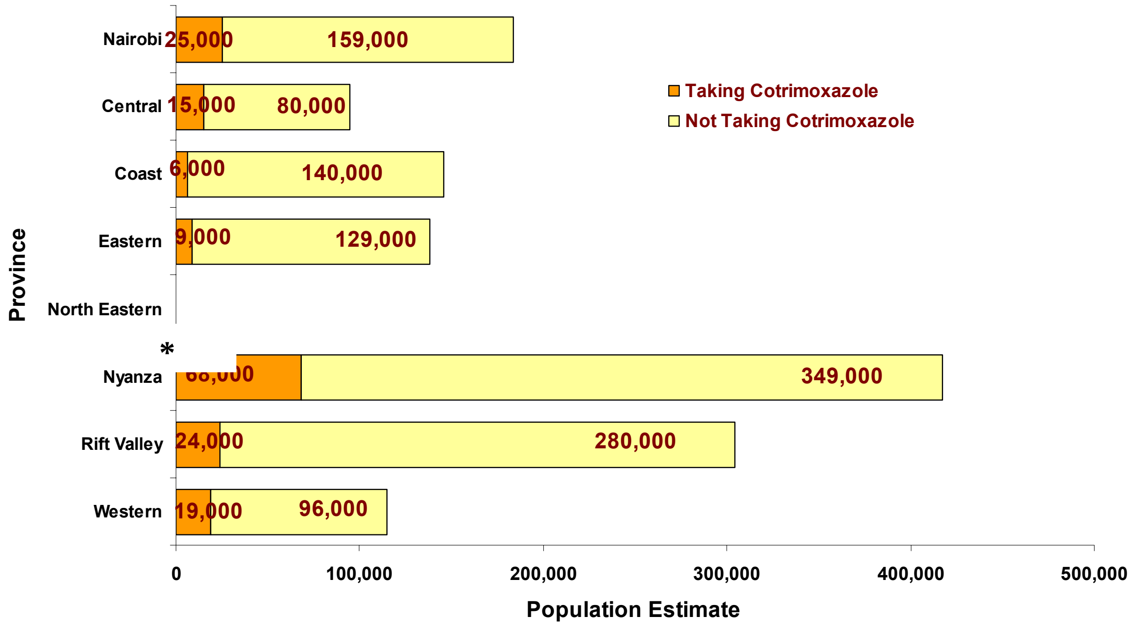


Figure 10.3c The estimated number of HIV-infected people taking cotrimoxazole varied by province. Nyanza had the greatest number of adults taking and not taking cotrimoxazole. Central had the lowest number of adults not taking cotrimoxazole, and Coast had the lowest numbers of adults taking cotrimoxazole.

*Estimates not presented due to small denominators of less than 25 observations in this category.

Nationwide, there were an estimated 172,000 HIV-infected adults taking daily cotrimoxazole (or Septrin) compared with over 1.25 million not taking cotrimoxazole.

Nyanza province had the greatest number of HIV-infected adults taking cotrimoxazole, estimated at 68,000 persons, followed by Nairobi with 25,000 and Rift Valley with an estimated 24,000 persons taking cotrimoxazole. Coast province had the fewest estimated number of HIV-infected adults taking cotrimoxazole, estimated at 6,000 persons, followed by Eastern province with an estimated 9,000 persons taking cotrimoxazole.

Nyanza and Rift Valley provinces combined are home to over half (52.3%) of adults with HIV and had the greatest number of HIV-infected persons not on cotrimoxazole. In Nyanza province, an estimated 349,000 HIV-infected adults were not taking cotrimoxazole, and in Rift Valley province, an estimated 280,000 were not on cotrimoxazole.

Figure 10.3d Source* of cotrimoxazole for HIV-infected adults aged 15-64 years, Kenya 2007.

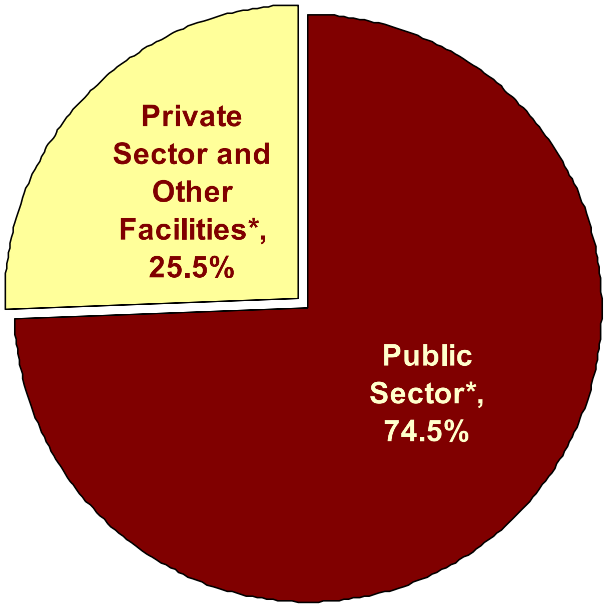


Figure 10.3d The majority of HIV-infected people who reported taking cotrimoxazole obtained it at public facilities such as government hospitals and clinics and the remainder from the private sector and other facilities.

* Private sector and other facilities includes missions, church hospitals and clinics, private hospitals and clinics, other private medical facilities, and other facilities. Public sector includes government hospital, government health centre/clinic, government dispensary, other public facilities.

Cotrimoxazole is widely available in Kenya and can be accessed at private and public facilities free of charge by HIV-infected persons. Of all HIV-infected people taking cotrimoxazole, 74.5% obtained it at public facilities such as government hospitals, health centres and public dispensaries, and 25.5% from private hospitals and clinics, mission or church facilities or other facilities.

10.4 ARV Eligibility, Coverage and Access

Once HIV infection is diagnosed, providing ARVs effectively requires that eligibility be established and patients be provided with a reliable supply of drugs, guidance on proper adherence to therapy and monitoring for adverse effects and drug resistance.

In the 2007 KAIS, 9.7% or 138,000 individuals of the estimated 1.42 million HIV-infected adults were taking ARVs nationwide. The remaining 1.28 million HIV-infected adults were not taking ARVs; however, not all were eligible.

For the purposes of this report, eligibility was determined solely by CD4 cell counts. Because physical examinations and medical histories were not conducted in the 2007 KAIS, it was not possible to determine WHO clinical stage.

Table 10.4 summarizes CD4 cell counts among HIV-infected adults not taking ARV medications.

Table 10.4 CD4 cell count distribution among HIV-infected adults aged 15-64 years not on ARV therapy, Kenya 2007.

CD4 count category (cells/μL)	Persons not taking ARVs	
	Percent (%)	Estimated† number
<250	18.1	214,000
250-349	12.1	144,000
350+	69.8	825,000
Total	100.0	1,183,000*

*HIV-infected individuals who were not taking ARVs and for whom CD4 count data were not available were excluded from this analysis. For this reason, total in Table 10.4 does not match total estimated number not taking ARVs.

† Based on 2007 projected population by province, age and sex reported in the *Revised Population Projections for Kenya 2000-2020, Kenya National Bureau of Statistics (August 2006)*.. Weighted, national prevalence estimates for HIV infection, ARV therapy use and CD4 count from the 2007 KAIS are used in these calculations.

The Ministry of Medical Services has recommended that people with HIV who have a CD4 count of less than 250 cells/μL should initiate ARVs.[4] An estimated 214,000 HIV-infected adults had CD4 counts of less than 250 cells/μL but were not taking ARVs and were thus eligible to initiate treatment. This figure likely underestimates ARV eligibility because the survey did not collect WHO clinical staging information. That is, some infected but untreated individuals with CD4 counts of 250 cells/μL or greater with WHO stage III or IV disease may have been eligible to begin ARV therapy but are not counted here.

An additional 144,000 infected adults who did not report that there were taking ARVs had CD4 cell counts of 250-349 cells/μL, indicating possible ARV eligibility depending on clinical status. Moreover, the Ministry of Medical Services could change ARV eligibility guidelines in the future to a criterion of less than 350 cells/μL, regardless of WHO stage, given that this cut off is used widely in other countries. Currently, Ministry of Medical Services guidelines recommend that asymptomatic patients in this group be observed and monitored regularly.

The remaining 69.8% of untreated HIV-infected adults, an estimated 825,000 persons nationwide, had CD4 counts of 350 cells/μL or greater, which will decline over time and necessitate ARV medications in the future.

DATA IN CONTEXT

What is a CD4 Count?

CD4+ lymphocytes (also called CD4 cells or T4-cells) are an important part of the immune system that lead the attack against infections. As HIV infection progresses, the number of CD4 cells is depleted. A laboratory test can measure the concentration of CD4 cells in a person's body. A normal CD4 cell count usually is >500 cells/μL. Lower CD4 counts are associated with increased risk of complicating infections, cancers and death. The Ministry of Medical Services currently recommends that all HIV-infected adults with a CD4 count of <250 cells/μL take ARVs. Once on ARVs, measurement of CD4 cell counts is recommended to monitor the amount of improvement in the immune system and the response to treatment. Availability of CD4 cell counting machines has increased markedly in the past several years. Equipment for testing CD4 cell counts is available at all the provincial hospitals, many district hospitals and other health facilities. For most patients, CD4 cell count testing requires travel or provision of a blood sample that is transported to one of these facilities.

[4] NASCOP, Kenya National Clinical Manual for ART Providers, 2nd Edition, 2007.

ARV coverage was estimated by taking the number of persons on ARV divided by the sum of the number on ARV and the number eligible but not taking ARV medications. We estimated coverage using current CD4 eligibility guidelines of less than 250 cells/μL and, in anticipation of future potential changes to ARV guidelines, a criterion of less than 350 cells/μL.

Figure 10.4a ARV coverage and access among HIV-infected adults aged 15-64 years eligible to take ARV by CD4 eligibility criteria, Kenya 2007.

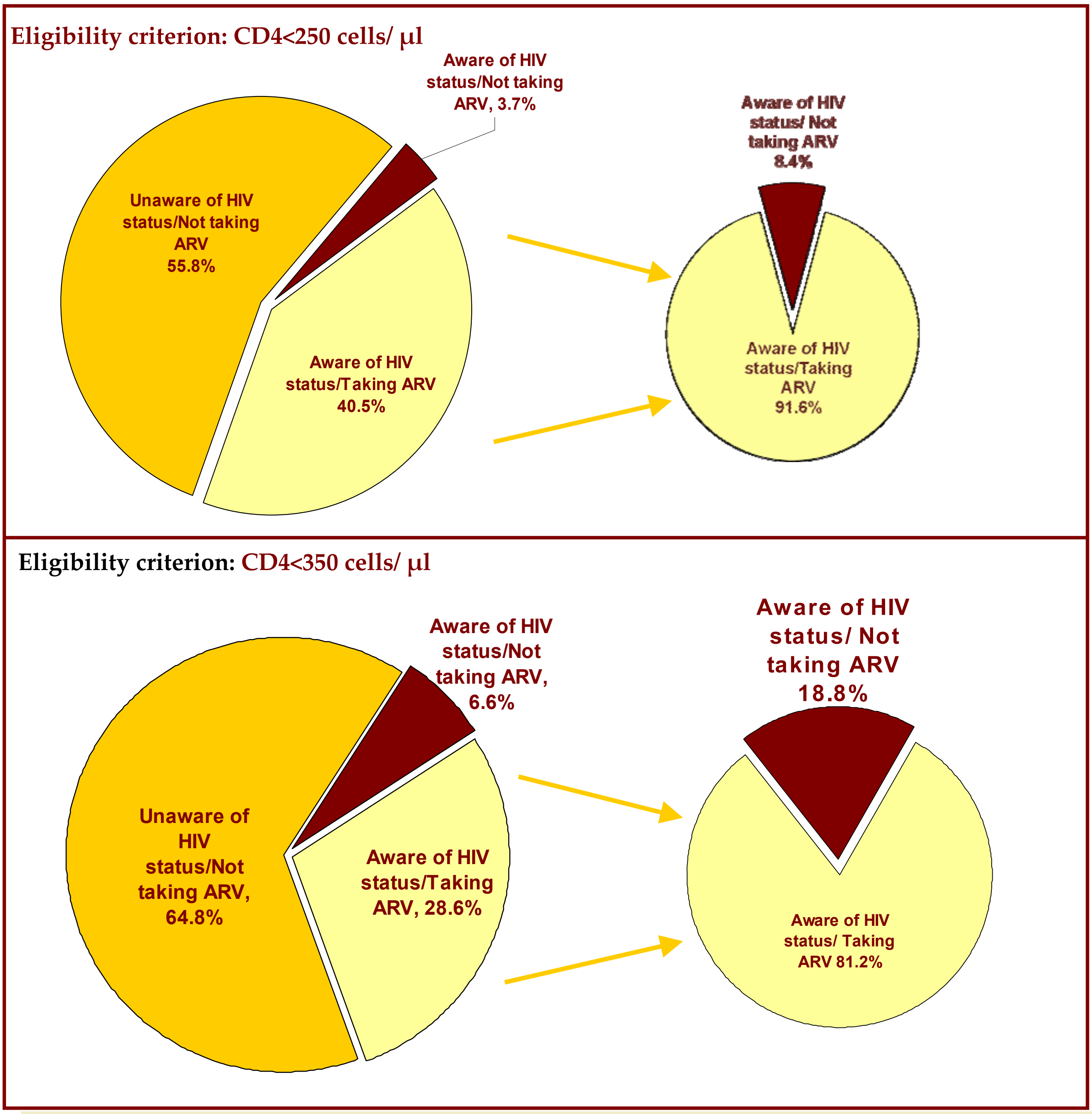


Figure 10.4a Using an eligibility criterion of CD4 <350 cells/μl, ARV coverage was approximately 10% less than when using a criterion of <250 cells/μL. Access to ARV among people who were aware of their infection was relatively high (>80%), regardless of CD4 eligibility criterion.

Overall, national ARV coverage was estimated to be 40.5%. That is, of all adults eligible to take ARV based on a CD4 eligibility criterion of less than 250 cells/µl, only 40.5% were doing so. Coverage of ARV based on a criterion of less than 350 cells/µL was estimated at 28.6%.

ARV coverage (based on CD4 less than 250 cells/µL) did not differ by sex, education level or residential setting, but was marginally different when stratified by age group, and significantly different by marital status. ARV coverage stimates for these groups are presented in Appendix B.10.

Among adults who were aware of their HIV infection and eligible for ARVs (based on a CD4 count less than 250 cells/µl), ARV access was high with 91.6% reporting they were taking daily ARVs. Among persons with CD4 cell counts less than 350 cells/µL who were aware of their HIV-infected status, access to ARV was still relatively high and not significantly different at 81.8%.

The vast majority (93.8%) of adults not on treatment but eligible (CD4 less than 250 cells/µL) were not aware of their infection because either they had never been tested for HIV or they incorrectly believed they were HIV-uninfected based on their last HIV test. ARV initiation requires that people infected with HIV know their status and receive medical evaluation to determine if they are eligible to initiate ARV. Therefore, to improve care and ARV coverage, HIV testing must be scaled up and encouraged. Once diagnosed, HIV-infected adults should be referred to medical services for clinical evaluation and CD4 testing.

Only a small percent of eligible (based on CD4 cell counts less than 250 cells/ µL), infected adults (3.7%) were aware of their infection but were not taking ARV. Although the 2007 KAIS did not collect explicit reasons for not taking ARV, all untreated respondents who knew they were infected, regardless of their CD4 count, had heard of "special drugs" for people with AIDS, and 57.7% specifically stated they knew of antiretroviral drugs. It is possible that some adults eligible for but not taking ARV had recent declines in CD4 count since their last clinical assessment and did not know that they were now eligible. This highlights the need for close patient monitoring.

Figure 10.4b ARV coverage among HIV-infected adults aged 15-64 years who were eligible to take ARVs by province*, Kenya 2007.

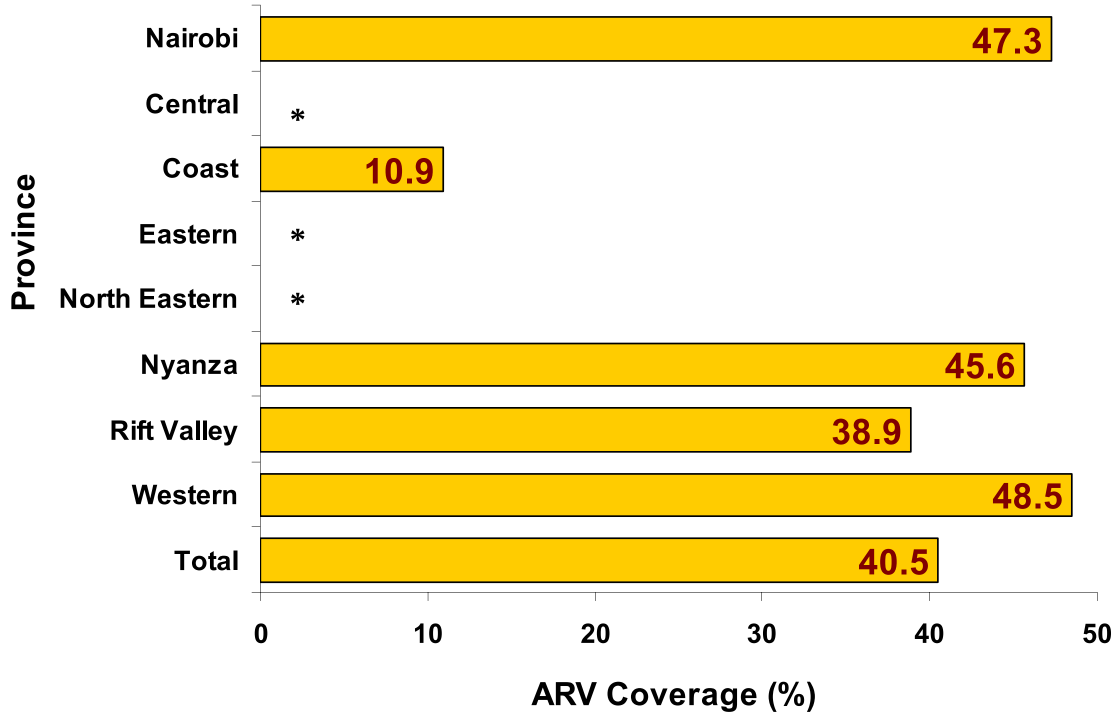


Figure 10.4b ARV coverage (based on CD4 <250 cells/µL)) varied significantly by province. High coverage was seen in Western, Nyanza and Nairobi provinces. In Coast province, ARV coverage was far below the national estimate.

* Estimates not presented due to small denominators of less than 25 observations in this category.

The percent coverage of ARVs differed significantly across provinces. Western, Nyanza and Nairobi provinces had ARV coverage estimates above the national estimate of 40.5%. Relatively low ARV coverage was seen in Coast province, where only 10.9% of eligible adults were taking ARV medications.

Figure 10.4c Estimated number of HIV-infected adults aged 15-64 years taking ARV and not taking ARV but eligible, by province,* Kenya 2007.

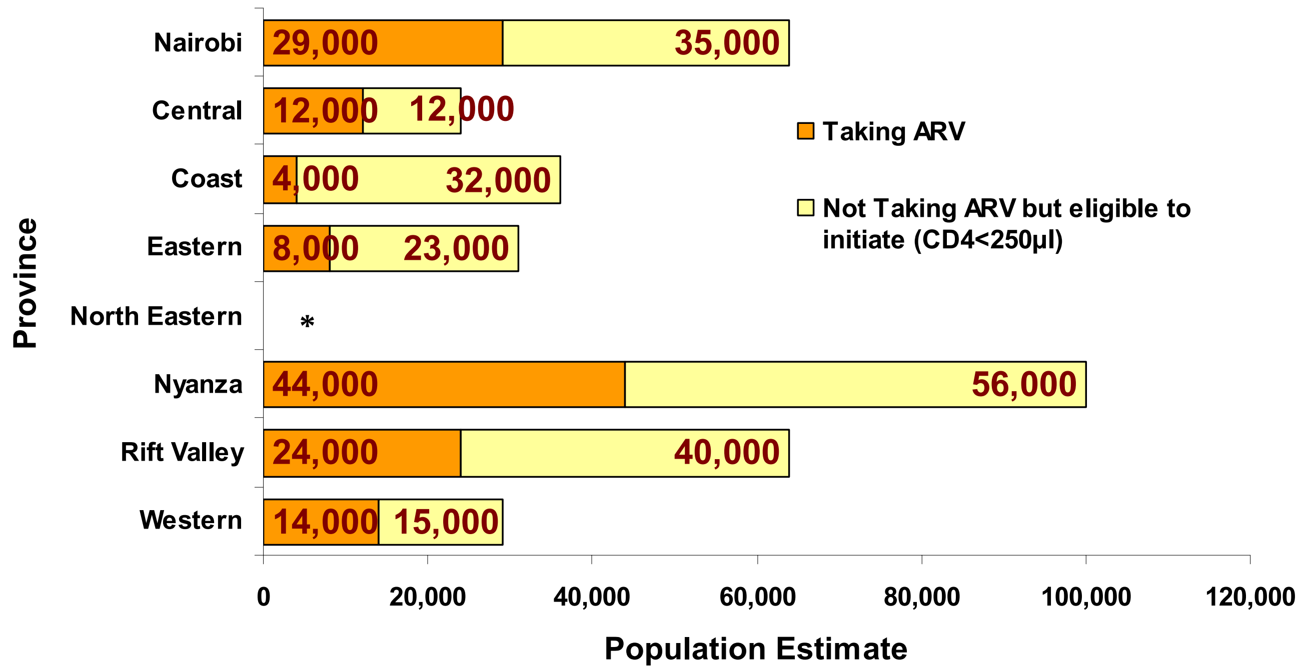


Figure 10.4c Nyanza province had the highest number of people taking ARVs (44,000) and eligible to initiate ARVs (56,000). Coast province had the lowest number of people taking ARVs (4,000), and Central had the lowest number of adults eligible but not taking ARVs (12,000).

* Estimates not presented due to small denominators of less than 25 observations in this category.

Because the size of the HIV-infected population varied by province, reporting ARV coverage by the number taking and eligible for ARV can show where ARV need is greatest. Nyanza province had the greatest need overall; 44,000 persons were estimated to be taking ARVs and 56,000 persons were eligible but not taking ARVs. Rift Valley and Nairobi provinces both had substantial numbers of adults in need of ARV therapy, with each having over 60,000 adults who either needed to maintain or initiate therapy. Coast province had relatively low ARV coverage; of the 36,000 adults eligible to take ARV medications, only 4,000 persons were doing so.

DATA IN CONTEXT

Estimates of HIV-infected Adults Taking ARVs

KAIS estimates that in 2007, 138,000 HIV-infected adults were taking ARV nationwide. Given the uncertainty involved in estimating this number, it is useful to compare estimates from KAIS to service statistics for the country and other existing estimates. Below are estimates for the number of HIV-infected adults taking ARVs in 2007. Data were abstracted from a nationwide facility-based reporting system and from UNAIDS estimates obtained using EPP/Spectrum. Both estimates fall with the 95% confidence interval around the 2007 KAIS-based estimate of 98,000 to 178,000 persons on ARVs.

Kenya Service Statistics[5]

Estimates from the NASCOP database state that in 2007, 172,000 HIV-infected adults were taking ARV.

UNAIDS Estimates[6]

UNAIDS figures provide a range of the number of HIV-infected individuals on ART. The estimates for 2007 ranged from a low estimate of 150,910 adults on ART to a high estimate of 172,910.

For HIV-infected persons, immunological monitoring is a valuable tool. The Ministry of Medical Services recommends that upon diagnosis, all HIV-infected individuals have a medical evaluation, including CD4 testing, to assess their disease status and determine eligibility for ARVs. Ministry guidelines also indicate that HIV-infected adults should have their CD4 levels measured every six months to assess immune function and/or monitor the progress of immune restoration while taking ARVs.

In low to middle income counties such as Kenya, not all medical facilities are capable of conducting CD4 tests. In the 2007 KAIS, HIV-infected persons who knew their status were asked if they have ever been offered a CD4 test. This information can give some indication as to the proportion of sites where CD4 testing may not have been available at the time of the survey.

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[5] National AIDS Control Council, Office of the President, Kenya. 2008. *UNGASS 2008 Country Report for Kenya*. NACC, Nairobi.

[6] UNAIDS/WHO Epidemiological Fact Sheets on HIV and AIDS, 2008 Update.

Figure 10.4d HIV-infected adults aged 15-64 years who are aware of their infection status who have ever or never been offered a CD4 test, Kenya 2007.

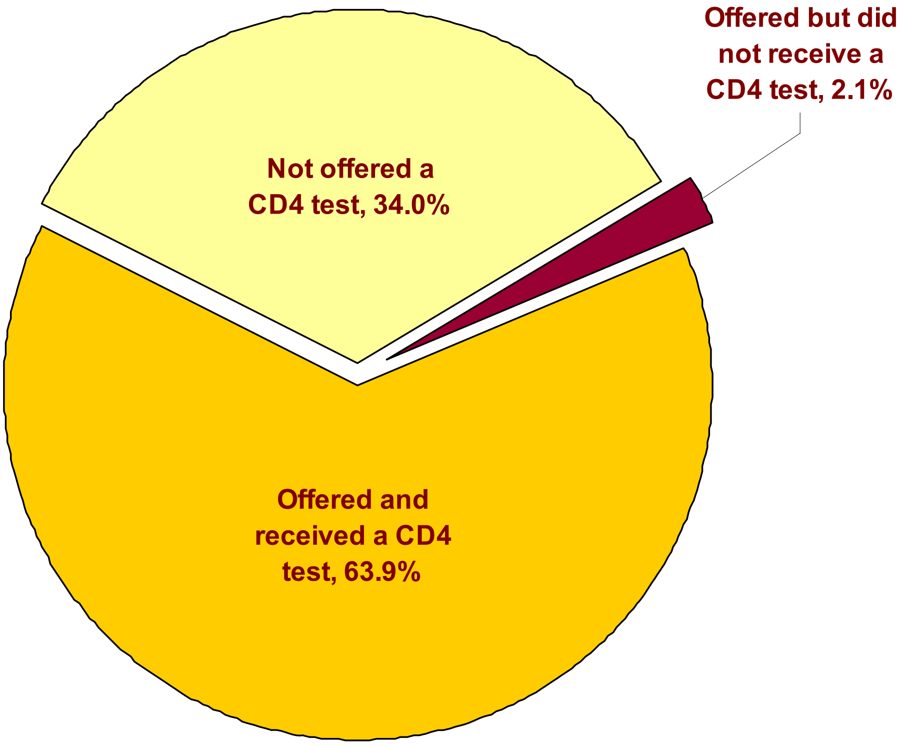

Figure 10.4d Among HIV-infected persons aware of their infection status, two-thirds reported they were offered a CD4 test.

CD4 count testing was common among HIV-infected adults aware of their infection. Among HIV-infected participants aware of their status, 34.0% reported not having been offered a CD4 testing, whereas 63.9% reported receiving CD4 testing at least once since their HIV diagnosis. A small number (2.1%) were offered but did not receive a CD4 test. Among those offered a CD4 test, the vast majority (96.8%) reported having a CD4 test performed.

10.5 Gaps and Unmet Needs

- **The estimated 1.25 million HIV-infected adults not taking cotrimoxazole is a large unmet need.**

- **The 214,000 people eligible to take ARVs but not taking them represent another large unmet need.**

- **Low coverage for both cotrimoxazole and ARVs were largely due to low awareness of HIV status among adults with HIV. Testing persons at risk tested for HIV remains a major priority.**

- **High access to both cotrimoxazole and ARV therapy suggests that once diagnosis is made, care and treatment services are available and accessible for HIV-infected individuals aware of their status.**

Health Care Utilization, Tuberculosis and Preventive Services among HIV-infected Adults

11.1 Key Findings

Health care utilization

- **HIV-infected adults aware of their status were significantly more likely to access outpatient care in the four weeks before the survey compared to HIV-infected adults unaware of their status (51.2%% and 22.9%, respectively).**
- **HIV-infected adults aware of their status were significantly more likely to be hospitalised in the six months prior to the survey compared to HIV-infected adults unaware of their status (14.1% and 3.2%, respectively).**

Tuberculosis (TB)

- **HIV-infected adults were significantly more likely to have ever been diagnosed with TB compared to HIV-uninfected adults (9.6% and 1.8%, respectively).**
- **The majority of adults who had ever been diagnosed with TB had completed TB treatment (84.1% and 55.8%, respectively). These estimates did not differ between HIV-infected and HIV-uninfected adults.**
- **Among HIV-infected adults who had ever been diagnosed with TB, 61.1% were aware of their HIV infection, compared to only 11.1% among those who had not.**

Preventive services

- **Almost half (45.5%) of HIV-infected adults lived in a household that treated its main source of drinking water, most commonly by boiling. There were no differences between those aware or unaware of their HIV infection.**
- **Among all HIV-infected adults, 45.3% slept under a mosquito net the night before the survey and 20.2% slept under a treated net. There were no differences between those aware or unaware of their HIV infection.**
- **Among HIV-infected adults aware of their HIV infection, 36.4% were taking multi-vitamins.**

11.2 Introduction

Without appropriate care and treatment, the vast majority of adults with HIV will suffer debilitating illness leading to hospitalisation, loss of income, disruptions to their family life and eventually death. Today, HIV/AIDS does not need to be an acute, debilitating disease. It is possible to delay or prevent disease and improve the quality of life for persons with HIV through a comprehensive approach to health care that emphasizes a continuum of support, extending beyond just antiretroviral therapy (see Chapter 10 in this report for findings on cotrimoxazole and ARV usage). HIV-infected adults need access to health care facilities and an array of preventive services. In this chapter, we report on aspects of HIV care for infected adults, including use of outpatient and inpatient services; co-infection with tuberculosis (TB); and uptake of prevention practices, including treatment of drinking water, mosquito nets and nutritional supplements.

Appendix B.11 provides sample sizes and 95% confidence intervals for estimates presented in this chapter. Throughout the chapter, the term significant indicates a chi-square p-value less than 0.05; marginally significant indicates a p-value between 0.05 and 0.10, inclusive; and not significant indicates a p-value greater than 0.10.

Population estimates reported in this chapter were calculated based on the 2007 projected population by province, age and sex reported in the *Revised Population Projections for Kenya 2000-2020, Kenya National Bureau of Statistics (August 2006).*Weighted national estimates for selected indicators from the 2007 KAIS were used in these calculations. Detailed methods used for calculating population estimates are described in Appendix A.

11.3 HEALTH CARE UTILIZATION

In the following analyses, we report on estimated outpatient service use and inpatient admissions for HIV-infected adults. These data are useful in understanding patterns in utilization, especially differences in use between HIV-infected persons who are aware and those who are unaware of their HIV status. Health facility encounters among HIV-infected persons unaware of their HIV infection serve as opportunities for diagnosis of HIV; utilization among those aware of their HIV infection can help plan for growing burden on the system as increasing numbers of people become aware of their HIV status. Data on uptake of outpatient services and hospitalisations were collected at the household level; that is, the head of the household who answered the household questionnaire reported on health care visits for all members of the household listed.

Figure 11.3a Adults aged 15-64 years who accessed outpatient facilities one or more times in the four weeks before the survey, Kenya 2007.

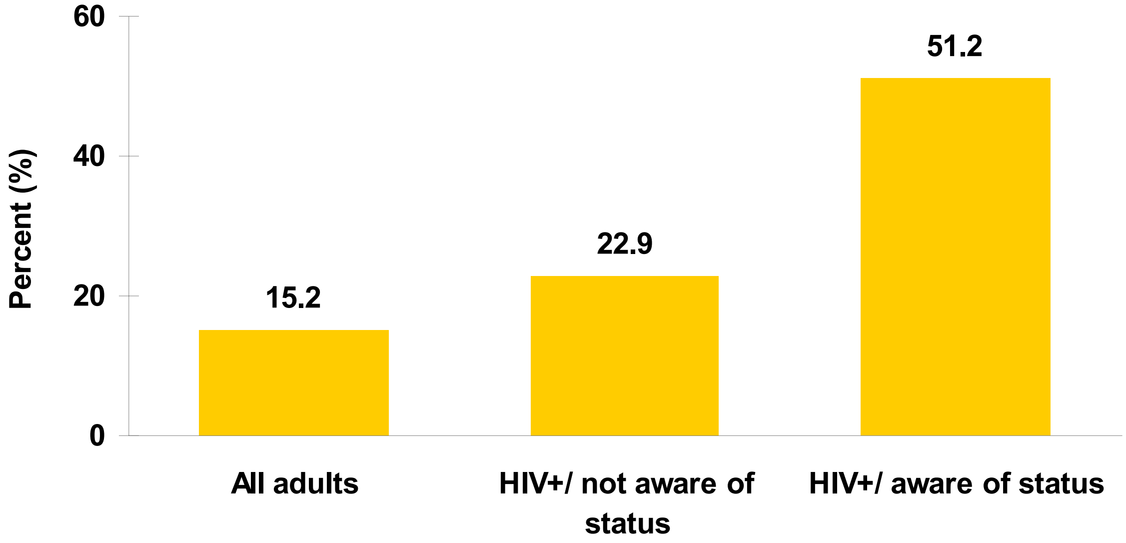

Figure 11.3a Adults with HIV were significantly more likely to visit an outpatient facility in the four weeks before the survey compared to all adults regardless of knowledge of their HIV status.

Overall, 15.2% of all adults reported visiting an outpatient clinic or health facility during the four weeks before the survey. Among HIV-infected adults, access to outpatient services differed significantly by knowledge of HIV status: 22.9% of those unaware of their HIV status visited an outpatient facility, compared to 51.2% of adults aware of their infection. The purpose of the outpatient visit was not captured in the 2009 KAIS. The percent of HIV-infected adults with a recent outpatient visit did not vary by most socio-demographic characteristics or CD4 cell count, although age and provincial distribution was marginally significantly different across categories.

Among HIV-infected adults (83.6% of whom were not aware of their HIV status), 72.9% had no visit to an outpatient facility in the four weeks before the survey. Among those with at least one visit, 56.4% made a single visit, 26.9% made two visits and the remaining 16.7% made three or more visits. Among those unaware of their HIV status who reported any outpatient visit, 60.3% used a public facility[1] at the time of their last visit, 14.3% visited a private facility, 10.8% visited a chemist or pharmacy and 8.1% visited a faith-based clinic. The remaining 6.5% visited other types of facilities, such as a non-governmental clinic, a traditional healer or medical shop. These outpatient visits among HIV-infected persons unaware of their HIV status could be considered missed opportunities to learn their HIV status.

HOSPITALISATION

Figure 11.3b Adults aged 15-64 years who were hospitalised one or more times in the six months before the survey, Kenya 2007.

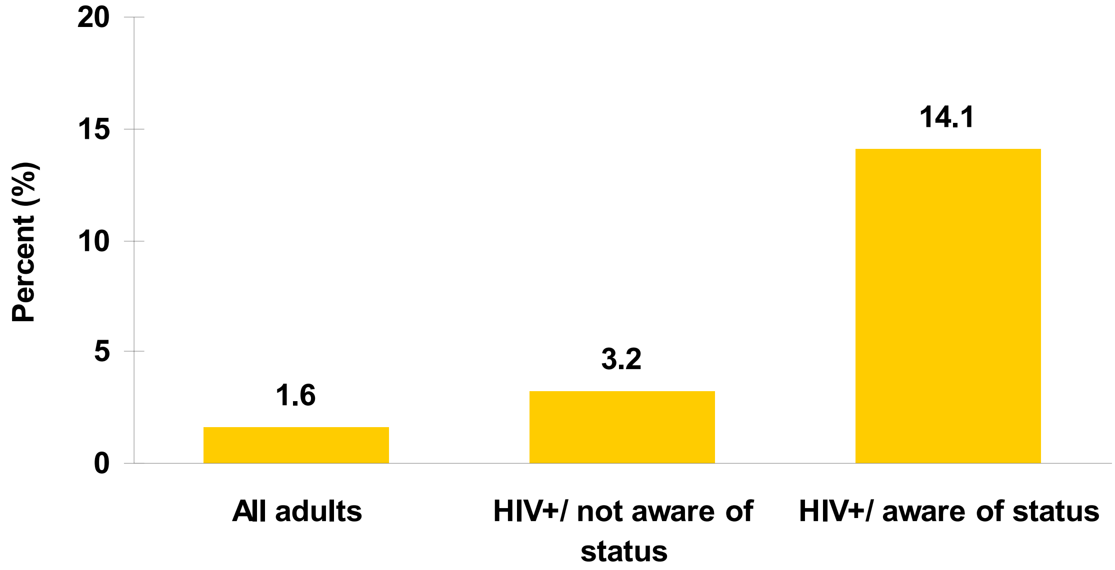

Figure 11.3b Adults with HIV were more likely to have been hospitalised in the six months before the survey compared to HIV-infected adults who were not aware of their HIV status.

Overall, 1.6% of all adults reported being hospitalised, which is defined as an overnight stay at a medical facility during the six months before their interview. Hospitalisation among HIV-infected adults varied significantly by awareness of status: 3.2% of those unaware of their status had been hospitalised compared to 14.1% of those aware of their status. There were no significant differences in hospitalisation of infected persons by sex, rural/urban residence, wealth index, or education, but hospitalisation rates did significantly increase with older age. Appendix B.11 provides hospitalisation rates stratified by socio-demographic characteristics.

[1] Public facilities include government hospital, government health centre/clinic, government dispensary, or other public facilities. Private facilities includes missions, church hospitals and clinics, private hospitals and clinics, voluntary counselling and testing clinics, and other private medical facilities. Other locations were not specified.

As with outpatient services, the purpose of the hospitalisation was not captured in the 2007 KAIS. Unlike outpatient services, however, which can include well-person visits for medication refills or minor health check-ups, hospitalisation typically indicates some level of severity of a person's condition.

Figure 11.3c HIV-infected adults aged 15-64 years hospitalised one or more times in the six months before the interview, by CD4 cell count, Kenya 2007.

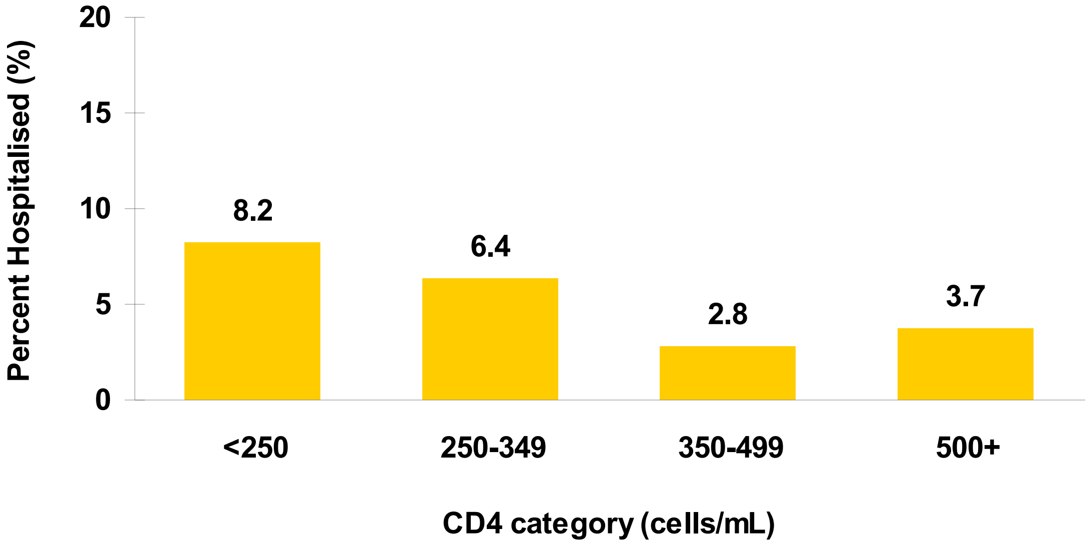

Figure 11.3c Among all HIV-infected adults, rates of hospitalisation tended to decrease with increasing CD4 cell counts, although the association was not significant.

A greater proportion of adults with CD4 counts less than 350 cells/μL were hospitalised during the six months before the survey compared to those who had 350 cells/μL or greater. Though this association was not statistically significant, the finding is consistent with current knowledge that adults with lower CD4 cell counts tend to be sicker than those with higher CD4 cell counts.

Figure 11.3d HIV-infected adults aged 15-64 years hospitalised one or more times in the six months before the interview, by knowledge of status and CD4 cell counts, Kenya 2007.

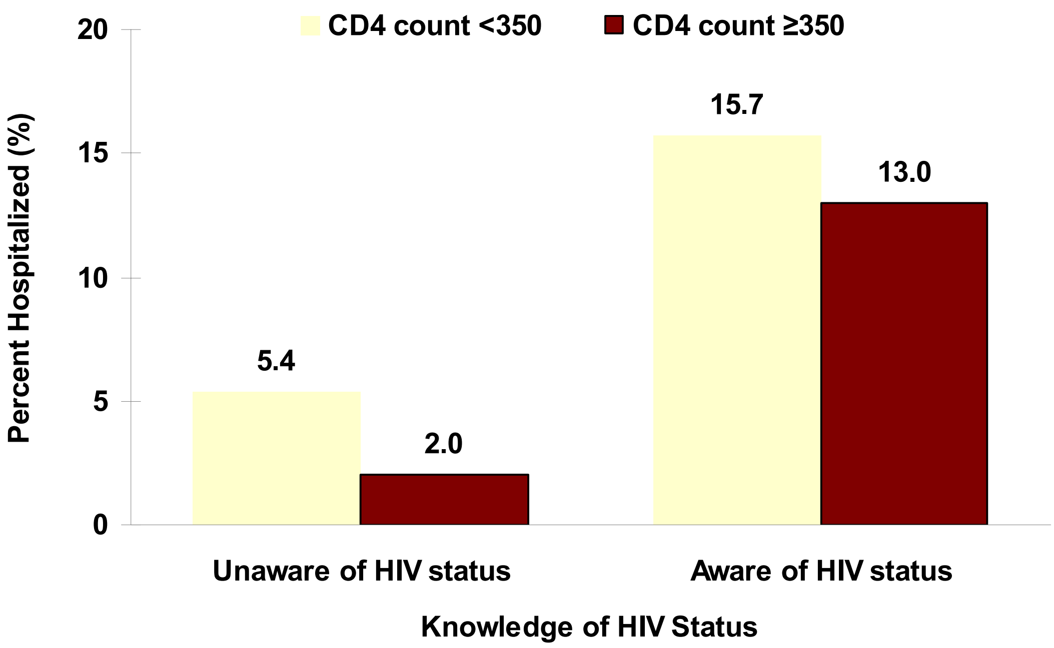

Figure 11.3d Adults who were aware of their HIV status were significantly more likely to have been hospitalised than those unaware of their HIV status.

Hospitalisation during the preceding six months was significantly associated with knowledge of HIV infection, regardless of immunological status. People who knew they were infected were significantly more likely to report an overnight stay in a hospital than those unaware of their infection, regardless of CD4 cell count.

Overall, of the 5.0% of HIV-infected persons with at least one hospitalisation in the six months before the 2007 KAIS, the great majority (79.5%) reported having one hospitalisation, 11.5% were hospitalised two times and 9.0% were held overnight at a hospital three times in six months. Among those with any hospital stays, 63.2% were last hospitalised at a public facility.[1] Approximately one fifth (21.6%) of these HIV-infected patients were last hospitalised at a private facility, and the remaining 15.3% had their stay at a faith-based health care facility.

11.4 Co-infection with Tuberculosis and HIV

The tuberculosis (TB) epidemic in Kenya has been fuelled by the concurrent HIV epidemic. TB is

[1] Public facilities include government hospital, government health centre/clinic, government dispensary, or other public facilities. Private facilities includes missions, church hospitals and clinics, private hospitals and clinics, voluntary counselling and testing clinics, and other private medical facilities. Other locations were not specified.

one of the leading causes of mortality among people with HIV, and, conversely, HIV infection is a risk factor for active TB.

According to the 2007 KAIS, awareness of TB was high among adults aged 15-64 years; 97.9% reported having heard of TB. When asked about modes of transmission, 69.9% correctly answered that TB spreads through the air through coughing or sneezing and 87.7% correctly answered the TB can be cured. When asked if respondents would want to keep their family member's TB infection a secret, 11.4% said yes. Responses to these TB knowledge and stigma questions did not vary by HIV status.

History of TB diagnosis was captured by self-report only in the 2007 KAIS, with no laboratory or clinical confirmation. Of all respondents, 2.3% reported ever receiving a prior TB diagnosis from a health care professional, corresponding to an estimated 454,000 adults nationwide. One half of a percent (0.5%) reported a recent TB diagnosis; that is, they were diagnosed in the 12 months prior to the survey. Among HIV-infected adults, 9.6% had a history of TB diagnosis, with 2.7% reporting diagnosis in the year before the survey.

Figure 11.4a Adults aged 15-64 years that received a tuberculosis diagnosis from a health care professional, by HIV status, Kenya 2007.

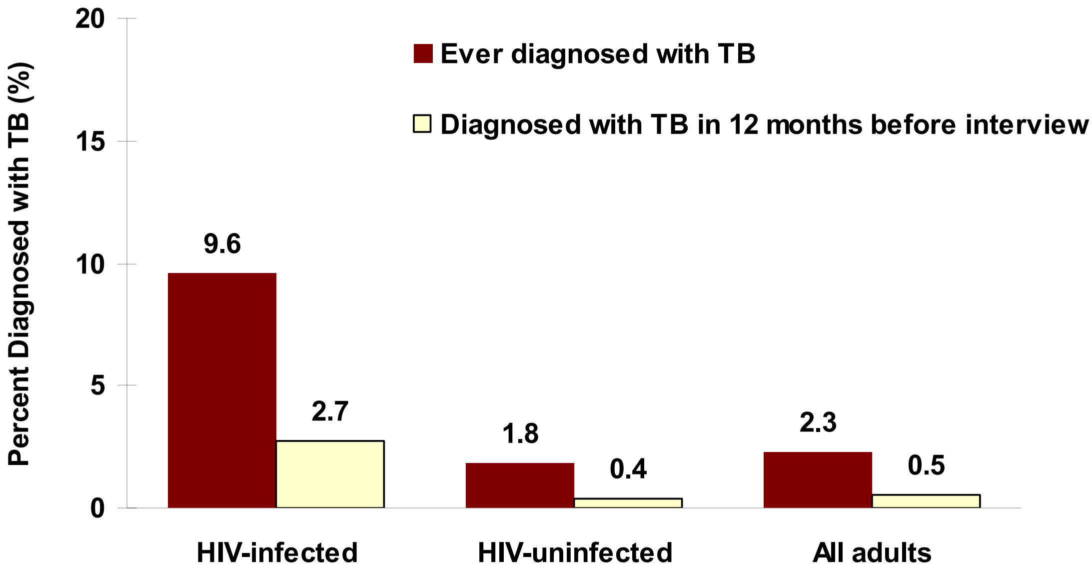

Figure 11.4a A significantly greater proportion of HIV-infected adults than HIV-uninfected adults had received a TB diagnosis ever and in the year before the survey.

Figure 11.4b HIV-infected adults aged 15-64 years ever diagnosed with TB who completed TB treatment, by knowledge of HIV status, Kenya 2007.

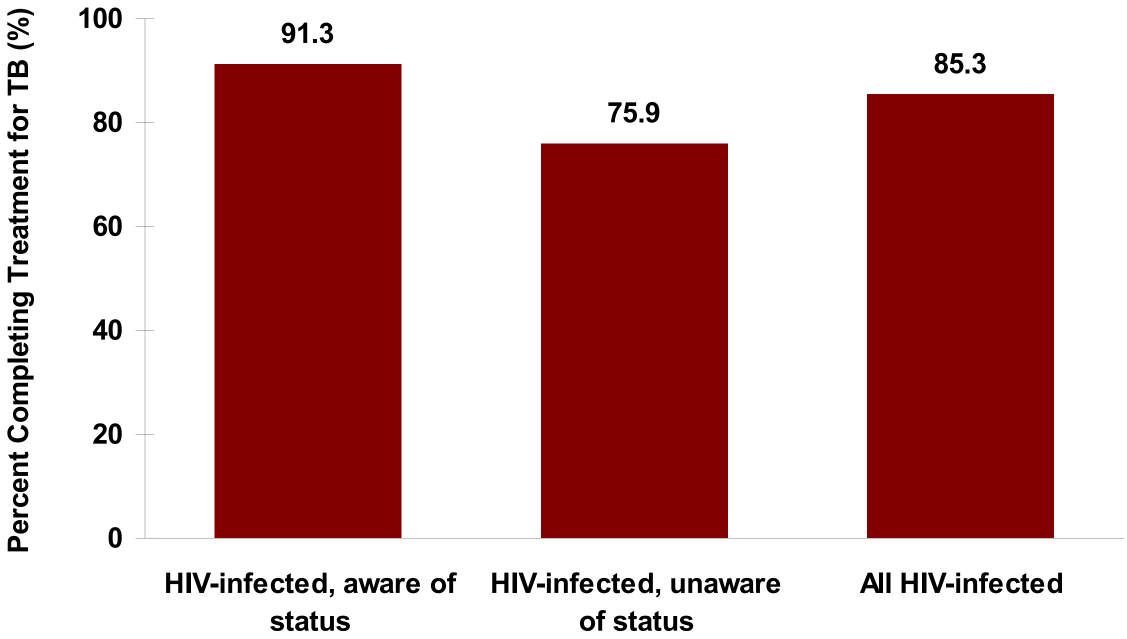

Figure 11.4b The majority of HIV-infected persons diagnosed with TB received and completed treatment for TB.

Among all HIV-infected adults who have ever received a TB diagnosis from a health care professional, 85.3% received and completed TB treatment. Knowledge of HIV status was significantly associated with completing TB treatment; a higher percent of HIV-infected adults who knew their HIV status completed treatment compared to HIV-infected adults who were unaware of their HIV status (91.3% and 75.9%, respectively).

Figure 11.4c HIV prevalence among adults aged 15-64 years by history of TB diagnosis, Kenya 2007.

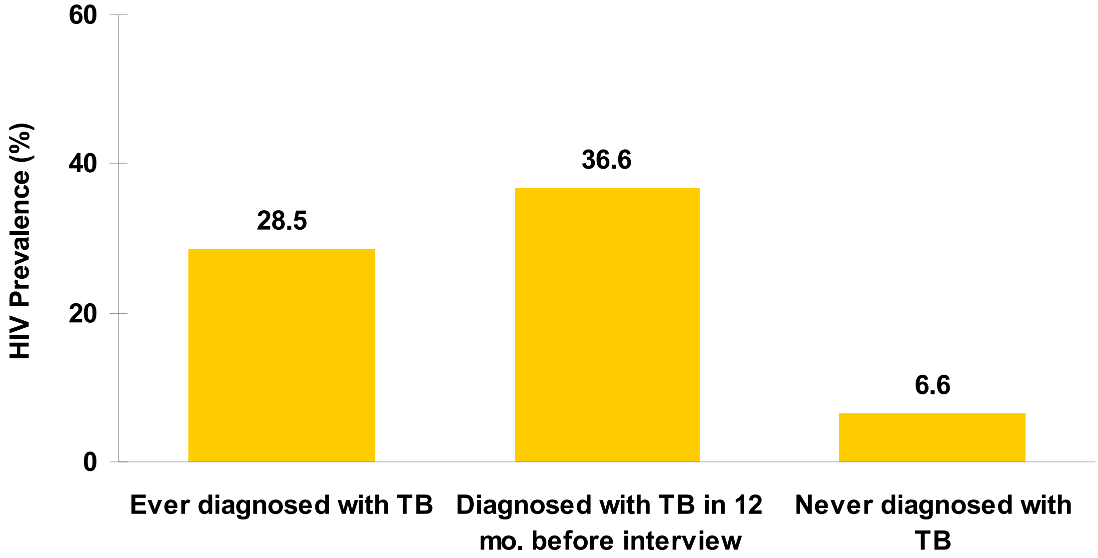

Figure 11.4c The prevalence of HIV was significantly higher among adults who had ever received or recently received a TB diagnosis compared to those who had never been diagnosed with TB.

In the 2007 KAIS, HIV prevalence was high among adults with a history of TB diagnosis. Among those ever diagnosed with TB infection, 28.5% were HIV-infected. Among adults with a recent TB diagnosis, 36.6% were HIV-infected, which was not significantly different from the prevalence among those with any TB diagnosis. HIV prevalence among those never diagnosed with TB was 6.6%, which was lower than the national HIV prevalence of 7.1% and significantly lower than HIV prevalence among those with any TB diagnosis.

Figure 11.4d HIV-infected adults aged 15-64 years who were aware of their HIV status, by history of TB diagnosis, Kenya 2007.

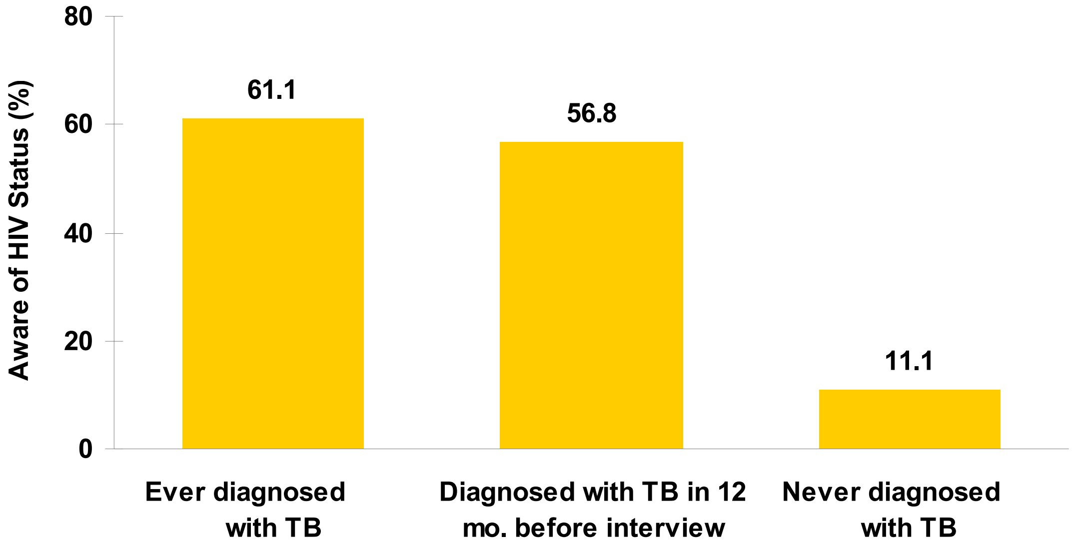

Figure 11.4d HIV-infected adults with a prior TB diagnosis were significantly more likely to be aware of their HIV status than those with no history of TB diagnosis.

Among HIV-infected persons with a prior TB diagnosis, the majority (61.1% with any TB diagnosis and 56.8% with a recent TB diagnosis) were aware of their HIV infection compared with only 11.1% who had never had a diagnosis of TB. Both differences were statistically significant. Nonetheless, approximately four in 10 people co-infected with HIV and TB did not know about their HIV infection.

Figure 11.4e Cotrimoxazole coverage and access among HIV/TB co-infected adults aged 15-64 years, Kenya 2007.

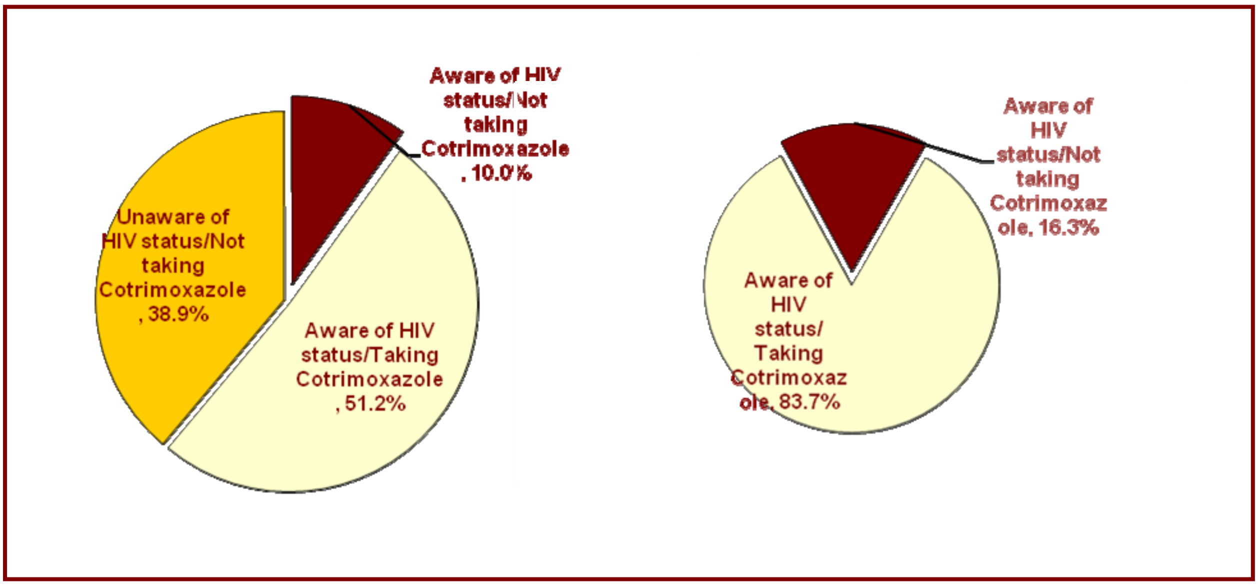

Figure 11.4e Approximately one-half (51.2%) of adults co-infected with TB and HIV were taking cotrimoxazole. Cotrimoxazole access among co-infected adults was 83.7%.

Daily cotrimoxazole is recommended for all HIV-infected persons. Cotrimoxazole coverage among HIV-infected people reporting a prior TB diagnosis was 51.2%. Access to cotrimoxazole among persons who were aware of their HIV infection and co-infected with TB and HIV was 83.7%. These findings among persons with HIV and TB are consistent with conclusions from Chapter 10, which indicate that coverage of cotrimoxazole among all HIV-infected adults was low compared to access among those who have been diagnosed with HIV and were aware of their status.

11.5 Preventive Services for People with HIV: Clean Water

Chronic diarrhoea is a leading killer of people infected with HIV. Contaminated water is often the source of microbes that cause diarrhoea. Treating water to make it safe for drinking dramatically improves the health of all people, particularly those with HIV infection who may have a weaker immune response to fight against simple waterborne infections. The Ministry of Medical Services recommends safe water systems for all households affected by HIV. Although boiling water, if done properly, can effectively kill most diarrhoea-causing organisms, consistent application of this practice may not be feasible because of limited sources of wood or fuel. In these areas, inexpensive and readily available chemical disinfectants may be more suitable.

DATA IN CONTEXT

HIV Basic Care Package

A number of low-cost and practical interventions have been shown to reduce HIV-related morbidity and mortality and prevent HIV transmission. Cotrimoxazole preventive therapy, long-lasting insecticide treated bednets, and safe water systems are inexpensive and can benefit people living with HIV/AIDS in sub-Saharan Africa by reducing the incidence of opportunistic infections (e.g., malaria and diarrhea).[1-3] The GOK recommends that all HIV-infected adults and children regardless of immunological status have access to these interventions and refers to them as the Basic Care Package (BCP). In addition to cotrimoxazole, bednets, and a safe water system, the BCP in Kenya includes condoms and information, education and communication (IEC) materials for HIV-infected persons and their families. Various combinations of these interventions have been packaged and distributed in countries such as Uganda and southern Sudan. A pilot program to scale-up access to BCP contents in Coast, Nyanza and Western provinces has been under development since early 2009. Experience gained during the pilot will guide the expansion of the BCP at the national level.

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In this section, we examine water treatment practices of households with HIV-infected members. The GOK recommends that in households affected by HIV, water from all sources, including piped systems, a public tap, dug wells, rainwater or surface water should be treated before drinking, with an exception only for bottled water. Drinking water treatment practices were collected at the household level, not at the individual level.

[1] World Health organization. Guidelines on co-trimoxazole prophylaxis for HIV-related infections among children, adolescents and adults in resource-limited settings: Recommendations for a public health approach. Geneva: World Health Organization; 2006. (http://www.who.int/hiv/pub/guidelines/WHO%20CTX. pdf)

[2] Mermin J, Lule J, Ekwaru JP, et al. Effect of co-trimoxazole prophylaxis on morbidity, mortality, CD4-cell count, and viral load in HIV infection in rural Uganda. Lancet. 2004; 364 (9443): 1428-34.

[3] Kamya MR, Gasasira AF, Achan J, et al. Effects of trimethoprim-sulfamethoxazole and insecticide-treated bednets on malaria among HIV-infected Ugandan children. AIDS 2007; 21 (15): 2059-66.

Figure 11.5a HIV-infected adults aged 15-64 years by water treatment practice of their household, Kenya 2007.

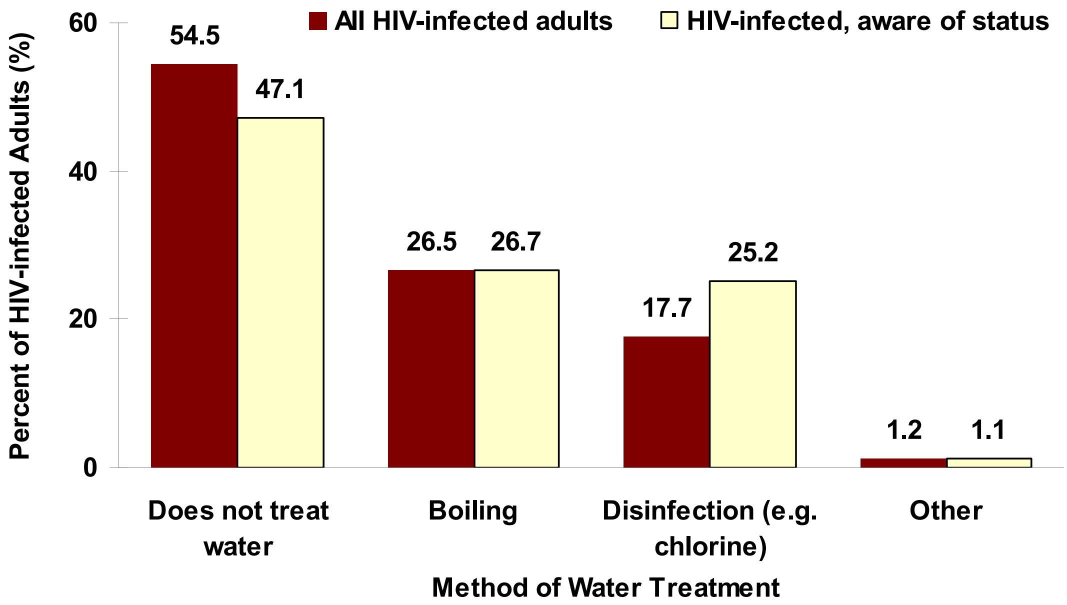

Figure 11.5a More than half of HIV-infected adults lived in a household with untreated drinking water.

Overall, 54.5% of HIV-infected persons lived in a household that did not treat its main source of drinking water. Among the remaining 45.5% that did treat their drinking water, boiling was the most common practice, followed by chemical disinfection. Other methods such as filtration, sedimentation or the exclusive use of bottled water were infrequent methods of treating water in these households (1.2%). Water treatment practices in households with HIV-infected members who were aware of HIV their status were similar with no significant differences observed.

Figure 11.5b HIV-infected adults aged 15-64 years who live in a household that treats its main source of drinking water, by province, Kenya 2007.

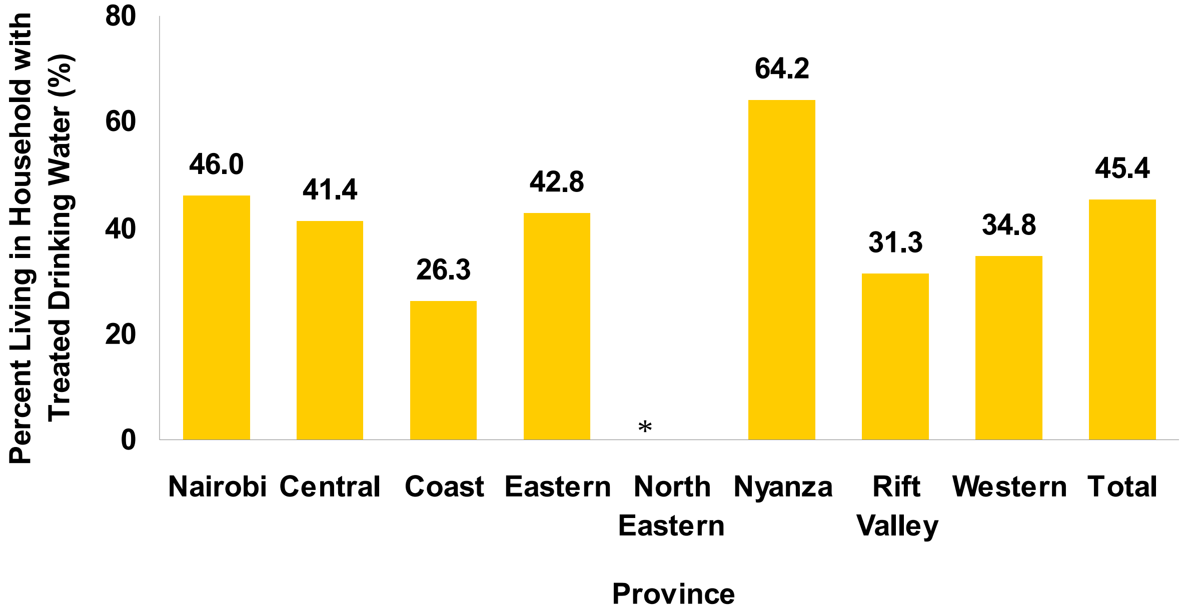

Figure 11.5b The proportion of HIV-infected adults living in a household with treated drinking water varied significantly by province.

* Estimates not presented due to small denominators of less than 25 observations in this category.

At the national level, 45.5% of HIV-infected adults lived in households with treated drinking water. These rates varied significantly by province, with Nyanza province having the highest percent of HIV-infected adults (64.2%) with treated drinking water at home and Coast province having the lowest (26.3%). HIV-infected adults living in rural households were as likely to have access to treated water as those living in urban households (47.3% and 40.9%, respectively) with no significant difference. Also, household access to treated water was similar for both HIV-infected women and men (44.8% and 47.0%, respectively). Among HIV-infected women who reported they were pregnant at time of survey, 53.8% had access to treated drinking water at home.

11.6 Preventive Services for People with HIV: Bednets

The GOK recommends that HIV-infected persons protect themselves against malaria by sleeping every night under an insecticide-treated net (ITN). This practice is especially important for HIV-infected pregnant women because malaria parasitaemia can increase the risk of maternal anaemia, low-birth weight babies and infant mortality. The 2007 KAIS captured individual bednet usage during the household interview; the household respondent reported whether each member slept under a bednet the night before the survey. General mosquito net use was defined as sleeping under any mosquito net, treated or untreated. We define use of an ITN as sleeping under a mosquito net that was manufactured with insecticide or treated with an insecticide in the past six months within the home. Since Nairobi is largely urban and considered malaria free, analyses presented in this section include only participants living outside of Nairobi, which is consistent with methods used in other national surveys, including the 2007 Kenya Malaria Indicator Survey.The 2007 KAIS findings on household-level ownership of bednets are presented in Chapter 14.

Figure 11.6a Bednet usage among adults aged 15-64 years by HIV status and knowledge of HIV status, Kenya 2007.

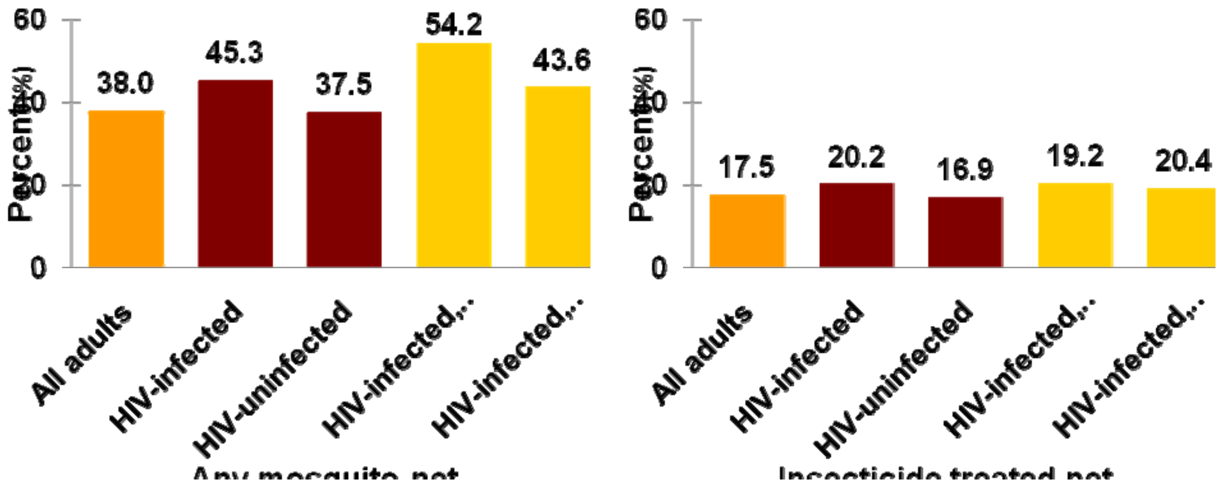

Figure 11.6a HIV-infected adults were significantly more likely to sleep under a bednet than HIV-uninfected adults. Use of insecticide treated nets was only half as common as use of any bednet.

Analyses of bednet use were restricted to individuals living in households outside of Nairobi.

Overall, 38.0% of adults slept under a bednet the night before the 2007 KAIS interview. Bednet use was significantly higher among HIV-infected adults (45.3%) compared to uninfected adults (37.5%), and marginally higher among those aware of their HIV status (54.2%) compared to those who were unaware of their HIV status (43.6%). The percent of adults who reported using ITNs was lower to the percent of adults who used any mosquito net use; 17.5% of all adults slept under an ITN the night before the 2007 KAIS interview. Use of ITN was marginally higher among HIV-infected adults (20.2%) compared to HIV-uninfected adults (16.9%), and ITN use did not differ significantly between HIV-infected persons aware of their HIV status (19.2%) compared with HIV-infected persons who were unaware of their HIV status (20.4%).

Figure 11.6b Percent of HIV-infected adults aged 15-64 years who slept under a bednet, by province, Kenya 2007.

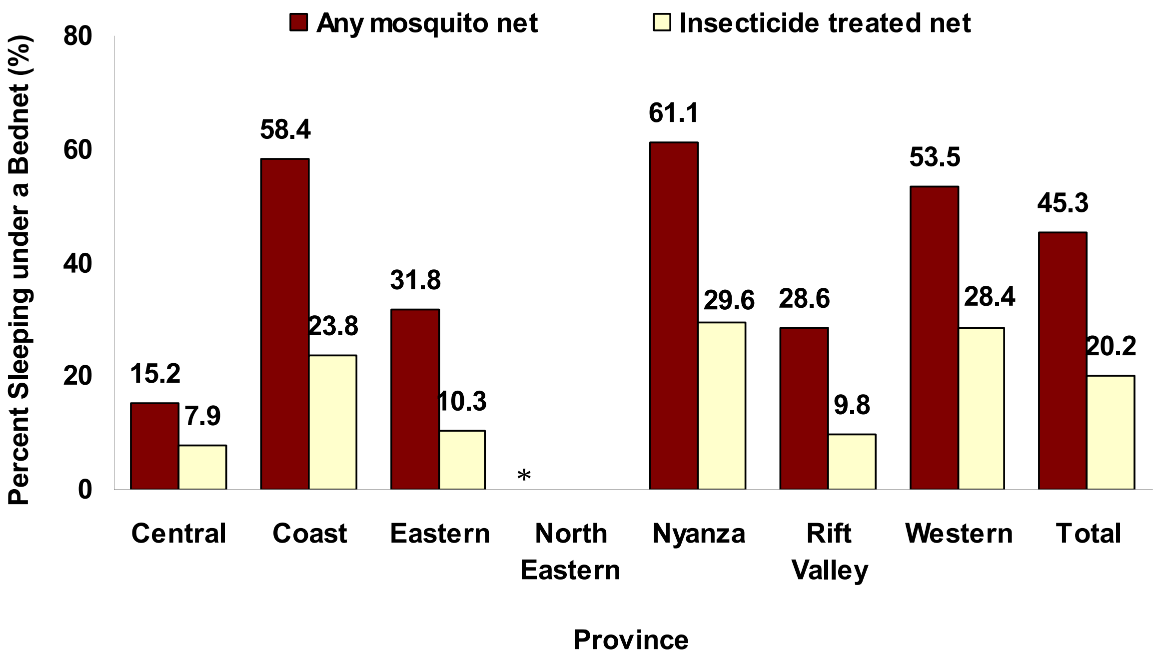

Figure 11.6b General benet usage and use of ITN was highest in Nyanza, Coast and Western provinces, where malaria is highly endemic.

* Estimates not presented due to small denominators of less than 25 observations in this category.
Analyses of bed net use were restricted to individuals outside of Nairobi.

Bednet use by HIV-infected adults varied significantly by province, with the highest net use found in Nyanza (61.1%), Coast (58.4%) and Western provinces (53.5%). All three provinces are located in the zones with the greatest malaria density, with endemic malaria year-round. Bednet use for HIV-infected adults in Eastern and Rift Valley provinces was moderate at 31.8% and 28.6%, respectively. Central province had the lowest bednet use at 15.2%. Central and Eastern provinces are located in seasonal malaria zones, and the highlands of the Rift Valley are prone to periodic malaria epidemics.

Use of ITNs among HIV-infected persons also differed significantly by province and followed a similar distribution observed for general bednet use. Nyanza (29.6%), Western (28.4%) and Coast (23.8%) provinces again the highest use of ITNs among HIV-infected adults. Use of ITNs was substantially lower in Eastern, Rift Valley and Central provinces. Nairobi is considered malaria free, although bednets are available. Among HIV-infected adults in Nairobi, general mosquito net use was 35.5% and ITN use was 12.1%.

Bednet use among HIV-infected adults was similar in rural (45.0%) and urban areas (46.6%), excluding Nairobi. Though ITN use was greater among HIV-infected adults in urban areas compared to rural areas (27.3% and 18.7%, respectively), this difference was marginally significant.

11.7 Preventive Services for People with HIV: Nutritional Supplements

Nutritional supplements and multi-vitamins have been proposed as a method of providing caloric and micronutrient support for HIV-infected people in resource-limited countries. Studies suggest that people with HIV benefit from receiving nutritional and multivitamin supplements, as these may reduce morbidity and delay progression to advanced stages of disease. The Ministry of Medical Services recommends daily multivitamins for all HIV-infected adults and children. In this section, we present the 2007 KAIS findings on the uptake of daily caloric supplements, immune boosters and multivitamins among HIV-infected adults who were aware of their status.

Figure 11.7a HIV-infected adults aware of their infection who take nutritional supplements, Kenya 2007.

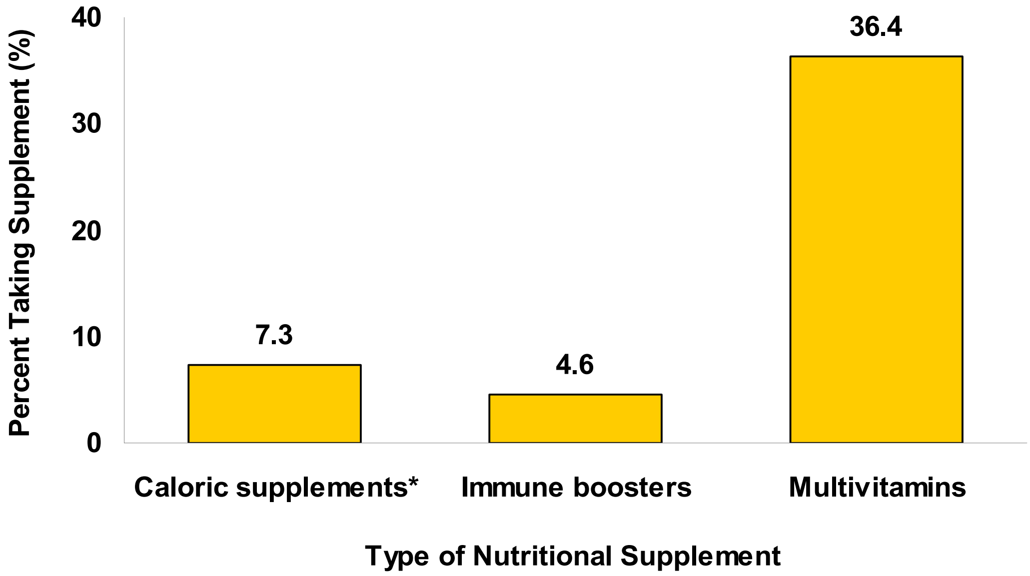

Figure 11.7a Among HIV-infected adults aware of their HIV infection, approximately one third were taking daily multivitamins.

*Caloric supplements include Plumpy Nut, Nutrimix, First Food, Foundation Plus+ and Foundation Advantage
Categories of nutritional supplement use are not mutually exclusive. A respondent could be taking as many as the three types listed.

Among HIV-infected adults who knew they were infected with HIV, 7.3% reported taking one or more daily caloric supplements and 4.6% reported taking immune boosters. The most common supplement taken was a daily multivitamin; 36.4% of HIV-infected persons who knew they were infected reported taking multivitamins on a daily basis. There were no significant differences in the use of multivitamins by age group, sex, rural/urban residence, educational level, wealth index or marital status.

11.8 Gaps and Unmet Needs

- **Counselling and testing for HIV should be emphasized as routine standard of care for everyone visiting a health care facility. For those infected with HIV and unaware of their status, each outpatient or inpatient visit is an opportunity for diagnosis and enrollment in care and treatment.**

- **Better education about TB transmission and available treatments may reduce new cases and stigma around accessing testing and treatment.**

- **Treatment of drinking water to prevent diarrheal diseases among people with HIV infection is low and needs to be improved to comply with the current policy. Education about why and how to best to treat water before drinking it should be enhanced among HIV-infected individuals and their family members.**

- **Eight out of 10 HIV-infected adults were not sleeping under treated bednets and therefore vulnerable to potentially malaria infection though mosquito bites. Access to treated bednets and bednet counseling, including home visits to hang bednets, should be improved.**

- **The Ministry of Medical Services recommends that all HIV-infected adults take daily multi-vitamins to help meet micronutrient requirements and prevent nutrition-related disease. Most HIV-infected adults are not taking multi-vitamins and could benefit from access to nutritional counseling and daily vitamin supplements.**

Prevalence of Herpes Simplex Virus-2 (HSV-2) and Co-infection with HIV and HSV-2

chapter **12**

12.1 Key findings

- **Overall, 35.1% of adults were infected with HSV-2, the virus that causes genital herpes; HSV-2 prevalence among women was significantly higher than among men (41.7% and 26.3%, respectively).**
- **The prevalence of HSV-2 infection varied significantly by number of lifetime sexual partners, number of partners in the past 12 months, and male circumcision status.**
- **Among HSV2-infected adults, 16.4% were infected with HIV. Among HSV-2-uninfected people, 2.1%% were infected with HIV.**
- **STIs or symptoms of STI were reported by 4.6% of HSV2-infected adults.**
- **Among HIV-discordant couples, one partner was infected with HSV-2 in 29.3% of couples and both partners were infected with HSV-2 in 49.8% of couples.**

12.2 Introduction

The 2007 KAIS was the first national seroprevalence survey of herpes simplex virus-2 (HSV-2) in Kenya. HSV-2 is a STI and is the leading cause of genital ulcer disease around the world. Pregnant women with active HSV-2 lesions (blisters) can transmit the infection to their babies during birth, and newly HSV-2-infected women are at high risk for perinatal transmission. HSV2-infected individuals are often asymptomatic, and most do not know they are infected. Those with symptoms suffer from genital irritation, ulcers and/or excoriation. Infection is life-long but rarely life-threatening; once someone has been infected, he or she will remain infected and HSV-2 seropositive for life. Therefore, reported HSV-2 prevalence reflects a lifetime HSV-2 infection. There is no cure, but symptoms can be controlled with drugs such as acyclovir, valcyclovir and famciclovir. Both asymptomatic and symptomatic persons can transmit HSV-2 to sexual partners.

Scientific evidence indicates that HSV2-infected individuals have an increased risk of acquiring HIV because HSV-2 lesions can serve as a portal of entry for HIV. In addition, the presence of HSV-2 in the genital mucosa is associated with an increased concentration of host immune response cells, which serve as targets for HIV entry and increased production of genital HIV. Individuals with HSV-2 and HIV co-infection have a greater risk of transmitting HIV to their sexual partners because co-infected individuals can shed HIV from more severe HSV-2 lesions for longer periods. Treatment of HSV-2 with antiviral drugs has not been shown to reduce risk of HIV transmission.[17]

Appendix B.12 provides sample sizes and 95% confidence intervals for estimates presented in this chapter. Throughout the chapter, the term significant indicates a chi-square p-value less than 0.05; marginally significant indicates a p-value between 0.05 and 0.10, inclusive; and not significant indicates a p-value greater than 0.10.

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[17] Celum C, Wald A, Hughes J, et al. Effect of aciclovir on HIV-1 acquisition in herpes simplex virus 2 seropositive women and men who have sex with men: a randomised, double-blind, placebo-controlled trial. Lancet 2008; 371:2109-2119.

12.3 HSV-2 prevalence

HSV-2 prevalence among adults aged 15-64 years was 35.1%; nationwide, an estimated 7,012,000 women and men were infected with HSV-2. Women were significantly more likely to be infected than men (41.7% compared to 26.3, respectively).

Figure 12.3a HSV-2 prevalence among women and men aged 15-64 years by age group, Kenya 2007.

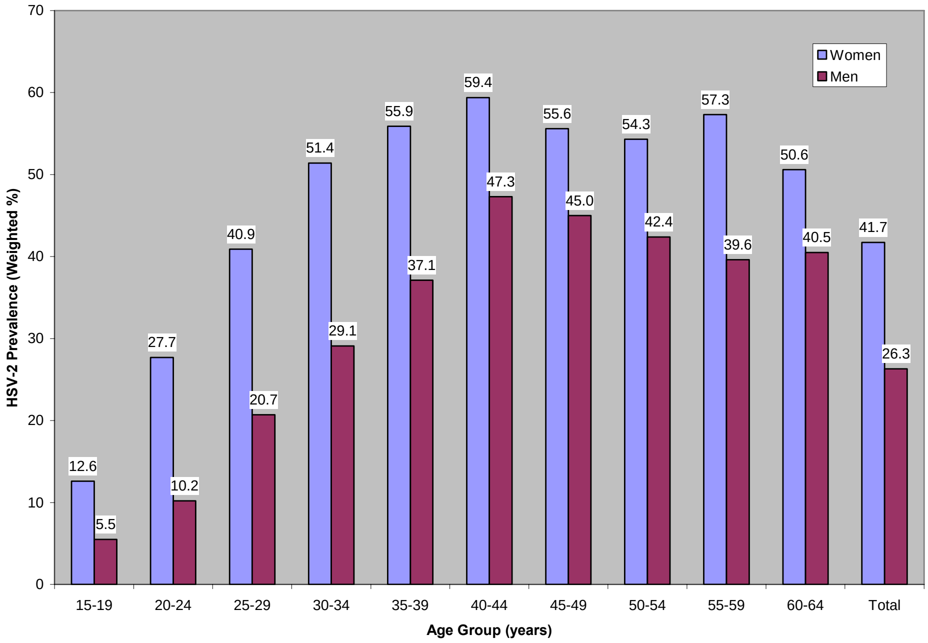

Figure 12.3a HSV-2 prevalence increased across adolescence and early adulthood and peaked in the fourth decade of life for both women and men.

HSV-2 prevalence was lowest among women aged 15-19 years (12.6%) and men aged 15-19 years (5.5%). Prevalence peaked in women and men in the 40-44 year age group (59.4% and 47.3%, respectively). Because infection is life-long, the pattern of increasing HSV-2 prevalence with age is expected. HSV-2 prevalence in older age groups reflects both cumulative lifetime infections and new infections occurring in older cohorts.

DATA IN CONTEXT

HSV-2 AND HIV IN THE LITERATURE

Multiple studies from sub-Saharan Africa indicate that HSV-2 infection can increase a person's risk of acquiring and transmitting HIV:

- **HSV-2 is the most common cause of genital ulcer disease.**
- **In 40-60% of new HIV cases in sub-Saharan Africa, HSV-2 is a contributing factor.[1]**
- **Among HIV-uninfected heterosexual women and men, HSV-2 is associated with an estimated three-fold increased risk of *acquiring* HIV.[2]**
- **Among HIV-infected women and men, HSV-2 is associated with an estimated five-fold increased risk of *transmitting* HIV per sexual contact and has also been linked to more rapid HIV/AIDS disease progression.[3,4]**
- **Suppressing HSV-2 with antiviral drugs among HIV-infected persons reduces HIV viral load in the blood and genital secretions.[5,6]**
- **HSV-2 suppression is thought to reduce sexual transmission of HSV-2 by up to 50%.[7] To date, however, there is no evidence for reduced HIV acquisition at the population level by suppressing HSV-2.[8,9]**

18 19 20 21 22 23 24 25 26

Figure 12.3b HSV-2 prevalence among women and men aged 15-64 years by marital status, Kenya 2007.

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18 Freeman EE, Weiss HA, Glynn JR, et al. Herpes simplex virus 2 infection increases HIV acquisition in men and women: Systematic review and meta-analysis of longitudinal studies. AIDS 2006; 20:73-83.

19 Freeman EE, Orroth KK, White RG, et al. Proportion of new HIV infections attributable to herpes simplex 2 increases over time: simulations of the changing role of sexually transmitted infections in sub-Saharan African HIV epidemics. Sex Transm Infect 2007; 83 (suppl 1):i17-24.

20 Gray RH, Wawer MJ, Brookmeyer R, et al. Probability of HIV-1 transmission per coital act in monogamous, heterosexual, HIV-1-discordant couples in Rakai, Uganda. Lancet 2001; 357:1149-1153.

21 Corey L. Synergistic copathogens: HIV-1 and HSV-2. *N Engl J Med* 2007; 356:854-856.

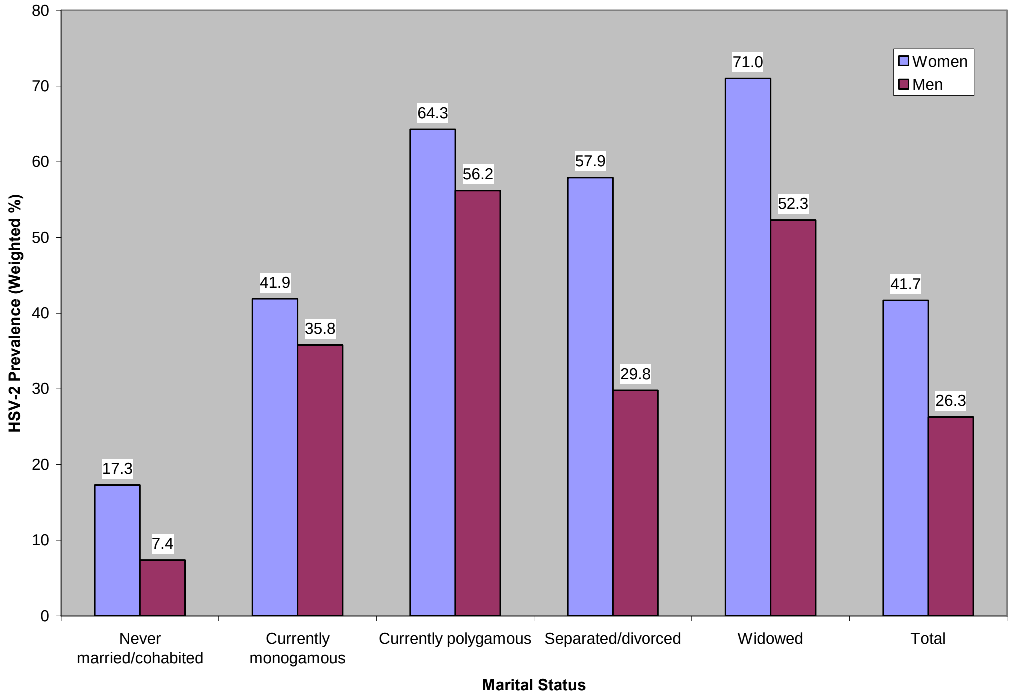
22 Baeten JM, Strick LB, Lucchetti A, et al. Herpes simplex virus suppressive treatment decreases plasma HIV-1 viral load in HSV-2/HIV-1 co-infected women: a randomized, placebo-controlled, crossover trial. J Infect Dis 2008; 198:1804-1808.

23 Nagot N, Ouedraogo A, Foulongne V, et al. Reduction of HIV-1 RNA levels with therapy to suppress herpes simplex virus. *N Engl J Med* 2007; 356:790–799.

24 Corey L, Ashley R, Valaciclovir HSV Transmission Study Group. Prevention of herpes simplex virus type 2 transmission with antiviral therapy. *Herpes* 2004; 11(suppl 3):170a-174a.

25 Celum C, Wald A, Hughes J, et al. 2008.

26 Watson-Jones D, Weiss HA, Ruizoka M, et al. Effect of herpes simplex suppression on incidence of HIV among women in Tanzania. N Engl J Med 2008; 358:1560-1571.



12.3b HSV-2 prevalence was lowest among women and men who had never married or cohabited.

The term "currently monogamous" refers to respondents that are married or cohabiting in a union with only one wife or one female partner.

HSV-2 prevalence varied significantly by marital status among women and men. Among women who were currently married or cohabiting or had ever married or cohabited, HSV-2 prevalence ranged from 41.9% to 71.0%. Among men who were currently married or cohabiting or had ever married or cohabited, HSV-2 prevalence ranged from 29.8% to 56.2%. HSV-2 prevalence among women and men who had never married or cohabited was 17.3% and 7.4%, respectively.

Figure 12.3c HSV-2 prevalence among women and men aged 15-64 years by province and residence, Kenya 2007.

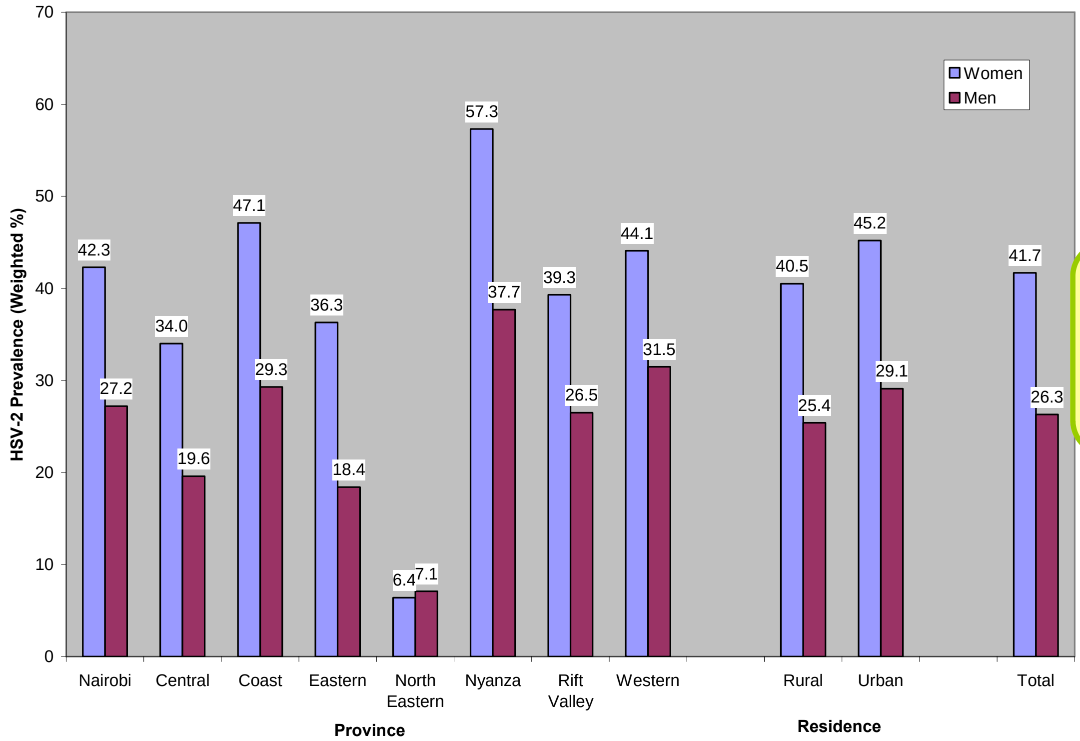


Figure 12.3c Prevalence of HSV-2 infection varied significantly by province and residence.

With the exception of North Eastern province, where HSV-2 prevalence was 6.7%, the prevalence of HSV-2 infection was high in all provinces and ranged from 27.9% in Central province to 49.1% in Nyanza province. HSV-2 prevalence was significantly higher in urban than rural areas. The difference in HSV-2 prevalence between rural and urban areas was significant among women (40.5% and 45.2%, respectively) and marginally significant among men (25.4% and 29.1%, respectively).

Figure 12.3d HSV-2 prevalence among women and men aged 15-64 years by education level, Kenya 2007.

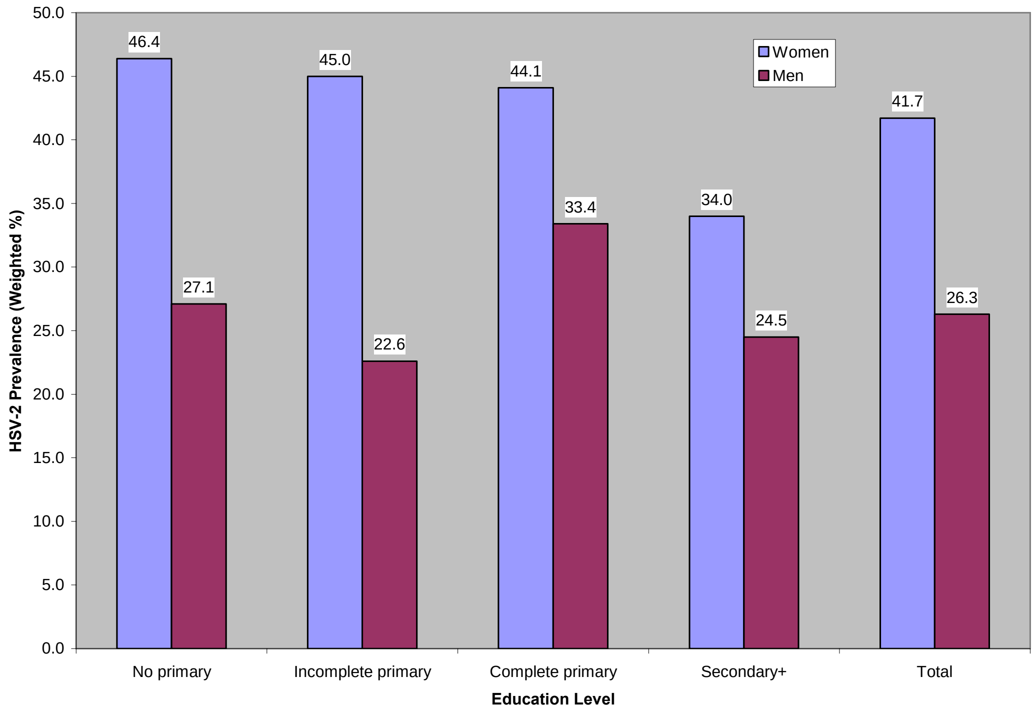


Figure 12.3d
Among women with no primary education, nearly half were HSV-2-infected; and approximately one third of women with secondary education or higher were HSV-2-infected.

HSV-2 prevalence varied significantly by level of education among women and men. Among women and men with no primary education, 46.4% and 27.1%, respectively, were HSV-2-infected. HSV-2 prevalence did not vary across wealth quintiles (data not shown).

DATA IN CONTEXT: LOW HSV-2 AWARENESS

In Kenya, HSV-2 is a silent epidemic. Awareness of HSV-2 is very low, even among health care providers, despite the high prevalence of HSV-2 and the potential role of HSV-2 in driving the HIV epidemic. Researchers estimate that in settings with high HSV-2 prevalence, such as Nyanza province, HSV-2 infection could contribute to the risk of HIV-infection in more than one in four new cases of HIV[1]

Although HSV-2 treatment is becoming more widely accessible, many cases of HSV-2 go undiagnosed and are not treated due to asymptomatic infections and lack of awareness and training of health care providers. In 2006, the Ministry of Health's Reproductive Health Department and NASCOP updated STI guidelines[2] to include genital herpes in syndromic management charts.

27 28

12.4 Acquiring and transmitting HSV-2

27 Freeman EE, Orroth KK, White RG, et al. 2007.

28 Ministry of Health: National Guidelines for Reproductive Tract Infection Services, Kenya 2006.

Figure 12.4a HSV-2 prevalence among women and men aged 15-64 years by number of lifetime sexual partners, Kenya 2007.

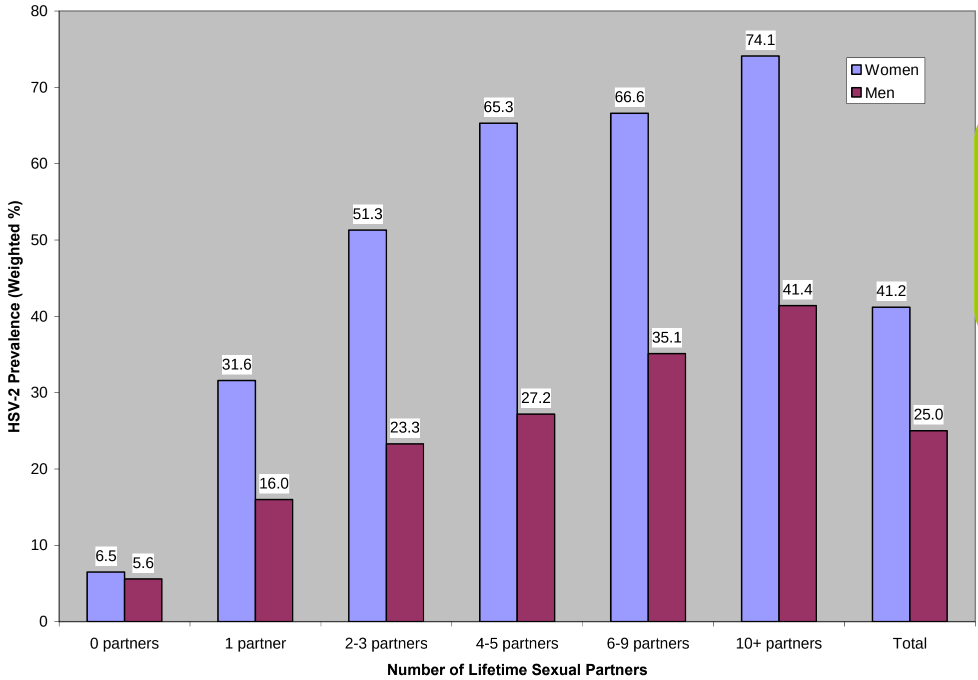


Figure 12.4a Among adults with two or more lifetime partners, more than half of women and over a fifth of men were HSV2-infected.

HSV-2 prevalence increased significantly and monotonically with number of lifetime sex partners for women and men. Estimates among women ranged from 6.5% among those who reported no lifetime sexual partners to 74.1% of those who reported 10 or more partners. Among men, HSV-2 prevalence ranged from 5.6% among men who reported no lifetime partners to 41.4% among men who reported 10 or more partners.

Figure 12.4b HSV-2 prevalence among women and men aged 15-64 years by number of sexual partners in the last 12 months, Kenya 2007.

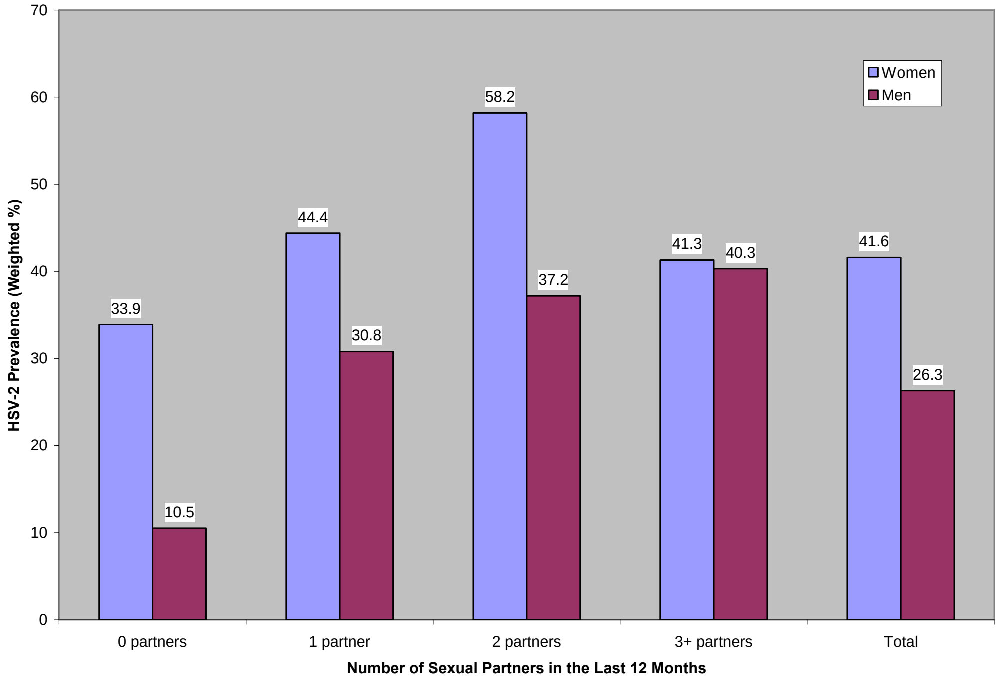


Figure 12.4b HSV-2 prevalence varied significantly by number of sexual partners in the last 12 months among women and men.

Among those reporting sexual activity in the year before the survey, overall HSV-2 prevalence was 41.6% for women and 26.3% for men. HSV-2 prevalence peaked among women who reported two partners in the year prior to the survey at 58.2% and among men who reported three or more partners in the year prior (40.3%).

Figure 12.4c HSV-2 prevalence among men aged 15-64 years by male circumcision status, Kenya 2007.

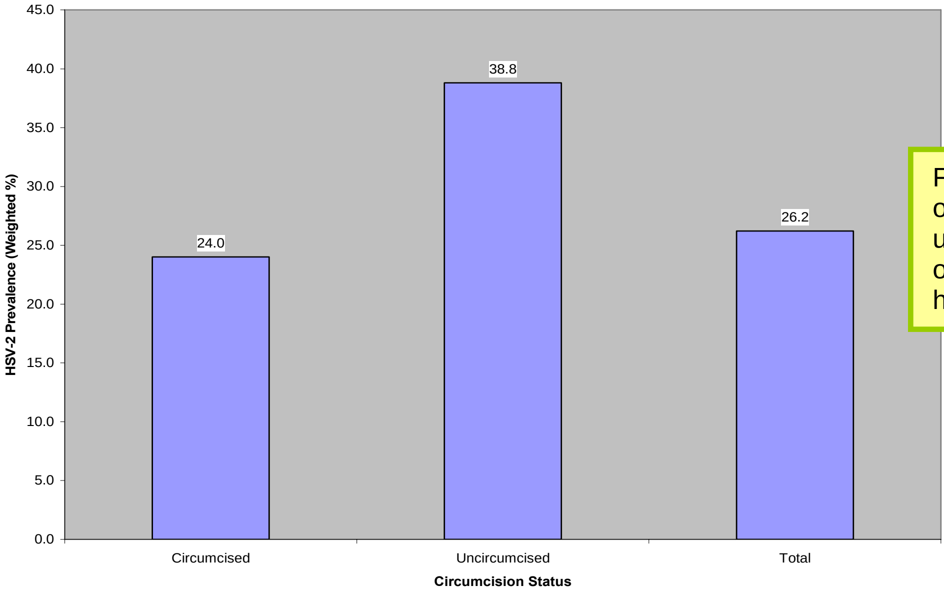


Figure 12.4c Prevalence of HSV-2 among uncircumcised men was one and a half times higher than that of

HSV-2 prevalence among men who reported being circumcised (24.0%) was significantly lower than HSV-2 prevalence among uncircumcised men (38.8%).

12.5 Co-infection with HIV and HSV-2

Table 12.5 describes the distribution of HIV, HSV-2, and co-infection with HIV and HSV-2 among adult women and men in the 2007 KAIS.

Table 12.5 Co-infection with HIV and HSV-2 among women and men aged 15-64 years, Kenya 2007.

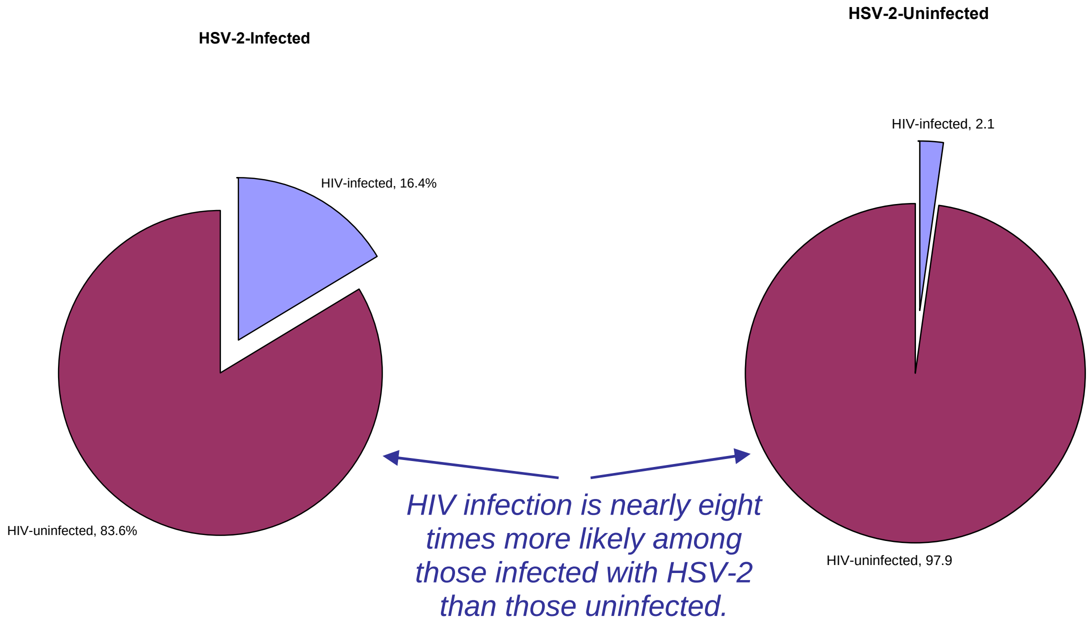
	Women		Men		Total	
	n	%	n	%	N	%
HIV only	119	1.3	97	1.4	216	1.4
HSV-2 only	3019	34.6	1450	22.3	4469	29.3
Both HIV and HSV-2	612	7.1	272	4.0	884	5.8
Neither HIV nor HSV-2	5203	57.0	4935	72.3	10138	63.5
Total	8953	100.0	6754	100.0	15707	100.0

*Percents are weighted; frequencies are unweighted.

Among adults aged 15-64 years, 5.8% were co-infected with HIV and HSV-2. This represented more than four fifths (83.6%) of all HIV-infected persons in the 2007 KAIS. In the absence of HSV-2 infection, HIV prevalence was low for both women and men (1.3% and 1.4%, respectively). Nearly 30% of all 2007 KAIS participants (29.3%) were infected with HSV-2 only and not with HIV. This was significantly different by sex with more women (34.6%) infected with HSV-2 only than men (22.3%).

The 2007 KAIS data did distinguish whether a person was first infected with HIV or first infected with HSV-2 or if they were infected with both during the same encounter.

Figure 12.5a HIV prevalence by HSV-2 status among adults aged 15-64 years, Kenya 2007.



Among HSV2-infected adults, 16.4% were HIV-infected. Among HSV2-uninfected adults, 2.1% were HIV-infected. The difference in HIV prevalence by HSV-2 status was statistically significant.

Figure 12.5b HSV-2 prevalence among couples by HIV status of couple, Kenya 2007.

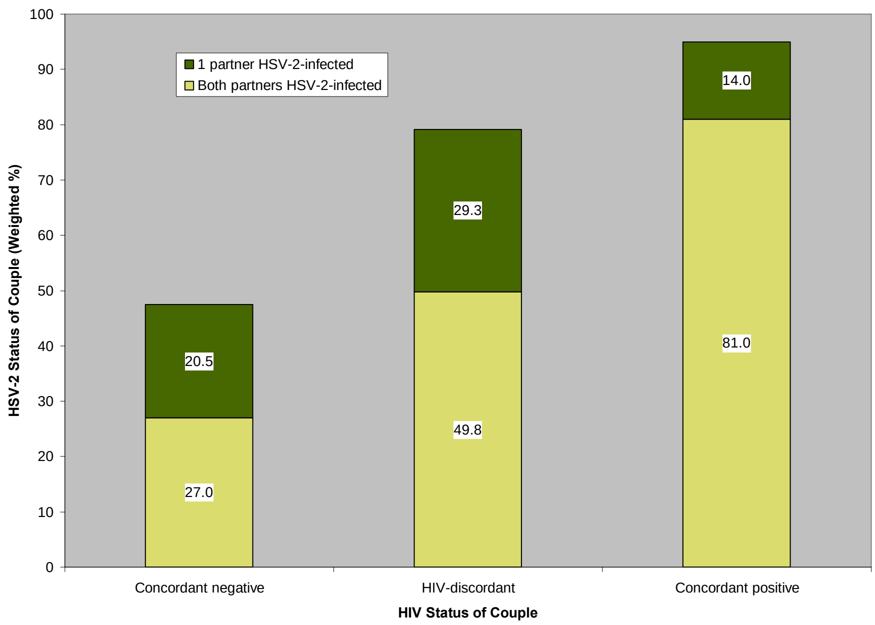


Figure 12.5b In nearly half of all HIV-discordant couples, both partners were infected with HSV-2.

HIV or HSV-2 concordant couples are defined by both partners having the same infection status (i.e. both are infected or both are uninfected with HIV or HSV-2). In the majority of concordant HIV-infected couples in Kenya, both partners also were infected with HSV-2 (81.0%). Among concordant HIV-uninfected couples, 27.0% were concordant HSV2-infected and 20.5% were HSV2-discordant. In

79.1% of all HIV-discordant couples, one or both partners were infected with HSV-2: 29.3% were HSV-2 discordant and 49.8% were concordant HSV2-infected.

12.6 HSV-2 prevalence and perceived risk of HIV, STI symptoms, STI treatment-seeking behaviour, and condom use

Worldwide, the vast majority of those infected with HSV-2 do not know they are infected and therefore may not be aware of their increased vulnerability to HIV. In the 2007 KAIS, approximately two-thirds (63.8%) of adults infected with HSV-2 believed they had little or no risk for HIV infection. Participants who self-reported that they were HIV positive were not included in this sample.

Of all 2007 KAIS participants, 90.5% had heard of STIs other than HIV. Among those aware of STIs who had ever had sex, 96.7% reported having no STI and no STI symptoms (e.g. genital discharge, sore or ulcer) in the year prior to the survey. The percent of HSV-2-infected adults who reported STI symptoms in the year before the survey was not significantly different from the percent of HSV-2-uninfected adults who reported STI symptoms (4.6% and 3.1%, respectively).

Figure 12.6a Treatment-seeking behaviour among women and men aged 15-64 years reporting an STI or symptoms of STI by HSV-2 status, Kenya 2007.

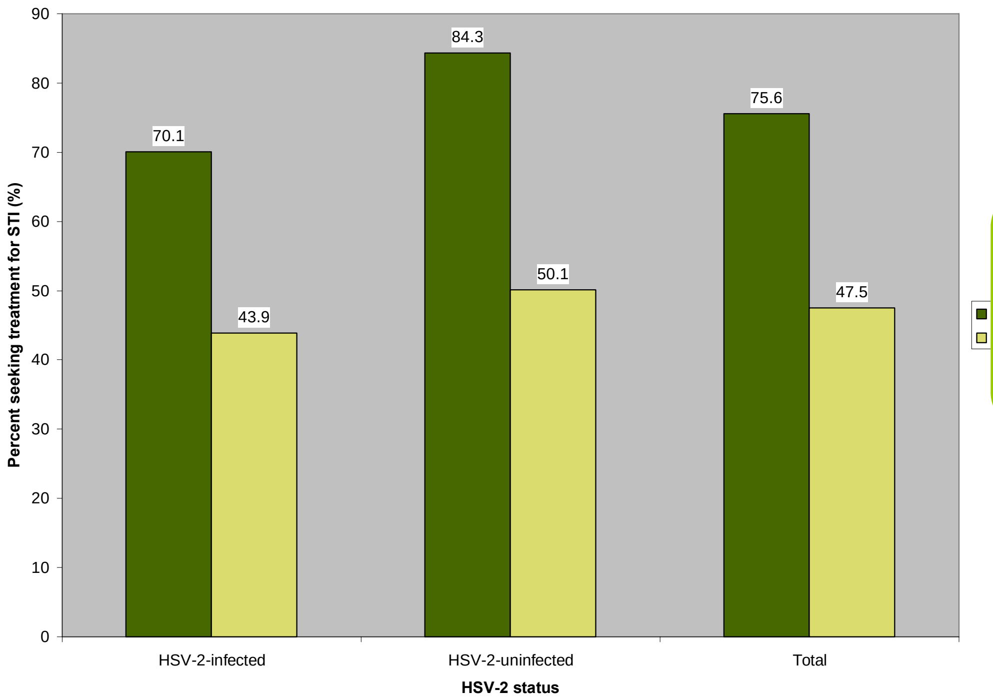
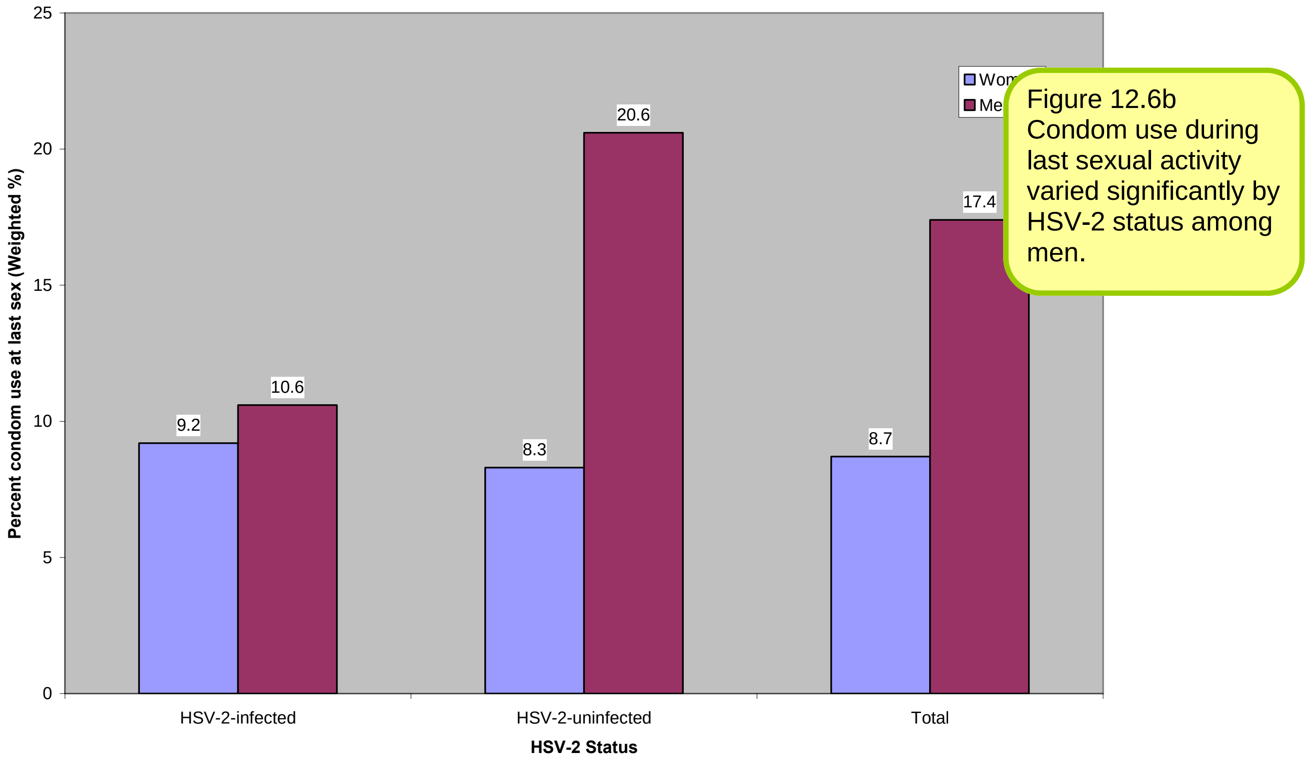


Figure 12.6a STi treatment-seeking behaviour varied by sex but was not significantly different by HSV-2 status.

Among the 3.3% of 2007 KAIS participants who self-reported having had an STI or symptoms of STI (regardless of HSV-2 infection status), 59.3% sought advice or treatment. A significantly higher proportion of women than men sought advice or treatment for their STI (75.6% vs. 47.5%, respectively). STI treatment-seeking behaviour was not significantly different between those infected and uninfected with HSV-2 (57.4% and 61.2%, respectively).

Figure 12.6b Condom use during last sexual activity among women and men aged 15-64 years by HSV-2 status, Kenya 2007.



Overall, condom use during last sexual activity was low and did not vary significantly by HSV-2 infection status for women. However, condom use during last sexual activity was significantly higher among HSV-2-uninfected men compared to HSV-2-infected men (20.6% and 10.6%, respectively).

Figure 12.6c Consistent condom use by partnership type and HSV-2 infection status, Kenya 2007.

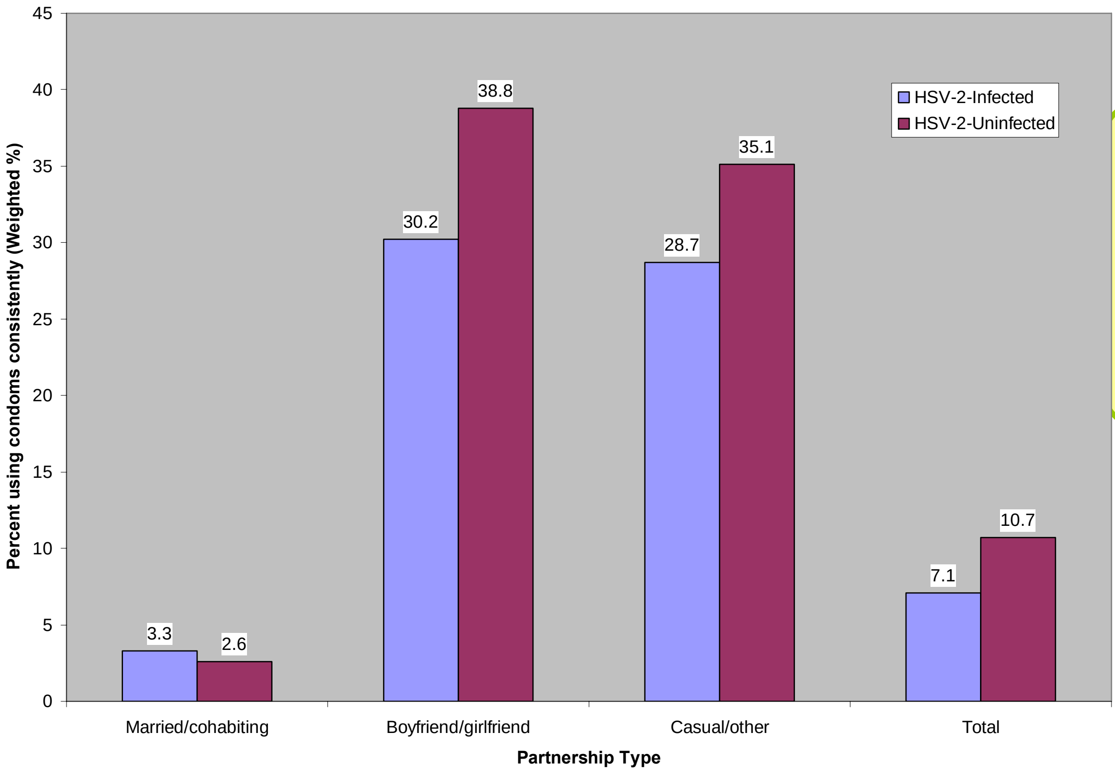


Figure 12.6c Consistent condom use varied significantly by partnership type for both HSV-2-infected and HSV-2-uninfected persons.

In this section, "consistent condom use" is defined as condom use every time the respondent had sexual intercourse with a partner in year prior to the survey. Overall, consistent condom use was low among 2007 KAIS participants and differed significantly by partnership type regardless of HSV-2 infection status of the respondent. HSV-2-uninfected persons used condoms consistently in 10.7% of sexual partnerships and HSV-2-infected persons used condoms consistently in 7.1% of partnerships. In partnerships with boyfriends and girlfriends, condoms were used consistently in 30.2% of partnerships reported by HSV-2-infected persons and 38.8% of partnerships reported by HSV-2-uninfected persons. Similar rates of consistent condom use were observed for casual partnerships by HSV-2-infected (28.7%) and HSV-2-uninfected (35.1%) respondents. Among married and cohabiting partnerships, consistent condom use was reported in only 2.6% and 3.3% of partnerships reported by HSV2-uninfected and HSV2-infected adults, respectively.

Though using condoms consistently and correctly is effective for protecting against many STIs including HIV, condoms may be less protective against HSV-2 transmission than for other STIs. If ulcers occur in places of contact other than those covered by condoms, condom use may be less effective in reducing the risk of HSV-2 transmission or acquisition.

12.7 Gaps and unmet needs

- Increasing awareness of HSV-2 and its role in transmitting and acquiring HIV for the general population is needed.
- According to the 2007 KAIS HIV-infected adults are likely to be co-infected with HSV-2. HSV-2 diagnostic and treatment services should be expanded to HIV care clinics. Healthcare workers should be trained to recognize symptoms of HSV-2 and provide treatment for symptomatic HSV-2.
- HSV-2 infection is high in HIV-discordant relationships. Encouraging condom use is critical for protecting uninfected adults from acquiring HIV and HSV-2.
- HIV prevention programs that promote condom use, male circumcision, and fewer sexual partners should be considered as potential avenues for also educating the public about HSV-2.
- Most HSV2-infected individuals did not recognize they had an STI, but treatment- seeking behaviour among those who recognized symptoms was relatively high, especially among women. Campaigns to improve STI recognition are necessary to facilitate access to treatment services.

13

Prevalence of Syphilis and Co-infection with HIV and Syphilis

13.1 Key Findings

- **The prevalence of syphilis seropositivity in Kenya was 1.8%.**
- **Prevalence was similar between women (1.7%) and men (1.9%), except among adults aged 50-64 years, among whom the higher prevalence for men compared to women was marginally significant (4.4% vs. 2.5%).**
- **Syphilis seropositivity significantly increased with numbers of lifetime sexual partners and was significantly higher in uncircumcised than circumcised men.**
- **Among participants who were seropositive for syphilis, 16.9% also had HIV, 71.5% had HSV-2 and 15.9% had both HIV and HSV-2.**
- **Syphilis seropositivity was signifincantly higher among HIV-infected than HIV-uninfected adults.**

13.2 Introduction

The 2007 KAIS is the first national seroprevalence survey of syphilis in Kenya. Syphilis is a sexually transmitted infection (STI) caused by the bacterium *Treponema pallidum* and is a common cause of genital ulcer disease in many countries. Syphilis causes three stages of symptomatic disease: primary syphilis, characterised by an ulcer at the site of infection; secondary syphilis, characterised by a generalised rash and fever; and tertiary syphilis characterised by neurological, cardiovascular and other potentially life-threatening and severely disabling systemic signs and symptoms, including joint degeneration. Time between secondary syphilis and the appearance of tertiary syphilis can be two or more decades, and is referred to as latent syphilis. Syphilis is most transmissible in the primary and secondary stages, but pregnant women can transmit the infection to the fetus at any point, causing congenital syphilis. Syphilis is easily curable with penicillin, although not all damage is reversible, especially in congenital and tertiary syphilis.

Like HSV-2, syphilis has been associated with an increased risk of acquiring and transmitting HIV, most likely through genital ulcers. HIV-infected individuals co-infected with syphilis are also at substantially elevated risk of tertiary syphilis, notably neurosyphilis, which can lead to psychosis and motor problems.

Appendix B.13 provides sample sizes and 95% confidence intervals for estimates presented in this chapter. Throughout the chapter, the term significant indicates a chi-square p-value less than 0.05; marginally significant indicates a p-value between 0.05 and 0.10, inclusive; and not significant indicates a p-value greater than 0.10.

Population estimates reported in this chapter were calculated based on the 2007 projected population by province, age and sex reported in *The Analytical Report on Population Projections, Volume II, Kenyan National Bureau of Statistics (2002)*. Weighted national estimates for selected indicators from the 2007 KAIS were used in these calculations. Detailed methods used for calculating population estimates are described in Appendix A.

DATA IN CONTEXT

Laboratory Testing for Syphilis in the 2007 KAIS

Syphilis testing was conducted using two types of laboratory tests. All serum specimens were first screened using a *Treponema pallidum* particle agglutination assay (TPPA) test. TPPA remains reactive indefinitely, even after treatment, and was thus used to screen for antibodies in order to identify participants previously exposed to syphilis. All TPPA-positive specimens were then tested using a rapid plasma reagin (RPR) test on undiluted (i.e. neat) serum specimen. This algorithm better identifies current infection, though sometimes, a reactive RPR may also reflect late syphilis that has been successfully treated. In this chapter, we refer to participants with both a positive TPPA and positive RPR test as "infected." For quality control purposes, all TPPA reactive specimens and 5% of nonreactive specimens were re-tested at the quality assurance laboratory using the same TPPA/RPR algorithm. It is worth noting that the standard algorithm for serological diagnosis of syphilis is an RPR test followed, if reactive, by a TPHA, a test similar but not identical to TPPA. In the 2007 KAIS, the laboratory used TPPA instead of TPHA because TPPA produces fewer false positive results and is faster to conduct. Participants classified as seropositive on both TPPA and RPR who returned to receive their results were referred for treatment for active infection.

13.3 Syphilis Prevalence

Overall, 1.8% of Kenyans aged 15-64 years were infected with syphilis. This corresponded to an estimated 344,000 people nationwide.

Figure 13.3a Prevalence of syphilis among adults aged 15-64 years by five-year age group, Kenya 2007.

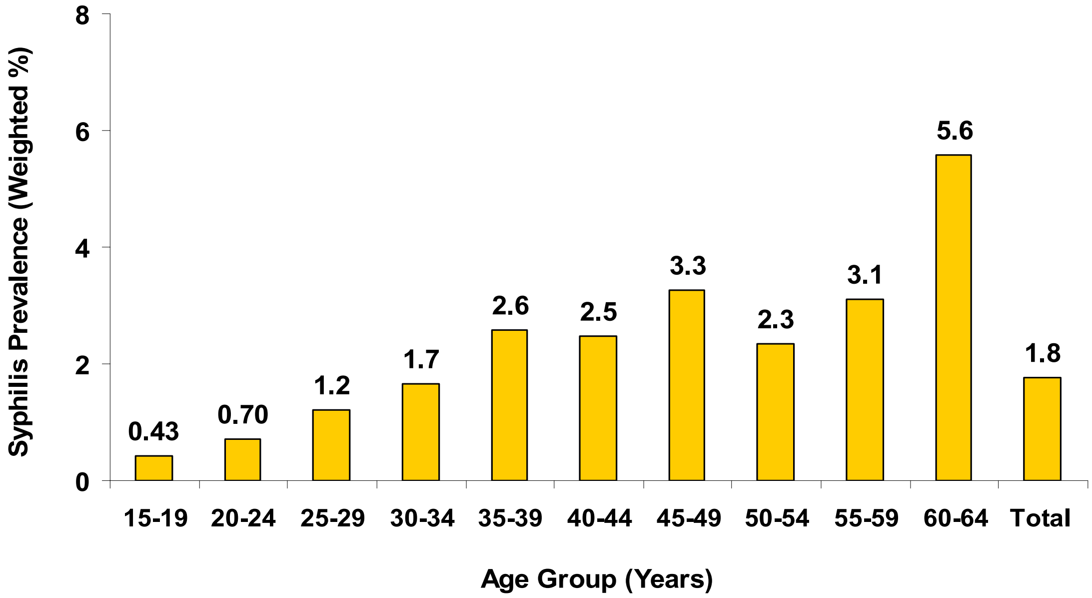


Figure 13.3a The prevalence of syphilis increased from adolescence to adulthood.

Older age groups experienced a significantly higher burden of syphilis compared to younger age groups. Among adults aged 15-24 years, 0.6% were infected with syphilis while 2.1% of adults aged 25-49 years were infected, as were 3.4% of those aged 50-64 years.

Figure 13.3b Prevalence of syphilis among women and men aged 15-64 years by five-year age group, Kenya 2007.

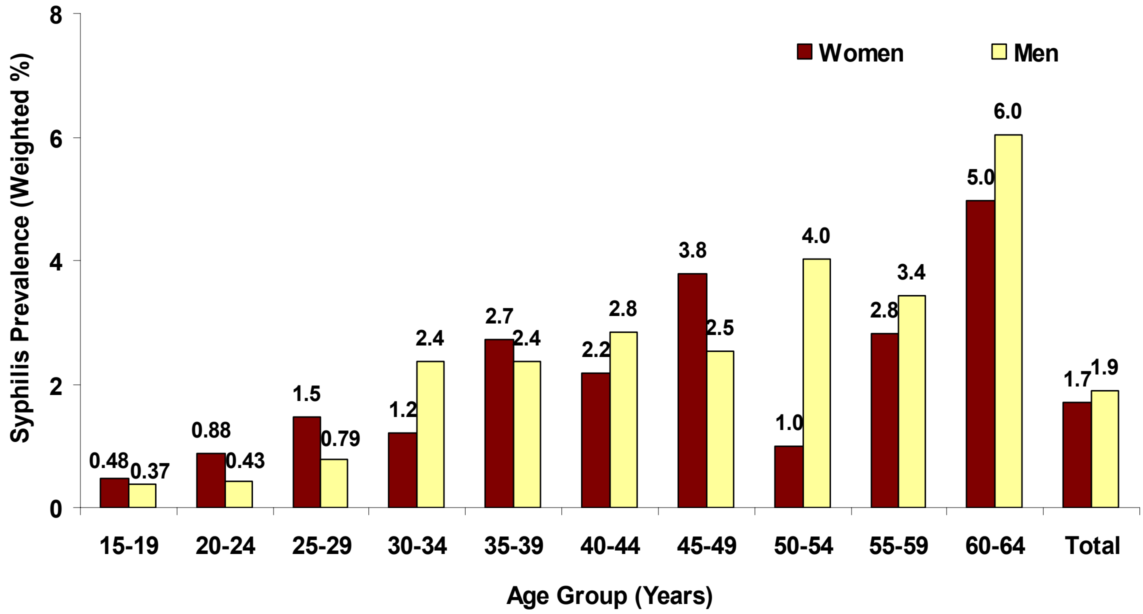


Figure 13.3b The prevalence of syphilis was highest among older men (aged 50-64 years) and lowest among youth (aged 15-24 years).

Differences in the prevalence of syphilis between women and men were not statistically significant among younger and middle-aged adults from 15-49 years of age. Among those aged 50-64 years, the higher rates of syphilis among men compared to women were marginally significant.

The distribution for syphilis in the 2007 KAIS by sex was different from patterns of HIV and HSV-2; as shown in Chapters 2 and 12, women had a significantly greater burden of both HIV and HSV-2.

Table 13.3a HIV and HSV-2 prevalence among women and men aged 15-64 years, Kenya 2007.

	Women	Men	Total
HIV	8.4	5.4	7.1
HSV-2	41.7	26.3	35.1

The distribution of syphilis by age was also different compared to HIV and HSV-2. For HIV, prevalence was highest in the middle-aged groups and lowest among both the youngest and oldest age groups. For HSV-2, prevalence rates appeared to peak in middle-aged groups and leveled off thereafter. Given that syphilis is treatable while infection with HIV or HSV-2 is chronic, these different patterns of distribution are expected. The prevalence of syphilis was similar in rural and urban areas at 1.4% and 1.9%, respectively. This pattern was similar for both women (1.2% urban; 1.9% rural) and men (1.7% urban; 1.9% rural).

Figure 13.3c Prevalence of syphilis among women and men aged 15-64 years by province, Kenya 2007.

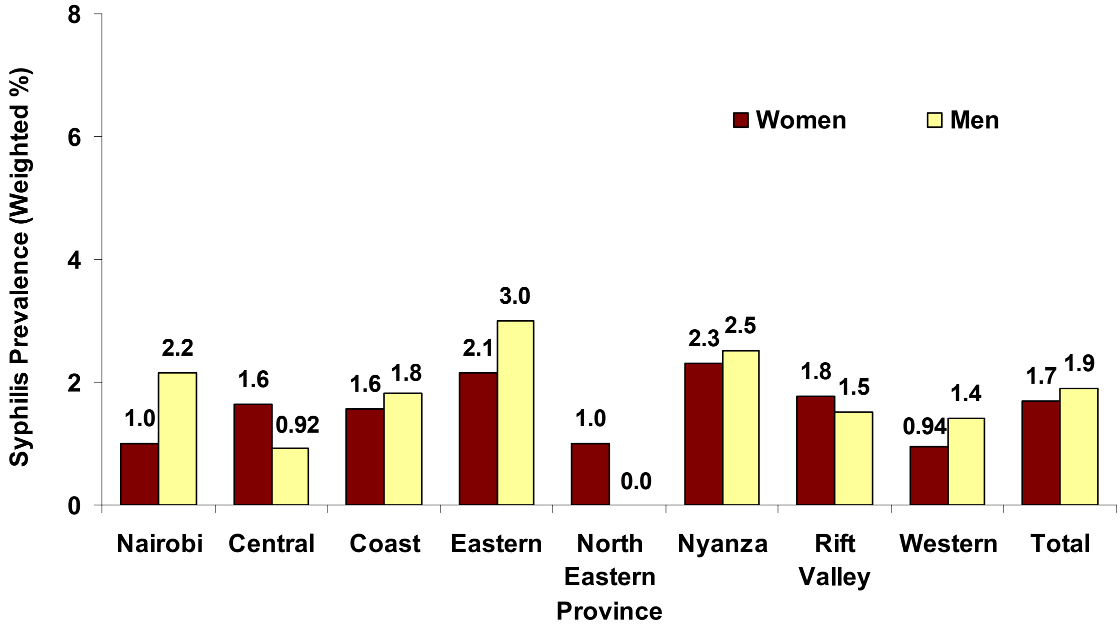
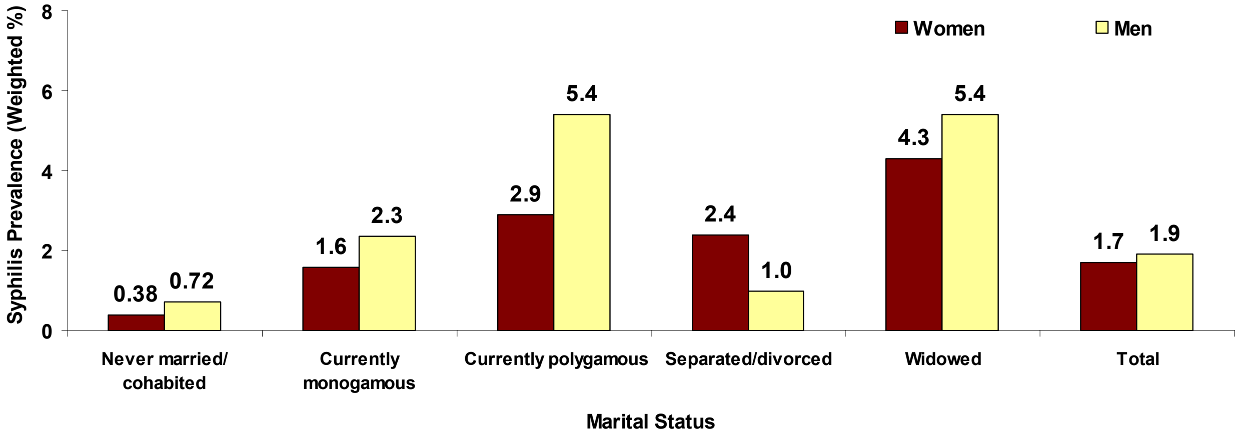


Figure 13.3c The prevalence of syphilis varied significantly by province and was lowest in North Eastern province.

The prevalence of syphilis among women did not vary significantly by province (range: 0.94%-2.3%), while among men, differences by province were marginally significant (range: 0.0%-3.0%). In North Eastern province, no cases of active syphilis were detected among men. The prevalence of syphilis in North Eastern province among women and men combined was the lowest, compared to the rest of the country, at 0.60%, and this difference was marginally significant. Prevalence estimates for HIV and HSV-2 were also lowest in North Eastern province (0.8% and 6.7%, respectively).

The 2007 KAIS sample size was not powered to provide provincial estimates for syphilis. Given the small number of syphilis cases detected in KAIS (n=262), apparent provincial differences and gender differences by province in syphilis prevalence should be interpreted cautiously.

Figure 13.3d Prevalence of syphilis among women and men aged 15-64 years by marital status, Kenya 2007.



The term "currently monogamous" refers to respondents that are married or cohabiting in a union with only one wife or one female partner.

Figure 13.3d Among women and men, those who had never married or cohabited had the lowest prevalence of syphilis.

The prevalence of syphilis varied significantly by marital status among all 2007 KAIS participants, but for women and men separately, this association was not significant. The 2007 KIAS found that 53.7% of the adult population aged 15-64 years was in a monogamous union at the time of the survey and 6.7% was in a polygamous union (see Appendix B.1). Of those in monogamous unions, 1.6% of women and 2.3% of men had syphilis infection, while of those in polygamous unions, 2.9% of women and 5.4% of men were infected with syphilis. Women and men who had never married or cohabited had lower prevalence of syphilis (0.38% for women and 0.72% for men) compared to other women and men.

Figure 13.3e Prevalence of syphilis among women and men aged 15-64 years by education level, Kenya 2007.

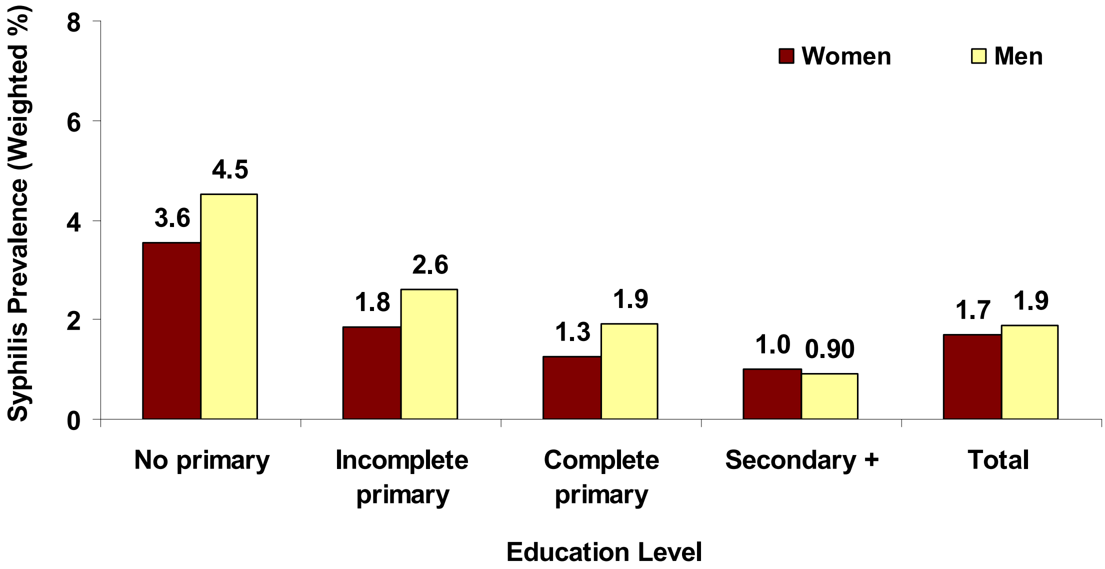


Figure 13.3e Syphilis prevalence varied significantly with education level; those who reported secondary school or higher education had lowest rates of syphilis.

According to the 2007 KAIS, participants who reported less years of education had significantly higher syphilis prevalence than participants who reported more years of education. Syphilis prevalence decreased significantly and monotonically for both women and men, with highest syphilis prevalence observed in participants who reported no primary education (3.6% for women and 4.5% for men) and lowest syphilis prevalence among participants who reported secondary or higher education (1.0% in women and 0.9% in men).

Figure 13.3f Prevalence of syphilis among women and men aged 15-64 years by wealth index[1], Kenya 2007.

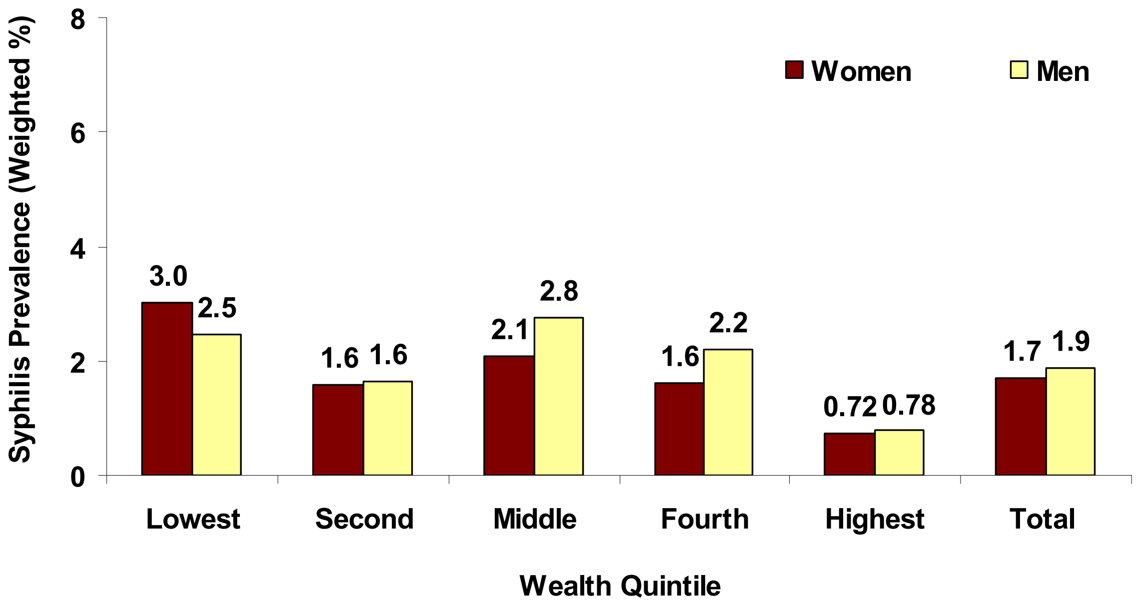


Figure 13.3f Individuals in the highest compared with the lower wealth quintiles had significantly lower syphilis prevalence.

The prevalence of syphilis varied significantly by wealth index. The prevalence of syphilis was significantly lower among adults in the highest quintile (0.72% among women and 0.78% among men), compared with all other groups (1.6%-3.0%).

[1] The wealth index was a composite measure of the living standard of a household, calculated using data on a household's ownership of selected assets, materials used for housing construction, water access and sanitation facilities. The wealth index placed households on a continuous scale of relative wealth using principal components analysis. Individuals were ranked according to the score of the household in which they resided and the sample was divided into five groups, each with an equal number of individuals (quintiles), ranging from the lowest to highest level of wealth.

13.4 Acquiring and Transmitting Syphilis

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Figure 13.4a Prevalence of syphilis among women and men aged 15-64 years by number of lifetime sexual partners, Kenya 2007.

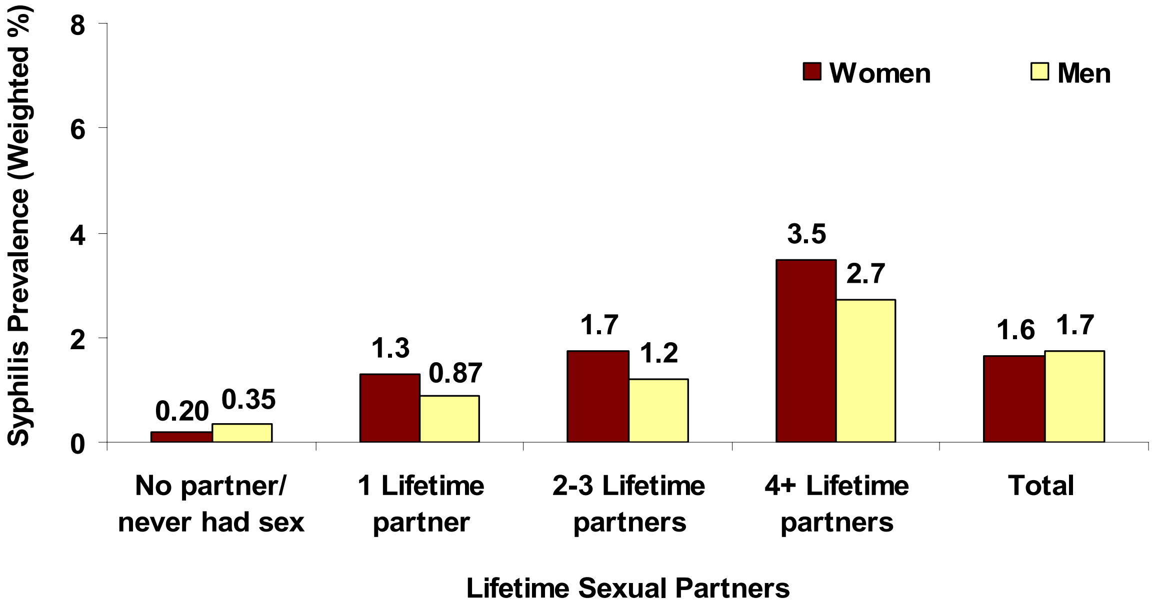

Figure 13.4a The prevalence of syphilis significantly increased with increasing numbers of lifetime sexual partners.

"Total" category includes only those women and men for whom sexual partner data were available.

Overall, number of lifetime partners was significantly associated with prevalence of syphilis.The number of lifetime sexual partners a person has had may give some indication of their exposure to syphilis and other STIs. Among women, the prevalence of syphilis rose from 0.20% among those with no sexual partners to 3.6% among those with four or more partners. Among men, prevalence rose from 0.35% among those with no partners to 2.7% among those with four or more partners. The non-zero prevalence among those with no lifetime sexual partners may be explained by misreported sexual activity or false positive test results.

Please note that consistent with other chapters, the information presented here is not adjusted for other factors, including age.

Figure 13.4b Prevalence of syphilis in men aged 15-64 years by circumcision status, Kenya 2007.

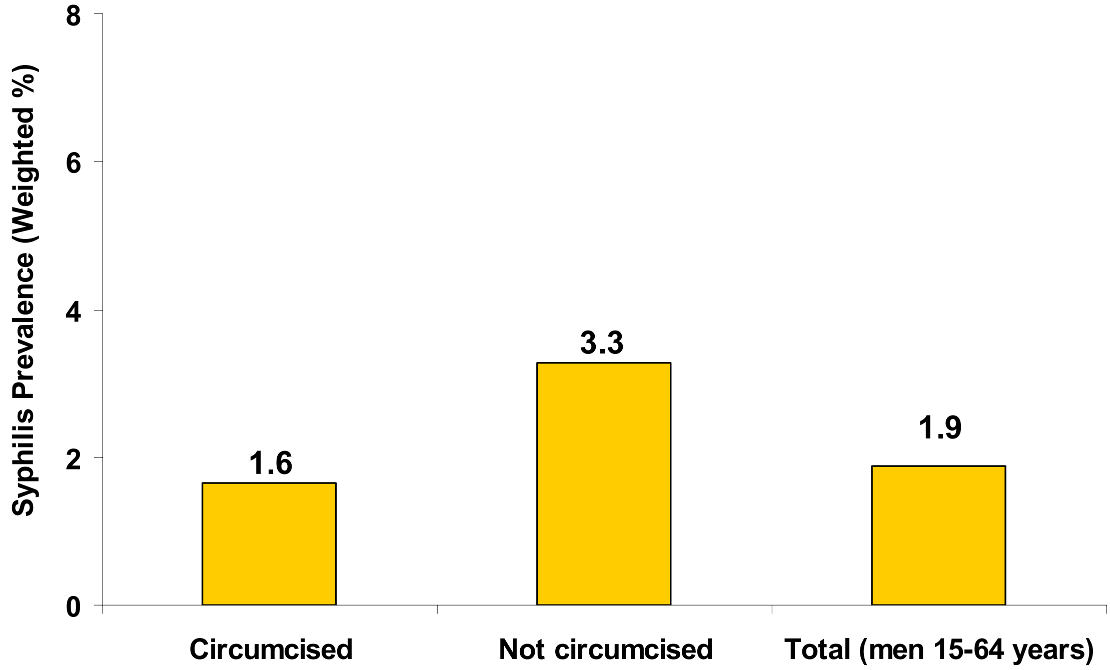

Figure 13.4b The prevalence of syphilis among uncircumcised men was two times greater than prevalence among circumcised men.

The efficacy of medical male circumcision in preventing HIV has been established in high-quality randomised controlled trials in sub-Saharan Africa. The 2007 KAIS found that lack of male circumcision was significantly associated with increased levels of both HIV and HSV-2 infection among men. Similarly, the prevalence of syphilis among uncircumcised men (3.3%) was approximately two times higher than the prevalence among circumcised men (1.6%) and this difference was significant.

13.5 HIV and HSV-2 Prevalence by Syphilis Status

Figure 13.5a Prevalence of HIV, HSV-2 and both infections by syphilis status among adults aged 15-64 years, Kenya 2007.

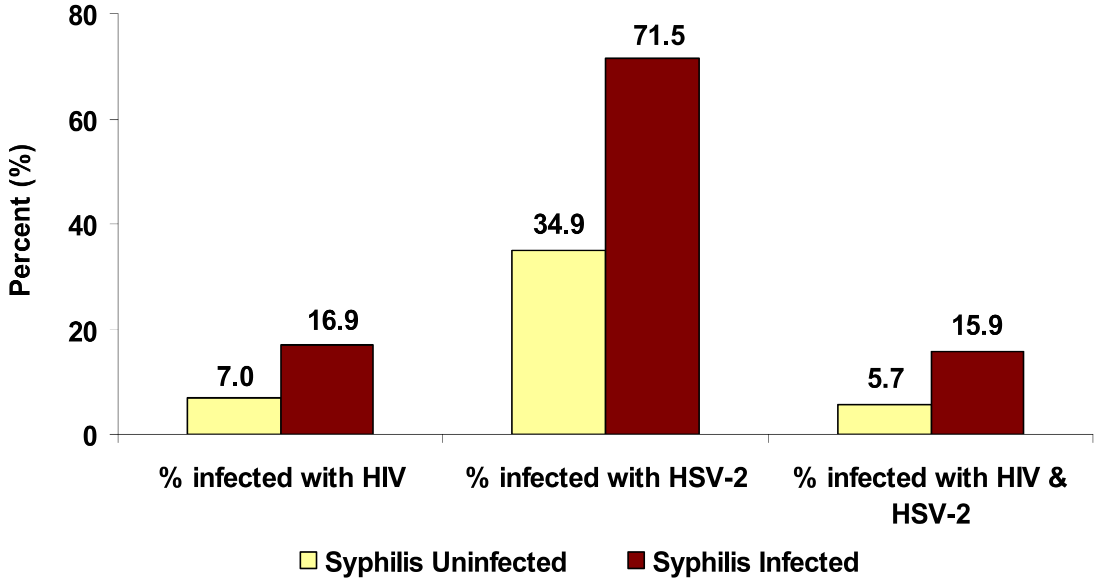

Figure 13.5a Infection with HIV, HSV-2 or both was significantly greater among people infected with syphilis than among those not infected with syphilis.

Persons with syphilis were significantly more likely to be infected with HIV, HSV-2 or both compared to persons who were uninfected with syphilis. Among persons with syphilis, 16.9% were infected with HIV, compared to only 7.0% of those not infected with syphilis. The great majority of those with syphilis were also infected with HSV-2 (71.5%) compared to 34.9% of those without syphilis. The prevalence of co-infection with both HIV and HSV-2 was 15.9% among those with syphilis and 5.7% among those without.

Among persons infected with syphilis, HIV prevalence was 16.9% and prevalence of HSV-2 was 71.5%

Of the 7.1% of adults aged 15-64 years infected with HIV, a significantly higher percentage had syphilis compared to HIV-uninfected adults (4.2% vs. 1.6%, respectively). In particular, syphilis infection was four times more prevalent among HIV-infected men (6.4%) compared to HIV-uninfected men (1.6%). This association was also significant.

Among the 35.1% of adults aged 15-64 years infected with HSV-2, a significantly higher percentage had syphilis compared to HSV2-uninfected adults (3.6% vs. 0.79%, respectively). In this survey we were unable to determine whether a person was first infected with HIV, HSV-2 or syphilis.

13.6 GAPS AND UNMET NEEDS

- **Patients tested for syphilis, and particularly those with found to be seropositive, should also be screened for HIV infection.**

- **Initial clinical evaluation for HIV offers an opportunity to screen patients for syphilis. Screening and treating HIV-infected adults for syphilis is one way to prevent progression to neurosyphilis and to reduce risk of transmitting syphilis or HIV to sexual partners or unborn babies.**

14 Household Characteristics and Impact of HIV on Households

14.1 Key Findings

- **Nationally, 11.0% of households were affected by HIV, that is, at least one person in the household was infected with HIV.**
- **Most households did not treat their drinking water (60.1% of rural households and 52.1% of urban households), including both HIV-affected and HIV-unaffected households.**
- **Mosquito net coverage increased 2.5 times between the 2003 KDHS and the 2007 KAIS; 56.1% of households in 2007 owned at least one mosquito net compared to 21.8% in 2003.**
- **Overall, 11.1% of children under aged 18 years have lost one or both of their parents. In Nyanza, the percent of orphaned children was 20.9%.**

14.2 Introduction

This chapter presents findings from the 2007 KAIS on basic characteristics of households and the relationship between HIV and households. In the 2007 KAIS, a household was defined as a person or group of people related or unrelated to each other who live together in the same dwelling unit or compound (group of dwelling units), share similar cooking arrangements, and identify the same person as head of household. The household questionnaire was administered to consenting heads of sampled, occupied households and its main purpose was to identify women and men eligible for the individual interview. A head of household was defined by KNBS as the key decision maker in the household whose authority was recognized by other members of the household. While this authority often comes with economic responsibility for the household, this is not always the case and therefore was not required to meet the definition for the 2007 KAIS.

The household questionnaire was used to collect information on all usual residents and visitors who spent the night preceding the interview in the dwelling. Many questions were asked at the household level, such as source of drinking water and type of toilet facilities; these indicators were treated as characteristics of the dwelling unit or the household as a whole, not as a characteristic of any particular individual. Other questions were asked about individual members of the household, such as the age of each member and whether each member slept under a mosquito bednet. This information was also collected from the household questionnaire respondent. Additionally, the 2007 KAIS household questionnaire collected information on parental survivorship and living arrangements for children under the age of 18 years, as well as social and material support for ill adult members and adult members who died in the year before the survey.

Appendix B.14 provides sample sizes and 95% confidence intervals for estimates presented in this chapter. Throughout the chapter, the term significant indicates a chi-square p-value less than 0.05; marginally significant indicates a p-value between 0.05 and 0.10, inclusive; and not significant indicates a p-value greater than 0.10. For any analysis that compared results from the 2003 KDHS and the 2007 KAIS data, the z-test statistic was used to compare the two weighted estimates from 2003 and 2007 and to determine if differences were statistically significant. Methods used for calculating the z-test statistic are described further in Appendix A.

Appendix B.14 also presents a table of general characteristics including household possession of durable goods and the physical condition of households, such as roofing material and source of fuel, those these results are not discussed in the chapter.

Population estimates reported in this chapter were calculated based on the total, national 2007 projected population reported in *The Analytical Report on Population Projections, Volume II, Kenyan National Bureau of Statistics (2002)*. Weighted national estimates for selected indicators from the 2007 KAIS were used in these calculations. Detailed methods used for calculating population estimates are described in Appendix A.

14.3 Household Composition

This section presents information on the composition of households, including the sex of the head of household, the size of the household and the age distribution of household members. These characteristics are important because they may be associated with the welfare of the household. Female-headed households, for example, typically have fewer resources than male-headed households. In larger households, economic resources are often more limited as they have to be shared across more people. Additionally, where the household size is large, crowding can lead to health problems.

Figure 14.3a Sex of head of household (HH) in rural and urban areas, Kenya 2007

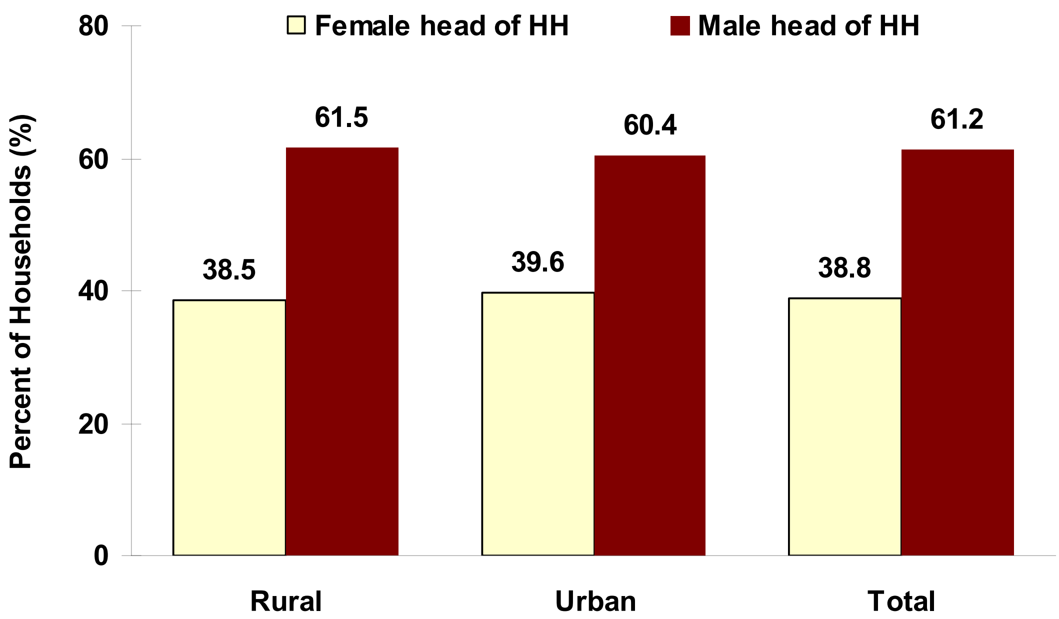

Figure 14.3a Most households in both rural and urban areas were headed by men.

Among all households, 61.2% were headed by men and 38.8% by women. These estimates were similar in all provinces, except in North Eastern province where a higher proportion of households were headed by women than by men (58.5% vs. 41.6%, respectively). A significantly greater percentage of households were headed by women in the 2007 KAIS (38.8%) compared to the 2003 KDHS (31.7%), especially in urban areas where the percent of households with a female head significantly increased from 25.6% to 39.6%.

While the urbanization of Kenya is ongoing, overall, the country remains largely rural. Of all households in the 2007 KAIS, 75.5% were classified as being located in rural areas, with 25.5% located in urban areas.

Figure 14.3b Percent distribution of households by residence, Kenya 2007

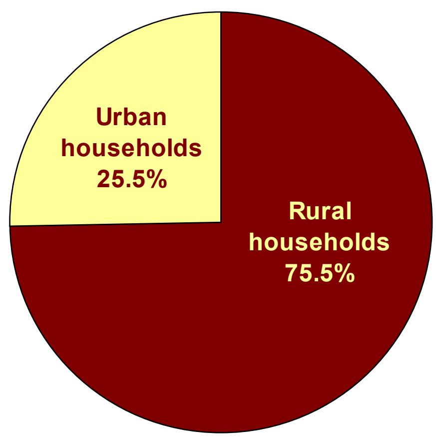

Figure 14.3c Mean size of household in rural and urban areas, Kenya 2007

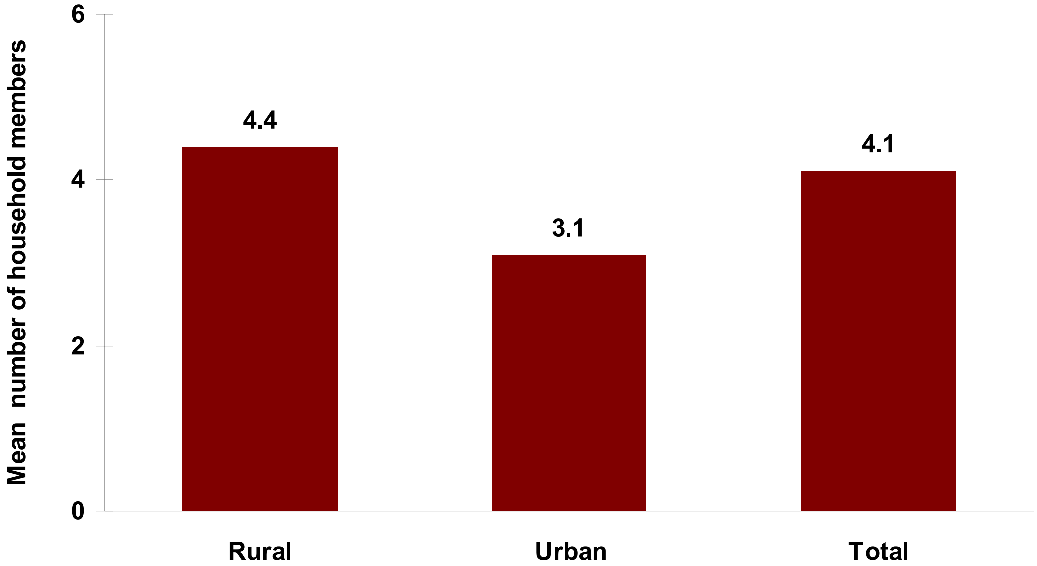

Figure 14.3c The mean household size was 4.1 persons per household with a significantly higher mean household size in rural areas compared to urban areas.

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The following analysis was limited to usual members of household only. Visitors the night prior to the survey, representing 2.3% of all households surveyed, were excluded. The mean household size in 2007 was 4.1 persons per household, with a significantly higher mean size among rural households compared to urban households (4.4 persons vs. 3.1 persons, respectively). The mean household size varied significantly by province, with Nairobi province having the lowest mean household size at 3.0 persons and North Eastern province having the greatest size at 5.3 persons per household. In the 2003 KDHS, the national mean was 4.4 persons per household, and 3.5 and 4.7 in urban and rural areas, respectively.

Figure 14.3d Household population, by age, sex and residence, Kenya 2007

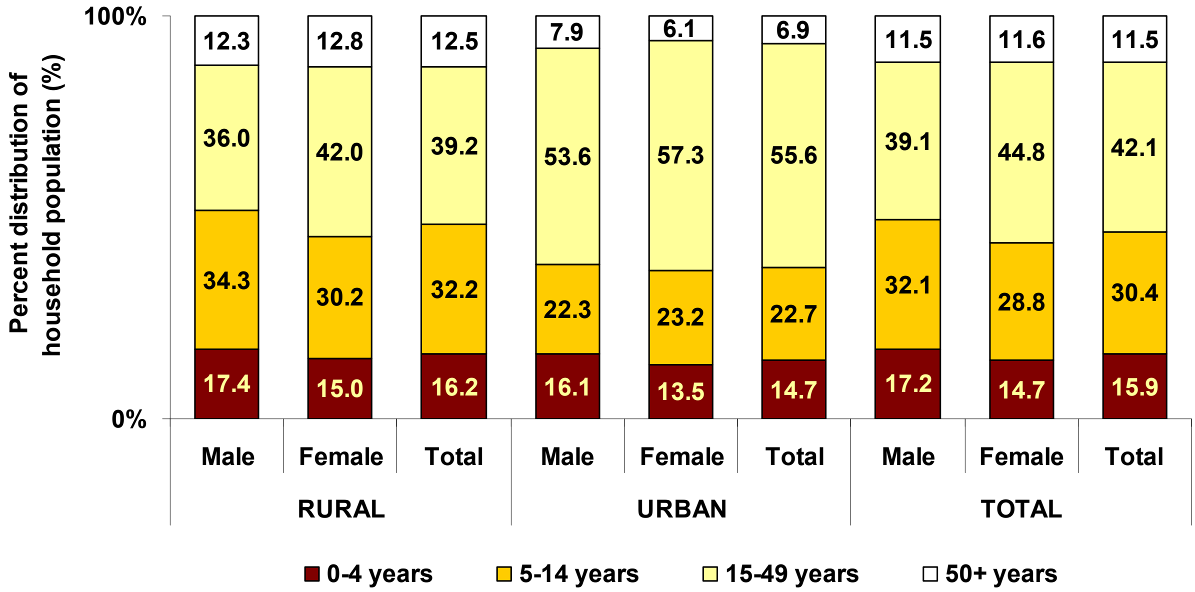


Figure 14.3d Households in rural areas had more children and more older adults compared to households in urban areas.

This analysis includes both usual members and household visitors who slept at the house the night before the survey.

Figure 14.3d presents the distribution of the 2007 KAIS household population, by age group, sex and rural/urban residence.

The total population of surveyed households consisted of 40,443 individuals, of whom 52.5% were females and 47.5% were males. The median age of the household population was 17.0 years, similar to previous observed population samples (17.5 in the 2003 KDHS and 16.9 in the 1998 KDHS). In the 2007 KAIS, individuals under the age of 15 years constituted 46.3% of the population, which was marginally higher than the 44.6% reported in 2003. Adults aged 15-49 years made up 42.1% of the population and those aged 50 years and older represented 11.5% of the household population. This was a statistically significant increase from 9.0% in 2003.

Age distribution within households differed by residence, with significantly more children (aged 0-14 years) and older adults (aged 50 years or older) in rural areas compared to urban areas; urban areas consisted mainly of adults aged 15-49 years. In both rural and urban areas, the proportion of males under the age of five years was statistically greater than the proportion of females.

14.4 Birth Registration

The GOK issues birth certificates and registers births in order to track growth and decline in the population. Birth certificates are more common at some types of health facilities, such as hospitals, than other facilities, such as health centres. Not all births registered with the civil authorities are also issued a birth certificate. When large proportions of births are not officially recorded, planning for public services, such as education and health care, becomes a substantial challenge.

Figure 14.4a Children under five years of age who were issued a birth certificate or registered with the civil authority, by province, Kenya 2007.

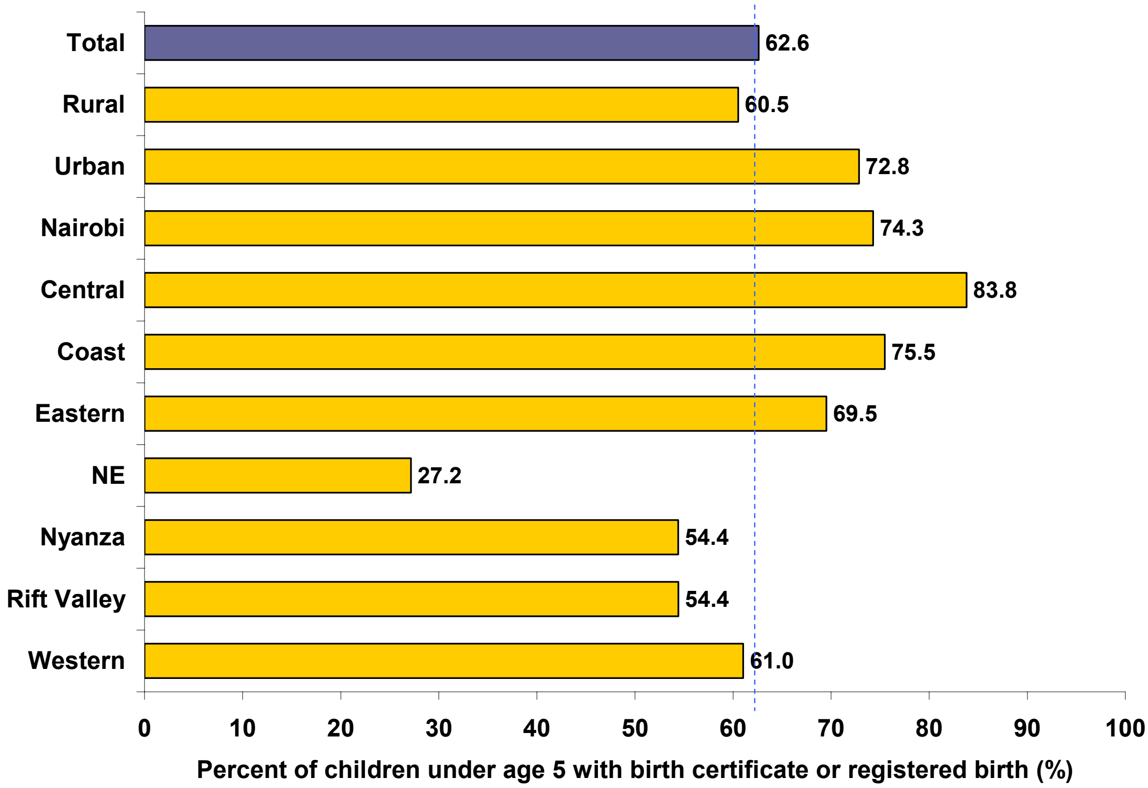


Figure 14.4a A significantly higher percent of children under five years of age in urban areas had a birth certificate or birth registration compared to children in rural areas.

The 2007 KAIS asked household heads to report whether household members aged 0-4 years had a birth certificate or had their birth registered with the civil authorities. In rural areas, 60.5% of children under the age of five years had a recorded birth while the percent was significantly higher in urban areas at 72.8%. Central province had the highest percent of recorded births (83.8%), while in North Eastern province, only 27.2% of births were recorded. Nyanza, Rift Valley and Western provinces also had rates of recording births that were lower than the national estimate (54.4%-61.0%).

14.5 PREVALENCE OF HIV-AFFECTED HOUSEHOLDS

In the 2007 KAIS, any household with at least one HIV-infected member was considered HIV-affected, regardless of that person's role in the household, CD4 cell count or knowledge of his or her status. Using this definition, the 2007 KAIS showed that 11.0% of households in Kenya were affected by HIV.

As stated in the introduction, 9,691 households completed the household questionnaire in the 2007 KAIS. Of these, 93.8% (9,094 households) had at least one member consent to both the individual interview and the blood draw. Analysis in this section is limited to only these households, for which HIV status was available for at least one household member. This is the first time this type of analysis has been conducted on national data for Kenya, and thus comparisons to 2003 are not readily available.

Figure 14.5a Households with at least one HIV-infected adult aged 15-64 years, Kenya 2007.

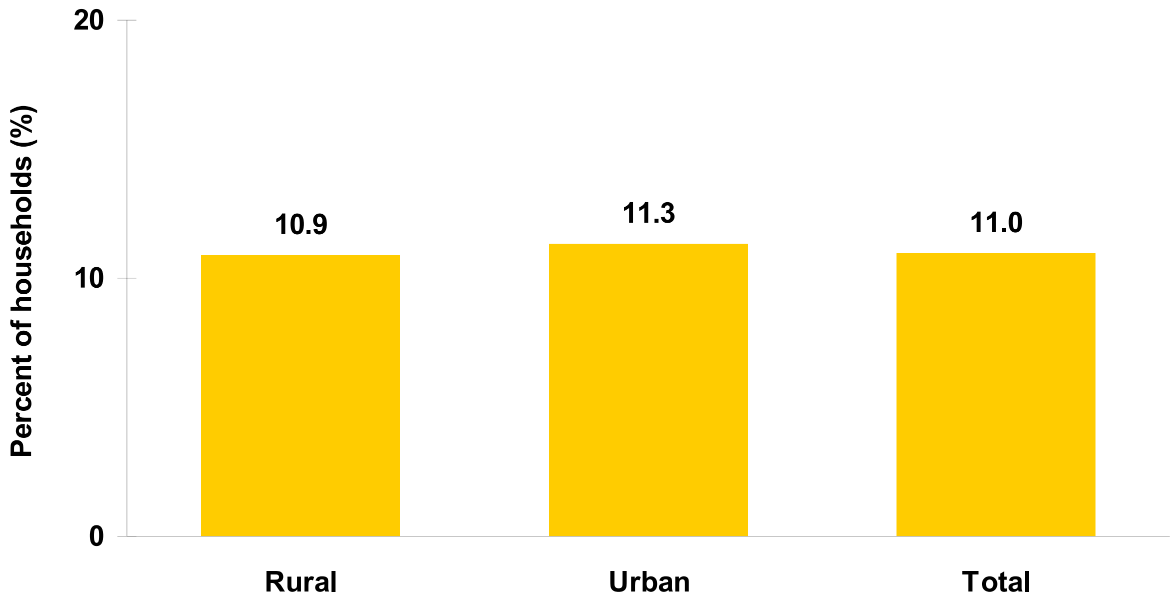


Figure 14.5a Similar percentages of households in rural and urban areas were affected by HIV, with at least one HIV-infected member.

Overall, 11.0% of households had at least one member infected with HIV. The estimates for rural and urban households were similar (10.9% and 11.3%, respectively). Nationally, this translates to approximately 930,000 HIV-affected households. According to the Ministry of Medical Services guidelines, as described in Chapter 11, all of these households are eligible for special services such as safe water systems (including safe water vessels and regular supplies of drinking water disinfectant), bednets and partner and family HIV counseling.

No significant association was observed between wealth and HIV-affected status of households in both rural and urban areas. Households in the highest wealth quintile were as likely to be affected by HIV as those in lower quintiles.

Figure 14.5b HIV-affected households by number of HIV-infected members, Kenya 2007.

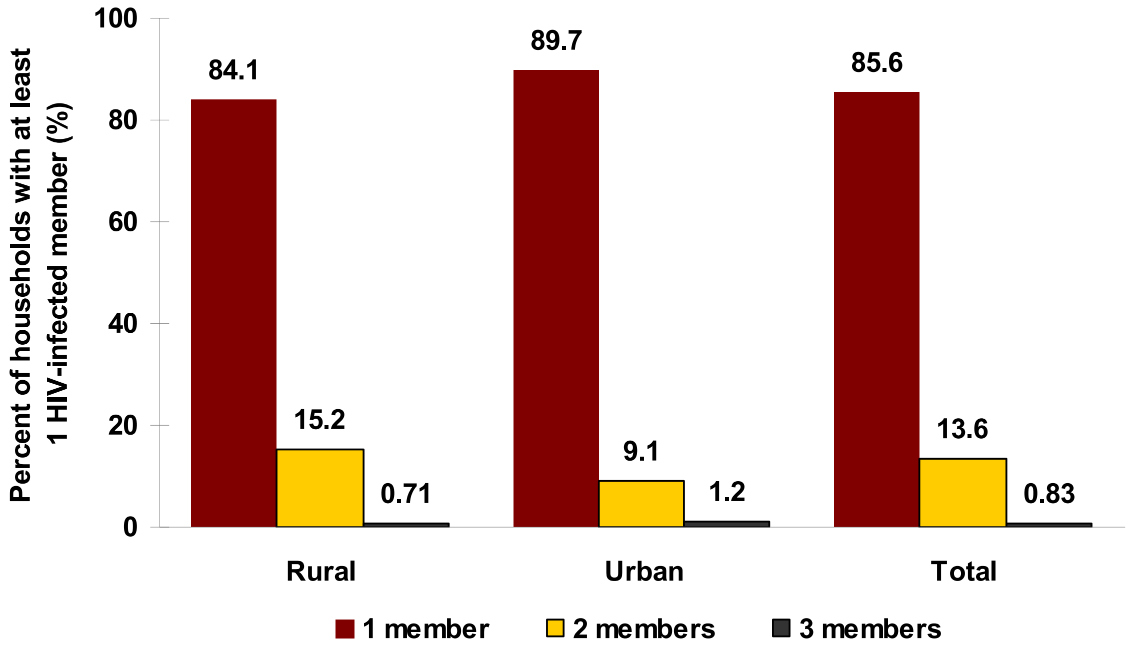


Figure 14.5b HIV-affected households in rural areas were more likely to have two HIV-infected members than households in urban areas.

The majority of HIV-affected households in rural and urban areas had one household member infected with HIV. A higher percentage of HIV-affected households in rural areas (15.2%) had two infected members compared to urban areas (9.1%). This difference was marginally significant. Nationally, less than one percent (0.83%) of affected households had three household members infected with HIV.

Figure 14.5c HIV-affected households with HIV-infected head of household, Kenya 2007.

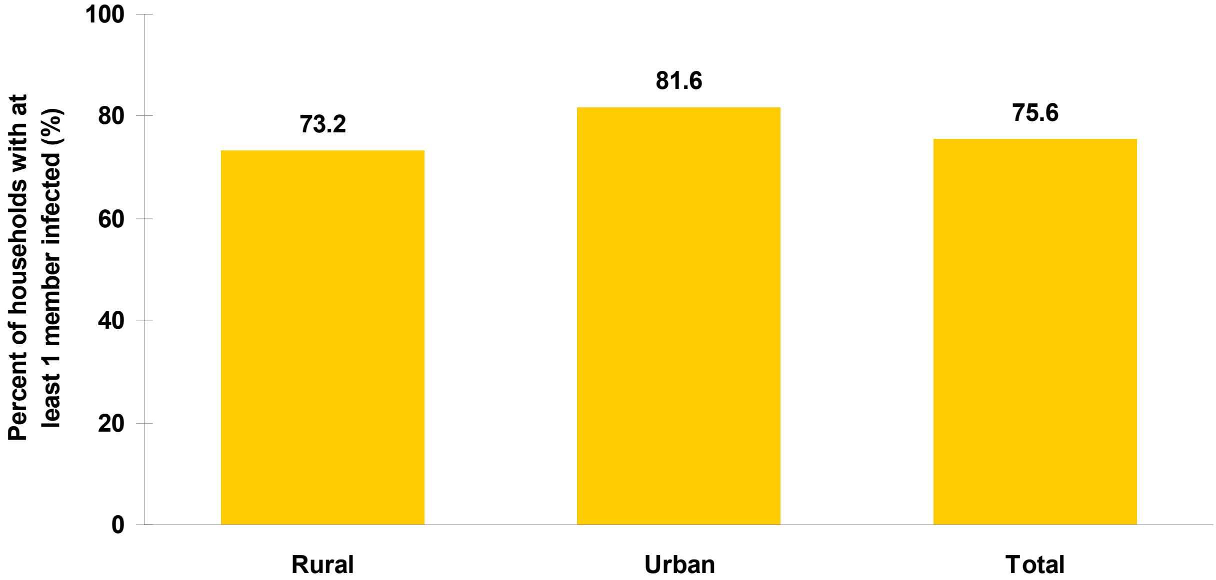


Figure 14.5c In most HIV-affected households, the household member infected with HIV was the head of household.

Among all households affected by HIV, that is, with at least one HIV-infected member, 75.6% had an HIV-infected head of household. There was no significant difference in this estimate for HIV-affected households in rural areas compared to urban areas. As stated before, head of household is defined by KNBS as the key decision maker in the household whose authority is recognized by other members of the household. While not always the case, this authority often comes with economic responsibility for the household.

Figure 14.5d CD4 cell category and ARV status of the HIV-infected member in HIV-affected households by rural/urban residence, Kenya 2007.

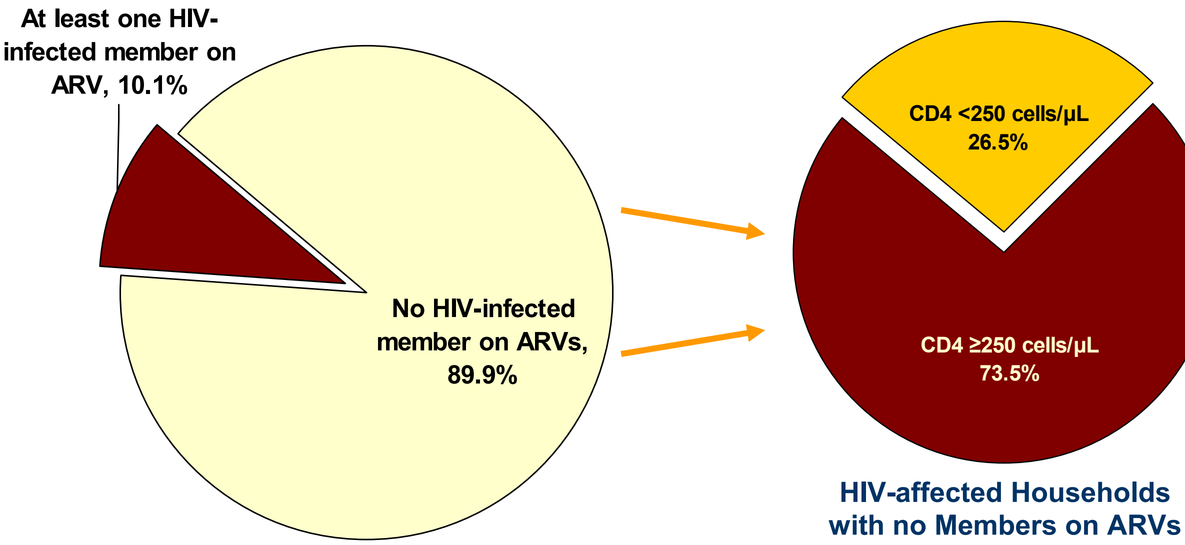


Figure 14.5d Nationally, nearly one in four HIV-affected households have at least one HIV-infected household member with CD4 <250 cells/μL who is not on ARVs.

Households with more than one HIV-infected adult were categorized first by ARV usage among any of its members; households with no ARV users were categorized by the lowest CD4 cell count among its infected members.

Of the 11.0% of households in the 2007 KAIS affected by HIV, 23.8% had at least one HIV-infected member with a CD4 cell count less than 250 cells/μL who was not taking ARVs. The estimates for rural and households were not statistically different (21.9% and 29.2%, respectively). Two-thirds of HIV-affected households (66.1%) had an HIV-infected member with a CD4 cell count of 250 cells/μL or higher. One in ten (10.1%) HIV-affected households had at least one HIV-infected member on ARVs.

Similar to survey results presented in Chapter 5 of this report, the great majority (83.4%) of HIV-affected households are not aware of their affected status since the HIV-infected member in the household was not aware that she or he was HIV-infected (data not shown). Even among the 16.6% of HIV-affected households with at least one adult aware of her or his HIV-infected status, it is possible that these adults had not disclosed his or her HIV status to other members of the household. Knowledge of HIV status in households has critical implications for prevention of transmission to sexual partners in the household and for improving risk-reduction practices for other diseases in the household to ensure a healthier environment for the HIV-infected member.

14.6 Drinking Water and Toilet Facilities

Given the generally strong relationship between household economic conditions and exposure to diseases, information on housing characteristics is critical to explaining the associations between social and economic conditions of households. Household members were asked a number of questions about the source of drinking water, sanitation facilities, access to electricity and type of roofing and flooring materials of their dwellings. In this section, we focus on drinking water and sanitation facilities; other indicators are provided in Appendix B.14.

Source of drinking water is important because unsafe sources can contain waterborne diseases. Sources of water expected to have minimal risk are piped water and public tap water, though even these are recommended for treatment prior to drinking. Wells, springs, surface water and rainwater are likely to carry pathogens that can cause disease, especially among immune-compromised individuals, such as those infected with HIV.

In figures 14.6a-b, estimates are presented for the total household sample (9,961 households). Figures comparing HIV-affected households and HIV-unaffected households (figure 14.6c) are limited to households that participated in the individual components of the survey (9,904 households).

Figure 14.6a Source of drinking water by rural and urban residence, Kenya 2007

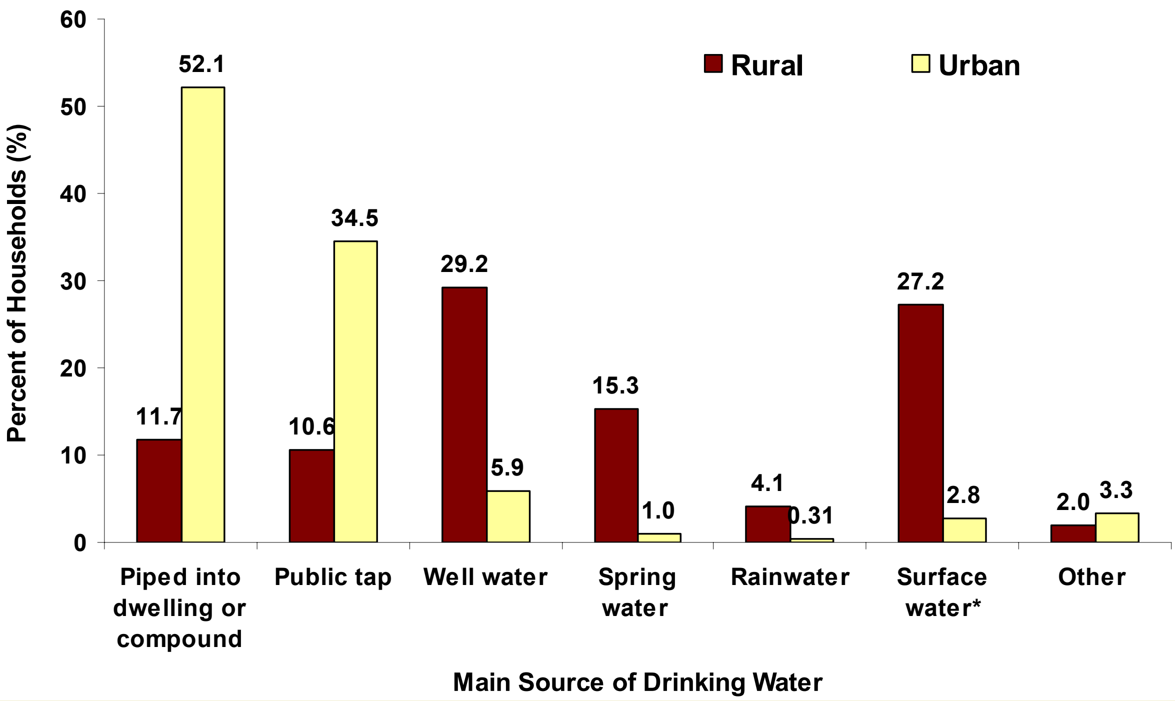


Figure 14.6a In urban areas, the majority of households use piped water or public tap as their main source of drinking water; in rural areas, the majority of households rely on well water or surface water.

* Surface water Includes including rivers, dam, lakes, ponds and streams, canals and irrigation channels

** Well water includes open well in compound (tube well), protected dug well, and unprotected dug well.

In the 2007 KAIS, households' main source of drinking water differed significantly by rural and urban residence. In rural areas, 27.2% of households collected their drinking water from surface water. Well water was also a common source of drinking water in rural areas, with 29.2% of households reporting wells as their main source. Reported sources of drinking water were different in urban areas, with only 2.8% and 5.9% of household heads identifying surface water and well water, respective, as their main source of drinking water. The majority of urban households reported drawing their drinking water from piped water (52.1%) or public tap (34.5%). Differences by province were statistically significant; notably, 42.4% of households in North Eastern province used open wells on their compounds or plots as their main source of drinking water (data shown in Appendix B.14).

Compared to the 2003 KDHS, significantly more urban households accessed drinking water through public tap in 2007 (34.5% in 2007 vs. 21.8% in 2003) while well water[29] was less likely, albeit marginally, to be cited as a main source of drinking water in 2007 than in 2003 (5.9% in 2007 vs. 11.8% in 2003). The proportion of rural households citing surface water as their main source of drinking water decreased significantly by 10 percentage points from 37.4% in 2003 to 27.2%. The proportions of these household citing public tap and well water as their main source of drinking water marginally increased from 2003 KDHS (6.8% and 21.1%, respectively) to 2007 KAIS, (10.8% and 29.2%, respectively).

Figure 14.6b Method of treating drinking water by rural and urban residence, Kenya 2007

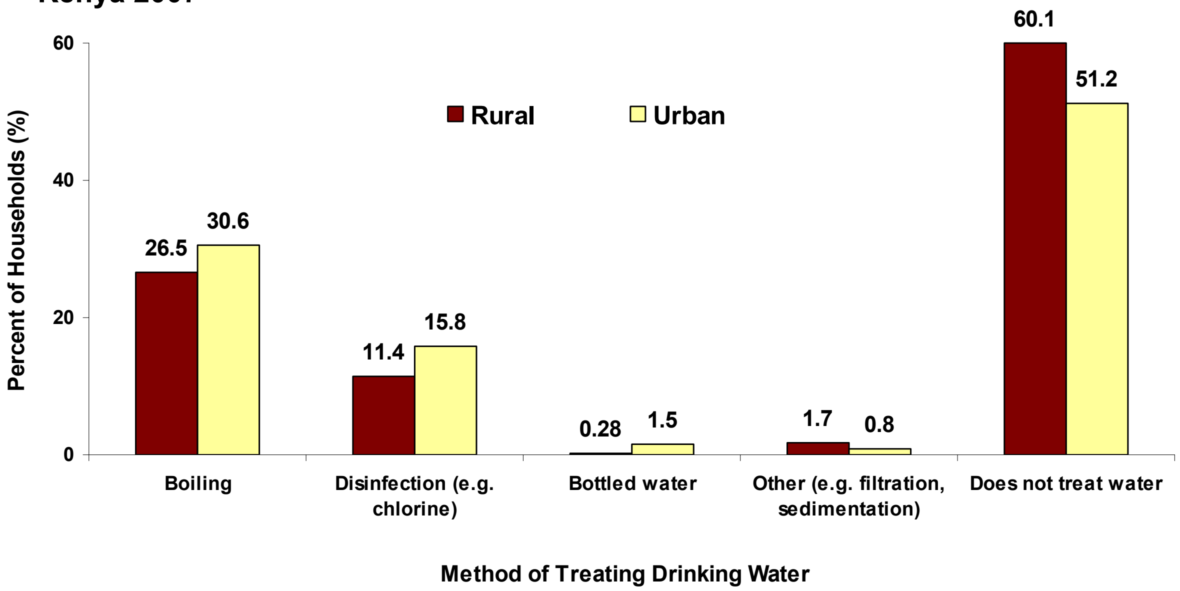


Figure 14.6b The majority of households in rural and urban areas did not treat water from their main drinking water source.

The majority of households in rural and urban areas did not treat their main source of drinking water (60.1% and 51.2%, respectively), with significantly more rural households lacking a treatment method compared to urban households. Among households in rural areas, 26.5% boiled their drinking water compared to 30.6% of households in urban areas. A further 11.4% of rural

[29] In the 2003 KDHS, well water included water from an open or covered public well, or an on or covered well in compound or plot.

households used chemical disinfectants, such as chlorine or Waterguard®[30], compared to 15.8% of urban households. These differences were marginally significant.

Across provinces, water treatment practices differed significantly, with four out of 10 households in Nairobi (42.1%) and Nyanza provinces (42.4%) reporting that they did not treat their drinking water compared to nine out of 10 households (91.3%) in North Eastern province. These data are presented in Appendix B.14.

Figure 14.6c Method of treating drinking water among HIV-affected and HIV-unaffected households, Kenya 2007

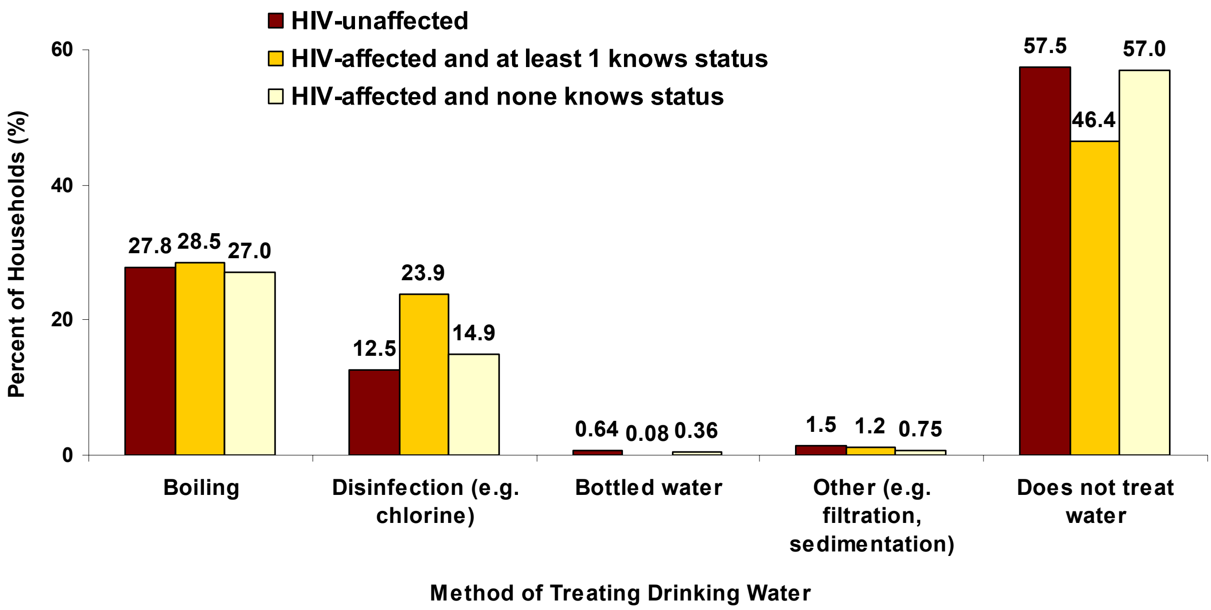


Figure 14.6c HIV-affected households with at least one member aware of his or her HIV status were significantly more likely to treat their drinking water with disinfection agents than other households.

HIV-infected adults in HIV care services are routinely provided with counseling about the importance of safer drinking water in the prevention of common infections.

Households with at least one HIV-infected member who was aware of his or her HIV status were significantly less likely (46.4%) to have untreated drinking water than other households (57.0%-57.5%). These households were also marginally more likely (23.9%) to treat their drinking water with disinfectants, such as chlorine or Waterguard® compared to other households (12.5%-14.9%). Other water treatment practices, such as boiling water, did not differ between HIV-affected and HIV-unaffected households.

[30] Waterguard® is a chlorine-based water treatment product commonly distributed by the government and non-governmental organizations in Kenya. Participants answering Waterguard® for their household's drinking water treatment method were included in the disinfectant category.

Figure 14.6d Type of household toilet facility by residence, Kenya 2007.

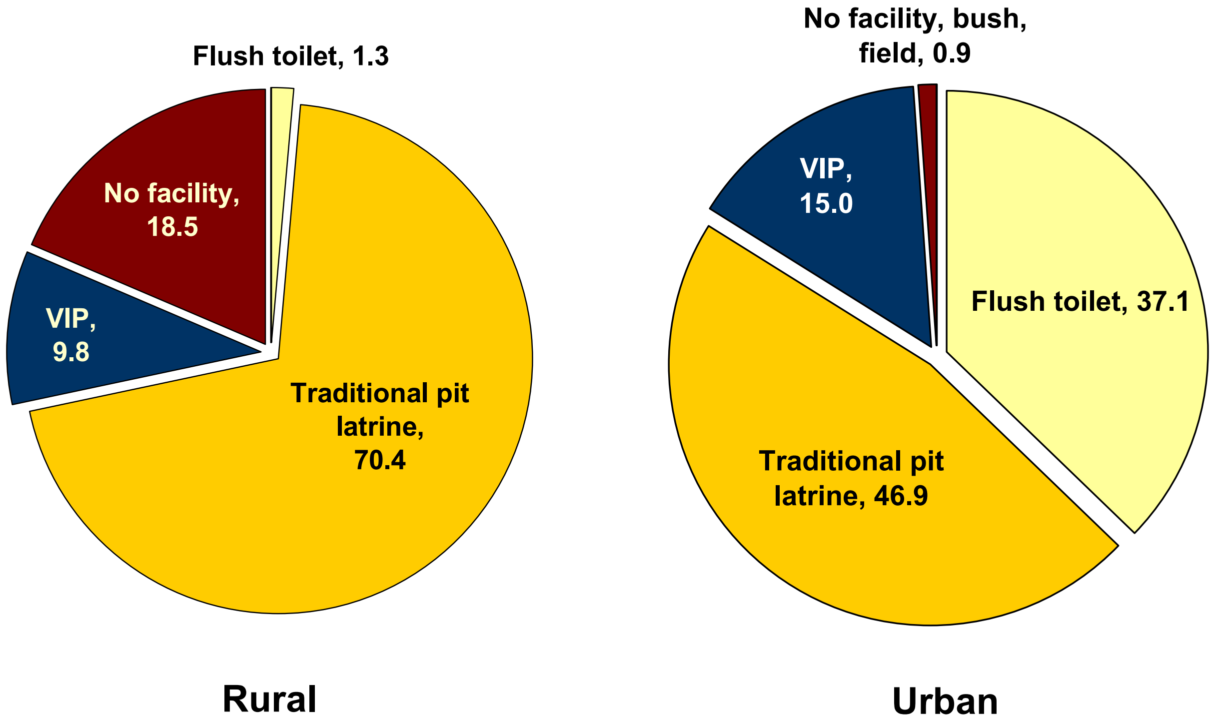


Figure 14.6d A traditional pit latrine was the most common type of toilet facility in both rural and urban households. Flush toilets were significantly more common in urban households than rural households.

A VIP is a ventilated, improved pit latrine.

Household toilet facilities differed widely between rural and urban areas. In rural areas, 18.5% of households had no toilet facility; therefore household members used the bush or fields for personal sanitation. This estimate was significantly higher than the 0.9% of urban households that reported no toilet facilities. Additionally, a significantly higher percentage of rural households (70.4%) compared to urban households (46.9%) used traditional pit latrines. Conversely, significantly more urban households used flush toilets (37.1%) and marginally more used ventilated, improved pit latrines (15.0%) compared to rural households (1.3% and 9.8%, respectively). There have been no significant changes in household sanitation facilities in rural or urban areas since the 2003 KDHS.

Among households with toilet facilities, nearly half shared these facilities with other households (48.3%). Sharing toilet facilities was significantly more common in the urban areas (74.0%) compared to rural areas (38.1%). In Nairobi and North Eastern province, approximately three out of 4 households had shared toilet facilities (71.3% and 77.2%, respectively). The percentage of households sharing toilet facilities was not statistically different from the 2003 KDHS where 68.3% of urban households and 32.1% of rural households reported sharing.

The type of toilet used by a household and the percentage sharing toilets did not significantly differ between HIV-affected and HIV-unaffected households.

14.7 HOUSEHOLD OWNERSHIP OF MOSQUITO BEDNETS

Malaria infection is a common cause of death among children in Kenya. Infection among pregnant women may lead to severe anaemia and infants with low birth weight. Malaria can also be deadly for immune-compromised individuals and the GOK has adopted malaria prevention as a key aspect of basic care for HIV-infected children and adults. A cornerstone of prevention of malaria transmission is the use of mosquito bednets while sleeping, especially ones that have been treated with insecticide. Widespread use of insecticide-treated nets (ITNs) reduces malaria at the population level by decreasing the length of adult mosquito life spans. The distribution of malaria in Kenya is not uniform due to geographical differences in altitude, rainfall and humidity, thus net distribution is not expected to be uniform. This section provides information on household ownership of nets and examines patterns of ownership by HIV-affected status of the household.

DATA IN CONTEXT

Kenya National Malaria Strategy

The public health importance of malaria globally cannot be disputed with 300-500 million cases each year causing 1-2 million deaths. Greater than 90% of these deaths occur in sub-Saharan Africa in children <5 yrs of age. Malaria affects over 100 countries which translate to 3.2 billion people being at risk. Kenyan National Malaria Strategy (KNMS) was launched in April 2001 and its four strategic approaches were 1) Access to prompt and effective treatment, 2) management and prevention of malaria during pregnancy, 3) use of insecticide- treated nets and other vector control methods and 4) improvements to epidemic preparedness and response. The level of endemicity of malaria in Kenya varies from region to region and there is a large diversity in risk mostly driven by climate and temperature. Based on malaria risk, districts in Kenya can be broadly categorized into one of 5 classes of malaria ecology- lakeside endemic, coastal endemic, highland, arid/seasonal, and low risk. All provinces are identified as hot zones except Central and Nairobi. A campaign was launched in July 2006 with a target of equipping 80% of households with at least one ITN. Three and a half million nets were distributed by GOK, with Nyanza and Western provinces receiving 1.5 million nets in July 2006, while Coast, Rift Valley, Central and Eastern provinces received 2 million nets in September of that year.

Overall, 56.1% of households owned at least one mosquito bednet and 32.8% owned more than one net. Coverage was significantly greater than the 21.8% reported in the 2003 KDHS by approximately 2.5 times. These findings corroborate the results of the 2007 Kenya Malaria Indicator Survey, which concluded that 62.5% of households (excluding Nairobi province) owned at least one bednet. KAIS results also indicate that among households with a child under the age of 5 years, 67.1% had at least one bednet. Given the target for the Kenya National Malaria Strategy to cover at least 80% of households with at least one bednet, an estimated 23.9% of all households are still in need of at least one net in order to reach this target.

Figure 14.7a Households that owned at least one mosquito bednet by province and rural/urban residence, Kenya 2007.

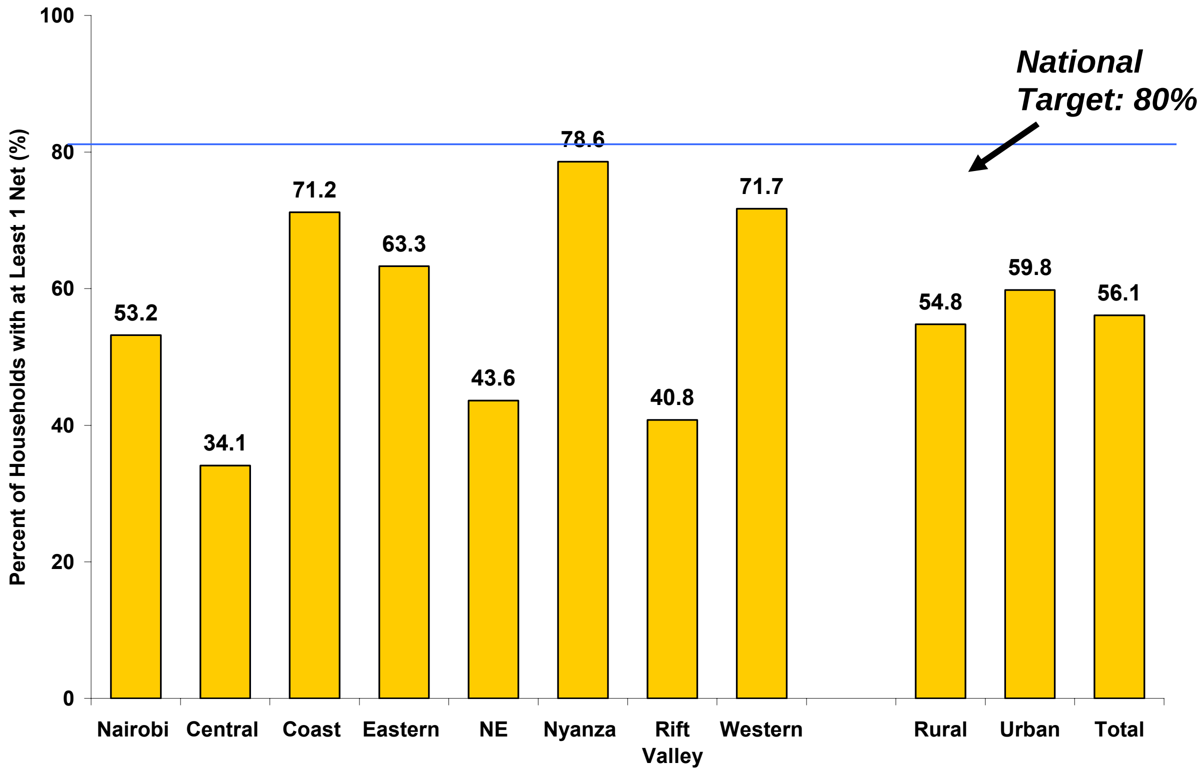


Figure 14.7a Bednet ownership was marginally higher in urban households than in rural households.

Bednet ownership varied significantly by province. Given that the need for mosquito nets is not uniform across the country, coverage of nets is also not expected to be uniform. In the 2007 KAIS, Nyanza, Western and Coast provinces had the highest coverage, ranging from 71.2% to 78.6% of households; malaria is endemic in these provinces and risk is year-round. Coverage in Central province appeared to be low at 34.1%, but most parts of this province (and Nairobi) are not considered malaria zones. In 2007, the gap between rural and urban household net ownership had narrowed to five percentage points (54.8% and 59.8%, respectively) from 21 percentage points in 2003 (16.6% in rural households compared to 37.6%). Nonetheless, in 2007, the percent of households owning at least one bednet was marginally higher in urban households than in rural households.

Figure 14.7b HIV-affected and HIV-unaffected households that owned at least one mosquito bednet by rural/urban residence, Kenya 2007.

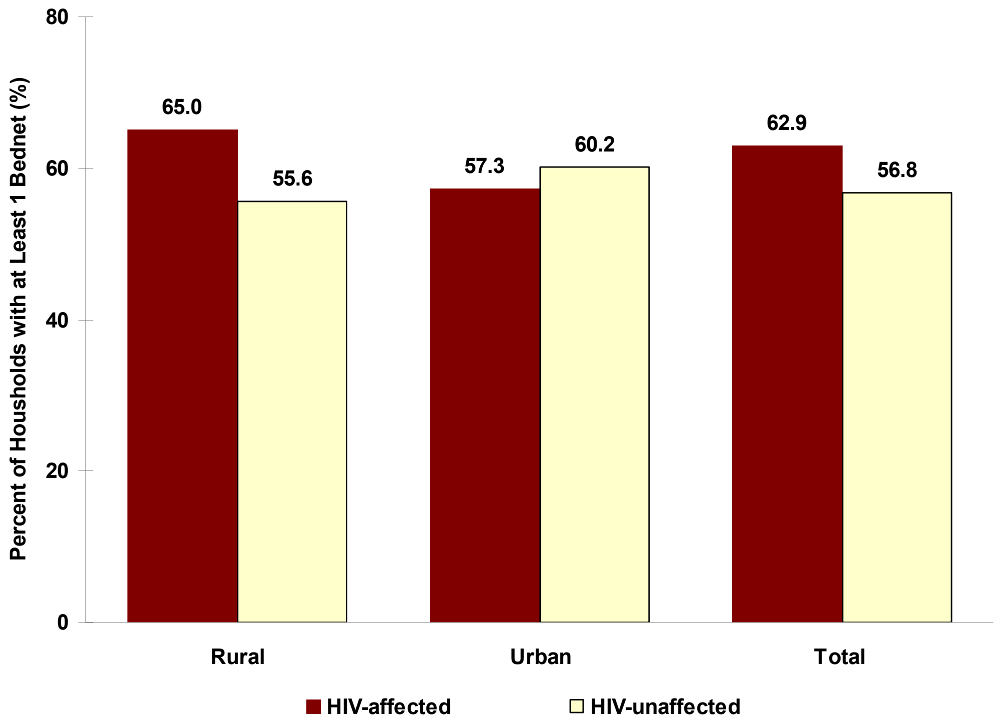


Figure 14.7b In rural areas, a significantly greater percent of HIV-affected households owned at least one mosquito bednet compared to HIV-unaffected households.

Overall, 62.9% of HIV-affected households and 56.8% of HIV-unaffected households owned at least one bednet. This pattern was different in rural areas compared to urban areas. Among rural households with at least one HIV-infected household member, 65.0% owned at least one bednet, compared to 55.6% of households with no HIV-infected members. This association was significant. In contrast, there was no significant difference in mosquito bednet ownership between HIV-affected and HIV-unaffected households in urban areas (57.3% and 60.2%, respectively).

Table 14.7a. Mean number of bednets among HIV-affected and HIV-unaffected households by rural/urban residence, Kenya 2007.

	HIV-affected households	HIV-unaffected households	Total households
Residence			
Rural	1.32	1.13	1.15
Urban	1.00	1.09	1.08
Total	1.24	1.12	1.13

Similar to findings presented in figure 14.7b, the mean number of nets (treated or untreated) owned by households in rural areas varied significantly by HIV-affected and –unaffected status; affected households owned 1.3 nets per households compared to 1.1 nets per unaffected household. Differences in mean number of bednets owned by affected and unaffected households in urban areas and overall were not statistically significant.

Figure 14.7c Household ownership of at least one insecticide treated mosquito bednet (ITN), by rural/urban residence, Kenya 2007.

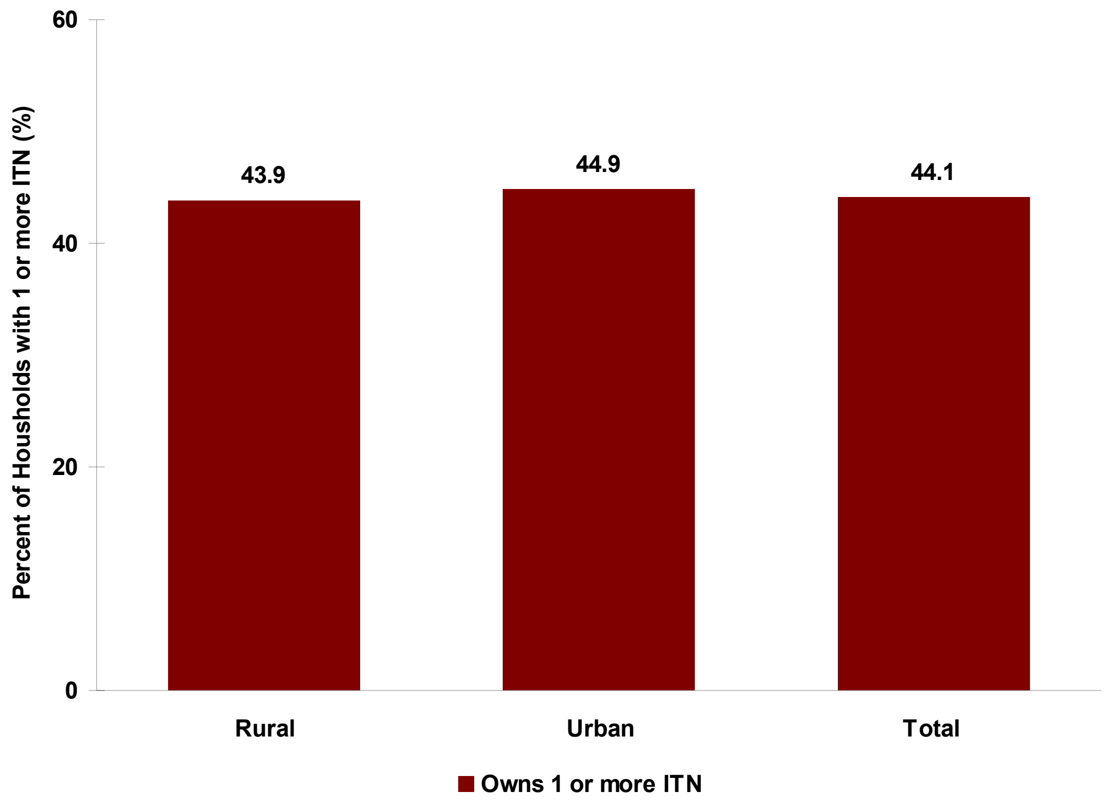


Figure 14.7c Household ownership of one or more ITNs was similar between rural and urban households.

An insecticide treated bednet (ITN) was defined as a pre-treated bednet or a bednet that had been treated within the household during the six months prior to the survey. Overall, 44.1% of households nationwide owned at least one ITN. While the percent of urban households owning any bednet was greater than the percent of rural household owning any bednet, no significant differences were observed between rural and urban households for ownership of ITNs. This is likely because a greater percentage of nets owned by rural households (76.9%) were treated with insecticide compared to nets owned by urban households (58.5%). KAIS results also indicate that 53.0% of households with a child under the age of 5 years owned at least one insecticide treated net (ITN). ITN ownership was similar between HIV-affected and HIV-unaffected households in both rural and urban areas.

Table 14.7b Source of bednets among HIV-affected and HIV-unaffected households by rural/urban residence, Kenya 2007.

	Purchased (%)	Free from NGO (%)	Free from government (%)	Free from other source (%)
Rural				
HIV-affected	63.1	13.7	39.5	4.7
HIV-unaffected	65.0	12.0	36.9	3.5
Total	64.7	12.2	37.2	3.7
Urban				
HIV-affected	79.9	7.6	17.7	9.8
HIV-unaffected	81.1	5.3	18.0	4.7
Total	80.9	5.5	17.9	5.2
Total				
HIV-affected	67.2	12.2	34.3	5.9
HIV-unaffected	69.3	10.2	31.8	3.8
Total	69.1	10.4	32.1	4.1

Categories are not mutually exclusive. Households with more than one bednet could be represented in more than one category of source of net. A household is not represented more than once per category; that is, if a household with two nets purchased both nets, it is only considered once in the category of purchased nets.

NGO refers to non-governmental organizations.

According to the 2007 KAIS, 69.1% of households owned at least one bednet that they purchased. Given that most households only owned one bednet, this means that most nets in Kenya are acquired by households themselves rather than free from sources such as the government or non-governmental organizations. Significantly more urban households purchased their bednets compared to rural households (80.9% and 64.7%, respectively). In contrast, significantly more rural households acquired a bednet from a non-governmental organization (12.2%) or from the government (37.2%) than urban households (5.5% and 17.9%, respectively). There were small but marginally significant differences between HIV-affected and HIV-unaffected households by the overall pattern of bednet sources. In rural areas, a higher percent of HIV-affected households reported receiving a bednet from the government (39.5%) compared to HIV-unaffected households (36.9%). In urban areas, a higher percent of HIV-affected households (9.8%) received at least one bednet from another, unspecified source compared to HIV-unaffected households (4.7%).

Across provinces, only North Eastern province deviated significantly the overall pattern of sources of nets: in this province, 42.9% of households identified NGOs as the source of one or mosquito bednets.

Heads of household were also asked to report the duration of ownership for each of the bednets in their household. Among households with at least one bednet, 65.9% owned at least one net that was acquired during the year prior to the survey; some of these nets could be attributed to the national distribution of bednets that occurred from July-September of 2006. Additionally, given that 2007 guidelines from the Kenya Division of Malaria Control recommended that bednets be replaced every three years, we also examined the percent of households with bednets that were no more than three years old. Eight-five percent (85.0%) of all households owned at least one net that was not more than three years old. Duration of ownership of mosquito bednets did not differ between HIV-affected and HIV-unaffected households.

14.8 Children's Living Arrangements and Orphanhood

This section describes findings from the 2007 KAIS on living arrangements of children under the age 18 of years including those who lived with both, neither, or either biological parent. Table 14.8 also provides information on whether either or both biological parents of children under 18 years of age were alive or had died.

For the purpose of this survey, an orphan is defined as any child under the age of 18 years whose mother, father, or both parents had died.

Table 14.8a Living arrangements and survival status of parents for children under 18 years of age, Kenya 2007.[3,4]

		Living with mother only		Living with father only		Not living with either parent			
Background characteristics	Living with both parents (%)	Father alive (%)	Father dead (%)	Mother alive (%)	Mother dead (%)	Both alive (%)	Mother dead (%)	Father dead (%)	Both dead (%)
Age group (years)									
0-4	57.5	31.3	2.6	1.8	0.5	5.3	0.6	0.4	0.15
5-9	52.5	24.6	5.1	2.8	1.2	8.3	0.9	1.1	1.3
10-14	47.2	21.7	8.2	3.1	1.5	9.9	1.9	1.5	2.7
15-17	45.3	14.2	9.8	3.2	2.4	12.6	2.2	1.8	4.1
<15	52.3	25.6	5.2	2.5	1.0	7.7	1.1	1.0	1.4
Sex									
Male	52.1	24.5	5.7	2.7	1.2	7.6	1.1	1.1	1.6
Female	51.2	24.5	5.6	2.4	1.1	8.8	1.3	1.1	1.6
Residence									
Rural	52.2	23.4	5.8	2.5	1.1	8.4	1.2	1.2	1.6
Urban	48.4	30.9	4.5	3.1	1.3	6.8	0.9	0.5	1.5
Province									
Nairobi	51.3	27.6	6.1	1.9	0.8	6.8	1.7	0.9	1.3
Central	51.0	29.8	3.8	0.7	0.7	6.3	0.7	0.9	0.5
Coast	45.0	33.6	4.3	4.1	1.4	7.0	1.7	0.9	0.5
Eastern	49.6	24.3	5.9	2.5	1.4	8.5	1.4	0.9	1.1
North Eastern	59.7	21.3	3.5	4.3	1.0	7.8	0.8	1.1	0.3
Nyanza	47.0	21.4	10.0	2.0	1.2	7.4	1.6	2.4	5.2
Rift Valley	55.0	25.3	4.5	2.8	1.1	8.0	0.9	0.3	0.4
Western	56.1	18.7	4.2	3.4	1.1	11.4	1.0	1.4	1.8
Total	52.3	25.5	5.8	2.7	1.1	8.5	1.2	1.1	1.7

[3] Column categories are mutually exclusive; that is, a child was only counted in one column category within each subset of background characteristic.

[4] Data were missing on survival status and/or place of residence of mother, father or both for 2.5% of children; these children were excluded from this analysis.

Overall, 52.3% percent of children aged 0-17 years were living with both parents. Older children aged 15-17 years were marginally less likely to live with both parents (45.3%) than children in other age categories (47.2%-57.5%) as were children in Coast province (45.0%) and Nyanza province (47.0%) compared to children in other provinces (49.6%-59.7%). The estimate was similar in rural and urban areas and for children of both sexes.

While 31.3% of children lived with their mothers only, 3.8% lived with their fathers only. Among all children aged 0-17 years, 12.1% were lived without either parent; 8.5% were living without either parent, though both parents were alive. At the time of the survey, 8.6% of children had lost their fathers, 4.0% had lost their mothers and 1.7% had lost both of their parents. The proportions were similar for children under 15 years of age.

Table 14.8b Children aged 0-17 years who were orphaned or vulnerable, Kenya 2007.

		Chronically ill parent[1] (%)	Adult death in household[2] (%)	Chronically ill adult in household [1,2,3] (%)	Vulnerable[4] children (%)	One or both parents dead (%)	Orphans and vulnerable[4] children (%)
Sex of household head	Male	4.8	1.2	6.0	7.4	5.1	11.4
	Female	4.0	2.9	5.3	8.5	19.9	25.0
Sex of child	Male	3.8	1.8	5.2	5.6	11.1	16.2
	Female	4.2	1.9	5.8	5.9	11.2	16.8
Province	Nairobi	2.7	1.5	3.4	4.1	10.8	13.9
	Central	1.9	1.0	3.2	2.9	7.4	10.6
	Coast	2.0	2.2	2.8	4.1	9.1	13.0
	Eastern	2.7	1.4	4.8	3.9	11.7	15.8
	North Eastern	0.8	0.5	0.9	1.3	6.6	8.7
	Nyanza	6.2	3.4	9.0	9.3	20.9	29.3
	Rift Valley	5.2	1.8	5.8	7.0	7.4	13.0
	Western	4.4	1.3	6.3	5.7	9.5	16.4
Residence	Rural	3.9	1.9	5.5	5.7	11.5	16.9
	Urban	4.5	1.6	5.5	6.1	8.6	14.5
Age group (years)	0-4 years	3.7	1.5	5.0	5.1	7.8	9.7
	5-9 years	3.7	1.6	4.9	5.2	10.0	15.0
	10-14 years	4.4	2.2	5.8	6.4	16.3	21.6
	15-17 years	4.8	2.5	8.1	7.3	21.5	28.4
Total		4.0	1.8	5.5	5.7	11.1	15.8

[1] Chronically ill defined as too sick to work or do normal activities for at least 3 of the 12 months preceding the KAIS interview
[2] Adult aged 18-64 years
[3] Chronically ill adult in household could be a parent or any non-parent adult aged 18-64 years
[4] Vulnerable child defined as a child aged 0-17 years living in a household in which 1) an adult aged 18-64 years had been chronically ill; 2) an adult had died in the 12 months preceding the survey; or 3) a child whose mother or father was not living in the same household but had been chronically ill.

Table 14.8b presents findings on orphanoond among children aged 0-17 years. Overall, 11.1% of children 0-17 years of age were orphans, translating to an estimated 1.78 million children orphaned nationwide. There were no significant differences by sex of the child, but the percent of children orphaned varied significantly with age, residence, and province. The percentage orphaned increased with age from 7.8% among 0-4 year olds to 21.5% among 15-17 year olds. In rural areas, 11.5% of children were orphaned compared to 8.6% of children in urban areas. Nyanza province had the highest percent of children orphaned at 20.9% and North Eastern province had the lowest percent at 6.6%, compared to other provinces (7.4%-11.7%). This means that nearly two times as many children under 18 years of age were orphaned in Nyanza province as compared to the national level.

Similar to other population-based surveys, including the 2003 KDHS, a vulnerable child was defined as a child aged 0-17 years living in household in which an adult aged 18-64 years had either been very ill for at least three of the 12 months preceding the survey; living in a household where an adult had died in the 12 months preceding the survey; or a child whose mother or father was not living in the same household but had been very ill (too sick to work or do normal activities) for at least three months of 12 months preceding the survey. A child could be counted in one or all three of these categories (chronically ill adult, adult death in household or chronically ill parent). Additionally, a child could be considered both an orphan and a vulnerable child, but was only counted once in the overall orphan or vulnerable child (OVC) category in Table 14.8b.

Four percent (4.0%) of children under the age of 18 years had a chronically ill parent living in another household, 1.8% had a household death in the 12 months prior to the survey, and 5.5% had a chronically ill adult in the household. Overall, 5.7% of children under 18 years of age were vulnerable children and 15.8% of all children were OVCs based on the definitions provided in this section. Similar patterns to those observed for orphans were observed for OVCs. Children in female-headed households were significantly more likely to be OVCs than those in male-headed households (25.0% compared to 11.4%, respectively). A significantly higher percent of children in Nyanza (29.3%) were OVCs compared to children in other provinces (8.7%-16.4%). Children in rural areas were marginally more likely to be OVCs than children in urban areas (16.9% versus 14.5%, respectively). The percent of children who were OVC differed greatly across age groups, from 9.7% among children 0-4 years of age to 28.4% of children aged 15-17 years.

14.9 Care and Support for Orphans and Vulnerable Children

Among all households in Kenya, 18.4% included an OVC and 11.4% included more than one OVC. Among households with at least one OVC, 38.2% had one OVC and 61.8% included more than one OVC (data not shown).

Of the 11.0% HIV-affected households in the survey, 79.9% had at least one child under the age of 18 years, out of which 36.5% had at least one OVC. Among the unaffected households, 75.2% had at least one child, out of which a significantly lower percent had at least one OVC (19.4%).

For consistency with other population-based surveys that capture and present data on care and support for OVCs, Table 14.9 is limited to the 84.4% of all reported OVCs for whom complete care and support information was available.

Table 14.9 External support for orphans and vulnerable children (OVC), Kenya 2007.

	Type of external support received by households with OVC aged 0-17 years in the 12 months preceding the survey (%):							
Background characteristics	Medical support	Emotional support	Material support	Social/ practical support	School support (ages 5 years and older)	Any support	No support	All types of support
Age group								
0-4	5.4	15.1	9.7	4.9	n/a	19.7	80.3	0.00
5-9	5.8	12.0	8.4	2.9	12.5	22.7	77.3	0.07
10-14	3.2	11.8	7.7	3.0	11.9	21.5	78.5	0.00
15-17	4.9	9.4	8.9	2.7	12.6	20.8	79.2	0.08
<15	4.5	12.6	8.4	3.4	12.1	21.5	78.5	0.02
Sex								
Male	4.2	12.0	8.4	3.5	12.9	21.5	78.5	0.04
Female	4.9	12.2	8.5	3.1	11.6	21.3	78.7	0.02
Residence								
Rural	4.8	13.2	8.1	3.6	12.2	21.7	78.3	0.04
Urban	2.7	5.0	10.8	0.92	12.1	19.7	80.3	0.00
Region								
Nairobi	3.7	14.5	6.3	3.4	10.2	18.5	81.5	0.00
Central	2.4	14.7	11.8	3.5	36.0	36.9	63.1	0.00
Coast	1.9	5.3	9.0	0.6	14.1	12.4	87.6	0.00
Eastern	5.6	13.5	8.7	5.1	9.7	22.9	77.1	0.00
North Eastern	20.7	10.3	21.3	7.5	24.3	21.8	78.2	0.72
Nyanza	5.0	13.0	5.9	1.3	10.9	21.4	78.6	0.00
Rift Valley	5.0	10.1	12.5	6.6	11.6	21.2	78.8	0.00
Western	2.1	12.1	5.7	1.1	8.0	17.8	82.2	0.15
Total	4.6	12.1	8.4	3.3	12.2	21.4	78.6	0.03

KAIS 2007 included questions about care and support that was given to households with OVCs. The study gathered information on whether orphans were supported with any free external support (other than from family and friends) for medical needs, such as medical care, supplies or medicine; emotional or psychosocial needs such as companionship, or spiritual support; material needs, such as clothing, food or financial support; social or practical needs, such as assistance with housework or legal services; or for schooling needs in the case of OVCs aged 5 years and older.

Among all OVCs, 21.4% lived in households that received at least one type of free, external support to help care for the OVCs. The majority of OVCs and their households, 78.6%, had not received any type of support. Very few no households (0.03%) had received all types of support. OVCs were more likely to receive emotional support (12.1%) or school support (12.2%) as compared to medical support (4.6%) or practical support (3.3%). Levels of support were similar across age groups and sex, but differed significantly by residence and by province. A significantly higher percent of OVCs in rural areas lived in households that received emotional support (13.2%) and social or practical support (3.9%) compared to OVCs in urban areas (5.0% and 0.92%, respectively). Compared to other provinces, Central province (36.9%) had the highest percent of OVCs living in households that received any of the five types of support (four types among 0-4 year olds) and Coast province had the lowest percent (12.4%). In Central province more than one-third of OVCs (36.0%) age 5 years or older received school support. In North Eastern province, levels of medical support (20.7%), material support (21.3%) and school support (24.3%) for OVCs were notably high though the number of observations was too small to draw conclusions for this province.

14.10 Care and Support for Chronically Ill Adults

In this section, we present findings from the 2007 KAIS on care and support for chronically ill adults, defined as adults aged 18-64 years who were very ill for three or more months during the 12 months preceding the survey. For purposes of the survey, very ill was defined as being too sick to work or do normal activities. Table 14.10 shows the percentage of women and men who were chronically ill whose households received free, external support to help caring for these households members within the 12 months preceding the survey. Four types of support were captured by the survey: medical support, such as medical care, supplies or medicine; emotional or psychosocial support such as companionship, or spiritual counseling; material support, such as clothing, food or financial support; and social or practical support, such as assistance with housework, caregiver training or legal services.

It should be noted that although the intent of this module within the household questionnaire was to obtain data on the extent of care and support provided to those sick with HIV- and AIDS-related illness, data from the survey indicate that only 21.4% of adults who were reported to have been very ill for at least three months out of the 12 months preceding the survey were HIV-infected according to KAIS testing results.

For consistency with other population-based surveys that capture and present data on chronically ill adults, Table 14.10 is limited to the 94.4% of all reported chronically sick adults for whom complete care and support information was available.

Overall, 2.4% of adults aged 18-64 years were reported as chronically ill by the head of household. The survey shows that 3.9% of rural households and 1.8% of urban households reported at least one sick adult (data not shown).

Table 14.10 External support for chronically ill adults, Kenya 2007.

Type of external support received by households with chronically ill adults aged 18-64 years in the 12 months preceding the survey (%):

Background characteristics	Medical support	Emotional support	Material support	Social/ practical support	Any support	No support	All types of support
Age group							
18-19	*	*	*	*	*	*	*
20-29	10.0	20.5	10.0	5.0	30.7	69.3	0.9
30-39	14.0	24.7	7.9	6.2	34.1	65.9	0.0
40-49	7.0	27.9	6.9	7.1	30.7	69.3	2.2
50-59	15.4	25.7	8.2	13.8	37.0	63.0	3.5
60+	17.3	38.5	4.2	0.0	47.1	52.9	0.0
Sex							
Male	10.4	27.7	8.3	5.3	34.5	65.5	1.3
Female	12.8	25.3	7.4	8.2	34.6	65.4	1.6
Residence							
Rural	11.4	26.7	7.2	7.9	34.2	65.8	1.5
Urban	14.8	23.4	10.0	4.7	36.1	63.9	1.3
Province							
Nairobi	20.3	18.4	2.9	7.6	43.1	56.9	0.0
Central	13.9	49.7	20.1	12.7	58.3	41.7	3.6
Coast	16.3	23.4	13.2	1.8	34.3	65.7	0.0
Eastern	9.0	28.2	8.8	2.6	36.7	63.3	1.3
North Eastern	*	*	*	*	*	*	*
Nyanza	9.0	22.4	3.9	3.3	25.6	74.4	1.2
Rift Valley	15.0	20.1	6.5	12.2	32.5	67.5	1.6
Western	10.5	29.6	7.3	9.4	34.9	65.1	1.7
Total	12.1	26.1	7.7	7.3	34.6	65.4	1.5

* Estimates not presented due to small denominators of less than 25 observations in this category.

According to the 2007 KAIS findings, 12.1% of chronically ill adults lived in households that received medical support, 26.1% received emotional or psychosocial support, 7.7% received material support and 7.3% of received some form of social or practical support. Less than two percent (1.5%) received all types of support and 65.4% of chronically ill adults lived in households that received no support to help care for their sick members. There were no significant differences in the pattern of support by sex. Sick adults in urban areas tended to receive more medical and material support than rural households, while rural households tended to receive more emotional and social or practical support than adults in urban areas; these differences were no statistically significant. Adults aged 60 years or older were more likely to have received medical (17.3%) or social support (25.3%), and subsequently any support (47.1%) compared to younger age groups. Looking across all types of support, a marginally higher percent of chronically sick adults in Central province (58.3%) received any type of support compared to other provinces; Nyanza had the lowest percent for any type of support at 25.6%.

14.11 GAPS AND UNMET NEEDS

- **Increasing efforts to capture and record all births, especially in provinces with large rural areas, could help policy makers better plan for services in these areas.**
- **Most HIV-affected households do not know they are affected because the HIV-infected member in the home is unaware of his or her HIV status. Increasing knowledge of HIV status among HIV-infected persons and supportive disclosure to family members could increase the number of households able to provide care and support for their HIV-infected household member and long-term planning for the well-being of the household**
- **In most HIV-infected households, the infected member is the head of the household. Programs are need to support these households in case the infected head of household becomes too ill to support the household.**
- **Most households do not treat their drinking water leaving household members potentially vulnerable to infections and illness. Universal access to safe drinking water would benefit all households and keep HIV-infected and uninfected members healthier.**
- **At the time of the survey, an estimated 2.0 million households were in need of a mosquito bednet in order to reach the national target of 80% household coverage.**
- **More than one in 10 children in Kenya have lost their mother or father or both. Most of these children are living in households that received no external support.**
- **Care and support for chronically ill adults could be improved by increasing general knowledge and awareness of existing services for this group.**

15

Returning Test Results

15.1 Key Findings

- **Nearly half (45.6%) of all KAIS participants who completed an interview and provided a blood sample travelled to select health facilities to receive their test results.**
- **More than one third (35.8%) of HIV-infected participants who had never tested or who believed themselves to be uninfected learned their HIV status during the 2007 KAIS.**
- **Participants in rural areas were twice as likely to return to receive their test results (52.5%) compared to those in urban areas (24.5%).**
- **Over 40% of participants in each province returned to receive their test results except in Nairobi, where it was 15.2%. North Eastern province recorded the highest rate of returning for test results at 74.0%**

15.2 Introduction

The 2007 KAIS all participants who consented to give blood samples during the survey were given the opportunity to receive their HIV, HSV-2 and syphilis test results and CD4 count (if HIV-infected) approximately six weeks after the interview in select health facilities. Participants who received their test results also received appropriate counselling and referrals to prevention, care and treatment services from trained counsellors. Testing and returning test results in the 2007 KAIS provided an important health service to survey participants, especially in underserved areas such as rural communities that may not have otherwise not had access to testing.

This chapter presents data on participants who visited a health facility to receive their test results from any of the blood tests conducted in the 2007 KAIS (HIV, CD4 cell count for HIV-infected persons, HSV-2 and syphilis). In this chapter the phrase "**returned to receive test results"** refers to participants that physically came to selected health facility approximately 6 weeks after sample collection to have their test results returned in the 2007 KAIS, Results were returned to participants through assigned health facilities within and near the sampled study clusters approximately six weeks after collection. Persons infected with HIV and STIs were counselled to seek care and treatment, reduce transmission to others and protect themselves from acquiring

DATA IN CONTEXT

Methods for Returning Test Results in the 2007 KAIS

In the 2007 KAIS, survey participants who consented to the blood draw were given the opportunity to receive their test results with appropriate counselling and referrals to prevention, care and treatment services for HIV and other STIs. At the time of specimen collection, laboratory technicians in the field provided participants a results voucher that contained a unique barcode identical to the barcode on their blood specimen. The voucher listed two facilities (one within the cluster and one outside of the cluster) where they could receive their test results approximately six weeks after the blood draw. Interviewers and laboratory technicians were trained to educate participants on the benefits of knowing one's disease status and encouraged them to visit a designated facility to receive their test results. Receiving test results, however, was completely voluntary. Vouchers were required for receiving results; participants without their vouchers were referred for re-testing. Counsellors that were trained to returning test results from the 2007 KAIS directed respondents who required follow-up to testing and treatment facilities as needed. Counsellors also recorded basic information from participants, including the date the participant returned to receive their test results, whether the person returned as an individual or a couple, and referrals the counsellor made during the session.

There were noted delays in returning test results to the field. This occurred mainly in the beginning of the survey, due to delays in testing and challenges in the initial coordination of returning test results to health facilities, and at the end of the survey when the country's political climate was unstable and road travel was unsafe.

A detailed desscription on the 2007 KAIS methods for returning test results is provided in Appendix A, section A.5.

other STIs. Uninfected persons who received their test results were given risk reduction counselling messages on how to protect themselves from acquiring HIV and other STIs.

Currently, results of HSV-2 serology are not widely available to clinicians and there are no guidelines on how to interpret and manage test results. HSV-2 counselling messages were adapted from studies conducted in Kenya and other countries.

Unlike earlier chapters, the percents reported in this chapter are not weighted; that is, we report the proportion of the 2007 KAIS participants who returned or did not return for their test results. Weighted statistics are not required for presenting uptake rates within a defined study population because the study participants who collected or did not collect their results are not expected to represent a wider population.

Appendix B.15 provides sample sizes and 95% confidence intervals for estimates presented in this chapter. Throughout the chapter, the term significant indicates a chi-square p-value less than 0.05; marginally significant indicates a p-value between 0.05 and 0.10, inclusive; and not significant indicates a p-value greater than 0.10.

15.3 Participants who returned for test results by socio-demographic characteristics

Figure 15.3a. Participants aged 15-64 years who returned to receive their test results by sex, Kenya 2007.

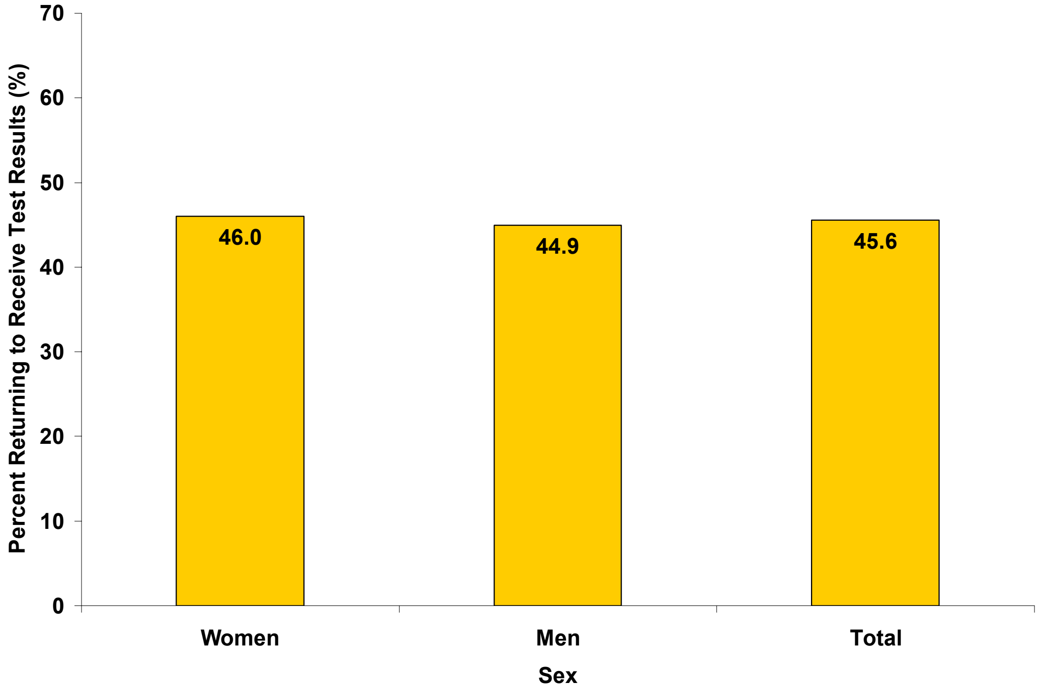


Figure 15.3a The percent returning for test results was similar among women and men.

Overall, 45.6% of participants who consented to the blood draw during the survey returned for their test results. There was no significant difference in the percent returning for test results between women (46.0%) and men (44.9%).

Figure 15.3b. Participants aged 15-64 years who returned to receive their test results by residence, Kenya 2007.

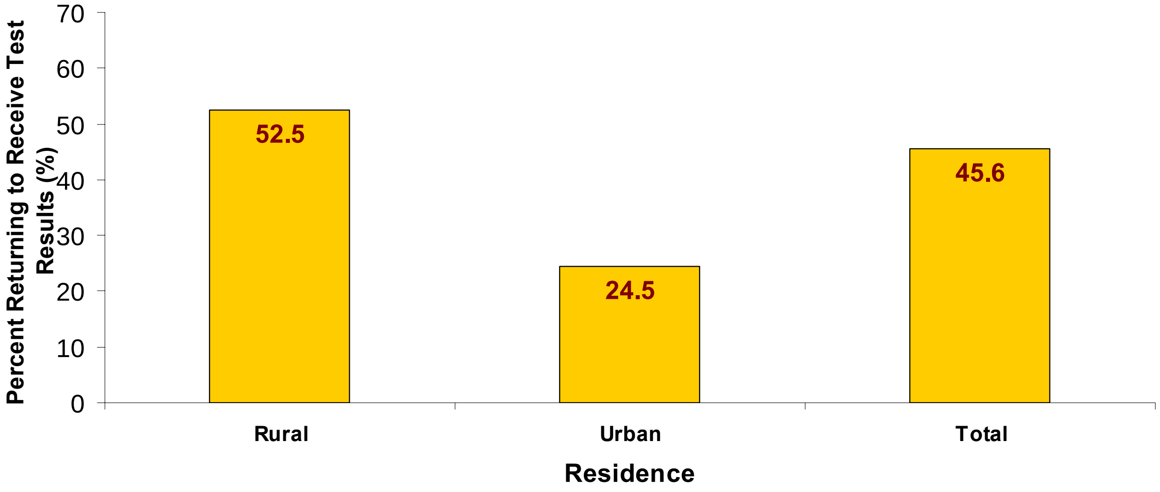


Figure 15.3b One in two rural residents returned to receive their test results compared to one in four urban residents.

There was a significant association between the percent of participants who returned to receive their test result and rural/urban residence. More than half of rural participants (52.5%) returned for their test results compared to 24.5% of participants in urban areas.

Figure 15.3c Participants aged 15-64 years who returned to receive their test results by province, Kenya 2007.

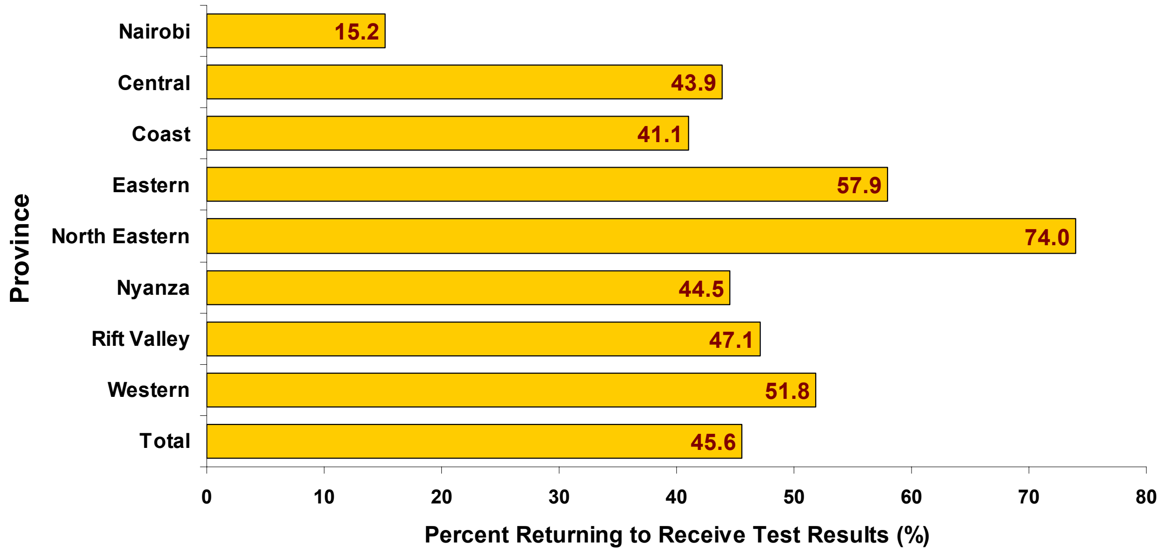


Figure 15.3c Almost three in four participants in North Eastern province returned to receive their test results but fewer than one in six did so in Nairobi province.

The rate of returning to receive test results varied significantly by province, with the highest percent of participants returning to receive test results in North Eastern province (74.0%) and the lowest percent in Nairobi province (15.2%).

Figure 15.3d. Participants aged 15-64 years who returned to receive their test results by age group, Kenya 2007.

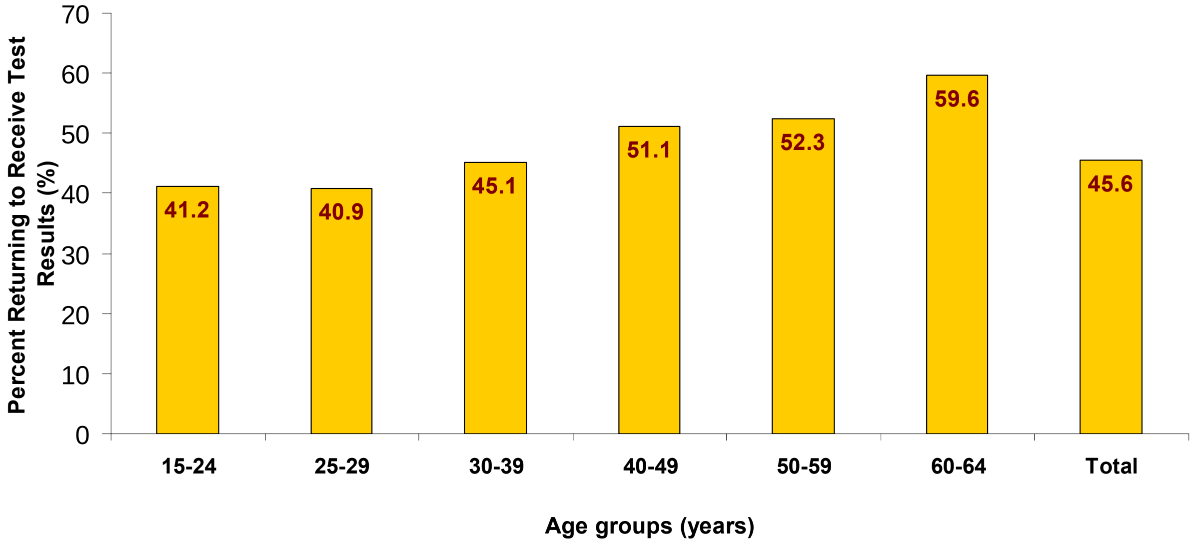
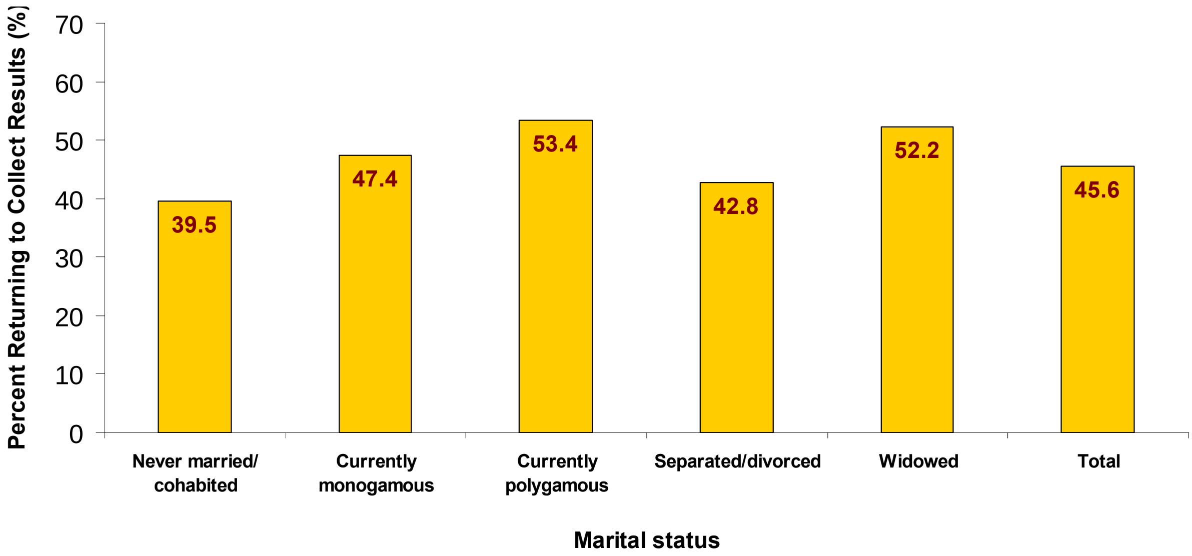


Figure 15.3d Rates of returning to receive test results increased significantly with increasing age.

Overall, there was a significant association between the percent of participants who returned for test results and age group. Older participants were more likely to return to receive their test results compared to younger participants. A total of 59.6% of participants aged 60-64 years returned to receive their test results compared to 41.2% of participants aged 15-24 years.

Figure 15.3e Participants aged 15-64 years who returned to receive their test results by marital status, Kenya 2007.



The term "currently monogamous" refers to respondents that are married or cohabiting in a union with only one wife or one female partner.

Figure 15.3e Participants who had never married or cohabited were least likely to return to receive their results.

The proportion of participants who returned to receive their test results varied significantly by marital status. Among participants who were polygamous or widowed, of the proportion that returned to receive their test results was more than 10 percentage points higher than among participants who had never married or cohabited.

During fieldwork, survey participants were encouraged to learn their test results with their spouses or partners, and provisions were made for couples counselling when participants returned for test results. Among those who returned to receive their test results and were married or cohabiting as a monogamous couple, the majority (73.4%) received their results as individuals while 26.1% came with a partner or spouse (data for 0.55% of monogamous participants that returned for their results were missing). Similarly, among those who received their results and were married or cohabiting as a polygamous couple, the majority (80.1%) received results as individuals while 19.6% came with a partner or spouse (data for 0.32% of polygamous participants that returned for their results were missing). Among those who were separated or divorced, those who were widowed and those who had never married or cohabited, less than 4% came to receive their results with a partner. One of five participants with at least one sexual partner in year before the survey received their test results as a couple (22.1%) and 77.4% came to the health facility alone.

Figure 15.3f. Participants aged 15-64 years who returned to receive their test results by wealth index[1], Kenya 2007.

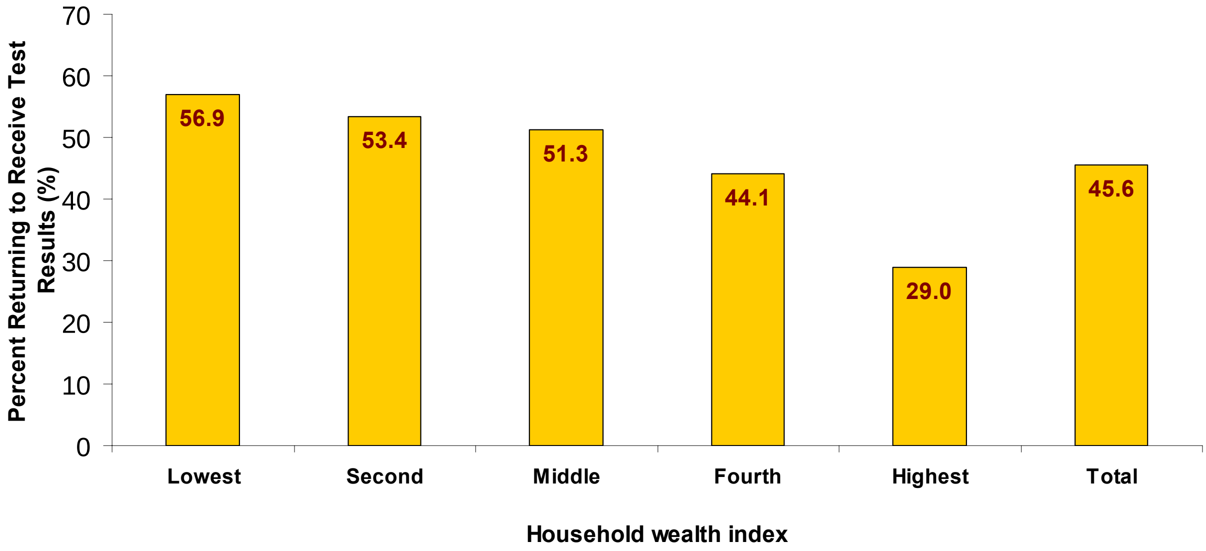


Figure 15.3f As wealth index increased, the proportion of participants who returned to receive their test results declined.

The rate of returning to receive test results declined significantly with increasing wealth index category. Participants in the lowest wealth quintile were more likely to return to receive their test results (56.9%) compared to persons in the highest wealth quintile (29.0%).

[1] The wealth index was a composite measure of the living standard of a household, calculated using data on a household's ownership of selected assets, materials used for housing construction, water access and sanitation facilities. The wealth index placed households on a continuous scale of relative wealth using principal components analysis. Individuals were ranked according to the score of the household in which they resided and the sample was divided into five groups, each with an equal number of individuals (quintiles), ranging from the lowest to highest level of wealth.

Figure 15.3g Participants aged 15-64 years who returned to receive their test results by education level, Kenya 2007.

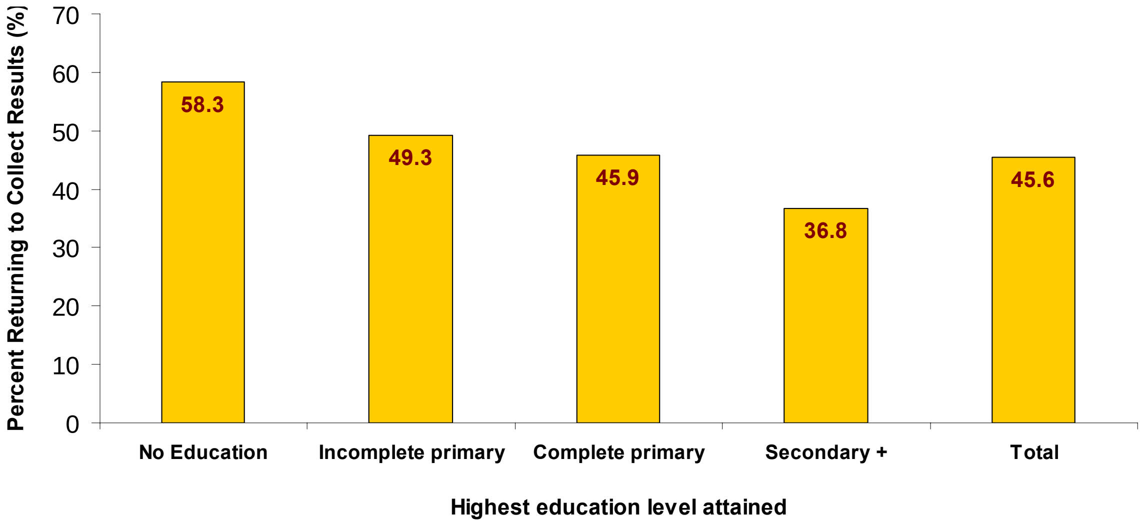


Figure 15.3g Participants who reported higher levels of education were less likely to return to receive their results.

Rates of returning to receive test results varied significantly by education level. Participants with no formal education were significantly more likely to return for test results (58.3%) compared to those who reported incomplete primary (49.3%), complete primary (45.9%), and secondary or higher (36.8%) levels of formal education.

15.4 RETURNING TO RECEIVE TEST RESULTS BY HIV TESTING BEHAVIOUR AND HIV STATUS

Figure 15.4a Participants aged 15-64 years who returned to receive their test results by HIV testing history, Kenya 2007.

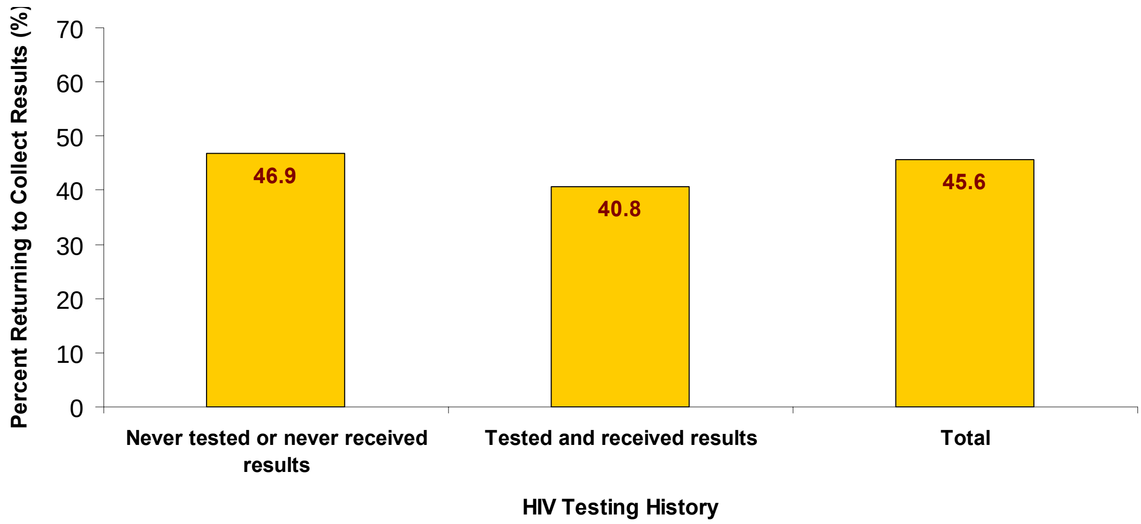


Figure 15.4a Almost half of respondents who had never tested for HIV or tested but never received test results returned to receive their test results during the 2007 KAIS survey.

Among survey participants who had never tested for HIV before the 2007 KAIS survey or who had tested but did not receive test results, approximately half (46.9%) returned to receive their results. Four out of ten (40.8%) of those who had previously tested for HIV returned for their results. These differences were statistically significant.

Figure 15.4b HIV-infected participants aged 15-64 years who returned to receive their test results by self-reported HIV status, Kenya 2007.

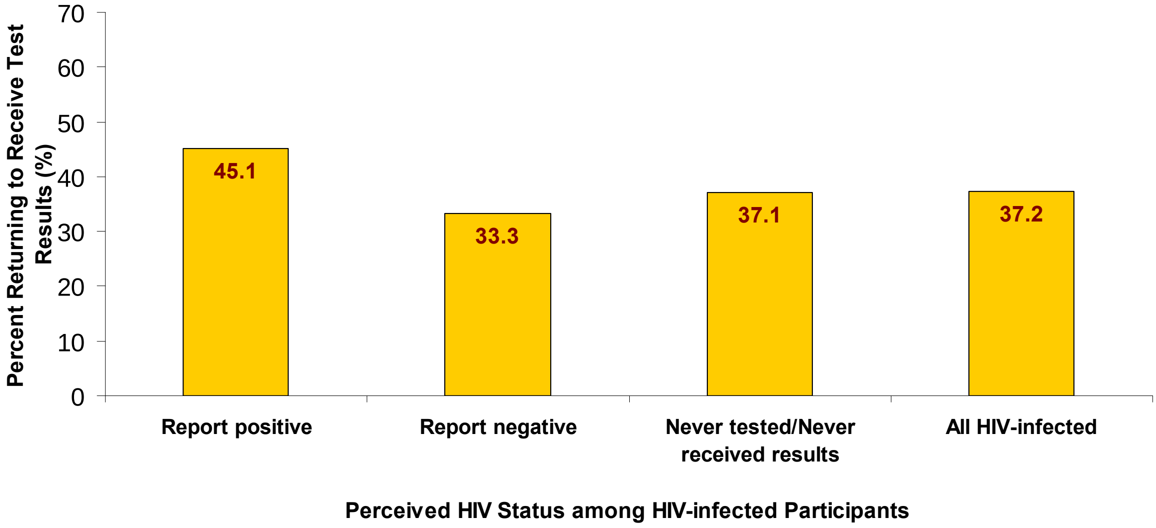


Figure 15.4b More than a third of HIV-infected participants who had never tested for HIV returned to receive their test results.

Overall, 37.2% of HIV-infected participants returned to receive their results during the 2007 KAIS. This estimate was lower than the overall proportion of participants who returned to receive test results in the 2007 KAIS. This difference could be due the following reasons: some HIV-infected persons already knew their status, some participants may have suspected they were infected and did not want to confirm their actual status or some participants may have been too sick to travel to the health facility to receive results. HIV-infected participants who disclosed their status during the survey were more likely to return for their test results than HIV-infected participants who had never tested, believed that they were uninfected based on their last test or who did not disclose their HIV status.

More than one third (35.8%) of HIV-infected individuals who did not know their current HIV status prior to the survey (that is, they had never been tested for HIV or believed themselves to be uninfected based on their last test) learned they were infected with HIV through the 2007 KAIS. Individuals who learned they were HIV-infected were provided behavioural counselling, referred to appropriate care and treatment services and to partner testing. These results demonstrate an important service that HIV testing and returning test results had for participants in the 2007 KAIS that would have otherwise not been provided.

15.5 RETURNING TO RECEIVE TEST RESULTS BY PREGNANCY STATUS

Figure 15.5 Women aged 15-64 years who returned to receive their test results by pregnancy status, Kenya 2007.

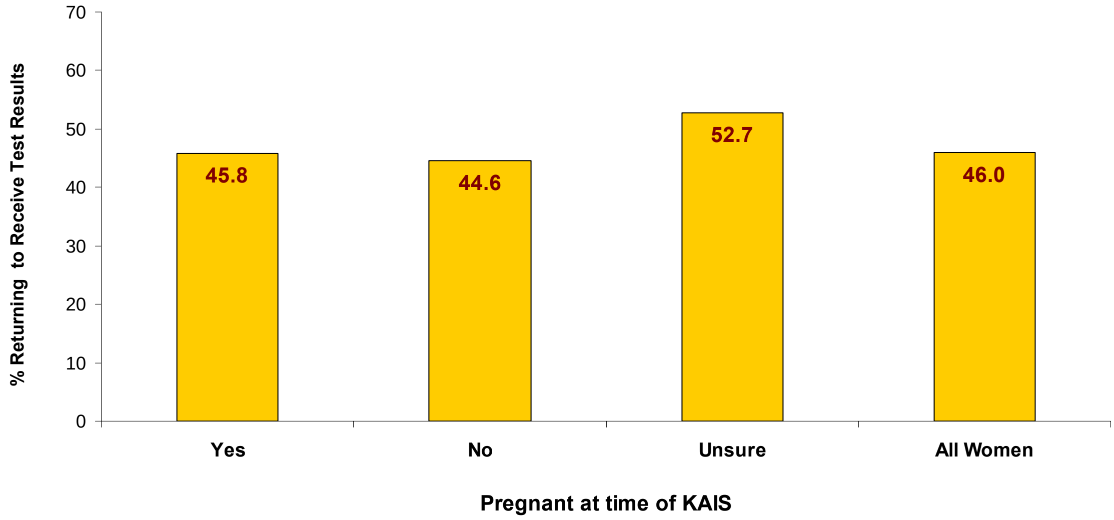


Figure 15.5 Almost half of women who were pregnant at the time of the survey returned for their test results.

The proportion of women who returned to receive test results did not vary by categories of self-reported pregnancy status. In total, 45.8% of women who were pregnant and 44.6% of women who were not pregnant during the survey returned to receive their test results. The rate of returning to receive test results was slightly higher among women who were unsure of their pregnancy status (52.7%), but this difference was not significant. Among women who were pregnant or unsure if they were pregnant and infected with HIV, HSV-2 or syphilis, 43.0% returned to receive their test results and 57.0% did not.

15.6 Gaps and Unmet Needs

- **An estimated one-half of participants in the 2007 KAIS did not return to receive their test results. For future population-based surveys, methods to return a greater proportion of HIV and other test results should be explored. The use of health facilities to return test results, for example, is logistically challenging and may delay participants from receiving test results in a timely manner. Future surveys should explore how to return test results to participants efficiently and quickly.**

- **The proportion of respondents that returned to receive their test results was significantly greater in rural areas than in urban areas. Different approaches for returning survey test results may need to be developed for participants in rural versus urban areas.**

- **The proportion of participants who returned to receive their test results as a couple was relatively low in the 2007 KAIS. Programs for couples testing and counseling should be strengthened.**

Methods of the 2007 KAIS

appendix A

This Appendix describes the methods of the 2007 KAIS. First we describe **survey methods,** including the population covered by the survey, sample size, sampling frame and sample allocation. We summarize **field methods,** which cover implementation of the survey questionnaires, blood draw and related training, community mobilisation, and supervision of the field teams. Protection of **human subjects** is described in the following section. **Laboratory methods** also are included, along with training of staff; sample collection, processing, labeling, and transport; receipt of samples and biological testing; repository storage; and data management. We also describes the methods for **returning test results to participants**, including organization and flow of test results from the laboratory to the participants, selection of facilities for returning test results, training counsellors, dispatching results to the field, documentation, supervision, and data management. The final section covers the methods used for calculating **weights, non-response adjustments, and statistical analysis**. This final section reminds readers that estimates in this report are unadjusted univariate and bivariate associations only. Multivariate analysis and associations adjusted for age and other factors will be provided in manuscripts and other disseminated materials.

A.1 Survey Methods

Geographic coverage and target population

The 2007 KAIS was a national, population-based, cross-sectional survey. The survey was conducted among a representative sample of households selected from all eight provinces and covered both rural and urban areas. A household was defined as a person or group of people related or unrelated to each other who live together in the same dwelling unit or compound (group of dwelling units), share similar cooking arrangements, and identify the same person as head of household. The 2007 KAIS was designed to allow reliable estimation of HIV prevalence and behavioural indicators relating to HIV/AIDS. All women and men aged 15-64 years who were either usual residents of the selected households or visitors present in the household on the night before the survey were eligible to participate in the study provided they gave informed consent. The inclusion criteria may have captured non-Kenyans living as usual residents or visitors in a sampled household. Military personnel and the institutionalized population are typically not captured in household-based surveys; although they may have been included in the 2007 KAIS if at home during the survey.

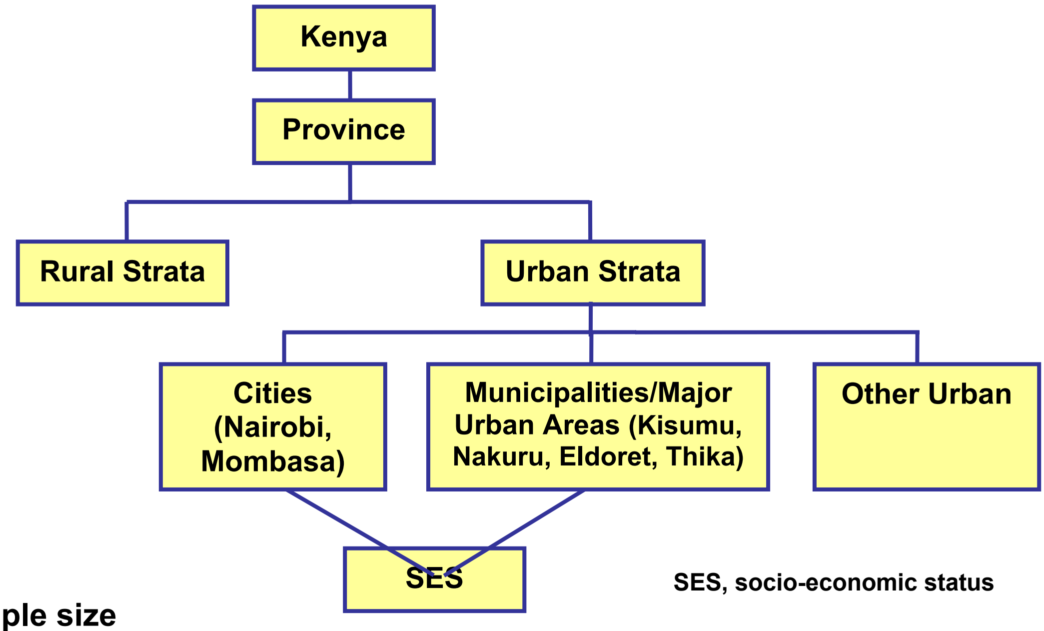
Sampling frame

Administratively, Kenya is divided into eight provinces. Each province is divided into districts, each district into divisions, each division into locations, each location into sub-locations, and each sub-location into villages. For the 1999 Population and Household Census, KNBS delineated sub-locations into 62,000 small units called Enumeration Areas (EAs) that constituted a village, a part of a village, or a combination of villages. The primary sampling unit for Kenya's master sampling frame, and for KAIS, is a cluster, which is constituted as one or more EAs.

As of February 2009 Kenya was divided into eight provinces and 149 districts; however, the sample frame used for the 2007 KAIS, the National Sample Survey and Evaluation Programme IV (NASSEP IV), was based on the 1999 Kenya Population and Housing Census, which covered a total of 69 districts. The NASSEP IV was created and is maintained by KNBS. The frame is a two-stage stratified cluster sample with 1800 clusters, comprised of 1,260 rural and 540 urban clusters. The clusters were sampled using the probability proportional to measure of size method within each rural and urban stratum. The clusters were defined based on one measure of size with an average of 100 households and upper and lower limits of 149 and 50 households, respectively.

During the creation of the master frame, the country was divided into various districts and rural/urban strata. The six major urban areas (Nairobi, Mombasa, Kisumu, Nakuru, Eldoret and Thika) were further stratified into five socio-economic classes (upper, upper-middle, middle, lower-middle and lower) to account for socio-economic variations. It should be noted that Nairobi and Mombasa have no rural areas and that Nairobi is both a district and a province. Figure A.1 shows the stratification of enumeration areas before sampling clusters for NASSEP IV.

Figure A.1 NASSEP IV enumeration area stratification, KAIS 2007.



Sample size

The target of the 2007 KAIS sample was to obtain approximately 9,000 completed household interviews. Based on the level of household non-response in the 2003 KDHS (13.2% of selected households), approximately 10,375 households in 415 clusters (294 rural and 121 urban) were selected for potential participation in the 2007 KAIS. Table A.1 shows the provincial distribution of households and clusters originally sampled for the 2007 KAIS.

Table A.1 Distribution of sampled clusters and households by province, KAIS 2007.

	Clusters			Households		
Province	Rural	Urban	Total	Rural	Urban	Total
Nairobi	0	58	58	0	1,450	1,450
Central	48	7	55	1,200	175	1,375
Coast	24	22	46	600	550	1,150
Eastern	50	5	55	1,250	125	1,375
North Eastern	23	5	28	575	125	700
Nyanza	54	7	61	1,350	175	1,525
Rift Valley	51	12	63	1,275	300	1,575
Western	44	5	49	1,100	125	1,225
Total	294	121	415	7,350	3,025	10,375

Of the original 415 clusters, 402 were accessed and surveyed. Thirteen clusters were inaccessible due to impassable roads or tenuous security situations. All reported estimates and design weights for households, individual interviews, and blood draws were based on data from the 402 clusters. Details about how cluster-level non-response was accounted for in the calculation of weights are provided in Section A.6 of this appendix. The survey was not designed to produce reliable district-level estimates; estimates are presented by rural/urban residence, and by province.

KAIS sample allocation

The 2007 KAIS sample used a stratified, two-stage cluster sample design for comparability to the 2003 KDHS. The first stage involved sampling clusters from NASSEP IV, and the second stage involved selecting households for the survey.

Selection of clusters (probability sampling units). The sample was allocated first to provinces in proportion to the square root of the number of households in the 1999 census and among rural and urban areas of the districts within each province based on the distribution of households.

A simple systematic sampling method was used to select 294 clusters in rural areas and 121 clusters in urban areas for a total of 415 clusters. KNBS selected clusters from the NASSEP IV frame using the equal probability selection method independently within rural and urban domains of each district. The resulting sample retained the properties of probability proportionate to size, as used in creation of the frame. EAs were arranged in serpentine order prior to the 1999 Census, and later clusters in the NASSEP IV master frame were serialized in the same order within districts and rural and strata. The systematic random sampling method had a sampling procedure with a random start, then every k*th* cluster was sampled in each category until the sample was achieved.

Selection of households. Household listings in 111 clusters were updated immediately before commencement of the survey and listing in the remaining 301 clusters had been updated in 2005-2006 for other national surveys.

An equal probability systematic sampling method was applied in each cluster to reach a uniform sample of 25 households per cluster. The following procedure was used to sample households from clusters:

> *Let L be the total number of households listed in the cluster; let Random be a random number between (0, I) (Random numbers are different and independent from cluster to cluster); let n be the number of households to be selected in the cluster; let I = L/n be the sampling interval.*
>
> *(1) The first selected sample household is k (k is the serial number of the household in the listing) if and only if:*
>
> *k = Random*I, where I is the sampling interval as defined above.*
>
> *(2) The subsequent selected households are those having serial numbers:*
>
> *k + (j-1)*I, (rounded to integers) for j = 2, 3, … n;*

A.2 FIELD METHODS

Data Collection

<u>Questionnaires.</u> Two questionnaires were used in the 2007 KAIS: a household and individual questionnaire. The content of the questionnaires was adapted from standard AIDS Indicator Survey questionnaires developed by ORC MACRO and technical partners, the 2003 KDHS HIV Module and previous surveys conducted in Africa. Stakeholders including NACC, the National AIDS and STI Control Programme (NASCOP) and other HIV/AIDS organizations working in Kenya met to determine the key HIV program information needs and gaps. The KAIS Technical Working Group (TWG) collated opinions from these stakeholders, modified existing questions and designed new questions to reflect issues relevant to Kenya's current epidemic. The final questionnaires were translated from English into Kiswahili and 11 vernacular languages and back-translated into English to ensure accuracy. The questionnaires were further refined after a pilot study prior to distribution of the final versions to field staff.

The household questionnaire gathered basic information from the heads of the households on each usual member and visitor in the household, including age, sex, relationship to the head of the household and orphanhood among children. Information was collected on characteristics of the household's dwelling unit, such as the source of water, type of toilet facilities, materials used for the floor of the house, property ownership and mosquito nets. Information was also collected on whether the household had received specific types of care and support in the year before the survey for any chronically ill adults, household members who died and orphans and vulnerable children. The household questionnaire was also used to record respondents' consent for blood collection and testing.

The individual questionnaire collected information from eligible women and men aged 15-64 years and covered basic demographic characteristics, reproductive history, fertility preferences, family planning, marriage and sexual activity. The individual questionnaire also captured HIV and STI knowledge, attitudes and behaviours, HIV testing, access to care and treatment services and other health issues, such as tuberculosis, blood donation history, and medical injections.

Figure A.2. Data collection tools, KAIS 2007.

HOUSEHOLD QUESTIONNAIRE	INDIVIDUAL QUESTIONNAIRE
▪ Household census ▪ Parental survivorship ▪ Household characteristics ▪ Mosquito net use ▪ Support to households for sick and recently deceased adults, and OVCs	▪ Socio-demographic characteristics ▪ HIV/STI knowledge and attitudes ▪ Marriage and sexual partnerships ▪ Fertility and family planning ▪ Use of HIV prevention, care and treatment services
BLOOD DRAW	**RESULTS FORM**
▪ Venous blood: HIV, HSV-2, syphilis testing; CD4 for those with HIV ▪ Dried blood spot: HIV testing only	▪ Specific test results retrieved ▪ Individual or couple counselling ▪ Minors with or without parents ▪ Referrals provided

Blood draw. All eligible women and men were asked individually for their voluntary consent to provide a venous blood sample in the home for HIV, syphilis, and HSV-2 testing, as well as CD4 cell quantification if seropositive for HIV. They also were asked to consent to extended storage of their samples for future, unspecified testing.

Experienced technicians were responsible for the collection of blood from the arm by venipuncture. Blood was collected into two separate tubes, one with anticoagulant from which serum was obtained for HIV, HSV-2, and syphilis testing and the other designed to stabilise CD4 cells for up to seven days after collection. For participants who were willing to participate but refused the venous blood sample, dried blood spot (DBS) samples from a finger prick were collected. DBS samples were also collected in cases in which the venipuncture process was not feasible.

Training. In July 2007, 204 skilled interviewers, laboratory technicians, laboratory scientists and field supervisors were recruited and trained for two weeks in the procedures for the survey. Interviewers were trained to identify eligible households and individuals, conduct informed consent, educate participants about HIV, HSV-2, and syphilis, use objective interview techniques, and administer the household and individual questionnaires. Field laboratory technicians and scientists were trained in preparing respondents for the blood draw and in collection, processing, storage, and transportation of specimens to the central laboratory in Nairobi. Laboratory training emphasized ways to minimise risks in handling biological specimens. Laboratory technicians were trained to process and analyse specimens in the laboratory and to issue vouchers for participants to retrieve their test results. The training involved didactic presentations, small group discussions and practical sessions, such as mock interviews and blood draws.

Community mobilisation. On August 1, 2007, KAIS was officially launched in conjunction with a national television, radio, and print media campaign to educate, sensitise, and mobilise Kenyans about the survey and the importance of broad participation. Mobilisation efforts then shifted to interpersonal communications at the community and village levels to raise awareness of the survey as a major surveillance initiative by the Government of Kenya. This also served to prepare communities before survey teams arrived.

District statistical officers and enumerators helped to locate sampled clusters and sampled households. As KNBS staff, these officers and enumerators were knowledgable about census enumeration systems and had developed a rapport with community and village leaders through previous surveys. Teams of trained community mobilisers then visited the village leaders to discuss the survey and when possible held community meetings to explain the purpose and process of the survey and to answer questions in a public forum. Mobilisers communicated regularly with data collection teams and were able to convey estimated dates of data collection to the sampled households.

Fieldwork. Each field team consisted of four interviewers, two laboratory technicians, one supervisor and one driver. A total of 29 field teams conducted fieldwork over a period of four months from August to December 2007. Teams were given local language questionnaires in addition to instruments in Kiswahili and English to accommodate respondents who were not conversant in the local languages. Completed questionnaires for each cluster were packed and delivered to KNBS headquarters in Nairobii through secured courier services for data processing.

After obtaining consent from the head of the household, interviewers administered the household questionnaire to the household heads. This was followed by interviews and blood draws among all eligible and consenting individuals in participating households. Participants received bilingual (English and Kiswahili) brochures on HIV, HSV-2, syphilis, and tuberculosis, including information on the association between the diseases and the value of knowing one's HIV status.

Supervision. Data collection teams were routinely visited by teams of supervisors representing different KAIS collaborating institutions. These supervision teams travelled throughout the country to meet with field teams, deliver survey supplies, perform quality checks on questionnaires, assess mobilisation efforts, and help address challenges to data collection. Supervision reports were circulated to the 2007 KAIS TWG members and pending issues in the field were resolved after discussion.

A.3 HUMAN SUBJECTS

The KEMRI Ethical Review Committee and the Institutional Review Board of the CDC approved the 2007 KAIS protocol prior to survey implementation. All participants provided oral informed consent and had the choice to consent separately to the interview, blood draw, and blood specimen storage for future testing.. Oral consent was requested from the KEMRI Ethical Review Committee and the Institutional Review Board of the CDC due to the high rate of illiteracy in some regions of the country and its potential to negatively impact survey uptake. For minors aged 15-17 years, parental consent and minor assent were both required for participation. Data collectors signed the consent form for each of the components and indicated whether or not oral consent was provided. Data collectors informed all eligible persons that participation in the survey was strictly voluntary and that there would be no consequences if a household or person refused participation. Every effort was made to identify space in households that provided privacy during the interview.

A.4 LABORATORY METHODS

The 2007 KAIS included several novel concepts and methods for maximising laboratory testing in a national surveillance effort.

Recruitment and training

Field and core laboratory staff were recruited from existing laboratory staff within NPHLS and from KEMRI laboratories. Training included the following components: a didactic overview of the 2007 KAIS methodology; a detailed description of the roles and structure of field and core laboratory survey teams; a review of basic laboratory operations, including collection, handling, and transport of blood specimens and bio-safety considerations; and a review of technical procedures, including specific assays, quality assurance, and general logistics.

Ensuring sufficient staff capacity was critical given the large volume of samples received per week (on average 500 samples per week), the rapid turnover required to quantify CD4 cells within seven days of sample collection, and the need to report test results for an entire cluster within six weeks of sample collection.

Laboratory field process

The laboratory field process consisted of three main components: sample collection at the participants' home; preparation of samples at temporary field laboratories, which were laboratory facilities within the cluster or hotel rooms designated for sample processing if laboratory facilities were not available; and proper packing and documentation of samples before transport to the central laboratory in Nairobi. The procedures for each of these elements are summarised in the following sections.

Sample collection. Trained, experienced laboratory technicians were responsible for the collection of blood from the arm by venipuncture using an evacuated tube collection system. Five milliliters (ml) of blood were collected into a "red-top" glass tube without anticoagulant for HIV, HSV-2, and syphilis testing. Immediately after the first 5 ml of blood was collected, an additional 2 ml of blood was collected into a special "green-top" blood collection tube (Becton Dickinson [BD] Vacutainer CD4 Stabilization Blood Collection System) designed to stabilise CD4 cells for up to seven days. The 2007 KAIS was the first national survey to utilise these tubes for CD4 testing. To protect against potential loss of specimens in transit, DBS samples for HIV testing were prepared from all CD4 blood tubes at temporary field laboratories at the end of each day.

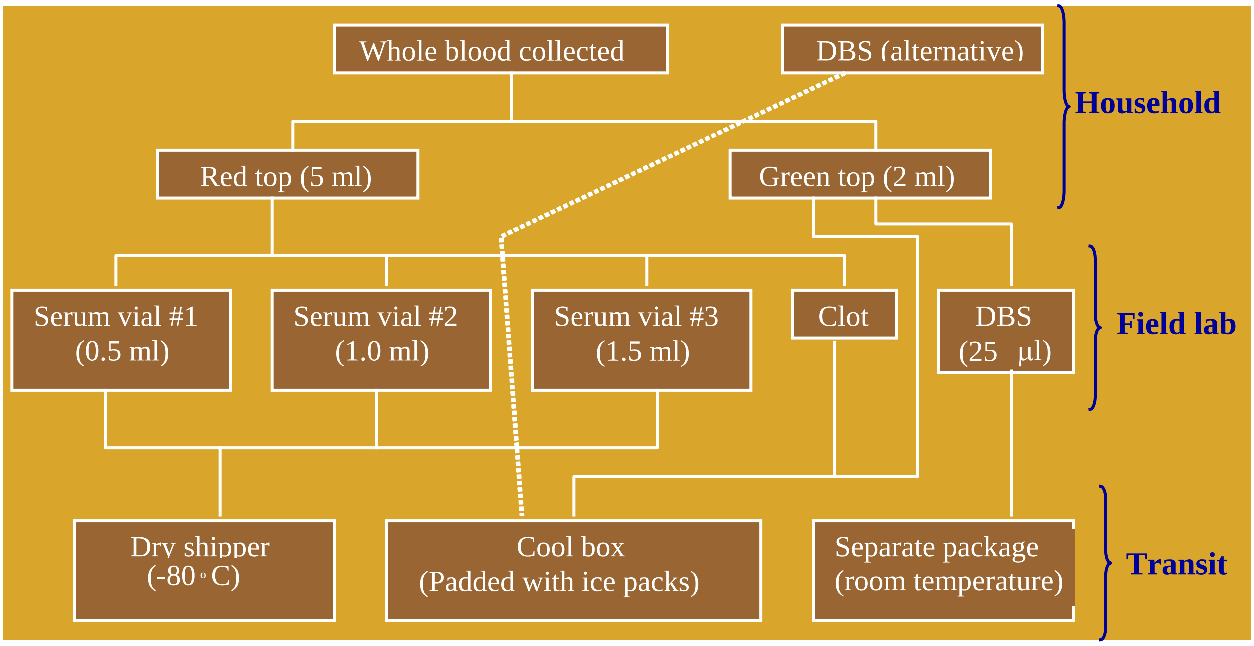
For participants who were willing to participate but refused the venous blood sample or for whom venipuncture was not feasible, technicians collected finger-prick DBS samples which were air-dried overnight, separated by glassine paper, and stored at ambient temperature in groups of 20 in sealable plastic bags (Zip-loc) containing desiccant and a humidity indicator card.

Processing blood samples in the field. At the end of each field day, laboratory technicians brought samples to a temporary field laboratory for processing. The red-top tube used in the 2007 KAIS allowed for complete separation of serum from the clotted red cells; however, each survey team was equipped with a manual centrifuge as a backup. Once separated from the clotted red cells, serum samples were transferred from the red-top tube to three cryovials; the packed red cells (red blood cells/buffy coat blood clot) remained in the red-top tube and were transported to the core laboratory. The CD4 tubes were kept at ambient temperature at the field laboratory until transportation to the National HIV Reference Laboratory (NHRL), within the larger NPHLS system, in Nairobi.

Labeling of blood samples in the field. A unique, bar-coded, random identification number (IDNO) was assigned to each participant who consented to testing. At the time of sample collection, labels containing the code were affixed to the household questionnaire, red-top and green-top tubes, DBS filter paper cards, cryovials and specimen tracking forms. To check specimens in the field and at the NHRL, the location of each cryovial or DBS filter paper card within a shipping container or bag was recorded on a specimen inventory form.

Packing and transporting samples. The three cryovials containing serum were stored in a dry shipper (-80^{o} C). The red-top tubes containing the blood clot were packaged in cold boxes for transportation. The green-top tubes were transported at room temperature. A contract courier service collected these samples and transported them overnight to the NHRL in Nairobi two to three times per week. The tubes containing the blood clot were stored at -80^{o} C at the NHRL for future testing, and the dried blood spots were stored at -20^{o} C. Because certain remote areas of North Eastern province could not be reached easily by road transport, the 2007 KAIS laboratory logistics team coordinated with the European Commission Humanitarian Organization (ECHO) to provide room in a small airline operated by ECHO to transport dry shippers, cool boxes and other supplies between remote areas in North Eastern province and the NPHLS in Nairobi. This service was provided free of cost to survey implementers.

Figure A3. Laboratory field process, 2007 KAIS.



Central laboratory process

The central laboratory in Nairobi was responsible for coordinating all laboratory logistics for the survey including securing supplies for the field laboratory activities, receiving, archiving and processing samples, testing, coordinating with the quality assurance laboratory, and dispatching testing results to NASCOP.

Receipt of specimens at central laboratory. An average of 500 samples from the eight provinces were received at the NHRL each week and logged into a laboratory information management system (LIMS) using an automated barcode reader. The specimen barcode labels were cross-checked against the sample tracking form. Core laboratory staff checked the integrity of the samples and recorded this information in the LIMS (e.g. satisfactory, haemolysed, contaminated). Overall, 98.9% of whole blood samples and 99.8% of serum samples collected in the 2007 KAIS were of adequate quality for testing. The three serum cryovials, which were marked for testing, quality assurance or long-term storage were sorted and forwarded to the appropriate stations for testing or archiving.

Specimen testing. The following section summarises the testing protocols followed at the NHRL and KEMRI quality assurance (QA) laboratories:

> **HIV testing.** Specimens were first tested at the NHRL according to the manufacturer's recommendations using a fourth-generation HIV enzyme linked immunoassay (EIA) (Vironostika HIV-1/2 antigen/antibody) for screening and a third-generation EIA (Murex HIV.1.2.O) for confirmation in a serial testing algorithm. The screening test was completed within 24 hours of logging-in the specimen into the LIMS, and seropositive samples were referred for immediate CD4 testing. The HIV confirmatory test was completed the same day or one day later. Samples showing discordant results were tested again with the two assays. Polymerase chain reaction (PCR) testing (Roche HIV

DNA v1.5) was conducted at the KEMRI QA laboratory to resolve specimens with two sets of discordant results. For QA purposes, all seropositive and 5% of seronegative specimens were transported to the KEMRI QA laboratory and re-tested using the same algorithm. Specimens with discordant results between the two laboratories were tested again at the KEMRI QA laboratory with the same algorithm. Specimens that were still discordant after re-testing were resolved by PCR at the KEMRI QA laboratory.

CD4 cell count. Stabilised whole blood specimens for CD4 testing were prepared in the temporary field laboratory at the end of each day. Specimens were transported to the NHRL at room temperature (18°–22°C). Only samples found to be reactive for HIV using the serial HIV testing algorithm described earlier were eligible for a CD4 cell count. Single-platform technology was used to determine both absolute and percentage lymphocyte subset values from each CD4 tube of blood using BD FACSComp™ software and BD CaliBRITE™ reagents. CD4 and CD8 cells were enumerated to calculate the CD4:CD8 ratio. For quality control of CD4 testing, internal controls with known CD4 quantities were included with each run. When the system detected an error with the control, results from the run were discarded, the specific error was rectified based on the error code generated by the software, and CD4 testing was repeated. All CD4 testing and re-testing was conducted at the NHRL.

Syphilis. Testing was conducted using two laboratory tests. All serum specimens were screened at the NHRL using a *Treponema pallidum* particle agglutination assay (TPPA) (Serodia-TPPA, Fujirebio Diagnostics Inc.). All TPPA positive specimens were reviewed by a second laboratory staff member and then tested using the rapid plasma reagin (RPR) (Macrovu-Vue RPR Card Test, BD USA) on undiluted (i.e. neat) serum. RPR results also were reviewed and reported by a second laboratory staff member. TPPA was used as an antibody-screening test to identify previous exposure to syphilis antigens, whereas RPR served as a test for presence of reaginic antigens, an indicator of active infection. For quality control, all TPPA-reactive specimens and 5% of nonreactive specimens were re-tested at the QA laboratory using the same TPPA/RPR algorithm. Specimens with discordant results between the two laboratories were reported as indeterminate.

HSV-2. All specimens were tested using Kalon HSV2 IgG ELISA based on gG-2 according to the manufacturer's recommendations. All samples reactive with the first EIA run were re-tested using Kalon HSV2 IgG ELISA and read by a second reader. For quality control, all reactive specimens, 5% of randomly-selected nonreactive specimens and specimens in gray zones were re-tested at the QA laboratory using the above EIA test. Specimens with discordant results between the two laboratories were reported as indeterminate.

Dried blood spots. The DBS samples prepared from the CD4 blood tubes at the temporary field laboratories were stored in freezers at temperatures of -20^{o} C at the NHRL. These samples were tested for HIV if serum samples were lost in transit or if respondents did not consent to giving venous blood but were willing to give blood from a finger prick. Sera were eluted from 6-mm discs punched from the DBS samples and were tested following the manufacturer's recommendations using a parallel testing algorithm using two HIV EIAs (Vironostika HIV UNIFORM II Plus O v 3.3 and Murex HIV 1.2.0). For quality control, all reactive specimens and 5% of nonreactive specimens were re-tested at the QA laboratory using the same testing algorithm. Specimens with discordant results between the two laboratories were resolved by HIV DNA PCR or reported as indeterminate.

Repository specimens

Serum, plasma, packed cells, and DBS samples remaining after testing were stored at -80^{o}C at the NHRL for future testing. Proposals for the use of repository specimens will be reviewed following standard procedures by KAIS leadership and submitted to the necessary ethical review committees for approval.

Field supervision

As part of the main survey supervision, a member of the central laboratory team visited field-based laboratory staff each month during the data collection period. Laboratory supervisors ensured high quality of specimens and replenished supplies for field teams. They also helped monitor and evaluate adherence to laboratory-related procedures, including bio-safety standards, and provided support to the laboratory field staff and assistance in problem solving any laboratory-related issues.

Laboratory data management

The LIMS used for the 2007 KAIS was developed by the Ugandan Ministry of Health, CDC-Uganda and other collaborators for the 2005 Uganda AIS. The platform for the system was Microsoft Access software. Upon receipt of specimens at the core laboratory, technicians scanned barcodes into the LIMS, which immediately identified any duplicate entries. The LIMS was installed at the NHRL and the KEMRI QA laboratory. During testing, the LIMS automatically captured HIV, HSV-2 and CD4 results from laboratory EIA readers. Syphilis results were double-entered manually into a separate, stand-alone database system. The LIMS, programmed with the approved testing algorithms, generated a final set of results for each participant.

A.5 Returning Laboratory Test Results To Participants

Returning test results with appropriate post-test counselling to persons infected with HIV and STIs can help HIV-infected individuals recognize symptoms, seek care and treatment, reduce transmission to others and protect themselves from acquiring other STIs. Uninfected persons who learn their test results can also benefit from risk reduction counselling messages on how to protect themselves from acquiring HIV and other STIs.

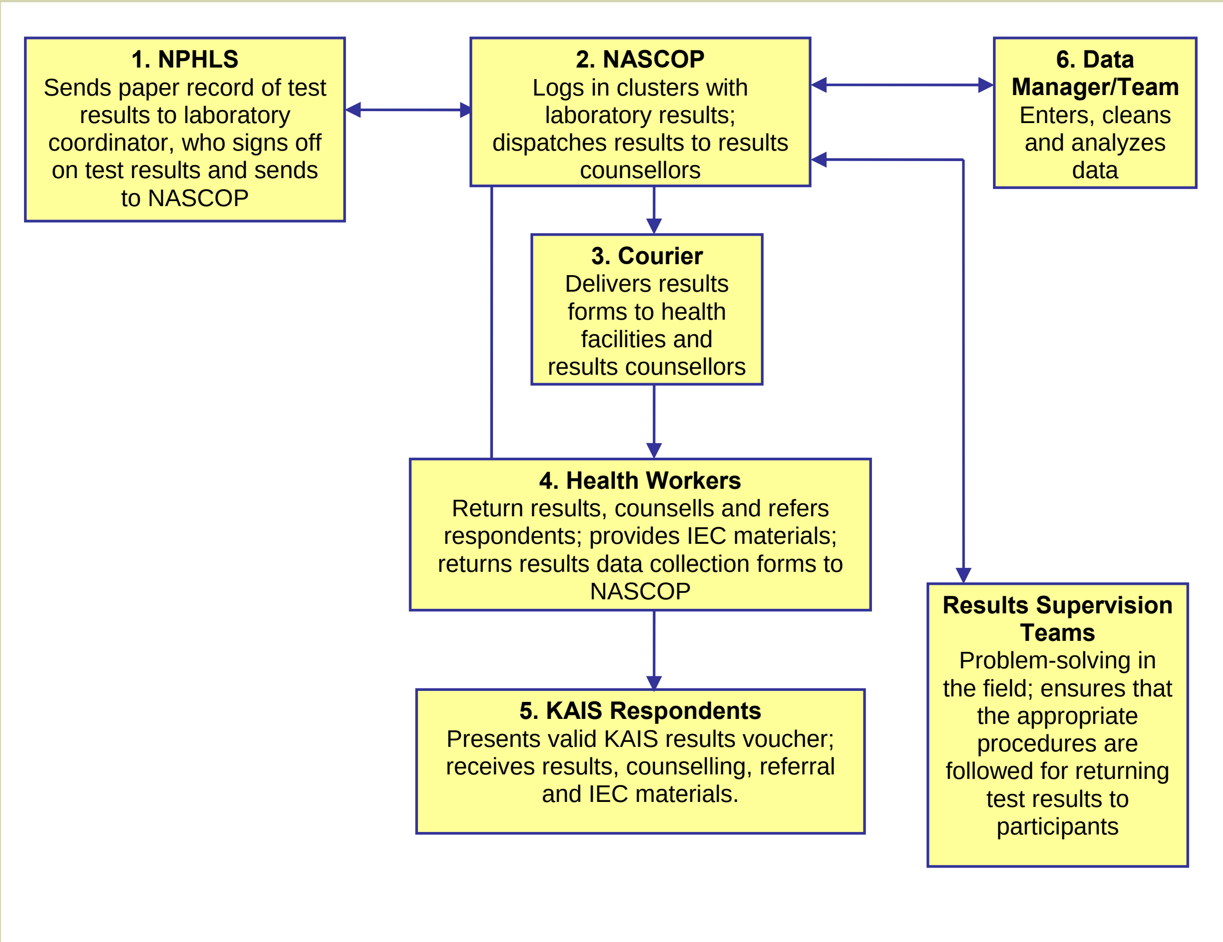
In the 2007 KAIS, participants who consented to blood draw during the survey were given an opportunity to learn their HIV, syphilis, and HSV-2 results and CD4 count, if HIV infected, approximately six weeks after sample collection. This activity was entirely voluntary and not a requirement for participation in the 2007 KAIS. The survey utilized a facility-based approach in which selected health facilities within and near the study clusters were involved in returning test results to participants. Persons who received their test results were provided post-test counselling, and if infected they were provided referrals to HIV and STI prevention, care, and treatment services.

This section outlines the methods used to return test results to participants and the data management and analysis procedures used to analyze data on persons who came to selected health faciltlies to have their test results from the 2007 KAIS returned to them.

Organization and structure of returning test results to participants

NASCOP coordinated the activity for returning test results to participants in close collaboration with the NHRL. The NASCOP coordinator for returning test results provided overall technical, administrative, and logistical oversight of the activity for returning test results to participants. Trained health workers (results counsellors) who returned test results to participants provided appropriate counselling and referral according to national guidelines for voluntary counselling and testing. Counsellors recorded information about participants who returned for results and any referrals that were made during the session. The NASCOP data management team coordinated entry of this information into a database linked to the questionnaire and laboratory databases, and the cleaning of these data.

Figure A5.a. Structure and flow of test results, KAIS 2007.



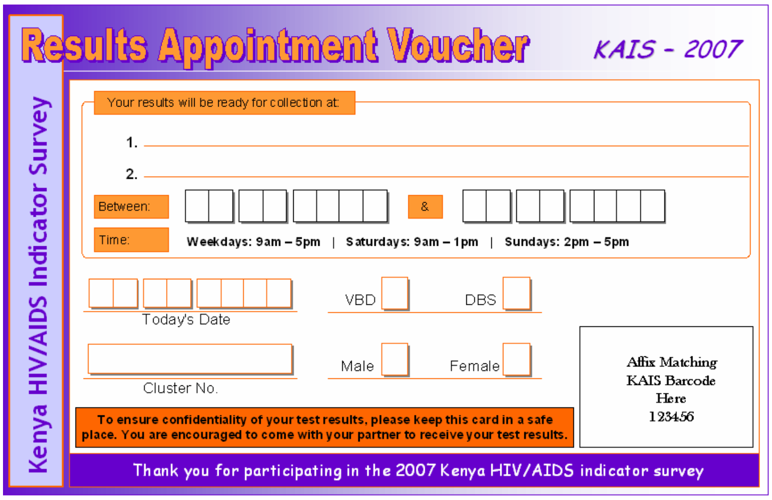
Results returned. Samples from participants who consented to venous blood draw were tested for HIV, HSV-2 and syphilis, and received a CD4 count test if HIV-infected. Participants who provided DBS samples were tested only for HIV. Table A5 shows the format used to report KAIS test results.

Table A5. Results formats for laboratory testing, KAIS 2007.

Test	Venous blood	Dried blood spot	Results format
HIV	Yes	Yes	Positive, negative, indeterminate
CD4	Yes	No	Counts (number of cells per micro-litre of blood) for HIV-infected people only
HSV-2	Yes	No	Positive, negative, indeterminate
Syphilis	Yes	No	Positive, negative, indeterminate

Results voucher. After blood sample collection, laboratory technicians issued results vouchers (see Figure A5.b) and counselled participants on the importance of knowing their disease status. The voucher contained the participant's study identification number, sex, the dates of the four-week period during which their test results would be available, and a list of two or three health facilities in the area where participants could receive their test results. Participants were provided with a choice of facilities in case they had concerns about confidentiality at nearby facilities and/or preferred to travel farther away for greater anonymity. Participants who wished to know their results prior to the voucher dates were given a listing of VCT sites and health facilities in the area where they could be tested for HIV.

Figure A5.b. Results voucher, KAIS 2007.



Selection of health facilities. District hospitals and health centres where respondents could access further testing and follow-up services were selected as results collection points. Dispensaries and other facilities, such as mission hospitals or VCT sites, were designated as results collection points in clusters far from major health facilities. The selected health facilities had to be accessible to participants and willing to participate in this activity by providing needed space for results counsellors on weekdays and weekends.

Recruitment and training of results counsellors. Effective results counselling in KAIS required that all counsellors be equipped with basic knowledge of the STIs covered in the survey and with appropriate counselling skills according to national voluntary counselling and testing guidelines. The results coordinator in collaboration with the Provincial AIDS/STI Coordinators (PASCOs) identified, recruited, and assisted in the training of the 2007 KAIS results counsellors. In September 2007, a total of 202 health workers attended a training on how to return KAIS test results to participants. Counsellors and health workers, regardless of their health care experience, attended the training to refresh their counselling skills, learn how to return the 2007 KAIS test results to participants, and to refer them and their partners for further testing, care and treatment if necessary. The training covered the following topic areas:

- Overview of HIV and CD4, HSV-2, and syphilis
- Protocol for returning HIV, CD4 count, HSV-2, and syphilis results
- Counselling and referral messages
- Effective counselling skills
- Documentation of information from persons who receive their test results
- Confidentiality
- Supervision

The training also included role plays and other opportunities for building practical experience in results counselling.

Documentation of results at laboratory. Upon completion of laboratory testing for a given cluster, the LIMS coordinator produced a laboratory results form through an automated, computer-based process for each cluster, listing out the test results for all individuals who provided a blood specimen for testing. The form was populated with the province, district, and cluster names; dates of sample collection; study identification numbers for a cluster; positive, negative, or indeterminate results for HIV, syphilis, HSV-2, and CD4 counts for HIV-infected persons; and codes indicating the reason for any missing results (e.g. insufficient sample, rejection sample, DBS only). Forms were submitted for review by the NPHLS lab coordinator (see Figure A5.c). After reviewing the results and resolving any discrepancies, the laboratory coordinator delivered hard copy results forms to the NASCOP results coordinator.

Dispatching results to the field. Upon receiving results from NHRL, the NASCOP results team logged in the cluster numbers with results and arranged for a courier service to pick-up the paper results and deliver to the selected health facilities. The courier service was given the mobile telephone numbers of results counsellors so they could communicate directly to arrange a secure drop off.

Methods for returning test results to participants. Results counsellors were trained to follow a standardized protocol for returning test results to participants. Counsellors were provided with counselling messages for each test result to guide them during the counselling session and to ensure consistency in the quality of counselling. The 2007 KAIS followed similar procedures for returning laboratory results that are followed in general health care settings in Kenya, including abbreviated counselling on basic information on

HIV and STI, an explanation of the meaning of test results, the importance of partner testing, counselling on risk reduction practices, and referrals for further care and treatment services.

Procedures for returning test results to minors complied with Kenyan law, Ministry of Health policy guidelines and international standards of ethics and practice. Youth were encouraged but not required to come with a parent or guardian to receive their test results. Test results were first returned to the minor and then, upon consent of the minor, shared with the accompanying parent or guardian.

The following core elements for returning test results to participants were emphasized during specimen collection and counselling session for returning test results:

Validity of KAIS test results and importance of further testing. In addition to delivering KAIS test results, results counsellors discussed the reliability of results with participants. Due to the time lapse between sample collection and returning test results, reported results reflected the participant's infection status at the time of specimen collection. When giving test results to participants, results counsellors explained that the participant's current status might be different based on the window period of HIV infection and recent exposures. Participants with negative test results were advised to seek further testing if they had engaged in unsafe risk behaviour after sample collection.

Relations between HIV, genital herpes, and syphilis. Counselling of respondents emphasized the links between HIV and tuberculosis, and between HIV and genital herpes and syphilis.

Partner testing. Partner testing or couples testing is a main strategy of national testing initiatives in Kenya. During specimen collection, respondents were encouraged to learn their test results with their partner.

Prevention of transmission to partners and children. Participants who received their test results as individuals (instead of as a couple) were encouraged to disclose their test results to their sexual partners. Participants were also offered free condoms when they received their test results, except at mission hospitals which did not supply condoms. Additionally, results counsellors provided specific messages to both male and female participants on prevention of transmission of HSV-2, syphilis and HIV to children.

Referrals for follow-up testing and counselling. Results counsellors provided appropriate referrals to infected persons for additional testing, counselling, care and treatment services. All participants received brochures on HIV, TB, syphilis, and genital herpes.

Confidentiality. During sample collection, laboratory technicians explained the need for participants to keep their results vouchers safe to ensure confidentiality of test results. A results voucher served as the only basis for providing test results to the 2007 KAIS respondents. Results counsellors verified that the sex of the person who returned for their test result was the sex of the participant who received the results voucher by cross-checking with the sex indicated on the voucher. Results counsellors were trained to observe confidentiality of participants' test results in line with existing national guidelines for voluntary counselling and testing. In addition, respondents could receive results at a health facility outside their study cluster if they had concerns about confidentiality among the staff at the facilities near their homes. Participants who did not have a valid results voucher were referred for testing and counselling at the nearest health facility.

Figure A5.c Sample laboratory test results form, 2007 KAIS.

NASCOP AND NPHLS – 2007 KAIS LAB TEST RESULTS

*****To be completed by NPHLS*

*Province:………………… *District : ……………… *Cluster No: ………….……

*Dates of sample collection: From dd……./mm………../2007 to dd………/mm………../2007

Name of health facility……………………… Health facility Code …... (to be completed by HW)

*Checked: Date: dd……….. /mm……… /2007 *Sign:……………………………………

*Missing Code: 01-Participant provided DBS only 02-Rejected/invalid specimen 03-Missing specimen 04-Insufficient specimen

** Referral Code: 01-Comprehensive care centre/ART 02-STI clinic 03-TB clinic 04-VCT centre 05-PMTCT/antenatal clinic 06-Other (specify in space provided – do not use abbreviations) 07-Respondant received condom

No.	IDNO	HIV	CD4 (cells/ µl)	SYP	HSV2	Reason for missing test result (Enter code*)	Results collected by Individual/ Couple I/C	Sex M/F	Returned results Enter date (dd/mm/yy) & tick results returned below each test	Referral (Enter code**)	Health worker code
1	01234	Pos	180	Neg	Neg		C-03	M	13/10/2007	01, 07	555
2	01235	Neg	-	Neg	Neg		I	F	25/10/2007	05	555
3	01236	Neg	-	Neg	Neg		C- 01	F	13/10/2007	02, 07	555
4 …											
… …											
20											

Remarks………………………………………………………………………..……

(To be completed by the PASCO)

Checked: Date: dd………mm………...2007 PASCO Code: …..…………

Documentation. Results counsellors recorded information about respondents who received their test results and any referrals onto the results form. This information included the sex of the person collecting the result, specific test results returned, the date results were returned, and whether the person came as an individual or was accompanied by a spouse or partner. All forms were submitted to NASCOP at the end of the four to six week period that the test results were available.

Monitoring and supervision. Supervision teams monitored procedures for returning test results to participants and supported results counsellors in the field. Supervision teams visited the field three times during the survey and verified adherence to the protocol for returning test results, ensured supplies were sufficient, and addressed any acute issues reported by results counsellors. After each supervisory visit, all supervisors submitted a status report on the progress of the exercise. Supervisors also met to discuss outcomes of the supervision visits and address unresolved issues. Feedback was provided to results counsellors as necessary.

Data management and analysis A Microsoft Access database was created to capture information on the activity for returning test results to participants. The database was pre-populated with cluster numbers, participant identification numbers, laboratory test results, and reasons for any missing test results. A team of six data managers at NASCOP was trained on data editing and entry. Upon receiving completed results forms, the team logged in the cluster numbers to keep track of counsellors who had filed their results forms. The results forms were photocopied to provide a backup copy in case of loss and were then manually edited and double entered into two separate datasets.

The two datasets were compared for consistency and discrepancies were resolved by referring to the results forms and making changes to the databases accordingly. Once the two datasets were equivalent, the team ran a series of consistency and range checks to ensure the data were accurate. Descriptive analyses were performed on the final, cleaned dataset. Fndings from these analyses are reported in Chapter 15 of this report.

A.6 Weighting, Non-Response Adjustment and Statistical Analysis

Sampling weights

Sampling weights were incorporated into all statistical analyses. The purpose of weighting was to correct for unequal probability of selection and to adjust for non-response to produce results that were representative of the larger population from which the sample was drawn. We used standard weighting procedures similar to methods used in the 2003 KDHS to increase comparability of results between surveys.

Design weights

The 2007 KAIS sample was not self-weighted and thus a weighting adjustment was required to provide estimates representative of the target population. The design weights incorporated the probabilities of selection of the 1800 clusters into the NASSEP IV sample frame and the probabilities of selection of the 402 clusters into the KAIS sample from the NASSEP IV clusters. The probabilities of selection of clusters into NASSEP IV were taken from the documentation of the NASSEP IV master sample, which was available through KNBS.

Post-stratification adjustment

The allocation of clusters among the urban and rural areas in each province was based on the distribution of households across the districts. The allocation resulted in 34 districts with no clusters in their urban strata. Consequently, an adjustment to the weights was made to increase the representation of urban areas within the affected provinces.

Table A6.a shows the ratios of the weighted number of households according to NASSEP IV to the weighted numbers using the base KAIS weights. There was reasonably close agreement between the two samples by province for Nairobi and for rural areas, but an under-representation for other urban areas except Central Province. Thus, we multiplied the original weights (for the urban areas outside of Nairobi) by the ratios shown in Table A6.a.

Table A6.a Ratio of NASSEP IV to original KAIS using sampling fractions at the district level, KAIS 2007.

Province	Rural	Urban	Total
Nairobi	na	1.033	1.033
Central	1.037	0.807	1.002
Coast	1.084	1.019	1.053
Eastern	1.086	1.397	1.104
North Eastern	0.950	1.169	0.975
Nyanza	1.055	1.183	1.066
Rift Valley	1.013	1.762	1.105
Western	1.064	1.766	1.113
Total	1.047	1.149	1.070

Non-response adjustment

Base weights were adjusted for cluster non-response, household non-response, and individual non-response (both for the interview and the blood draw). Ultimately, each cluster had three cluster-specific weights: household, individual interview, and blood draw. All household members captured in the household questionnaire were assigned the same household weight. All individuals within a cluster who participated in the individual interview or blood draw were assigned the same cluster-specific weights for individual interview or blood draw.

Normalisation of weights

Normalised weights were used to avoid generating incorrect standard errors and confidence intervals and were valid for estimation of proportions and means at any aggregation level. They were not valid for estimation of totals, however. Weights were normalised to the KAIS sample size and had a mean of 1.0

Population estimates *(Reference needs to be updated to 2006 projections)*

Estimation of adult population sizes through extrapolation provided a useful measure of the number of adults affected by a particular infection or accessing particular HIV services. In this report, we calculated estimates of populations sizes by multiplying weighted parameter estimates from the 2007 KAIS (proportions or percentages) by national and provincial-level population projections. We used national and provincial population projections from the *1999 Analytical Report on Population Projections, Volume VII, KNBS (2002)* to determine population sizes at the national and province level, and by sex for analyses requiring estimates for women (e.g. PMTCT). The projections for the 2007 population in the report are based on findings from the 1999 Census. While a national projection for the number of women and men aged 15-64 years was not explicitly provided in the report, we were able to construct a national projection by summing province-level projections for 2007 for women and men aged 15-64 years as shown in Table A6.e. The report provides projections by five-year age category; we summed all categories from 15-19 years through 60-64 years to arrive at a total.

Due to variations between the Census population distributions by province compared to the the 2007 KAIS population distributions by province, the total sum across provinces (or sex) may not equal the national estimate. The number of HIV-infected persons summed across provinces, for example, may not equal the number obtained by multiplying the national projected population by the weighted national KAIS HIV prevalence estimate. Analysts opted to utilize national level estimates and confidence intervals around national estimates whenever possible, rather than summing across provinces or sex, because national estimates were more precise than provincial estimates given the larger sample size. In many analyses by province, population estimates for North Eastern province were not presented because the parameter estimate was derived from a sample size too small to generate valid estimates.

Similarly, where possible, a "one-step" process for calculating population estimates was employed. To estimate the number of pregnant women who were HIV-infected, for example, we multiplied the projected number of women in Kenya by the weighted percent of women in the 2007 KAIS who were both pregnant and HIV-infected. In a two-step process, we would have had to first estimate the number of pregnant women and secondly, the number HIV-infected among those pregnant. The one-step process was both simpler and more appropriate given that the 2007 KAIS sampling and weighting design produced nationally representative 2007 KAIS estimates.

Table A6.e Estimated number of women and men aged 15-64 years by province, based on 1999 Census projections.

Province	Women	Men	Total
Nairobi	938,743	1,009,484	1,948,227
Central	1,337,054	1,159,867	2,496,921
Coast	962,636	758,756	1,721,392
Eastern	1,452,514	1,380,006	2,832,520
North Eastern	449,901	361,358	811,259
Nyanza	1,443,225	1,408,356	2,851,581
Rift Valley	2,365,472	2,241,801	4,607,273
Western	1,039,861	999,633	2,039,494
Total	9,989,406	9,319,261	19,308,667

For this report, population projections were rounded to the nearest 1,000 adults. That is, we used a national population projection of 19,309,000. The 2009 KAIS estimates were rounded to two decimal points. The final population estimates presented were also rounded to the nearest 1,000 adults. Confidence intervals around population estimates were calculated by multiplying the same base population (rounded to the nearest 1,000 adults) by the lower and upper bounds of the 95% confidence interval around the 2007 KAIS point estimate (rounded to two decimal points).

Data processing and statistical analysis

Data processing included a number of steps to prepare data collected in the field for analysis. The initial steps included editing questionnaires, both in the field and at KNBS, and double-data entry of all questionnaire responses to minimise errors. Data were double entered using Census and Survey Processing System (CSPro) version 3.3.[31] Once all survey responses were electronically entered, the double entered databases were compared for concordance, using paper questionnaires to resolve any discrepancies in transcription. A series of internal consistency and range checks helped to identify any illogical responses and to verify that responses adhered to skip patterns in the questionnaire. Data validation programs for data cleaning were written in Stata version 8.0[32] and corrections were entered directly in CSPro at KNBS.

A concurrent process for cleaning raw laboratory data was conducted at the NHRL. The final, cleaned questionnaire database at KNBS was merged with the laboratory results database at the NHRL using unique survey identification numbers to ensure accurate matches (>99.9% of identification numbers were matched). After successfully merging the questionnaire and laboratory results databases, cluster and household identification numbers were serialized from 1-402 and from 1-25, respectively. Original cluster and household numbers, barcodes, and individual survey identification numbers were stripped from the database prior to weighting and analysis to ensure anonymity of survey participants.

[31] U.S. Census Bureau, Washington, DC. USA.

[32] Stata Corporation, College Station, Texas. USA.

This report presents the results of univariate and bivariate analyses using the 2007 KAIS data. Analyses are not adjusted for any confounding factors; multivariate analyses have been reserved for other dissemination materials, such as scientific manuscripts. By convention, we present weighted proportions (except where noted) and unweighted frequencies. In addition to weights, appropriate survey design variables were included in the analyses to obtain standard errors and chi-square p-values. Weighted proportions based on a denominator of less than 25 participants were suppressed in the chapters and appendices given the instability of the estimate, although the corresponding unweighted number of cases and unweighted total (unweighted n/N) was still presented in Appendix B. Most analyses were stratified by sex given the importance of this variable in understanding the distribution of HIV, HSV-2, and syphilis. With the exception of Chapter 3 (Trends in HIV Prevalence), statistical significance was assessed based on chi-square p-values produced in standard statistical software packages. In Chapter 3, we assumed the estimates from the 2003 KDHS and the 2007 KAIS were independent and used the z-test to compare two weighted estimates and determine if differences were statistically significant. The z-statistic was constructed as the difference in the point estimates between 2003 and 2007 divided by the standard error of the difference:

$$Z = \left(p_{2007} - p_{2003}\right) \Big/ \sqrt{\left(\mathrm{var}_{2007} + \mathrm{var}_{2003}\right)}$$

where var_{2007} and var_{2003} are the variances for the two estimates.

We used the z-statistic to calculate a p-value for differences between estimates in 2003 and 2007. Throughout the report, the term significant indicates a p-value less than 0.05. Marginally significant indicates a p-value between 0.05 and 0.10; and not significant indicates a p-value greater than 0.10. Terms such as “apparent” or “appears to be” refer to the general shape of the graph or a possible pattern of data that has not been formally evaluated with a statistical test; such testing was beyond the scope of this report.

The program used for the analysis of the 2007 KAIS data was SAS version V9.13. This program accounts for the clustered, stratified design of the KAIS survey sample and can produce reliable standard errors and confidence intervals.