Populations at Increased Risk for HIV Infection in Kenya: Results From a National Population-Based Household Survey, 2012

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Background: Populations with higher risks for HIV exposure contribute to the HIV epidemic in Kenya. We present data from the second Kenya AIDS Indicator Survey to estimate the size and HIV prevalence of populations with high-risk characteristics.

Methods: The Kenya AIDS Indicator Survey 2012 was a national survey of Kenyans aged 18 months to 64 years which linked demographic and behavioral information with HIV results. Data were weighted to account for sampling probability. This analysis was restricted to adults aged 18 years and older.

Results: Of 5088 men and 6745 women, 0.1% [95% confidence interval (CI): 0.03 to 0.14] were persons who inject drugs (PWID). Among men, 0.6% (CI: 0.3 to 0.8) had ever had sex with other men, and 3.1% (CI: 2.4 to 3.7) were males who had ever engaged in transactional sex work (MTSW). Among women, 1.9% (CI: 1.3 to 2.5) had ever had anal sex, and 4.1% (CI: 3.5 to 4.8) were women who had ever engaged in transactional sex work (FTSW). Among men, 17.6% (CI: 15.7 to 19.6) had been male clients of transactional sex workers (TSW). HIV prevalence was 0% among men who have sex with men, 6.3% (CI: 0 to 18.1) among persons who injected drugs, 7.1% (CI: 4.8 to 9.4) among male clients of TSW, 7.6% (CI: 1.8 to 13.4) among MTSW, 12.1% (CI: 7.1 to 17.1) among FTSW, and 12.1% (CI: 5.0 to 19.2) among females who ever had engaged in anal sex.

Conclusions: Population-based data on high-risk populations can be used to set realistic targets for HIV prevention, care, and treatment for these groups. These data should inform priorities for high-risk populations in the upcoming Kenyan strategic plan on HIV/AIDS.

Key Words: high-risk populations, HIV, men who have sex with men, transactional sex, anal intercourse, Kenya

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INTRODUCTION

Kenya has a mature HIV epidemic with HIV prevalence estimated to be 5.6% in the adult general population in 2012.[1] Embedded within this epidemic are several key populations that have substantially higher risks for HIV infection. Local population-based surveys conducted between 2008 and 2011 found high levels of HIV prevalence among female sex workers (FSW), estimated to range from 29.1% in Nairobi to 56.5% in Kisumu; men who have sex with men (MSM), with prevalence of 18.2% in Nairobi and 11.1% in Kisumu; and persons who inject drugs (PWID) of whom 18.7% were HIV infected in Nairobi.[2,3] In a long-standing cohort of MSM in Mombasa, not only has high HIV prevalence been reported at 43% [95% confidence interval (CI): 35 to 52] of the study population, but elevated levels of HIV incidence have been observed both among men who have sex with men exclusively and MSM who have sex with women, up to 8 times as high as the rates observed in the general population.[4–6] Through mathematical modeling, the Kenya Modes of Transmission study estimated that up to 1 in 3 recently acquired HIV infections in Kenya were attributable to key populations.[7]

Bridging populations, defined as members of the general population that interact sexually with key population members, may further facilitate the spread of HIV infection.

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In particular, receptive anal intercourse has been cited as an important risk factor for HIV infection and described primarily in the context of MSM behavior in Kenya.[4,5,8] However, the extent to which heterosexual anal intercourse is prevalent among women and how this behavior may bridge with key populations is unknown.

Many of the behaviors that place key populations at increased risk of acquiring and transmitting HIV are illegal in Kenya. The prevailing stigma and criminalization make these groups hidden and difficult to reach in routine HIV surveillance, impeding their access to HIV prevention, care, and treatment services. The Kenya National AIDS Strategic Plan III 2009–2013 recognized the need to prioritize access to services for key populations.[9] To date, available HIV surveillance data among key populations are based on targeted sampling, using convenience samples or complex sampling designs, such as respondent-driven or time–location sampling. No nation-wide estimates for key populations, however, are available, and the lack of reliable estimates of population sizes, burden of HIV, and spatial distribution of these groups impede HIV programmatic activities and advocacy. We report on a national household-based survey that included HIV-related biomarkers and behavioral indicators relevant to key and other high-risk populations in Kenya.

METHODS

Survey Design and Study Population

The second Kenya AIDS Indicator Survey (KAIS 2012), described in detail elsewhere,[10] was a nationally representative cross-sectional household survey conducted from October 2012 to February 2013 in 9 programmatic regions in the country. KAIS 2012 used the National Sample Survey and Evaluation Programme V household sampling frame, which comprised a total of 5360 clusters with county boundaries. From these, 372 clusters were selected for KAIS 2012. The study population included individuals aged 18 months to 64 years who were usual residents of or had stayed in the sampled household the night before the survey. For this article, we restricted our study population to adult participants aged 18–64 years.

Data Instruments

Household and individual survey questionnaires were adapted from several instruments used in previous national surveys, including standard AIDS Indicator Survey tools developed by Monitoring and Evaluation to Assess and Use Results of Demographic and Health Surveys (MEASURE DHS, Calverton, MD), the HIV module used in the 2003 Kenya Demographic and Health Survey, and the adult individual adult questionnaire used in the first Kenya AIDS Indicator Survey conducted in 2007.[11,12] The questionnaires were translated from English into Kiswahili and other local languages, back-translated into English, and reviewed to ensure accuracy.

The individual questionnaire covered basic sociodemographic characteristics, reproductive history, fertility preferences, family planning, marriage, sexual and drug-using behaviors, HIV knowledge and attitudes, HIV testing, access to HIV care and treatment services, medical injections, and other health-related topics. Questionnaires were administered in the participant's home by trained interviewers in a private location away from other members of the household.

Data Collection

Data were collected by field team members using tablet computers (Mirus Innovations, Mississauga, Ontario, Canada). Survey data were electronically transferred between field team members through a secure local area wireless network for review and cleaning. The field team supervisor then transmitted the electronic data at the end of the day to a central database in Nairobi using a virtual private network.

Laboratory Tests

Blood specimens were collected from consenting participants and tested at the National HIV Reference Laboratory in Nairobi for HIV antibodies using enzyme immunoassays (EIA) [Vironostika HIV-1/2 UNIF II Plus O EIA (bioMérieux, Marcy I'Etoile, France) as the screening assay and Murex HIV.1.2.O HIV EIA (DiaSorin, SpA, Saluggia, Italy) as the confirmatory assay]. Laboratory-based test results were not returned to participants. However, participants could learn their HIV status in privacy of their homes through home-based testing and counseling using the national HIV testing guidelines for rapid HIV testing.[13] HIV testing and counseling was conducted by trained home-based testing and counseling service providers who were a part of the survey team. Referrals for follow-up care were provided where needed.

Data Analysis

We assessed 6 populations with high-risk characteristics: PWID, MSM, females and males who had engaged in transactional sex work (FTSW and MTSW, respectively), male clients of transactional sex workers (TSW), and females who had engaged in anal sex. The 6 high-risk population groups analyzed were not mutually exclusive; based on reported behaviors, individuals could fall in 1 or more population groups. Respondents were classified as PWID if they answered "yes" to the question "Have you ever injected drugs with a needle and syringe for pleasure?" Men were classified as MSM if they replied "yes" to the question "Have you ever had sex with a man?" Women and men were classified as FTSW and MTSW, respectively, if they answered "yes" to the question "Have you ever received money, gifts, or favors in exchange for sex?" Men were classified as male clients of TSW if they answered "yes" to the question "Have you ever given money, gifts, or favors in exchange for sex?" Female respondents who replied "yes" to the question "Have you ever had anal sex?" were classified as females who ever had engaged in anal sex (FAS).

We estimated the proportion of adults who reported a history of high-risk characteristics as defined above.

TABLE 1. Weighted Proportions and Estimated National Population Size of Adult Populations Aged 18–64 Years With High-Risk Characteristics, Kenya AIDS Indicator Survey 2012

	Lifetime Behavior*			Behavior in the Past 12 mo†		
Population	Unweighted, n	Weighted % (95% CI)	Estimated Population Size (95% CI)	Unweighted, n	Weighted % (95% CI)	Estimated Population Size (95% CI)
PWID	12	0.1 (0.03 to 0.14)	16,000 (6000 to 25,000)	‡	‡	‡
MSM	25	0.6 (0.3 to 0.8)	49,000 (25,000 to 72,000)	‡	‡	‡
MTSW	140	3.1 (2.4 to 3.7)	262,000 (204,000 to 320,000)	37	0.9 (0.5 to 1.2)	63,000 (40,000 to 87,000)
Male clients of TSW	779	17.6 (15.7 to 19.6)	1,497,000 (1,332,000 to 1,661,000)	214	6.3 (5.2 to 7.5)	408,000 (333,000 to 484,000)
FTSW	278	4.1 (3.5 to 4.8)	382,000 (320,000 to 443,000)	72	1.4 (1.0 to 1.8)	103,000 (73,000 to 133,000)
FAS	118	1.9 (1.3 to 2.5)	175,000 (118,000 to 232,000)	37	0.8 (0.4 to 1.1)	56,000 (28,000 to 83,000)

*Among persons who had ever had sex (with the exception of PWID).
†Among persons who were sexually active in the past 12 months.
‡Population size estimates for PWID and MSM in the past 12 months not presented because of small sample size.

Using non-normalized weights based on the 2012 projected population data from the 2009 Kenya Population and Housing Census,[14] we estimated the national population sizes of MSM, PWID, MTSW, FTSW, male clients of TSW, and FAS. For MTSW, FTSW, male clients of TSW, and FAS, we further estimated population sizes for individuals who had engaged in these behaviors in the past 12 months. However, due to the small sample sizes of MSM and PWID, we only ascertained population sizes for individuals who reported this behavior at any point during their lifetime. We conducted bivariate analyses to estimate the frequencies and proportions of select sociodemographic factors, risk behavior characteristics, and HIV status for the populations analyzed. Because we identified few MSM and PWID in our sample, we present a limited number of indicators for these 2 groups. Statistical significance in comparisons were assessed using the Rao–Scott χ^2 test. Estimates and 95% confidence intervals (CI) were adjusted to account for the survey sampling design and nonresponse using sampling weights. All analyses were conducted in SAS version 9.3 (SAS Institute, Cary, NC) using procedures for survey sampling.

Ethical Considerations

The survey protocol was approved by the Ethical Review Board of the Kenya Medical Research Institute, The Institutional Review Board of the US Centers for Disease Control and Prevention, and the Committee on Human Research of the University of California, San Francisco.

RESULTS

From October 2012 to February 2013, 14,411 eligible persons aged 18–64 years were identified in participating households. Of these, 12,301 (85.4%) were interviewed, of whom 5088 (41.4%) were men and 7213 (58.6%) were women.

Prevalence of High-Risk Characteristics

Among 5088 participating men, 0.6% (95% CI: 0.3 to 0.8) were MSM, 3.1% (95% CI: 2.4 to 3.7) were MTSW, and 17.6% (95% CI: 15.7 to 19.6) were male clients of TSW (Table 1). Among 7213 participating women, 1.9% (95% CI: 1.3 to 2.5) were FAS, and 4.1% (95% CI: 3.5 to 4.8) were FTSW. Among the 12,301 men and women participants combined, 0.1% (95% CI: 0.03 to 0.14) were PWID.

Population Size Estimates of Groups With High-Risk Characteristics

Based on self-reported lifetime behaviors, we estimated that the national number of MSM was 49,000 (95% CI: 25,000 to 72,000) and the number of men and women who had ever injected drugs was 16,000 (95% CI: 6000 to 25,000). The estimated number of persons who in the past 12 months had engaged in high-risk behaviors that defined FAS, MTSW, FTSW, and male clients of TSW were 56,000 (95% CI: 28,000 to 83,000) for FAS, 63,000 (95% CI: 40,000 to 87,000) for MTSW, 103,000 (95% CI: 73,000 to 133,000) for FTSW, and 408,000 (95% CI: 333,000 to 484,000) for male clients of TSW, respectively.

HIV Testing, HIV Prevalence, and Undiagnosed Infection

The percentage of persons who had ever been tested for HIV ranged from 68.0% (95% CI: 63.9 to 72.1) for male clients of TSW, 72.8% (95% CI: 64.8 to 80.8) for MTSW, 87.9% (95% CI: 83.8 to 92.0) for FTS, and 90.8% (95% CI: 85.4 to 96.2) for FAS (Tables 2–5). HIV testing rates were 70.7% (95% CI: 47.7 to 93.6) for PWID and 61.3% (95% CI: 45.1 to 77.5) for MSM (data not shown). The estimated HIV prevalence was 6.3% (95% CI: 0.0 to 18.1) among PWID, 7.1% (95% CI: 4.8 to 9.4) among male clients of TSW, 7.6% (95% CI: 1.8 to 13.4) among MTSW, 12.1% (95% CI: 7.1 to 17.1) among FTSW, and 12.1% (95% CI: 5.0 to 19.2) among FAS. No HIV infections were detected among MSM. Among individuals with laboratory-confirmed HIV infection, 37.7% (95% CI: 8.2 to 67.1) of FAS, 45.4% (95% CI: 16.5 to 74.2) of MTSW, 55.5% (95% CI: 34.7 to 76.4) of FTSW, and 57.7% (95% CI: 41.9 to 73.5) of male clients of TSW had been previously diagnosed with HIV infection (data not shown). Among HIV-infected PWID, none were aware of their HIV infection.

TABLE 2. Sociodemographic, Behavioral, and Clinical Characteristics Among Men Aged 18–64 Years by MTSW Status, Kenya AIDS Indicator Survey 2012

	History of MTSW (N = 140)*†		No History of MTSW (N = 4948)*		
Select Characteristic	**Unweighted, n**	**Weighted % (95% CI)**	**Unweighted, n**	**Weighted % (95% CI)**	***P*‡**
Age group, yrs					
18–24	34	20.9 (14.1 to 27.6)	1207	24.5 (22.9 to 26.2)	0.1450
25–34	53	36.3 (27.7 to 44.9)	1491	30.2 (28.6 to 31.7)	
35–44	25	21.7 (12.8 to 30.5)	1051	21.5 (20.2 to 22.8)	
45–54	21	14.6 (7.9 to 21.3)	708	14.1 (13.1 to 15.1)	
55–64	7	6.6 (1.7 to 11.4)	491	9.7 (8.6 to 10.7)	
Marital status					
Never married/never cohabited	52	33.6 (25.4 to 41.9)	1528	30.7 (29.0 to 32.5)	0.2555
Separated/divorced/widowed	8	5.6 (0.9 to 10.4)	259	5.2 (4.4 to 6.0)	
Married/cohabiting	80	60.8 (51.1 to 70.4)	3157	64.0 (62.3 to 65.7)	
Highest educational attainment					
No primary	5	2.6 (0 to 5.8)	358	4.2 (3.2 to 5.3)	0.2096
Incomplete primary	8	4.7 (1.3 to 8.0)	291	5.1 (4.0 to 6.2)	
Complete primary	39	26.8 (19.2 to 34.4)	1560	31.2 (29.2 to 33.2)	
Secondary or higher	88	66.0 (57.3 to 74.7)	2739	59.5 (57.2 to 61.8)	
Residence					
Rural	75	54.6 (43.5 to 65.6)	2954	59.7 (56.8 to 62.6)	0.1451
Urban	65	45.4 (34.4 to 56.5)	1994	40.3 (37.4 to 43.2)	
Received money, gifts, or favors in exchange for sex in the past 12 mo					
No	103	76.0 (68.6 to 83.3)	4948	100	NA
Yes	37	24.0 (16.7 to 31.4)	0	—	
Used a condom the last time received money, gifts, or favors in exchange for sex in the past 12 mo					
No	15	37.0 (19.9 to 54.1)	—	—	NA
Yes	22	63.0 (45.9 to 80.1)	—	—	
Used a condom with most recent sex partner in the past 12 mo					
No	100	73.2 (65.0 to 81.3)	4192	84.4 (83.2 to 85.5)	<0.001
Yes	40	26.8 (18.7 to 35.0)	756	15.6 (14.5 to 16.8)	
Ever engaged in anal sex					
No	132	94.6 (90.6 to 98.7)	4467	98.3 (97.8 to 98.7)	0.0009
Yes	8	5.4 (1.3 to 9.4)	82	1.7 (1.3 to 2.2)	
Ever had sex with a man					
No	137	98.0 (95.5 to 100)	4528	99.5 (99.2 to 99.8)	0.0079
Yes	3	2.0 (0 to 4.5)	22	0.5 (0.2 to 0.8)	
Lifetime number of partners					
1 partner	4	3.6 (0.0 to 7.1)	654	15.2 (13.5 to 16.9)	<0.001
2–3 partners	28	21.2 (13.4 to 29.1)	1346	32.2 (30.5 to 33.9)	
4–5 partners	25	24.9 (16.4 to 33.4)	850	21.3 (19.8 to 22.9)	
6–9 partners	18	13.4 (6.9 to 19.9)	461	11.7 (10.2 to 13.2)	
10+ partners	42	36.9 (26.4 to 47.3)	750	19.6 (17.6 to 21.6)	
HIV risk perception					
No risk	41	36.0 (26.3 to 45.6)	1800	40.2 (37.6 to 42.8)	<0.001
Low risk	47	36.4 (26.4 to 46.4)	2152	46.8 (44.2 to 49.5)	
Moderate risk	27	21.4 (13.2 to 29.6)	373	8.8 (7.7 to 9.8)	
Great risk	10	6.2 (2.3 to 10.1)	175	4.2 (3.4 to 5.0)	
Ever been tested for HIV					
No	35	27.2 (19.2 to 35.2)	1679	34.5 (32.4 to 36.5)	<0.001
Yes	105	72.8 (64.8 to 80.8)	3254	65.5 (63.5 to 67.6)	

(*continued on next page*)

TABLE 2. (*Continued*) Sociodemographic, Behavioral, and Clinical Characteristics Among Men Aged 18–64 Years by MTSW Status, Kenya AIDS Indicator Survey 2012

	History of MTSW (N = 140)*†		No History of MTSW (N = 4948)*		
Select Characteristic	Unweighted, n	Weighted % (95% CI)	Unweighted, n	Weighted % (95% CI)	*P*‡
Self-reported HIV status					
HIV-positive	3	2.8 (0 to 5.9)	88	1.9 (1.4 to 2.4)	<0.001
HIV-negative	95	64.3 (55.2 to 73.5)	3072	61.6 (59.6 to 63.6)	
Never tested or unknown status	42	32.9 (24.5 to 41.3)	1773	36.5 (34.4 to 38.5)	
Laboratory-confirmed HIV test result					
HIV-positive	8	7.6 (1.8 to 13.4)	181	4.7 (3.8 to 5.6)	<0.001
HIV-negative	106	92.4 (86.6 to 98.2)	3978	95.3 (94.4 to 96.2)	

*Among persons who had ever had sex.
†MTSW is not mutually exclusive with PWID, MSM, and male clients of TSW.
‡*P* value based on the Rao–Scott χ^2 test. The number of observations in categories may not equal to total because of missing data.
NA, not applicable.

Males Engaging in Transactional Sex Work

The median age of MTSW was 31.3 years [interquartile range (IQR), 24.9–41.2] compared with the median age of other men at 32.6 years (IQR, 24.9–43.3). One-third (33.6%, 95% CI: 25.4 to 41.9) had never been married or cohabited (Table 2). Among MTSW, 24.0% (95% CI: 16.7 to 31.4) reported engaging in transactional sex in the past 12 months, 5.4% (95% CI: 1.3 to 9.4) reported a lifetime history of anal sex, and 2.0% (95% CI: 0 to 4.5) reported ever having sex with other men. Sixty-three percent (95% CI: 45.9 to 80.1) of MTSW reported that they used a condom the last time they engaged in transactional sex in the past 12 months, and 26.8% (95% CI: 18.7 to 35.0) used a condom with their most recent partner in the past 12 months. Despite low rates of condom use, the majority perceived themselves to be at no (36.0%, 95% CI 26.3 to 45.6) to low (36.4%, 95% CI 26.4 to 46.4) risk of HIV infection. Compared with other men, MTSW were significantly more likely to report higher lifetime number of sexual partners ($P < 0.001$). Over one-third (36.9%) of MTSW reported 10 or more lifetime number of sexual partners, compared to 19.6% of other men. We also found significant differences in the self-perception of risk for HIV among MTSW and other men ($P < 0.001$): 36.4% of MTSW compared with 46.8% of other men perceived that they were at low risk of HIV infection. Furthermore, significant differences were observed in the use of condoms with the most recent sexual partner in the past 12 months (26.8% compared with 15.6%, $P < 0.001$), anal intercourse in the past (5.4% compared with 1.7%, $P = 0.0009$), and a history of sex with other men (2.0% compared with 0.5%, $P = 0.008$) between MTSW and other men, respectively.

Females Engaging in Transactional Sex Work

FTSW were younger than other women, with a median age of 29.0 years (IQR, 23.9–38.2) compared with 32.7 years (IQR, 25.0–43.4) among women without a history of FTSW. Approximately one-half (51.9%, 95% CI: 45.6 to 58.3) of FTSW were married of cohabiting with a partner (Table 3). Among FTSW, 26.9% (95% CI: 21.0 to 32.8) reported engaging in transactional sex in the past 12 months, and the majority perceived themselves to be at no (23.5%, 95% CI: 17.1 to 29.9) to low (31.2%, 95% CI: 24.7 to 37.8) risk of HIV infection. A history of anal sex was reported by 7.5% (95% CI: 3.0 to 11.9) of FTSW. Marital status, lifetime number of sexual partners, and self-perception of HIV risk differed significantly between FTSW and other women ($P < 0.001$). Compared with other women, FTSW were less likely to be married or cohabiting (51.9% compared with 72.7%) but more likely to be separated, divorced, or widowed (25.1% compared with 13.6%), report 10 or more lifetime number of sexual partners (8.1% compared with 0.9%), and report that their risk for HIV was great (13.6% compared with 5.5%), respectively. Additionally, FTSW were more likely to report a history of anal intercourse (7.5% compared with 1.7%, $P < 0.001$) and condom use with their most recent sexual partner in the past 12 months (18.4% compared with 8.7%, $P < 0.001$) than other women, respectively.

Male Clients of Persons Who Engaged in Transactional Sex Work

The median age of male clients of TSW (34.2 years; IQR, 26.3–46.7) was higher than the median age of other men (32.4 years; IQR, 24.8, 43.0). Over one-quarter (26.8%, 95% CI: 23.4 to 30.3) had never been married or cohabited (Table 4). Overall, 27.3% (95% CI: 23.1 to 31.5) reported having a transactional sex partner in the past 12 months. Of those, 65.9% (95% CI: 59.2 to 72.5) reported that they used a condom the last time they had sex with a transactional sex partner. Male clients of TSW differed significantly from other men with respect to marital status ($P < 0.001$): 10.4% of male clients of TSW reported being separated, divorced, or widowed compared with 4.5% of other men; lifetime number of sex partners ($P < 0.001$): 39.2% of male clients of TSW reported 10 or more lifetime number of partners compared with 16.3% of other men; and self-perception of HIV risk ($P < 0.001$): 21.4% of male clients of TSW reported having a moderate to great risk for HIV compared with 12.4% of other men.

Females Engaging in Anal Sex

The median age of FAS was 30.3 years (IQR, 24.0–42.4) compared with 32.6 years (IQR, 24.9–43.3) among women who

TABLE 3. Sociodemographic, Behavioral, and Clinical Characteristics Among Women Aged 18–64 Years by FTSW Status, Kenya AIDS Indicator Survey 2012

	History of FTSW (N = 278)*†		No History of FTSW (N = 6467)*		
Select Characteristic	**Unweighted, n**	**Weighted % (95% CI)**	**Unweighted, n**	**Weighted % (95% CI)**	***P*‡**
Age group, yrs					
18–24	84	30.9 (24.8 to 36.9)	1456	22.6 (21.3 to 24.0)	0.0013
25–34	82	28.5 (22.8 to 34.3)	2152	33.5 (32.0 to 35.0)	
35–44	70	26.1 (20.2 to 32.0)	1395	21.4 (20.2 to 22.5)	
45–54	31	10.9 (7.3 to 14.5)	923	14.3 (13.3 to 15.3)	
55–64	11	3.6 (1.2 to 5.9)	541	8.2 (7.4 to 9.0)	
Marital status					
Never married/never cohabited	62	22.9 (17.8 to 28.1)	866	13.7 (12.3 to 15.0)	<0.001
Separated/divorced/widowed	70	25.1 (19.1 to 31.1)	896	13.6 (12.6 to 14.6)	
Married/cohabiting	146	51.9 (45.6 to 58.3)	4704	72.7 (71.2 to 74.2)	
Highest educational attainment					
No primary	28	7.9 (4.2 to 11.6)	1071	11.5 (9.6 to 13.4)	0.0185
Incomplete primary	22	7.0 (4.0 to 10.1)	492	7.4 (6.3 to 8.6)	
Complete primary	98	36.8 (30.3 to 43.3)	1901	31.5 (29.6 to 33.4)	
Secondary or higher	130	48.2 (41.1 to 55.4)	3003	49.6 (47.4 to 51.7)	
Residence					
Rural	154	54.2 (46.2 to 62.3)	4130	64.3 (61.9 to 66.7)	0.0037
Urban	124	45.8 (37.7 to 53.8)	2337	35.7 (33.3 to 38.1)	
Received money, gifts, or favors in exchange for sex in the past 12 mo					
No	206	73.1 (67.2 to 79.0)	6467	100	NA
Yes	72	26.9 (21.0 to 32.8)	0	—	
Used a condom the last time received money, gifts, or favors in exchange for sex in the past 12 mo					
No	38	53.2 (41.7 to 64.8)	—	—	NA
Yes	34	46.8 (35.2 to 58.3)	—	—	
Used a condom with most recent sex partner in the past 12 mo					
No	228	81.6 (76.5 to 86.8)	5925	91.3 (90.3 to 92.2)	<0.001
Yes	50	18.4 (13.2 to 23.5)	542	8.7 (7.8 to 9.7)	
Ever engaged in anal sex					
No	260	92.5 (88.1 to 97.0)	6364	98.3 (97.8 to 98.9)	<0.001
Yes	18	7.5 (3.0 to 11.9)	100	1.7 (1.1 to 2.2)	
Lifetime number of partners					
1 partner	40	14.5 (9.8 to 19.2)	2980	45.6 (43.7 to 47.6)	<0.001
2–3 partners	116	44.2 (37.5 to 51.0)	2581	43.1 (41.3 to 44.8)	
4–5 partners	63	24.4 (19.5 to 29.3)	509	8.8 (7.9 to 9.7)	
6–9 partners	19	8.8 (4.5 to 13.1)	91	1.5 (1.2 to 1.9)	
10+ partners	22	8.1 (4.3 to 11.8)	56	0.9 (0.7 to 1.2)	
HIV risk perception					
No risk	56	23.5 (17.1 to 29.9)	2099	39.0 (36.6 to 41.5)	<0.001
Low risk	70	31.2 (24.7 to 37.8)	2187	43.6 (41.0 to 46.3)	
Moderate risk	66	31.7 (24.8 to 38.5)	646	11.8 (10.4 to 13.2)	
Great risk	29	13.6 (8.7 to 18.4)	253	5.5 (4.6 to 6.4)	
Ever been tested for HIV					
No	36	12.1 (8.0 to 16.2)	969	14.5 (13.1 to 15.9)	0.2502
Yes	241	87.9 (83.8 to 92.0)	5477	85.5 (84.1 to 86.9)	
Self-reported HIV status					
HIV-positive	20	6.4 (3.2 to 9.6)	242	4.0 (3.3 to 4.7)	<0.001
HIV-negative	217	79.9 (74.7 to 85.0)	5112	79.5 (78.0 to 80.9)	
Never tested or unknown status	41	13.7 (9.5 to 18.0)	1104	16.5 (15.1 to 18.0)	

(*continued on next page*)

TABLE 3. (*Continued*) Sociodemographic, Behavioral, and Clinical Characteristics Among Women Aged 18–64 Years by FTSW Status, Kenya AIDS Indicator Survey 2012

Select Characteristic	History of FTSW (N = 278)*†		No History of FTSW (N = 6467)*		P‡
	Unweighted, n	Weighted % (95% CI)	Unweighted, n	Weighted % (95% CI)	
Laboratory-confirmed HIV test result					
HIV-positive	28	12.1 (7.1 to 17.1)	415	7.6 (6.6 to 8.6)	<0.001
HIV-negative	210	87.9 (82.9 to 92.9)	5144	92.4 (91.4 to 93.4)	

*Among persons who have ever had sex.
†FTSW is not mutually exclusive with PWID and FAS.
‡*P* value based on the Rao–Scott χ^2 test. The number of observations in categories may not equal to total because of missing data.
NA, not applicable.

never had anal sex. Three-quarters (74.9%, 95% CI: 67.3 to 82.5) of FAS were married or cohabiting with a partner. Among FAS, 31.8% (95% CI: 22.1 to 41.5) reported engaging in anal sex in the past 12 months (Table 5). Overall, 13.2% (95% CI: 5.2 to 21.2) of FAS had used a condom with their last sexual partner; 16.4% (95% CI: 8.7 to 24.0) reported a history of transactional sex work. Over 40% of FAS (41.3%, 95% CI: 31.5 to 51.2%) reported that they had low risk for HIV infection. Compared with other women, FAS were more likely to have ever engaged in transactional sex work (16.4% compared with 3.9%, $P < 0.001$) and report higher numbers of lifetime partners ($P < 0.001$), respectively. FAS had significantly different self-perceptions of HIV risk compared with other women ($P < 0.001$). While 40.6% reported a moderate to high self-perceived risk for HIV, only 17.9% of other women perceived themselves to have the same level of HIV risk.

DISCUSSION

This is the first study to provide national estimates of key and other high-risk populations in sub-Saharan Africa using data collected from a national population-based household survey. The estimated population sizes derived in this analysis were consistent with the Kenya Ministry of Health 2012 population size consensus estimates of key populations, which were based on a synthesis of available programmatic and surveillance data in the country.[15]

Our findings suggest that while the sizes of high-risk populations may be small, their contribution to the HIV epidemic is important. The estimated HIV prevalence among most high-risk populations was high, up to 1.8 times as high as among women and up to 2.8 times as high as among men in the general population.[1] Still, the prevalence ratios for MSM and transactional sex were lower than those reported elsewhere, likely because our analysis was based on lifetime characteristics,[16,17] Although it has been estimated elsewhere that 1.9% of the adult male population in sub-Saharan Africa are MSM[18] we found that less than 1% of the male adult population reported lifetime male-to-male sex behavior. Furthermore, only 2% of MTSW reported MSM behavior. Although this is roughly 4 times as high as observed among other men, it is lower than men who engage in commercial sex work in Kenya.[19] Our survey instrument did not collect information to determine whether partners of MTSW were women or men and whether money, as opposed to gifts or goods, were exchanged during sexual transactions. However, we suspect that some MTS were men who engaged in sexual transactions with other men based on the proportion that reported anal sex in the survey. While 98% of MTS denied a history of having sex with other men, 5.4% reported a history of anal intercourse compared with only 1.9% of women. The discrepancy in the prevalence of anal sex among men and women suggests potential reporting bias, where MTS may have been reluctant to self-report on same sex relations because of stigmatization of this behavior in Kenya.

Women who had been divorced, separated, or widowed were more likely to report a history of transactional sex. In Kenya's traditional culture, where most women depend on their male partners for financial support, the loss of a marital partnership may drive women to seek other means to quickly finance their livelihood. Programs aimed to address transactional sex should focus on understanding the cultural, social, and economic contexts that influence HIV risk and seek practical approaches for addressing HIV vulnerability, particularly for women. Promising interventions include those aimed to empower women to become self-sufficient in their economic circumstances, including microfinance opportunities and cash incentive programs, to lower the risk of becoming economically disadvantaged and relying on sexuality for survival.

Our survey findings highlight the need for expanded education campaigns to improve awareness of high-risk sexual behaviors such as anal intercourse. Although few women in our study reported ever having had anal intercourse, HIV prevalence among women who engaged in this behavior was 1.6 times as high as women who had never engaged in anal intercourse in their lifetime. Our data indicate that anal intercourse is not an exclusive practice among females who engage in transactional sex, as commonly perceived, but is also occurring among women in the general population. Anal intercourse among women is rarely discussed in HIV prevention despite evidence that shows the risk of HIV infection from unprotected anal intercourse among women can range from 20 to over 500 times as great as the risk from unprotected vaginal intercourse.[20,21] Key messages on the elevated risk of HIV acquisition among persons who engage in unprotected anal intercourse should be included in

TABLE 4. Sociodemographic, Behavioral, and Clinical Characteristics Among Men Aged 18–64 Years by Client of TSW Status, Kenya AIDS Indicator Survey 2012

	Male Client of TSW (N = 779)*†		Not a Male Client of TSW (N = 3889)*		
Select Characteristic	**Unweighted, n**	**Weighted % (95% CI)**	**Unweighted, n**	**Weighted % (95% CI)**	***P*‡**
Age group, yrs					
18–24	140	16.3 (13.4 to 19.1)	759	20.6 (18.9 to 22.3)	0.5188
25–34	254	33.1 (29.9 to 36.2)	1236	31.4 (29.6 to 33.2)	
35–44	167	22.5 (19.4 to 25.6)	900	23.2 (21.7 to 24.7)	
45–54	130	16.0 (13.2 to 18.7)	592	15.0 (13.7 to 16.2)	
55–64	88	12.2 (9.5 to 14.9)	402	9.8 (8.6 to 11.0)	
Marital status					
Never married/never cohabited	217	26.8 (23.4 to 30.3)	973	25.5 (23.8 to 27.2)	<0.001
Separated/divorced/widowed	77	10.4 (7.9 to 13.0)	186	4.5 (3.7 to 5.3)	
Married/cohabiting	485	62.8 (58.8 to 66.7)	2728	70.0 (68.2 to 71.7)	
Highest educational attainment					
No primary	32	3.5 (1.7 to 5.2)	303	4.5 (3.3 to 5.6)	0.0018
Incomplete primary	38	4.6 (3.0 to 6.2)	225	5.2 (3.9 to 6.4)	
Complete primary	247	31.4 (27.8 to 35.1)	1206	30.6 (28.5 to 32.7)	
Secondary or higher	462	60.5 (56.4 to 64.5)	2155	59.7 (57.3 to 62.1)	
Residence					
Rural	470	60.8 (54.7 to 66.9)	2285	58.7 (55.7 to 61.8)	0.4136
Urban	309	39.2 (33.1 to 45.3)	1604	41.3 (38.2 to 44.3)	
Gave money, gifts, or favors in exchange for sex in the past 12 mo					
No	565	72.7 (68.5 to 76.9)	3889	100	NA
Yes	214	27.3 (23.1 to 31.5)	0	—	
Used a condom the last time gave money, gifts, or favors in exchange for sex in the past 12 mo					
No	71	34.1 (27.5 to 40.8)	—	—	NA
Yes	142	65.9 (59.2 to 72.5)	—	—	
Used a condom with most recent sexual partner in the past 12 mo					
No	601	77.9 (74.4 to 81.4)	3271	83.8 (82.5 to 85.1)	<0.001
Yes	178	22.1 (18.6 to 25.6)	618	16.2 (14.9 to 17.5)	
Lifetime number of partners					
1 partner	20	2.9 (1.4 to 4.5)	638	17.3 (15.4 to 19.2)	<0.001
2–3 partners	121	17.2 (14.2 to 20.1)	1253	34.8 (33.1 to 36.6)	
4–5 partners	161	24.4 (20.7 to 28.2)	714	20.8 (19.2 to 22.4)	
6–9 partners	112	16.3 (13.1 to 19.5)	367	10.8 (9.3 to 12.4)	
10+ partners	256	39.2 (34.4 to 44.0)	535	16.3 (14.5 to 18.0)	
HIV risk perception					
No risk	224	33.0 (28.5 to 37.5)	1384	39.1 (36.2 to 42.1)	<0.001
Low risk	318	45.5 (40.7 to 50.3)	1749	48.5 (45.5 to 51.5)	
Moderate risk	94	13.8 (11.0 to 16.6)	291	8.7 (7.5 to 9.8)	
Great risk	52	7.6 (5.4 to 9.8)	125	3.7 (2.8 to 4.6)	
Ever been tested for HIV					
No	245	32.0 (27.9 to 36.1)	1255	32.9 (30.6 to 35.1)	0.6800
Yes	532	68.0 (63.9 to 72.1)	2629	67.1 (64.9 to 69.4)	
Self-reported HIV status					
HIV-positive	32	4.1 (2.6 to 5.7)	57	1.6 (1.1 to 2.2)	0.3315
HIV-negative	478	60.8 (56.6 to 65.1)	2504	63.7 (61.5 to 65.9)	
Never tested or unknown status	267	35.0 (30.8 to 39.3)	1323	34.6 (32.4 to 36.9)	
Laboratory-confirmed HIV test result					
HIV-positive	48	7.1 (4.8 to 9.4)	141	4.7 (3.7 to 5.7)	0.0012
HIV-negative	615	92.9 (90.6 to 95.2)	3119	95.3 (94.3 to 96.3)	

*Among persons who had ever had sex.
†Male client of TSW is not mutually exclusive with PWID, MSM, and MTSW.
‡*P* value based on the Rao–Scott χ^2 test. The number of observations in categories may not equal to total because of missing data.
NA, not applicable.

TABLE 5. Sociodemographic, Behavioral, and Clinical Characteristics Among Women Aged 18–64 Years by Lifetime History of Anal Sex, Kenya AIDS Indicator Survey 2012

	History of Anal Sex (N = 118)*†		No History of Anal Sex (N = 6702)*		
Select Characteristic	**Unweighted, n**	**Weighted % (95% CI)**	**Unweighted, n**	**Weighted % (95% CI)**	***P*‡**
Age group, yrs					
18–24	27	25.1 (15.4 to 34.8)	1527	22.9 (21.6 to 24.1)	0.2247
25–34	40	31.4 (22.9 to 39.8)	2216	33.2 (31.8 to 34.7)	
35–44	28	24.7 (17.5 to 31.9)	1458	21.5 (20.4 to 22.7)	
45–54	20	16.3 (8.9 to 23.7)	941	14.1 (13.2 to 15.1)	
55–64	3	2.6 (0.0 to 5.6)	560	8.2 (7.4 to 9.0)	
Marital status					
Never married/never cohabited	16	11.8 (5.6 to 18.0)	923	14.1 (12.8 to 15.4)	0.8576
Separated/divorced/widowed	15	13.3 (5.4 to 21.2)	968	14.2 (13.2 to 15.3)	
Married/cohabiting	87	74.9 (67.3 to 82.5)	4810	71.7 (70.1 to 73.2)	
Highest educational attainment					
No primary	7	4.3 (1.1 to 7.4)	1138	11.9 (9.9 to 13.9)	0.0131
Incomplete primary	10	6.8 (1.2 to 12.5)	513	7.5 (6.3 to 8.6)	
Complete primary	43	37.3 (28.8 to 45.9)	1967	31.5 (29.6 to 33.3)	
Secondary or higher	58	51.6 (42.8 to 60.4)	3084	49.2 (47.1 to 51.3)	
Residence					
Rural	69	56.5 (40.7 to 72.3)	4268	64.1 (61.7 to 66.4)	0.2438
Urban	49	43.5 (27.7 to 59.3)	2434	35.9 (33.6 to 38.3)	
Engaged in anal sex in the past 12 mo					
No	81	68.2 (58.5 to 77.9)	6702	100	NA
Yes	37	31.8 (22.1 to 41.5)	0	—	
Used a condom with most recent sexual partner in the past 12 mo					
No	102	86.8 (78.8 to 94.8)	6126	91.0 (90.1 to 92.0)	0.0576
Yes	16	13.2 (5.2 to 21.2)	576	9.0 (8.0 to 9.9)	
Ever received money, gifts, or favors in exchange for sex					
No	100	83.6 (76.0 to 91.3)	6364	96.1 (95.5 to 96.7)	<0.001
Yes	18	16.4 (8.7 to 24.0)	260	3.9 (3.3 to 4.5)	
Lifetime number of partners					
1 partner	30	25.3 (16.1 to 34.6)	2994	44.8 (42.8 to 46.7)	<0.001
2–3 partners	53	51.4 (42.4 to 60.4)	2643	42.9 (41.2 to 44.6)	
4–5 partners	22	14.7 (8.4 to 21.0)	550	9.4 (8.5 to 10.3)	
6–9 partners	5	5.0 (1.2 to 8.8)	106	1.8 (1.4 to 2.2)	
10+ partners	4	3.5 (0.1 to 6.9)	74	1.2 (0.9 to 1.5)	
HIV risk perception					
No risk	21	18.1 (8.8 to 27.4)	2151	38.8 (36.4 to 41.2)	<0.001
Low risk	42	41.3 (31.5 to 51.2)	2246	43.2 (40.6 to 45.8)	
Moderate risk	24	24.8 (13.5 to 36.0)	690	12.3 (10.9 to 13.7)	
Great risk	13	15.8 (7.5 to 24.1)	271	5.6 (4.8 to 6.5)	
Ever been tested for HIV					
No	12	9.2 (3.8 to 14.6)	1014	14.6 (13.2 to 16.1)	<0.001
Yes	106	90.8 (85.4 to 96.2)	5664	85.4 (83.9 to 86.8)	
Self-reported HIV status					
HIV-positive	5	4.2 (0.4 to 8.1)	258	4.1 (3.4 to 4.7)	0.2075
HIV-negative	100	86.4 (79.9 to 92.8)	5278	79.2 (77.8 to 80.6)	
Never tested or unknown status	13	9.4 (4.0 to 14.8)	1155	16.7 (15.3 to 18.2)	
Laboratory-confirmed HIV test result					
HIV-positive	11	12.1 (5.0 to 19.2)	434	7.7 (6.7 to 8.6)	0.3192
HIV-negative	98	87.9 (80.8 to 95.0)	5321	92.3 (91.4 to 93.3)	

*Among persons who had ever had sex.
†FAS is not mutually exclusive with FTSW and PWID.
‡*P* value based on the Rao–Scott χ^2 test. The number of observations in categories may not equal to total because of missing data.
NA, not applicable.

the minimum package for HIV prevention for high-risk population and general population members.

Although condom use was higher among high-risk groups compared with their referent groups, the level of condom use was low with their sexual partners, with only 13%–27% of high-risk population members reporting condom use with their most recent sexual partner in the past 12 months. We found that condom use was higher in the context of transactional sex with 47% of FTSW, 63% of MTSW, and 66% of male clients of TSW reporting that they used a condom with their last transactional sex partner in the past year. Still these levels were not optimal given that consistent condom use is needed to prevent HIV infection in high-risk situations. The low rates of condom use observed may be influenced by the low level of self-perceived risk we also observed in our study, where the majority of high-risk population members reported that they were at no to low risk for HIV.[22] Different findings regarding self-perceived risk were reported in a population-based study of active female sex workers in Nairobi, where self-perceived risk for HIV was great, yet condom use remained low with all sexual partners.[23]

We found that high-risk population members who were HIV infected were generally unaware of their HIV infection. Coupled with unsafe risk behavior, such as inconsistent condom use and high numbers of sexual partners, incorrect knowledge of HIV-positive status among HIV-infected members of high-risk groups presents a dangerous potential for rapid transmission of HIV to sexual partners. Efforts are therefore needed to help establish routine access to HIV testing for high-risk populations through targeted and tailored programs that also facilitate early linkages to care and treatment services.

This analysis of high-risk populations in Kenya was not without limitations. We present results from bivariate analyses and did not control for factors that may have confounded our observed associations or masked potential associations. Our definition of transactional sex was not limited to the monetary exchange for sex, but included broader elements of sexual transactions, such as gifts and favors. These exchanges represent aspects of more heterogenous sexual relationships compared with commercial sex relationships, which rely specifically on financial gain.[24] Transactional sex partnerships tend to last longer than commercial relationships, tend toward intergenerational relationships, and the exchange of gifts and favors is often viewed as symbols of love and respect. Although persons engaging in transactional sex can be at high-risk for HIV infection,[25,26] these findings should not be generalized to men and women who exclusively practice formal sex work for monetary gain.

Populations with high-risk characteristics are less likely to be included in the sampling frame of a household survey. Therefore, the number of high-risk population members identified in this study was small, resulting in lack of precision in some of the estimates presented. Because of the small numbers, it was not possible to describe the geographical distribution of high-risk population members nor were we able to characterize MSM and PWID beyond a few limited indicators. Therefore careful consideration should be used when interpreting these findings as estimates may not be reliable or generalizable due to the small sample size. The small number of affirmative responses to the high-risk behaviors of interest mandated that our data analysis be based primarily on lifetime behaviors rather than behaviors during the preceding 12 months. Because of this, high-risk population members in this analysis may have characteristics that are reflective of those expected in the general population, such as higher rates of HIV testing. The much smaller numbers of affirmative responses for high-risk behaviors in the preceding 12 months suggest reluctance to report illegal and stigmatized behaviors and selection bias, leading to the likely exclusion of population members who were actively engaged in high-risk behavior. Because of this limitation, the estimated national population sizes for high-risk populations analyzed are likely to be underestimated and should be considered as lower plausible bounds for these groups.

For the first time in a national survey in Kenya, we asked sensitive questions on anal intercourse, transactional sex, and illicit drug use. None of the survey teams reported that respondents ended their interviews because such sensitive questions were asked. With high-risk populations potentially contributing substantially to new HIV infections in Kenya,[3] the reduction of risky behaviors in these groups has been defined as a priority area in the Kenyan HIV response.[5] To fully understand the epidemiology of HIV and coverage of HIV prevention, care, and treatment programs among populations with high-risk characteristics, we recommend that targeted and routine surveillance approaches be designed to reach hidden and vulnerable populations at high-risk for HIV.[27] Nonetheless, national data on high-risk populations provide important public health information that can complement targeted surveillance efforts to evaluate the impact and reach of current services for high-risk populations, baseline levels of risk behaviors, and the burden and awareness of HIV infection in these groups. With the current Kenya National AIDS Strategic Plan ending, these data will inform the new 5-year national strategic vision for planning, implementing, and monitoring HIV prevention, care, and treatment programs among key and other high-risk populations to help achieve an AIDS-free generation in Kenya.

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