HIV Risk Behaviors in Sub-Saharan Africa and Northern Thailand: Baseline Behavioral Data from Project Accept

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Abstract

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Background—Of 2.5 million new HIV infections worldwide in 2007, most occurred in Sub-Saharan Africa and Southeast Asia. We present the baseline data on HIV risk behaviors and HIV testing in Sub-Saharan Africa and northern Thailand from Project Accept, a community-randomized controlled trial of community mobilization, mobile voluntary counseling and testing (VCT), and post-test support services.

Methods—A random household probability sample of individuals aged 18–32 years yielded a sample of 14,657 with response rates ranging from 84–94% across the five sites (Thailand, Zimbabwe, Tanzania and two in South Africa). Individuals completed an interviewer-administered survey on demographic characteristics, HIV risk behaviors and history of VCT.

Results—In multivariate analysis, females, married individuals, less educated with one sexual partner in the past 6 months were more likely to have had unprotected intercourse in the previous 6 months. Rates of lifetime HIV testing ranged from 5.4% among males in Zimbabwe to 52.6% among females in Soweto.

Conclusion—Significant risk of HIV acquisition in Project Accept communities exists despite two decades of prevention efforts. Low levels of recent HIV testing suggest that increasing awareness of HIV status through accessible VCT services may reduce HIV transmission.

INTRODUCTION

In 2007 there were approximately 2.5 million new HIV infections worldwide, with a significant burden in Sub-Saharan Africa and Southeast Asia {{1503 UNAIDS 2007;}}. The generalized epidemic in Sub-Saharan Africa continues to spread mainly through heterosexual transmission {{1342 Buve, A. 2002; 1355 Malamba, S.S. 1994;}}. Research in Sub-Saharan Africa and Asia has shown that marriage is a significant risk factor for HIV transmission for women due to the risk profiles of their male partners {{392 Clark, S. 2004; 255 Bhattacharya, G. 2004; 256 Xu, F. 2000;1331 Newmann, S. 2000; 1328 Allen, S. 1991; 1357 Nunn, A.J. 1994; 1363 Glynn, J.R. 2001;}}.

Increased HIV risk among partnered women results primarily from inconsistent condom use within regular partnerships as well as the behaviors of their regular male partners, including males' concurrent sexual relationships and infrequent condom use in primary and non-primary relationships {{257 Munguti, K. 1997; 393 Kimuna, S. 2005;}}. Concurrent partnerships create interconnected sexual networks and inconsistent condom use within regular and non-regular partnerships that increase the risk of HIV transmission, especially in high prevalence regions {{998 Halperin, D.T. 2004;}}. Densely connected sexual networks pose greater risks in populations where few individuals infected with HIV are aware of their infection.

Recent research in the US suggests that those unaware of their HIV infection are over three times more likely to sexually transmit HIV than those who are aware of their infection {{1321 Marks, G. 2006;}}. Voluntary counseling and testing (VCT) has been shown to be an effective means of encouraging reductions in sexual risk behaviors in developing countries when accompanied by high quality risk reduction counseling {{409 The Voluntary HIV-1 Counseling and Testing Efficacy Study Group 2000; 261 Allen, S. 2003; 1366 Kamenga, M. 1991;}}.

Project Accept is a community-randomized controlled trial to determine the effectiveness of community-based VCT delivered at the community-level in four sites in three southern African countries with generalized HIV/AIDS epidemics, and one site in northern Thailand which has a concentrated epidemic. A key goal of the intervention is to facilitate large proportions of the sexually active population to learn their HIV infection status, and the project aims to reach at least 40% of persons 18–32 years with HIV VCT in intervention communities. Project Accept will be evaluated using a representative population-based random sample from each

community to assess recent HIV infection and secondary outcomes of sexual risk and community attitudes towards HIV prevention and HIV/AIDS-related stigma.

This paper presents the methods and results from the baseline survey of the five Project Accept sites, focusing on individual-level sexual risk behaviors and prior HIV testing histories; additional results from the survey will be reported elsewhere. The Project Accept baseline survey assessed demographic characteristics, sexual behaviors, and history of prior VCT from a representative sample of community members prior to the start of the intervention in 48 pair-matched communities. A comparable assessment will be repeated following the conclusion of the three-year intervention period in both intervention and control communities to assess the primary and secondary outcomes of the trial.

We explored sexual risk behaviors and HIV testing histories by sex to examine the differential HIV risk profiles within each country. In addition, we determined the socio-demographic and sexual risk factors related to condom use within the past six months by sex across the five research sites in an attempt to determine the main risks for heterosexual HIV transmission in these samples from the general population.

METHODS

Study Settings

The Project Accept baseline survey was conducted in five study sites: Chiang Mai Province, Thailand; Mutoko District, Mashonaland East Province, Zimbabwe; Kisarawe District in Pwani Region of Tanzania; Vulindlela (KwaZulu Natal Province) and Soweto (Gauteng Province), South Africa. Thirty-six African communities (8 communities in Zimbabwe, Vulindlela and Soweto; 10 communities in Tanzania) and 14 Thai communities participated. The communities have population sizes ranging from 5,000–10,000 (15,000–20,000 in the high-density urban area of Soweto). Pairs of intervention and comparison communities were selected to be culturally and economically similar and socially coherent in terms of familiarity and connectedness {{401 Shaffer, C. 1993; 402 MacQueen, K.M. 2001;}}, but sufficiently distant or topographically separated to allow little cross-contamination of the project intervention activities.

Chiang Mai, Thailand

Six districts in Chiang Mai province (Mae-tang, Chiang Dao, Chai Prakarn, Praow, Mae-Ai, and Fang) were selected as the research sites for Project Accept. With a total population of 467,225 {{1351 Thailand Department of National Statistics;}}, the districts are located near the northern border with Burma. The region is mountainous and home to lowland Thais as well as many ethnic minorities including Lahu, Karen, Hmong, Lisu, Yao, and Burmese immigrants (Shan), groups who differ in terms of geographic origin and language, as well as HIV rates, behavioral risks, and awareness of HIV/AIDS. In the 1990's northern Thailand experienced an earlier and more severe HIV epidemic than other regions of the country. While the region represents only 12% of the national population, the upper north accounted for 24.7% of AIDS cases in Thailand from 1984 to 2006 {{1370 Thailand Ministry of Public Health;}}.

Mutoko, Zimbabwe

Project Accept is located in Mutoko, a rural district in Mashonaland East Province of Zimbabwe, situated approximately 150 km northeast of the capital city Harare. Mutoko District has 29 administrative wards with a total population of approximately 130,000. Zimbabwe is experiencing one of the world's most severe HIV/AIDS epidemics. Recent HIV sentinel surveillance in antenatal care (ANC) clinics in Zimbabwe showed a gradual increase in adult HIV/AIDS prevalence from less than 1% in 1986 to a peak of 29% during 1995 to 1997 {{1350

Health Information and Surveillance Unit, Department of Disease Prevention and Control, AIDS & TB Programme 2005;}}. Since the late 1990s, the HIV prevalence has been gradually declining in Zimbabwe, dropping to an estimated adult prevalence of 20.1% in 2006 {{406 UNAIDS December 2006;}} with a current prevalence among adults estimated at 16% {{1531 UNGASS 2008;}}.

Kisarawe, Tanzania

Kisarawe District is located in Pwani Region, located west of Dar es Salaam and adjacent to a major east-west transit route. The study area is largely agricultural with a total population around 160,000. Despite the cultural and language diversity of Tanzania, persons residing in Kisaware are culturally homogeneous and are almost exclusively from the Zaromo tribe. The language is nearly exclusively Kiswahili and the population is largely Muslim. In 2003–4 the prevalence of HIV among adults aged 15–49 in the Pwani region was estimated to be between 6.9–10% {{1349 Tanzania Commission for AIDS (TACAIDS);}}.

Vulindlela, South Africa

Vulindlela is situated about 90 km from Durban and 20 km from Pietermaritzburg in KwaZulu-Natal Province. It has a total population of approximately 553,000, and encompasses both semi-rural and rural communities. Extended families reside together in homesteads scattered across tribal land. Each homestead typically has a number of family households clustered together with a single authority recognized as the head of the household. South Africa faces one of the most severe HIV/AIDS epidemics in the world, with the highest prevalence being found in KwaZulu-Natal province. In 2005, the HIV prevalence among pregnant women attending ANC in KwaZulu-Natal was 39.1% {{1347 South African Department of Health 2006;}}.

Soweto, South Africa

Soweto, an urban African township located in Gauteng Province, is situated 15 km southwest of Johannesburg, with a population estimated as 1 million people living in an area of nearly 63 square km. Soweto is a culturally diverse environment, with substantial in-migration. Although the people living in the communities being studied are all Black Africans, the majority being South African citizens, they have diverse cultural and geographic origins. Soweto is home to nearly 40 townships, each with populations of 50,000–300,000. In 2004, 14.7% of people living in Gauteng Province were infected with HIV {{1346 Shisana, O. 2004;}}. In 2005, the HIV prevalence among pregnant women attending government ANC services was 32.4% {{1347 South African Department of Health 2006;}}.

Instrument Design

Survey questions were designed collaboratively with all sites, and when possible, drawn from instruments that have been previously used in similar settings {{403 Grinstead, O.A. 2001; 404 NIMH Collaborative HIV/STD Prevention Trial Group 2007;}}. Surveys were translated from English into the appropriate local language(s), back-translated by an independent translator and verified for accuracy. Drafts of the instrument were pilot tested at each site using convenience samples (ranging from 25–100 respondents). The survey included questions on demographic characteristics, sexual behaviors, alcohol and substance use, communication regarding HIV/AIDS, perceptions of HIV stigma and discrimination, and HIV testing history and disclosure of test results.

Ethical Review

The baseline study was approved by ethical review committees for each site: The Johns Hopkins Bloomberg School of Public Health (Thailand and Tanzania), Chiang Mai University Research Institute for Health Sciences (Thailand) and Ministry of Public Health (Thailand);

Muhimbili University College of Health Sciences (Tanzania), The Medical College of South Carolina (Tanzania), The National Institute of Medical Research (Tanzania), The University of California at Los Angeles, South General IRB (South Africa), The University of the Witwatersrand Human (South Africa), The University of California, San Francisco (Zimbabwe), and The Medical Research Council of Zimbabwe (Zimbabwe).

Sampling

The multi-stage sampling strategy utilized an enumeration of all households in each community. The methods of the enumeration varied by site and included door-to-door censuses (Thailand, Zimbabwe), mapping with Global Positioning Satellite devices (Tanzania) and aerial photography (South Africa). To take into account cultural variation in household composition and characterization, sites created definitions of what constituted a household for the purposes of this study. Households were randomly ordered and selected in batches of a pre-specified size. All households within a batch were visited by interview teams until the target sample sizes were reached and all household in the batch visited (200 per community in Thailand; 300 in Africa).

All members of selected households were enumerated using standardized methods. An adult who lived in the household was asked to list all members of the household if they met two criteria for residency: 1) the individual had lived in the household for more than 4-months during the past year; and 2) during this time, the individual slept in the household at least 2 nights during the week. These residency criteria were established to capture community members who may spend some time outside of the community, such as migrant workers or students, who we believe may be important for HIV transmission pathways {{1354 Lurie, M. 1997;}}. One eligible household member, who met the residency criteria and was aged 18–32 years, was randomly selected per household using the Kish Grid method {{405 Kish, L. 1965;}}. The interviewer obtained verbal consent for participation and privately administered the survey in the respondent's local language, which took approximately 45–60 minutes to complete. After recruitment goals were reached in each site, communities were assigned to intervention or control arms of the study by random number generation by the Statistical Center at Charles University (Prague, Czech Republic).

Data analysis

Data were analyzed using the software package R {{1499 R Development Core Team 2008;}}. Demographic information, sexual behavior and VCT history are presented by gender for each site. Bivariate and adjusted logistic regression models were estimated for reporting never having used a condom in the previous six months. We investigated the effects of clustering within villages using generalized linear mixed models fitted through penalized quasi-likelihood methods, with similar results to those presented without accounting for clustering (and are not shown). Concurrent partnerships were defined as having reported any sexual activity in the past 30 days with at least two regular (spouse, boy/girlfriend) or non-regular (friend, casual, one-time, commercial sex worker) partners.

RESULTS

Population Estimates and Individual Demographics

Estimates of the population size, number of households in each community, household characteristics, and interview response rates from each site are provided in Table 1. Overall, the household enumeration response rates exceeded 90%, the interview response rates were nearly 85% for all five sites, with low refusals overall. Complete interviews were obtained from 2,992 randomly selected individuals in Thailand; 2,871 in Zimbabwe; 3,065 in Tanzania; 2,588 in Vulindlela, and 3,141 in Soweto, for a total sample size of 14,657. After

randomization, there were no statistically significant differences between intervention and control communities in terms of gender, age, marital status, employment status, household socioeconomic status, usual source of healthcare, and sources of health care used in the past six months (data not shown).

Demographic characteristics are presented by gender and site in Table 2. Just over half of the baseline sample was female in all of the communities (ranging from 52.6% in Thailand to 58.6% in Vulindlela). The mean age of the study subjects ranged from 22.9 years (among males in Tanzania) to 25.8 years (among females in Thailand). Education levels were lower in Tanzania and Thailand, with nearly 95% and 75% of the participants, respectively, reporting less than 10 years of education. A very large percentage of the respondents in both South African sites reported that they were never married, with slightly higher proportions of never married males in both Soweto and Vulindlela. The majority of females in Thailand (68.4%), Zimbabwe (58.9%) and Tanzania (65.5%) reported being married, while the majority of males in these countries were single (50.4%, 67.2% and 66.3%, respectively). Site-specific definitions of socioeconomic status (SES) based on household assets, showed similar distributions of SES by sex within sites.

Sexual Behaviors: Lifetime, Intermediate, Recent

Table 3 provides data on the lifetime, intermediate (6 months) and recent (30 days) sexual behaviors of the study participants by gender and site. Over three-fourths of the samples in each site reported ever having had vaginal sex (from a low of 73% among males in Zimbabwe to a high of 93% among females in Tanzania), with the mean age at first intercourse ranging between 16.5 and 18 years of age among both genders in all sites (Table 4). Younger age at first sex was reported by males in South Africa only. Anal sex was reported in all five sites, generally more frequently by males than females. Lifetime prevalence of anal sex was highest in South Africa (12.5% reported by males in Soweto and 7.7% by females in Vulindlela) and lowest in Zimbabwe and Tanzania. The mean number of lifetime partners was consistently higher among males than females in all five sites, while partner numbers among males were highest in the South Africa sites (8.7 in Soweto, 7.6 in Vulindlela). The two South African sites each had approximately 40% of the males reporting more than 5 lifetime partners. Most women in Thailand and Zimbabwe reported only one lifetime partner, while the majority of men in all sites and the majority of women in South Africa and Tanzania reported between two and five lifetime partners.

In the six months prior to interview (Table 3), females were more likely to report having had any sexual activity, while males had a higher mean number of partners than females across all sites. Males overall were more likely to report having had multiple partners in the past 6 months, but the proportion varied across sites from a low of 7.8% in Thailand to approximately one-third of the males in the African sites. Consistent condom use in the past six months varied by site and sex, with females overall reporting less consistent condom use than males across all sites. Consistent condom use was lowest in Thailand among both males and females. High levels of consistent condom use were reported among males in Zimbabwe, and the most marked gender differences were observed between males and females in Zimbabwe and Tanzania. Consistent condom use was reported most often in South Africa with over 30% of males and females in these sites reporting consistent condom use.

Recent (past 30 days) sexual behaviors showed similar patterns across sites (see Table 3). In the African sites, males were more likely than females to report non-regular partnerships and they more frequently reported consistent condom use with their non-regular partners as compared to their regular partners. African females were less likely than males to report consistent condom use with their regular partners. The levels of consistent condom use among regular partners in the African sites varied from a low of 4.7% among females in Zimbabwe

to a high of 49.3% among men in Soweto. While fewer women than men in Sub-Saharan Africa reported non-regular partners, a smaller proportion reported consistent condom use than males across these four African sites. In Thailand, the large majority of both males and females reported inconsistent condom use with their regular partners. Sexual partner concurrency was higher among males than females in all sites, ranging from a low of 7% in Thailand, to over one-quarter of men in the African sites.

Correlates of Never Using Condoms

In the subset of individuals who reported sexual activity within the past six months, we examined factors associated with reporting never having used a condom during that time. In bivariate analysis, female gender, being married, having fewer than 10 years of education, and having had only one partner were significantly associated with never having used a condom across all sites (Table 4). No use of alcohol in the past 30 days (compared to alcohol use less than weekly or greater than weekly) was associated with unprotected sex in all five sites. Those who had never used illicit drugs (compared with those who had ever used drugs) were more likely to have had unprotected intercourse in the past six months in Thailand.

In multivariate analysis (Table 5), the odds of reporting unprotected sex in the past six months was 1.2 to 2.0 times as high among women (as compared to men) in all four African settings, with statistically significant associations observed in Zimbabwe and Tanzania. In addition, the adjusted OR for unprotected sex among married (as compared to unmarried) individuals ranged from 4.14 in Soweto to 9.15 in Thailand. Having education of less than 10 years was associated in all five sites with higher odds of unprotected intercourse (compared with 10 or more years of education) (OR ranging from 0.78 in Zimbabwe to 0.45 in Soweto). Having only one partner in the previous six months increased the odds for unprotected sex in all five sites. Alcohol and illicit drug use were not associated with condom use in multivariate analysis in any of the five sites.

HIV Testing History

Varying proportions of the samples across the sites reported ever having had a voluntary HIV test in their lifetime (Table 6). Around half of females in Thailand and Soweto reported ever having had an HIV test, while only one-third of males reported a lifetime HIV test. In Tanzania and Vulindlela, approximately 40% of women had ever had an HIV test, while 10% and 16% of men, respectively, had been tested at some point in their lifetime. Zimbabwe had the lowest reported levels of lifetime testing across all of the sites. Lower proportions in each site reported having had an HIV test in the past 12-months, ranging from a high of 31% of women in Soweto to a low of 2.5% of men in Zimbabwe. Fairly large proportions of those individuals who had been tested in each site reported having received their test results (all sites were above 80%) and at least three-fourths in every site reported having disclosed their test results to at least one individual.

DISCUSSION

The data presented on the frequency of HIV risk behavior and prior HIV testing, collected consistently with probability-based sampling among over 14,000 people across five distinct cultural and geographic settings, provide important insights into the current status of HIV risk behavior in several countries severely affected by HIV/AIDS. The high level of sexual risk behaviors presented here exists despite many years of HIV prevention efforts in some sites (e.g., Thailand and South Africa) and points to the need for increased prevention in rural and resource-constrained settings (e.g., Tanzania and Zimbabwe) and in countries currently experiencing national declines in HIV (e.g., Zimbabwe and Thailand).

The data presented here confirm that the sexual risk behaviors of males outside of their regular partnerships may facilitate opportunities for heterosexual HIV transmission to their regular female partners. Males reported higher numbers of lifetime sexual partners and higher frequency of concurrency in sexual partnerships, particularly in the African sites, compared to females. Further while males reported higher consistent condom use with both regular and non-regular partners than females, the levels of consistent use among males in regular partnerships in South Africa were less than 50% and less than 25% in Zimbabwe and Tanzania. While the level of consistent condom use among males in all sites increases with non-regular partners, these data may be limited due to smaller sample sizes reporting sexual activity in the prior 30 days.

While less likely to report concurrent partners, females were less likely than males to report consistent condom use with both regular and non-regular partners across all sites. Gender inequalities in many countries create environments which decrease women's ability to protect themselves through negotiation of safer sexual behaviors {{263 Susser, I. 2000; 394 O'Sullivan, L.F. 2006; 1367 van der Straten, A. 1995;}}, and hence increase their risk within their regular partnerships. The level of behavioral risk observed in this study suggests that given the national HIV prevalence is estimated in Zimbabwe and South Africa to be approximately 20% {{406 UNAIDS December 2006;}} and the lack of consistent condom use by males across concurrent regular and non-regular partnerships, the risk of HIV transmission and acquisition among females within heterosexual partnerships is significant.

With continued high levels of HIV sexual risk behavior among heterosexual populations in high prevalence areas, efforts to increase the proportion of the population who are aware of their HIV infection status are urgently needed. Overall, any lifetime HIV testing was more common among females in all sites, most likely at least partially accounted for by routine testing during ANC. While lifetime HIV testing among males varied across the sites from a low of approximately 5% in Zimbabwe to around one-third in Thailand, having had a recent HIV test was infrequent among both men and women in all sites. HIV testing programs should emphasize the importance of repeat testing as an important HIV prevention strategy. Particularly in Sub-Saharan Africa, where there is substantial unprotected intercourse in concurrent partnerships, the consequences due to the widespread lack of awareness of current HIV status are likely substantial.

We also examined other potential risk factors for HIV acquisition. The rates of anal sex observed among males in Soweto are higher than previously reported in a national survey from South Africa {{1319 Lane, T. 2006;}}. Anal sex is often neglected by prevention programs targeted to the general population, and these data suggest that more attention to the risks of anal sex and same-sex behaviors needs to be addressed in HIV prevention interventions. The low rate of drug use observed in these samples likely reflects the population-based sampling, as illicit drug use, particularly in Sub-Saharan Africa, is quite rarely reported in general populations. While both men and women who never used illicit drugs reported less recent condom use recently in Thailand, neither alcohol nor drug use were associated with condom use in multivariate analysis in all sites.

This study has several limitations. While a random sample of community residents with high survey participation was obtained, there is a chance that those who refused participation or those who were not contacted for participation were different in terms of important risk factors and therefore introduced some limited bias into our study sample. However, many procedures were in place during field work to limit such biases, such as intensive community preparation and involvement prior to data collection to ensure that community members understood the study, and we set rigid requirements for the number of visits to each household (minimum of 2 visits to each household) to allow equal participation for all sampled individuals. Questions

regarding sensitive or illegal topics such as sexual behavior and illicit drug use have the potential for misreporting or underreporting due to social desirability or discomfort, particularly in face-to-face interviews. However surveys were confidential and no identifiable information (such as names and addresses) was collected. Finally, because this is a cross-sectional survey, limited causal or temporal inferences can be drawn from the associations described.

The baseline survey for Project Accept also provided valuable information for the conduct of the community-level trial that is currently underway. By enumerating the individuals who lived in each household, we were able to extrapolate and estimate the structure of the population living in our selected communities. This information has been critical for assessing completion of target coverage for interventions in the study communities. This study is unique in HIV/AIDS prevention research, in that the samples are representative of the population residing in the community, with high enumeration and survey completion rates, and very little missing data. In addition, the large sample sizes in each site ensure that we can evaluate the impact of the intervention on the behavioral (secondary) endpoints with sufficient precision for each study site.

In conclusion, these population-based survey data suggest that significant risk of heterosexual HIV transmission in Project Accept communities exists, despite decades of prevention efforts. While levels of consistent condom use with non-regular partners varied by sex and study site, concurrency of sexual partnerships among males, inconsistent condom use within regular partnerships and low levels of recent HIV testing among both males and females across all sites suggest that increasing awareness of HIV status through the provision of easily accessible VCT services may prove successful in reducing HIV transmission in these contexts. The evaluation of Project Accept should answer this question conclusively.

Acknowledgements

Table 1

Population estimates, household estimates and response rates for household enumeration and interview participation by site

	Chiang Mai, Thailand	Mutoko, Zimbabwe	Kisarawe, Tanzania	Vulindlela, South Africa	Soweto, South Africa
Estimated total site population	102500	76300	54900	66100	152500
Number of communities	14	8	10	8	8
Estimated population per community (range)	5000 – 9200	7800 – 13000	3300 – 7800	6800 – 9300	5500 – 29000
Number of households per community (range)	1751 – 2952	1794 – 2679	864 – 1818	1586 – 2505	1641 – 6760
Number of individuals in each household (median)	3	5	4	4	3
Female (%) in household	50.6	52.8	50.2	54.9	51.8
Age (in yrs) of household members					
0–15 (%)	26.4	43.1	41.3	35.2	27.8
16–24 (%)	9.4	19.7	13.0	20.1	19.1
25–32 (%)	8.3	10.0	10.3	12.3	14.0
33–45 (%)	23.3	11.5	12.5	14.9	19.8
46 + (%)	32.6	15.7	22.9	17.4	19.2
Household Participation					
Total number of households visited by fieldworkers (n)	11050	5116	7028	5490	5090
Non-residential structures/abandoned structures (n) *	795	310	566	675	119
Failure to contact head of household (n)†	78	133	168	241	208
Refusal by head of household (n)	11	92	41	144	129

	Chiang Mai, Thailand	Mutoko, Zimbabwe	Kisarawe, Tanzania	Vulindlela, South Africa	Soweto, South Africa
Households with complete enumeration (n)	10166	4581	6253	4430	4634
Response for enumeration (%)	99.1	95.3	96.8	92.0	93.2
Individual Participation					
Households with eligible persons (n)	3286	3419	3276	3057	3141
Failure to contact selected individual (n)	187	496	128	338	315
Refusal by selected individual (n)	102	49	75	123	163
Partially complete survey (n)	5	3	8	8	8
Complete interview (n)	2992	2871	3065	2588	2655
Interview response (%)	91.1	84.0	93.6	84.7	84.5

*
In Thailand and Zimbabwe, this category includes households were no contact was made with any individual after 3 visits;

†
In Tanzania, Vulindlela and Soweto, this category includes households where no contact was made with any individual after 3 visits; The response rate for the household enumeration was calculated as the proportion of households with a successful enumeration (head of household was identified and agreed to participate) from the number of households that were visited by an interviewer (excluding non-existent or non-residential structures). The interview response rate was calculated as the proportion of complete interviews (excluding refusals, failure to contact and partial interviews) from the number of participating households with at least one eligible household member.

Table 2

Demographic characteristics for all interview respondents in each of five sites by gender

	Chiang Mai, Thailand (n=2,997)		Mutoko, Zimbabwe (n=2,874)		Kisarawe, Tanzania (n=3,073)		Vulindlela, South Africa (n=2,596)		Soweto, South Africa (n=2,663)	
	M	F	M	F	M	F	M	F	M	F
Total, n (%)	1422 (47.4)	1575 (52.6)	1237 (43.0)	1637 (57.0)	1423 (46.3)	1650 (53.7)	1076 (41.4)	1520 (58.6)	1208 (45.4)	1455 (54.6)
Age (mean) in yrs	24.8	25.8	22.9	24.9	24.3	25	23.2	24.2	24.2	24.6
Education, n (%)										
<5 years	348 (24.5)	555 (35.2)	30 (2.4)	47 (2.9)	421 (29.6)	521 (31.6)	29 (2.7)	41 (2.7)	18 (1.5)	8 (0.6)
5–10 years	730 (51.3)	643 (40.8)	483 (39.4)	892 (55.4)	933 (65.6)	1058 (64.2)	413 (38.5)	473 (31.2)	290 (24.2)	246 (16.9)
11–12 years	255 (17.9)	252 (16.0)	629 (51.3)	615 (38.2)	54 (3.8)	49 (3.0)	584 (54.4)	927 (61.2)	743 (62.0)	1014 (69.8)
12+ years	89 (6.3)	125 (7.9)	85 (6.9)	57 (3.5)	15 (1.1)	21 (1.3)	47 (4.4)	74 (4.9)	147 (12.3)	184 (12.7)
Marital Status, n (%)										
Single	716 (50.4)	301 (19.1)	830 (67.2)	390 (23.8)	944 (66.3)	448 (27.2)	1058 (98.5)	1423 (93.7)	1126 (93.3)	1227 (84.3)
Married	618 (43.5)	1078 (68.4)	365 (29.5)	965 (58.9)	406 (28.5)	1081 (65.5)	12 (1.1)	82 (5.4)	72 (6.0)	202 (13.9)
Married living separately	16 (1.1)	113 (7.2)	15 (1.2)	79 (4.8)	7 (0.5)	14 (0.8)	1 (0.1)	6 (0.4)	6 (0.5)	4 (0.3)
Separated	5 (0.4)	6 (0.4)	0 (0.0)	11 (0.7)	19 (1.3)	15 (0.9)	0 (0.0)	2 (0.1)	2 (0.2)	6 (0.4)
Divorced	60 (4.2)	59 (3.7)	21 (1.7)	122 (7.5)	43 (3.0)	76 (4.6)	2 (0.2)	2 (0.1)	1 (0.1)	11 (0.8)
Widowed	7 (0.5)	18 (1.1)	5 (0.4)	70 (4.3)	4 (0.3)	16 (1.0)	1 (0.1)	3 (0.2)	0 (0.0)	5 (0.3)
Earned money for work*, n (%)	1273 (89.5)	1293 (82.1)	742 (60.6)	827 (50.9)	1170 (82.2)	654 (39.6)	620 (57.7)	612 (40.3)	831 (69.0)	907 (62.5)
Household socioeconomic status, n (%)**										
Low	338 (23.9)	457 (29.1)	396 (32.0)	623 (38.1)	541 (38.0)	602 (36.5)	412 (38.3)	547 (36.1)	158 (13.1)	141 (9.7)
Moderate	458 (32.4)	448 (28.6)	679 (54.9)	801 (48.9)	789 (55.4)	898 (54.4)	517 (48.1)	780 (51.4)	712 (59.1)	916 (63.0)
High	617 (43.7)	664 (42.3)	161 (13.0)	213 (13.0)	93 (6.5)	150 (9.1)	146 (13.6)	190 (12.5)	335 (27.8)	397 (27.3)

*
Refers to respondent's earning money from a person, trade, organization or self-employment in the past 12 months;

**
These categories are not comparable across sites as they are site-specific definitions of socioeconomic status

Table 3

Lifetime sexual history and recent sexual behaviors among sexually active respondents (those reporting ever engaging in vaginal or anal sex) aged 18–32 years in five sites by sex

	Chiang Mai, Thailand (n=2,997)		Mutoko, Zimbabwe (n=2,874)		Kisarawe, Tanzania (n=3,073)		Vulindlela, South Africa (n=2,596)		Soweto, South Africa (n=2,663)	
Sex	M	F	M	F	M	F	M	F	M	F
Ever sexually active, n (%)	1092 (76.8)	1304 (83.0)	915 (74.3)	1366 (83.5)	1208 (85.0)	1548 (93.8)	949 (88.8)	1365 (90.1)	1068 (89.4)	1261 (87.2)
Lifetime sexual history[*]										
Ever anal sex, n (%)	52 (4.8)	30 (2.3)	12 (1.3)	27 (2.0)	46 (3.8)	30 (1.9)	63 (6.7)	105 (7.7)	133 (12.5)	126 (10.0)
Age at first sex (mean)	18.1	18.2	18.5	18.4	17.6	17.9	16.6	17.7	16.4	18.2
Number of lifetime sexual partners (mean)	4.1	1.9	3.8	1.5	5.3	2.2	7.6	2.5	8.7	3.5
Number of lifetime sexual partners, n (%)										
1	415 (38.5)	995 (76.8)	234 (25.8)	940 (69.5)	257 (21.3)	685 (44.3)	93 (9.9)	457 (33.8)	109 (10.8)	338 (28.1)
2–5	471 (43.7)	288 (22.2)	525 (57.9)	402 (29.7)	638 (53.0)	808 (52.3)	467 (49.8)	841 (62.2)	478 (47.2)	758 (63.1)
>5	193 (17.9)	13 (1.0)	148 (16.3)	11 (0.8)	309 (25.7)	52 (3.4)	377 (40.2)	54 (4.0)	425 (42.0)	106 (8.8)
Sexually active, past 6 months, n (%)	758 (69.4)	1129 (86.6)	599 (65.9)	1018 (75.1)	730 (60.5)	962 (62.2)	704 (74.6)	1065 (78.3)	770 (73.2)	938 (75.0)
Past six months[†]										
Number of partners, past 6 months (mean)	1.2	1	1.6	1	1.7	1.1	1.6	1	1.6	1.1
Multiple partners, past 6 months, n (%)	59 (7.8)	3 (0.3)	158 (26.5)	23 (2.3)	229 (31.4)	42 (4.4)	226 (32.2)	27 (2.5)	213 (27.9)	33 (3.5)
Number of sexual acts per month (mean)	8.6	7.1	9.6	10.7	7.4	8	5.9	5.2	8.1	8.2

	Chiang Mai, Thailand (n=2,997)		Mutoko, Zimbabwe (n=2,874)		Kisarawe, Tanzania (n=3,073)		Vulindlela, South Africa (n=2,596)		Soweto, South Africa (n=2,663)	
Sex	M	F	M	F	M	F	M	F	M	F
Frequency of condom use, n (%)										
Never	587 (77.5)	1013 (89.7)	314 (52.5)	867 (85.4)	361 (49.5)	739 (76.9)	246 (35.0)	497 (46.8)	208 (27.1)	345 (37.2)
Sometimes	113 (14.9)	73 (6.5)	151 (25.3)	116 (11.4)	245 (33.6)	168 (17.5)	194 (27.6)	226 (21.3)	184 (24.0)	233 (25.1)
Always	57 (7.5)	43 (3.8)	133 (22.2)	32 (3.2)	123 (16.9)	54 (5.6)	262 (37.3)	339 (31.9)	376 (49.0)	349 (37.6)
Past 30 days‡										
Frequency of condom use with regular partner, n (%)										
Never	531 (91.4)	867 (93.9)	164 (57.1)	438 (88.8)	307 (68.2)	607 (85.9)	190 (50.8)	388 (56.4)	140 (38.1)	278 (50.2)
Sometimes	29 (5.0)	19 (2.1)	55 (19.2)	32 (6.5)	64 (14.2)	31 (4.4)	34 (9.1)	73 (10.6)	46 (12.5)	50 (9.0)
Always	21 (3.6)	37 (4.0)	68 (23.7)	23 (4.7)	79 (17.6)	69 (9.8)	150 (40.1)	227 (33.0)	181 (49.3)	226 (40.8)
Frequency of condom use with non-regular partner, n (%)										
Never	9 (26.5)	0 (0.0)	11 (16.7)	14 (45.2)	71 (46.7)	18 (81.8)	6 (16.2)	2 (40.0)	11 (17.5)	3 (27.3)
Sometimes	7 (20.6)	1 (100.0)	15 (22.7)	8 (25.8)	30 (19.7)	1 (4.5)	6 (16.2)	0 (0.0)	6 (9.5)	1 (9.1)
Always	18 (52.9)	0 (0.0)	40 (60.6)	9 (29.0)	51 (33.6)	3 (13.6)	25 (67.6)	3 (60.0)	46 (73.0)	7 (63.6)
Concurrent partners, n (%)	46 (7.0)	2 (0.2)	121 (30.3)	18 (2.5)	208 (31.6)	36 (4.3)	125 (26.2)	15 (1.8)	132 (26.7)	20 (2.8)
Partner age difference in years (mean)	1.3	−5.8	4.3	−8	3.5	−7.4	2.5	−4.3	2.8	−5

*
among those who were sexually active any time in the past;

†
among those who were sexually active over the last 6 months;

‡
among those who were sexually active over the last 30 days

Table 4

Participant characteristics for reporting never using condoms in the past 6 months among sexually active participants by site

	Chiang Mai, Thailand (n=1,886)		Mutoko, Zimbabwe (n=1,613)		Kisarawe, Tanzania (n=1,690)		Vulindlela, South Africa (n=1,764)		Soweto, South Africa (n=1,695)	
	Never used condom N, (%)	OR (95% CI)	Never used condom N, (%)	OR (95% CI)	Never used condom N, (%)	OR (95% CI)	Never used condom N, (%)	OR (95% CI)	Never used condom N, (%)	OR (95% CI)
Sex										
Male	587 (77.5)	1	314 (52.5)	1	361 (49.5)	1	246 (35.0)	1	208 (27.1)	1
Female	1013 (89.7)	2.53 (1.96–3.27)	867 (85.4)	5.30 (4.18–6.72)	739 (76.9)	3.39 (2.75–4.18)	497 (46.8)	1.63 (1.34–1.98)	345 (37.2)	1.60 (1.30–1.96)
Marital status										
Unmarried	65 (34.9)	1	108 (29.5)	1	247 (39.2)	1	668 (40.1)	1	388 (27.0)	1
Married	1535 (90.3)	17.32 (12.31–24.37)	1072 (86.0)	14.72 (11.17–19.39)	853 (80.5)	6.39 (5.13–7.97)	75 (76.5)	4.87 (3.02–7.85)	165 (63.7)	4.74 (3.59–6.27)
Education										
<10 years	1371 (88.1)	1	721 (77.9)	1	1067 (66.4)	1	297 (48.5)	1	160 (45.5)	1
10 years or more	229 (69.6)	0.31 (0.23–0.41)	442 (66.5)	0.56 (0.45–0.70)	33 (40.2)	0.34 (0.22–0.54)	446 (38.8)	0.67 (0.55–0.82)	390 (29.2)	0.50 (0.39–0.63)
Number of partners, past six months										
1	1588 (87.0)	1	1123 (78.8)	1	1009 (71.1)	1	691 (45.9)	1	522 (36.3)	1
>1	12 (19.7)	0.04 (0.02–0.07)	52 (28.9)	0.11 (0.08–0.15)	91 (33.7)	0.21 (0.16–0.27)	51 (20.2)	0.30 (0.22–0.41)	29 (11.8)	0.24 (0.16–0.35)
Alcohol use, past 30 days										
Abstinent	921 (90.5)	1	1019 (79.8)	1	1022 (67.2)	1	589 (43.9)	1	368 (35.9)	1

	Chiang Mai, Thailand (n=1,886)		Mutoko, Zimbabwe (n=1,613)		Kisarawe, Tanzania (n=1,690)		Vulindlela, South Africa (n=1,764)		Soweto, South Africa (n=1,695)	
	Never used condom N, (%)	OR (95% CI)	Never used condom N, (%)	OR (95% CI)	Never used condom N, (%)	OR (95% CI)	Never used condom N, (%)	OR (95% CI)	Never used condom N, (%)	OR (95% CI)
Less than weekly	287 (81.8)	0.47 (0.34–0.67)	88 (52.1)	0.28 (0.20–0.38)	54 (49.5)	0.48 (0.32–0.71)	73 (34.0)	0.66 (0.49–0.89)	101 (28.9)	0.72 (0.56–0.94)
Weekly or more	392 (75.8)	0.33 (0.25–0.44)	62 (40.5)	0.17 (0.12–0.24)	24 (39.3)	0.32 (0.19–0.53)	78 (38.8)	0.81 (0.60–1.10)	79 (26.0)	0.63 (0.47–0.83)
Illicit drug use										
Never	1353 (87.2)	1	1130 (75.1)	1	1055 (66.1)	1	659 (42.7)	1	483 (33.4)	1
Ever used any drug	245 (73.8)	0.41 (0.31–0.55)	43 (44.8)	0.27 (0.18–0.41)	45 (47.4)	0.46 (0.30–0.70)	84 (38.4)	0.83 (0.62–1.12)	64 (27.4)	0.75 (0.55–1.02)

Table 5

Participant characteristics and reporting never using condoms in the past 6 months among sexually active in the past six months by site (odds ratios and 95% confidence intervals adjusted for the other variables).

	Thailand	Zimbabwe	Tanzania	Vulindlela	Soweto
Sex					
Male	1	1	1	1	1
Female	1.02 (0.70–1.49)	1.96 (1.40–2.73)	1.76 (1.37–2.27)	1.20 (0.94–1.54)	1.15 (0.90–1.48)
Marital status					
Unmarried	1	1	1	1	1
Married	9.15 (6.17–13.57)	8.46 (6.26–11.42)	4.45 (3.51–5.65)	4.21 (2.59–6.83)	4.14 (3.09–5.54)
Education					
<10 years	1	1	1	1	1
10 years or more	0.50 (0.36–0.70)	0.78 (0.59–1.03)	0.35 (0.21–0.59)	0.67 (0.54–0.82)	0.45 (0.35–0.59)
Number of partners, past six months					
1	1	1	1	1	1
>1	0.15 (0.07–0.32)	0.33 (0.21–0.51)	0.41 (0.29–0.56)	0.33 (0.23–0.47)	0.28 (0.18–0.44)
Alcohol use, past 30 days					
Abstinent	1	1	1	1	1
Less than weekly	0.70 (0.47–1.03)	0.73 (0.47–1.13)	0.73 (0.47–1.15)	0.89 (0.64–1.25)	0.93 (0.69–1.24)
Weekly or more	0.83 (0.55–1.26)	0.65 (0.40–1.06)	0.70 (0.38–1.28)	1.19 (0.84–1.70)	0.91 (0.65–1.27)
Illicit drug use					
Never	1	1	1	1	1
Ever used any drug	0.80 (0.54–1.19)	1.09 (0.61–1.95)	1.43 (0.87–2.34)	1.14 (0.82–1.61)	1.09 (0.77–1.55)

Table 6

HIV testing and disclosure patterns among individuals aged 18–32 in five sites by sex

Sex	Chiang Mai, Thailand (n=2,997)		Mutoko, Zimbabwe (n=2,874)		Kisarawe, Tanzania (n=3,073)		Vulindlela, South Africa (n=2,596)		Soweto, South Africa (n=2,663)	
	M	F	M	F	M	F	M	F	M	F
Voluntary HIV test										
Ever	464 (32.7)	779 (49.5)	67 (5.4)	178 (10.9)	144 (10.1)	699 (42.4)	174 (16.2)	606 (39.9)	348 (28.9)	764 (52.6)
Recent (past 12 months)	149 (10.5)	266 (16.9)	31 (2.5)	99 (6.1)	71 (5.0)	314 (19.0)	119 (11.1)	376 (24.9)	201 (16.7)	451 (31.2)
Received results from last HIV test[†]	420 (86.8)	763 (91.5)	59 (85.5)	166 (83.4)	125 (83.9)	657 (83.8)	157 (89.7)	605 (92.5)	337 (93.6)	907 (96.8)
Disclosure of last HIV test results[‡]	354 (81.6)	658 (84.4)	40 (71.4)	123 (78.3)	96 (75.6)	558 (83.3)	152 (93.8)	546 (88.3)	290 (86.1)	799 (89.0)

[†] among those reporting ever having had a voluntary HIV test;

[‡] among those reporting ever receiving results of last HIV test