Trends in extra-partner sexual relationship and condom use in sub-Saharan Africa

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Rationale

With the generalization of the HIV epidemic to the general population, large efforts are being deployed by governments, non-governmental and international agencies to curb the epidemic. The discovery of antiretrovirals has allowed implementation of care and treatment programs while continuing focus on prevention programs. As of December, 2006, UNAIDS estimated that almost 40 million individuals were living with HIV, of whom 11% were newly infected during 2006.

Sub-Sahara Africa bears the largest burden of the epidemic, hosting almost two thirds of the people living with the virus. Because HIV is transmitted mainly through sexual contacts in the region, prevention programs focus mainly on the three means for prevention the transmission: Abstinence from sexual relationships, use of condom at sexual intercourse, and faithfulness in relationships. Studies are showing downward trends in the seroprevalence in some countries of the region but in many, the trends are stable and also dependent on the quality of surveillance data being used (Asamoah-Odei et al, 2004,). National population-based surveys conducted by Macro International in collaboration with African countries indicated lower seroprevalence than expected in many countries.

The objective of the present study is to assess trends in extra-partner sexual relationship and condom use with non regular partners in sub-Saharan Africa. Prevention programs through mass media campaigns and targeted interventions have dramatically increased awareness and knowledge of the disease and its characteristics and some studies show consequent changes in sexual behaviors (e.g. Cleland and Ali, 2006). This paper is an effort to document whether these programs have produced at national level any significant change in risky sexual behaviors such as sexual relationships outside of the marital relationship and condom use at such sexual encounters.

In the era of the HIV pandemic where increasing preventive interventions as well as care and treatment programs are being developed and implemented at the population level in sub-Saharan Africa, it is relevant to assess whether there are global changes in terms of safe sexual behaviors observed among men and women. Outside of Africa studies have shown changes in patterns of condom use, especially among groups that are at greater risk of sexually transmitted infections or HIV infections. In the United States for example, there was an increase in condom use among young women, those at an early stage of a relationship, women who were better educated and those not living in union from 1988 and 1995 (Bankole et al, 1999). Furthermore there was an association between increased risk of sexually transmitted disease and choice of dual methods.

As people are more aware of the risks of HIV and sexually transmitted infections, there is more choice for condom to prevent pregnancy as well. Analyzing trends in a set of sexual behaviors among young women aged 15-24 years old in 18 sub-Sahara African countries

using demographic and health surveys, Cleland and Ali showed a significant increase in condom use for pregnancy prevention in most countries. The median rate of annual increase was 1.4%. Although their study did not focus mainly on condom use for HIV prevention, it suggests that condom promotion for both pregnancy and HIV infection prevention is a successful intervention (Cleland and Ali, 2006).

Some studies have established an association between community factors and condom use. Ukwuani and colleagues (2003) used demographic and health survey data from Tanzania and Uganda and data collected by Measure Evaluation program to assess the influence of community factors on condom use to prevent HIV transmission. They showed that individuals living in communities with socio-economic infrastructure and health facilities offering HIV services were more likely to use condom to prevent HIV transmission. For example, women in communities with telephone access, postal services or school facilities were more likely to use condom.

Although assessment of condom use in populations is relevant and important, it is also important to keep in mind some of limitations associated with increases in condom use at the population level. Typically condom use may increase because it's being used more by people who are not really at risk or are at lower risk of HIV infection. A literature review on the effectiveness of condoms showed that although condoms are highly effective when it comes to specific high risk groups such as gays and commercial sex workers, their effectiveness to curb the HIV epidemic at the population level is still to be established

(Hearst et al, 2004). Success stories that follow the decline of the epidemic in some countries such as Uganda, Cambodia and Thailand are not mainly explained by successful condom promotion at the population level. At present, no study has successfully identified a country which has reduced the level of the epidemic through condom promotion alone as a public health intervention. Thus, Hearst and colleagues (2004) argue for a targeting approach in condom promotion and a better measure of the impact of condom promotion.

Although condom use might play a major role in curbing the HIV epidemic, condom promotion and availability in itself is not sufficient. In their commentaries on the main reasons for high HIV prevalence in Africa and especially in Sub-Saharan Africa, Halperin and Epstein raised one specific sexual pattern observed in the region. In eastern and Southern Africa, there is high level of concurrent long term multiple partnerships compared to other regions (Halperin and Epstein, 2004). While in Asian countries, multiple partnerships are higher than in African countries, concurrent multiple partnership are not common in Asia. The authors referred to the mathematical modeling done by Morris and Kretzschmar which showed that concurrent long term partnership increase the spread of the HIV epidemic ten times higher than serial partnership with similar numbers of partners (Morris and Kretzschmar, 1997)

Data and methods

Demographic and Health Survey (DHS) data from eleven sub-Saharan African countries are used. DHSs are multi-stage and nationally representative population-based surveys conducted in many developing countries. They are usually standardized and provide an opportunity to assess levels and trends in population and health indicators. Countries included in the analysis are: Benin, Burkina Faso, Cameroon, Chad, Ethiopia, Guinea, Kenya, Malawi, Rwanda, Tanzania, Uganda, and Zambia. These countries were selected based on the following criteria: (1) they have conducted at least two DHS, (2) they have conducted their most recent DHS since 2000, (2) data are available on sexual relationships with non marital or non-cohabiting partners in the twelve months preceding the survey, and reports of condom use with such partners are available in the data and recorded in such a way that allows comparison between the most two recent surveys. Data for men and women of reproductive age were analyzed. Women's sample sizes for analyses range from zzz in zzz to zzz in zzz, while men's go from zzz to zzz.

Descriptive analyzes are conducted by calculating the percentage of women and men who reported having a sexual relationship with a non marital or non cohabiting partner in the twelve months preceding the survey (what we call an extra-partner relationship) and the percentage of women and men who reported using a condom at the last encounter with a non marital or non-cohabiting partner within the twelve months preceding the survey. Trends in extra-partner relationships and condom use with such partners are adjusted for

covariates known to be highly associated with each outcome of interest such as: education, residence, region, household wealth quintile, marital status, and knowledge of whether a healthy looking individual could have been infected with the HIV virus. Logistic regression is used for the adjustment and analyses took into account the cluster sampling and the probability weight of individuals included in the samples. STATA package is used for data analyses (StataCorp, 2005). GIVE REF

Results:

Extra-partner relationships

Tables 1 and 2 present the percentages of sexually active women and men respectively, who reported an extra-partner relationship within the twelve months preceding the survey by marital status. Consistent with previous studies, unmarried individuals are more likely to engage in extra-partner sexual activities than married individuals, and men more likely than women to do so. Overall, over 40% of unmarried women and over 60% of unmarried men reported such activities compared to less than 5% and less than 20% of married women and men respectively.

Extra-partner relationships seem to have decreased on average among married women and remained stable among married men. The median percentage across countries went from 60% to 47% among unmarried women and from 1.3% to 1.5% among married women although these changes are not significant when the 95% confidence intervals are

examined. However the apparent increase of such relationship among married women is of great consequence for programmatic implications. With the generalization of the HIV epidemic to the general population, such trends have serious implications in increasing the risk of HIV transmission within marital or cohabiting relationship. As many programs focus on the unmarried population and high risk group, the risk of HIV infection may be gradually increasing within stable relationships.

The observed general trends are the reflection of country specific trends. Among unmarried women, extra partner relationships declined in 8 out of 11 countries. In 5 of these, the trend is statistically significant at 95% confidence level. The three countries where an increase is observed are Benin, Guinea and Rwanda. This increase is statistically significant in Rwanda where the percentage went from 14% to 19%. It is important to note however that compared to other countries, Rwanda presents one of the lowest percentages beside Ethiopia. Extra-partner relationships among unmarried women seems particularly prevalent in countries such as Benin, Burkina Faso, Cameroon, Guinea, and Tanzania, where the percentages are above 60% in the latest survey.

Among married women, the percent who reported extra-partner relationships increased in 9 out of the 11 countries although the increase is statistically significant only in Benin and Cameroon. It could be argued that there has been no change over time among married women. This finding is equally critical for programmatic interventions in view of the general trends of the HIV epidemic in the general population and especially among

stable relationships. A decline in the percentages is observed in Ethiopia and Guinea but is only significant in Ethiopia.

Although percentages of extra-partner relationships are generally higher among men than women, similar trends are observed among unmarried men compared to unmarried women. Overall, the median percentage across countries declined significantly from 78% to 71% (table 2). This is a reflection of an observed decline in 9 out of the 11 countries with a statistically significant trend observed in 5 of these. . An insignificant increase is observed in Benin (76% to 80%) and Guinea (79% to 82%), which is consistent with trends observed among the unmarried women. These two countries stood out with unexpected trends among the unmarried population which should be of concern for policymakers and organizations involved in activities aimed at reducing risky sexual behaviors in these populations.

Unlike married women, there is a remarkable decline in reported extra-partner relationships among married men. Overall, the median percentage across countries declined from 16% to 11% although statistically insignificant. This decline is observed in 7 countries with 4 statistically significant trends. An increased trend is observed in Burkina Faso, Cameroon, Rwanda and Zambia.

The dynamic of extra-partner sexual activity among married women and men is critical to the trends in new infections rates. Studies demonstrate very low protective behaviors within marriage or cohabiting relationship. The paradox is that protective behaviors such

as condom use are adopted mostly at the beginning of such relationships, the period where partners are less likely to engage in extra-partner relationship. But as the relationship lasts and becomes stable, the condom is no longer used whereas partners are also more likely to engage in sexual relations outside their stable relationship. The next section focuses on condom use with extra-partners among married and unmarried individuals.

Condom Use

In order to decrease the individual and population risk of HIV infections, a condom must be used in every risky sexual encounter. While studies have shown quite a universal awareness and knowledge of condoms and a relatively high level of its perception as effective in prevention of HIV transmission, uptake of condom remains a great challenge for governments and organizations embarked in the promotion of safe sex behaviors. Tables 3 and 4 present the percent of women and men who had an extra-partner relationship in the past twelve months and reported using a condom at last intercourse with such partners. Similar to the report on extra-partner relationships, men are in general more likely to report condom use than women but interestingly, the rates among unmarried women and men are very close to those among married women and men respectively.

The median rate of condom use across countries increased significantly from 16% to 25% among unmarried women and from 17% to 18% among married women. All 11 countries showed an increase in condom use among unmarried women, with statistically significant trends in 6 countries. Among this group of women, the highest rates are observed in Burkina Faso and Cameroon with rates closer to 50% and the lowest rates are observed in Chad and Rwanda. Due to smaller sample size among married women, reflected in the large confidence intervals, the reported rates of condom are unstable. However an increase in the rate of condom use is observed in 6 out of the 11 countries. Only the increase in Cameroon appeared to be statistically significant. Evidence of a decline is apparent in 5 countries. Thus, small sample sizes in this group made it difficult to observe significant and consistent trends.

An overall increase in condom use was also seen among men. Among the unmarried, 9 countries showed increases with 5 showing a statistically significant upward trend. The highest levels are observed in Burkina Faso, Cameroon, Ethiopia and Tanzania where the rates were above 50%. Among this group of men, levels of condom use seem to have decreased in Chad and Rwanda. Married men showed similar patterns as the unmarried. In 8 countries there is an apparent increase in condom use, especially in Tanzania where the trend is statistically significant. A decline was apparent in Chad and Kenya.

It should be noted that though the rates of condom use may seem high, they may not be high enough to significantly curb the risk of HIV infection and, more importantly, tell us nothing about consistent use of condom. To effectively reduce this risk, studies have

demonstrated that individuals must use condoms consistently and systematically at risky sexual encounters. In addition, the trends presented in table 1, 2, 3 and 4 are unadjusted and do not take into account variations within and across populations in some socio-demographic and economic characteristics which are shown to be related to sexual and safe sex behavior. We present in the next sections, the results of the multivariate analyses that adjust for some socio-demographic and economic characteristics.

Multivariate Analyses

Extra-partner relationship

Tables 5 and 6 present the results of the multivariate analysis of extra-partner relationship on selected independent variables for women and men respectively. The interest here is to assess whether previously observed trends remain after adjusting for selected socio-demographic and economic variables. Only the unadjusted and adjusted odds-ratios are presented. For other control variables, a sign indicates whether the variable was significant in the analysis and in what direction. A positive sign indicates a positive a significant association and a negative sign indicates a significant and negative association. The strength of the association is then indicated by the number of signs.

Among sexually active women there was a decline in extra-partner relationships in 5 ountries (Chad, Ethiopia, Kenya, Tanzania and Zambia) with a significant reduction in the odds from 65% in Ethiopia to 19% in Zambia. A significant increase in the odds of

about 30% is observed in 4 countries (Benin, Burkina Faso, Guinea and Rwanda) and no significant trend is noted in Cameroon and Malawi. When the odds are adjusted by the independent variables, the results became more interesting. The decline observed at the unadjusted level remained persistent with even a reduction in the odds ratios indicating a widening of the gap between the two surveys considered. In Chad, Kenya and Zambia, there was respectively 54%, 36% and 26% reduction in the odds of extra-partner relationship during the respective period considered for each country. In these three countries, changes in education, marital status, and household wealth were significantly associated with change in the likelihood of an extra-partner relation. In Ethiopia, the odds declined by 66% between 2000 and 2005, and education, marital status, household wealth and knowledge that a healthy looking person can carry the HIV virus were significant in the model. In Tanzania there was a significant decline of 29% and urban residence, marital status and knowledge that a healthy looking person can carry the HIV virus showed significant association with extra-partner relationships. It is important to notice that, beside marital status, all other control variables presented in table 5 showed a positive relationship with extra-partner relationship. In other words, in general among sexually active women, those who are urban residents, more educated, aware that a healthy looking person can carry the HIV virus, and residents of wealthier household are more likely to engage in extra-partner relationships.

In other countries the adjusted trend was insignificant. This is the case for Benin, Burkina Faso, and Guinea in which an apparent increase was noticed at the unadjusted level. In Rwanda, there is a significant increase in the odds of extra-partner relationship

after adjusting for the independent variables. Beside marital status, only urban residence showed a marginal association with this outcome.

Among sexually active men, table 6 indicates a significant reduction in the odds of extra-partner relationships in 5 countries (Ethiopia, Kenya, Malawi, Tanzania and Zambia) at the unadjusted level, ranging from 23% in Zambia to 66% in Ethiopia. There is a marginally significant increase in Rwanda and in all other countries no significant trend is observed. When the trends are adjusted for the independent variables, there is a persistent and significant downward trend in 4 countries (Ethiopia, Kenya, Malawi and Tanzania) and 2 other trends became significant (Benin and Cameroon). In these 6 countries, the odds of an extra-partner relationship declined significantly by 16% in Cameroon and 64% in Kenya. No significant increase in the odds is observed in any country, indicating that among sexually active men, there has been an overall decline or stability in the report of extra-partner relationships.

The significance of each control variable in each of these countries is variable. In Kenya, Malawi and Tanzania, only marital status remained significant in the multivariate models. In Benin, marital status, household wealth and knowledge that a healthy looking person can carry the HIV virus showed significant associations with extra-partner relationships. In Cameroon, education, marital status, and household wealth were the significant factors while in Ethiopia it is education, marital status, and knowledge that a healthy looking person can carry the HIV virus. Similar to women, education, household wealth, urban residence and knowledge that a healthy looking person can carry the HIV virus showed a

positive association with extra-partner relationships. Zambia however was an exception -- men living in wealthier households were more likely to report extra-partner relationships.

Condom use

Tables 7 and 8 present the multivariate results of condom use with extra-partners among women and men respectively who have reported extra-partner relationships in the twelve months preceding the survey. There is evidence of a significant increase in condom use among women in most countries. The unadjusted trend indicates a significant increase in 8 countries with the odds of condom use in the most recent survey ranging from 1.51 to 3.89 times those in the previous survey. Non significant unadjusted trends are observed in Ethiopia, Malawi and Rwanda. In the multivariate model adjusting for other independent variables, the increase in condom use remained except in Chad and the upward trend in Rwanda became significant. Thus adjusting for the control variables, no significant increase is observed in Chad, Ethiopia and Malawi. Urban residence, education, household wealth and knowledge that a healthy looking person can carry the HIV virus are positively associated with condom use in most countries and have contributed to the increased trends in condom use observed. Marital status is not or is only marginally significant in most countries except in Zambia where significantly more married women reported condom use with extra-partners.

Similar overall upward trends are also observed among men in most countries. The unadjusted odds ratios indicated a significant increase in condom use with extra-partners

in 7 countries with the odds of condom use in the most recent survey being 1.30 (Guinea) to 2.82 times (Cameroon) those in the previous survey. Only one country (Rwanda) shows a significant decline of 53% between the two surveys. When all the independent variables are included in the models, the upward trends remained significant in 6 countries but became insignificant in one country (Ethiopia). The decline observed in Rwanda persisted in the adjusted model. Similar to the case for women, all independent variables showed a significant positive association with condom use is most countries.

Discussion

The main objective of this paper is to assess trends in non-marital non cohabiting relations, and condom use within such relationships among women and men in eleven Sub-Saharan African countries. There appear significant signs of positive behavior change in terms of extra-partner relationships and condom use with such partners in countries included in the analysis. In most countries, a decline in the percent of women and men who reported having extra-marital sexual relationships in the past twelve months is observed. However the stability of this percentage among married women is of concern. In order for interventions toward HIV preventive behaviors to impact the populations, it is crucial that high risk and multiple relationships be drastically reduced (Halperin et al, 2004). In fact concurrent sexual partnership plays a significant if not most important role in the rapid expansion and the high prevelance of the HIV epidemic in sub-Saharan Africa (Morris et al, 1997, Halperin et al, 2004). With the generalization of the epidemic to the entire population in most sub-Saharan African countries, efforts to

contain the virus and curb the epidemic trends should focus more and more on stable or marital relationships where new infections are more likely to occur. In fact, Ali and colleagues (2004) concluded in a study that assessed condom use within marital relationships that although condom use within marriage is low and less effective than other contraceptive methods such as pills, promotion of condom within marriage would not increase abortions and unwanted births but would rather reduce the risk of HIV infection (Ali et al, 2004). Despite general downward trends in extra-marital relationships observed in many countries, the level of the phenomenon is still dangerously high, especially among unmarried populations. Rwanda showed an increased in the extra-partner relationships, even after adjusting for socio-demographic and economic indicators. It is important that specific studies be conducted in this country to assess the reasons for this result.

Interestingly, condom use with non marital or non cohabiting partners has significantly increased in most countries, which is probably due to various interventions in this area of HIV prevention. Again despite this significant increase, the level of condom use and patterns of use needed to significantly reduce the incidence of the HIV epidemic is still a challenge in many countries. In fact a literature review on condom promotion showed that no single country has to date successfully reduced the trends in HIV epidemic through promotion of condoms to the general population (Hearst et al, 2004). The complexity of evaluation of impact of condom use intervention resides in the fact that condom use can increase simultaneously with the incidence of HIV infection. This is because condom may be used increasingly by people who are not at risk of contracting

the disease and not used enough in risky relationships. Also benefits of an increase in condom use may be offset by an increase in sexual partners (Kajubi et al, 2005). In addition, current methods of measurement of condom use are limited and do not reflect consistent condom use. In fact studies have shown that inconsistent use of condom is worse than no condom use at all since it creates some false sense of protection (Ahmed et al, 2001). Thus increases in overall condom use in a country should not reduce efforts to diversify strategies for HIV prevention that includes reduction in sexual partners, and abstinence. Integrated approaches need to be applied, including efforts to improve community development factors such as access to basic socio-economic services. Ukwani and colleagues demonstrated the importance of community factor such as access to modern services (telephone and postal services for example), health facilities providing HIV services in the trends in condom use to prevent HIV among women and men (Ukwani et al, 2001). Gender roles are another set of factors that affect the dynamic of the HIV epidemic. Specifically, not only do men report higher level of extra-partner sexual relations and condom use than women, but also women and men have different goals when engaging in sexual relationships and therefore tend to develop different sexual networks. For example, while young men are more driven by pleasure and demonstration of masculinity, young women rather consider relationships that would provide more stability, security and material goods. A study in Zambia showed significant differences in relationship characteristics reported by men and women (Benefo, 2004). More studies are warranted on how men and women choose their sexual partners and how the decisions to use condoms or not are taken within such networks. It is also crucial that methodology for evaluation of the attributable benefit of condom at the

population level be improved. Condom use, abstinence and faithfulness to relationship are the main preventive behaviors advocated since the advent of the HIV epidemic. There is need of more research to come up with additional and more effective preventive methods given the limitations observed in the existing modes.

This study has some limitations. First of all it is based on outcomes that are self-reported. The low reliability of self-report answers to sensitive questions such as sexual partnership and condom use is well known. More specifically studies have demonstrated that women tend to understate their sexual relationships, especially risky ones and men tend to overstate them (REF). Secondly, the trend assessments are based on multiple cross sectional data. Although there was an explicit effort to determine trends based only on questions that are comparable, it is possible that differential measurement errors will affect the results presented.

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Table 1: Percentage of women who reported an extra-partner relationship in the twelve month preceding the survey, by marital status.

Country	Unmarried				Married			
	Year 1		Year 2		Year 1		Year 2	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Benin, 1996, 2001	65.7	(61.7, 69.7)	66.5	(63.1, 69.9)	0.9	(0.5, 1.2)	1.3	(0.9, 1.7)
Burkina Faso, 1998, 2003	63.0	(58.3, 67.7)	60.2	(56.2, 64.2)	0.7	(0.4, 1.0)	0.9	(0.6, 1.3)
Cameroon, 1998 2004	76.7	(74.2, 79.2)	65.0	(62.2, 67.9)	5.5	(4.4, 6.6)	13.0	(11.5, 14.5)
Chad, 1996, 2004	43.7	(38.8, 48.7)	18.3	(13.6, 23.0)	0.7	(0.4, 0.9)	1.5	(0.9, 2.0)
Ethiopia, 2000, 2005	16.4	(13.5, 19.4)	6.1	(4.5, 7.7)	1.3	(0.9, 1.8)	0.6	(0.4, 0.8)
Guinea, 1999, 2005	59.6	(55.5, 63.7)	65.9	(60.9, 71.0)	4.0	(3.4, 4.7)	3.8	(3.0, 4.6)
Kenya, 1998, 2003	62.6	(59.8, 65.3)	47.3	(44.5, 50.2)	1.6	(1.1, 2.0)	2.3	(1.7, 2.8)
Malawi, 2000, 2004	37.5	(35.0, 40.1)	33.0	(30.2, 35.7)	0.6	(0.5, 0.8)	0.9	(0.6, 1.1)
Rwanda, 2000, 2005	14.3	(12.6, 15.9)	19.5	(17.8, 21.3)	0.5	(0.2, 0.7)	0.6	(0.4, 0.8)
Tanzania, 1999, 2004	81.4	(76.3, 86.5)	65.1	(62.2, 68.1)	8.2	(6.4, 9.9)	8.4	(7.4, 9.5)
Zambia, 1996, 2001	54.5	(52.1, 56.8)	45.0	(42.2, 47.9)	1.6	(1.1, 2.0)	1.8	(1.3, 2.2)
Average	*52.3*	*(48.9 55.7)*	*44.7*	*(41.6 47.9)*	*2.3*	*(1.8 2.9)*	*3.2*	*2.6 3.8*
Median	*59.6*	*(55.5 63.7)*	*47.3*	*(44.5 50.2)*	*1.3*	*(0.9 1.8)*	*1.5*	*0.9 2.0*

Note: Year 1 and year 2 indicate the first and second years include in front of the name of the country and represent the year of each survey.

Table 2: Percentage of men who reported an extra-partner relationship in the twelve month preceding the survey, by marital status.

Country	Unmarried				Married			
	Year 1		Year 2		Year 1		Year 2	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Benin, 1996, 2001	75.5	(70.3, 80.7)	80.3	(77.4, 83.2)	27.5	(24.7, 30.4)	23.1	(20.4, 25.8)
Burkina Faso, 1998, 2003	80.2	(76.8, 83.6)	77.6	(73.4, 81.7)	6.8	(5.2, 8.5)	10.6	(8.7, 12.5)
Cameroon, 1998 2004	88.3	(85.7, 90.9)	81.9	(79.6, 84.2)	33.7	(29.2, 38.2)	34.9	(32.2, 37.7)
Chad, 1996, 2004	82.0	(78.2, 85.7)	18.3	(13.6, 23.0)	13.4	(11.2, 15.7)	1.5	(0.9, 2.0)
Ethiopia, 2000, 2005	59.3	(51.9, 66.7)	40.3	(35.6, 45.0)	7.4	(5.3, 9.5)	1.1	(0.7, 1.6)
Guinea, 1999, 2005	78.7	(75.1, 82.4)	81.6	(78.7, 84.6)	21.7	(19.0, 24.4)	19.3	(16.6, 22.1)
Kenya, 1998, 2003	82.5	(79.7, 85.2)	63.0	(59.6, 66.5)	16.4	(14.5, 18.4)	10.4	(8.7, 12.0)
Malawi, 2000, 2004	69.8	(65.2, 74.3)	62.5	(57.6, 67.4)	14.8	(12.4, 17.3)	6.7	(5.3, 8.1)
Rwanda, 2000, 2005	32.5	(28.3, 36.7)	28.9	(26.0, 31.9)	1.9	(1.2, 2.7)	5.4	(4.0, 6.8)
Tanzania, 1999, 2004	87.9	(85.2, 90.6)	71.3	(67.1, 75.4)	31.8	(28.3, 35.2)	27.9	(24.6, 31.1)
Zambia, 1996, 2001	78.1	(74.5, 81.8)	70.8	(66.7, 75.0)	18.7	(16.0, 21.3)	19.2	(16.6, 21.7)
Average	*74.1*	*(70.1 78.1)*	*61.5*	*(57.8 65.3)*	*17.7*	*(15.2 20.1)*	*14.5*	*(12.6 16.5)*
Median	*78.7*	*(75.1 82.4)*	*70.8*	*(66.7 75.0)*	*16.4*	*(14.5 18.4)*	*10.6*	*(8.7 12.5)*

Table 3: Percentage of women who reported an extra-partner relationship in the twelve month preceding the survey who reported using condom, by marital status.

Country	Unmarried				Married			
	Year 1		Year 2		Year 1		Year 2	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Benin, 1996, 2001	9.3	(6.3, 12.2)	16.5	(13.7, 19.3)	15.7	(4.5, 27.0)	11.9	(4.1, 19.6)
Burkina Faso, 1998, 2003	41.7	(35.5, 47.9)	55.0	(48.7, 61.3)	32.6	(15.1, 50.1)	34.1	(13.4, 54.7)
Cameroon, 1998 2004	14.5	(11.7, 17.3)	44.2	(40.9, 47.6)	16.6	(11.5, 21.7)	34.8	(31.1, 38.6)
Chad, 1996, 2004	7.2	(4.6, 9.9)	13.6	(6.8, 20.4)	12.2	(3.7, 20.8)	12.3	(3.9, 20.8)
Ethiopia, 2000, 2005	16.4	(10.6, 22.1)	24.9	(13.7, 36.1)	4.6	(0.1, 9.1)	3.0	(-2.1, 8.1)
Guinea, 1999, 2005	19.2	(15.3, 23.0)	24.8	(19.9, 29.8)	16.0	(10.7, 21.4)	24.8	(17.3, 32.3)
Kenya, 1998, 2003	15.9	(13.1, 18.7)	24.5	(21.1, 27.9)	26.3	(13.0, 39.6)	19.7	(10.8, 28.6)
Malawi, 2000, 2004	28.8	(24.8, 32.8)	30.6	(26.3, 34.9)	16.7	(7.7, 25.8)	23.5	(12.7, 34.3)
Rwanda, 2000, 2005	14.9	(9.5, 20.3)	19.2	(14.8, 23.5)	6.7	(-3.6, 17.0)	7.9	(-2.2, 18.1)
Tanzania, 1999, 2004	13.2	(8.7, 17.8)	32.1	(28.2, 35.9)	22.5	(14.7, 30.3)	13.3	(9.9, 16.6)
Zambia, 1996, 2001	21.1	(18.0, 24.1)	33.1	(29.1, 37.2)	35.6	(25.5, 45.6)	30.1	(18.4, 41.7)
Average	*18.4*	*(14.4 22.4)*	*29.0*	*(23.9 34.0)*	*18.7*	*(9.4 28.0)*	*19.6*	*(10.7 28.5)*
Median	*15.9*	*(11.7 20.3)*	*24.9*	*(21.1 34.9)*	*16.6*	*(10.7 25.8)*	*19.7*	*(10.8 28.6)*

Table 4: Percentage of men who reported an extra-partner relationship in the twelve month preceding the survey who reported using condom, by marital status.

Country	Unmarried				Married			
	Year 1		Year 2		Year 1		Year 2	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Benin, 1996, 2001	23.0	(16.6, 29.3)	33.5	(29.3, 37.8)	18.8	(13.8, 23.8)	27.2	(22.6, 31.9)
Burkina Faso, 1998, 2003	56.8	(50.7, 62.9)	69.6	(63.2, 76.1)	57.9	(46.2, 69.7)	64.5	(57.1, 71.9)
Cameroon, 1998 2004	28.5	(25.1, 31.8)	55.0	(51.5, 58.5)	30.7	(25.2, 36.2)	52.0	(48.1, 55.9)
Chad, 1996, 2004	22.5	(17.9, 27.1)	13.6	(6.8, 20.4)	28.4	(21.4, 35.4)	12.3	(3.9, 20.8)
Ethiopia, 2000, 2005	32.9	(23.9, 41.9)	52.7	(44.2, 61.2)	12.4	(3.0, 21.9)	17.1	(3.7, 30.5)
Guinea, 1999, 2005	34.3	(29.3, 39.4)	37.4	(32.5, 42.3)	30.7	(24.3, 37.2)	42.9	(36.9, 48.9)
Kenya, 1998, 2003	41.1	(37.0, 45.2)	46.7	(42.4, 50.9)	55.2	(48.4, 62.0)	43.3	(35.5, 51.2)
Malawi, 2000, 2004	35.9	(30.5, 41.4)	46.7	(40.9, 52.5)	41.2	(32.5, 49.8)	47.2	(37.7, 56.8)
Rwanda, 2000, 2005	55.0	(46.0, 64.0)	39.2	(32.9, 45.5)	20.8	(6.9, 34.8)	18.0	(10.3, 25.7)
Tanzania, 1999, 2004	25.7	(20.2, 31.3)	50.5	(44.7, 56.4)	29.5	(24.7, 34.4)	41.2	(34.7, 47.7)
Zambia, 1996, 2001	38.4	(34.1, 42.7)	43.1	(37.4, 48.8)	47.5	(39.9, 55.0)	49.5	(42.7, 56.2)
Average	*35.8*	*(30.1 41.5)*	*44.4*	*(38.7 50.0)*	*33.9*	*(26.0 41.8)*	*37.8*	*(30.3 45.2)*
Median	*34.3*	*(29.3 41.4)*	*46.7*	*(40.9 50.9)*	*30.7*	*(24.7 36.2)*	*42.9*	*(35.5 48.9)*

Table 5: Odds ratios of extra-partner relationship in the twelve months preceding the survey between the two most recent surveys among women, results of logistic regression

Country	Survey				Residence	Education		Marital status	Healthy looking person can carry HIV	Wealth quintile			
	Unadjusted		Adjusted		Urban	Primary	Second. or higher	Married	Yes	Poorer	Middle	Richer	Richest
Benin, 1996, 2001	1.34	++	0.98			+	+++	---	++				
Burkina Faso, 1998, 2003	1.31	++	1.01			++		---	++	+	++	+++	+++
Cameroon, 1998 2004	1.02		1.08		++	+++	+++	---	+++		++	++	
Chad, 1996, 2004	0.59	---	0.46	---			+++	---				+++	+++
Ethipoia, 2000, 2005	0.35	---	0.33	---			+	---	+++				++
Guinea, 1999, 2005	1.30	++	1.16		+++	+++	+++	---	++	-			
Kenya, 1998, 2003	0.78	---	0.64	---		++		---		--			
Malawi, 2000, 2004	0.90		0.94		+	++	++	---		+++	+++	++	+++
Rwanda, 2000, 2005	1.31	+++	1.36	+++	+			---					
Tanzania, 1999, 2004	0.75	---	0.71	---	++			---	+				
Zambia, 1996, 2001	0.81	---	0.74	---		++	+++	---					--

Note: All models except the unadjusted also include age

Reference groups: Year of survey: first survey; residence: rural; education: none; marital status: unmarried; Healthy looking person can carry HIV: no; Wealth quintile: poorest

+++ or ---: p<0.01; ++ or --: p<0.05; + or -: p<0.10; A positive sign indicates a positive relationship and a negative sign indicates a negative relationship.

Table 6: Odds ratios of extra-partner relationship in the twelve months preceding the survey between the two most recent surveys among men, results of logistic regression

Country	Survey				Residence	Education		Marital status	Healthy looking person can carry HIV	Wealth quintile			
	Unadjusted		Adjusted		Urban	Primary	Second. or higher	Married	Yes	Poorer	Middle	Richer	Richest
Benin, 1996, 2001	1.13		0.78	---				---	+++			+++	+++
Burkina Faso, 1998, 2003	1.12		1.20			++		---					
Cameroon, 1998 2004	0.90		0.84	--		+++	+++	---		+++	+++	+++	+++
Chad, 1996, 2004	0.99		0.86			+++	+++	---	+++				+
Ethipoia, 2000, 2005	0.34	---	0.27	---			+	---	+++				
Guinea, 1999, 2005	0.91		0.91			+++	+++	---	+++				
Kenya, 1998, 2003	0.62	---	0.36	---				---					
Malawi, 2000, 2004	0.58	---	0.55	---				---					
Rwanda, 2000, 2005	1.20	+	1.18		+++			---					
Tanzania, 1999, 2004	0.76	---	0.59	---				---					
Zambia, 1996, 2001	0.77	---	0.89					---			--		---

Note: All models except the unadjusted also include age

Reference groups: Year of survey: first survey; residence: rural; education: none; marital status: unmarried; Healthy looking person can carry HIV: no; Wealth quintile: poorest
+++ or ---: p<0.01; ++ or --: p<0.05; + or -: p<0.10; A positive sign indicates a positive relationship and a negative sign indicates a negative relationship.

Table 7: Odds ratios of condom use with extra-partner relationship in the twelve months preceding the survey between the two most recent surveys among women, results of logistic regression

Country	Survey				Residence	Education		Marital status	Healthy looking person can carry HIV	Wealth quintile			
	Unadjusted		Adjusted		Urban	Primary	Second. or higher	Married	Yes	Poorer	Middle	Richer	Richest
Benin, 1996, 2001	1.78	+++	1.63	++	++	++	+++	+	+				
Burkina Faso, 1998, 2003	1.62	+++	1.39	+		++	+++		+++				
Cameroon, 1998 2004	3.89	+++	3.59	+++	+++	++	+++		+++				++
Chad, 1996, 2004	1.80	+	1.08		++	++	+++		++				
Ethipoia, 2000, 2005	1.42		1.34					--				---	
Guinea, 1999, 2005	1.51	++	1.61	+++	+		+++						+
Kenya, 1998, 2003	1.59	+++	1.53	+++			++	+			++	+++	+++
Malawi, 2000, 2004	1.09		1.15		++	+++	+++				++	++	++
Rwanda, 2000, 2005	1.35		1.80	++	++		+++			+++	++		+++
Tanzania, 1999, 2004	1.96	+++	2.00	+++	+	+	++	--	++	+			+++
Zambia, 1996, 2001	1.74	+++	2.03	+++		+	+++	+++	+++		+++	+++	+++

Note: All models except the unadjusted also include age

Reference groups: Year of survey: first survey; residence: rural; education: none; marital status: unmarried; Healthy looking person can carry HIV: no; Wealth quintile: poorest
+++ or ---: p<0.01; ++ or --: p<0.05; + or -: p<0.10; A positive sign indicates a positive relationship and a negative sign indicates a negative relationship.

Table 8: Odds ratios of condom use with extra-partner relationship in the twelve months preceding the survey between the two most recent surveys among men, results of logistic regression

Country	Survey				Residence	Education		Marital status	Healthy looking person can carry HIV	Wealth quintile			
	Unadjusted		Adjusted		Urban	Primary	Second. or higher	Married	Yes	Poorer	Middle	Richer	Richest
Benin, 1996, 2001	1.73	+++	1.56	+++			+++		++			++	++
Burkina Faso, 1998, 2003	1.62	+++	1.68	+++	+++		+++	++	+++		++	++	+++
Cameroon, 1998 2004	2.82	+++	2.66	+++	+++	+	+++	+++	+++		+	+++	+++
Chad, 1996, 2004	1.26		1.34		++	+++	+++	+					+
Ethipoia, 2000, 2005	2.55	+++	1.33			+++	+++		++				+
Guinea, 1999, 2005	1.30	++	1.26	+			+++	+	+++			+++	+++
Kenya, 1998, 2003	1.07		1.00				+++	+++				++	+++
Malawi, 2000, 2004	1.46	+++	1.42	++		++	+++			+			
Rwanda, 2000, 2005	0.47	---	0.56	--	+++		+++						++
Tanzania, 1999, 2004	2.34	+++	2.28	+++		++	+++		+++		+++	++	+++
Zambia, 1996, 2001	1.20		1.23				+	+++	+++			+++	+++

Note: All models except the unadjusted also include age

Reference groups: Year of survey: first survey; residence: rural; education: none; marital status: unmarried; Healthy looking person can carry HIV: no; Wealth quintile: poorest
+++ or ---: p<0.01; ++ or --: p<0.05; + or -: p<0.10; A positive sign indicates a positive relationship and a negative sign indicates a negative relationship.