Damien de Walque
Development Research Group (DECRG)
The World Bank
1818 H St. NW
Washington DC 20433
ddewalque@worldbank.org

Comparing condom use with different types of partners: evidence from national HIV surveys in Africa.

Damien de Walque
The World Bank
Development Research Group
Rachel Kline
The World Bank
Development Research Group

Abstract:

Based on nationally representative samples from 13 sub-Saharan African countries, we reinforce and expand previous findings that men report using condoms more frequently than women and that unmarried individuals report they use condoms more frequently than married individuals with their spouse. Based on descriptive, bivariate, and multivariate analyses, we also demonstrate to a degree not previously shown in the current literature that married men from most countries report using condoms with extramarital partners about as frequently as unmarried men. However, married women from most countries included use condoms with extramarital partners less frequently than unmarried women. This result is especially troubling because marriage usually ensures regular sexual intercourse, providing more opportunities to pass HIV from extramarital partner to spouse than an unmarried person who may also have multiple partners but not as regular sexual intercourse. These findings about high-risk behaviors can be used to better target future prevention efforts.

Section 1: Introduction

Condoms are one of the best methods for protection against HIV (Davis and Weller, 1999) and they have great potential to keep the epidemic from expanding further if used broadly and consistently. However, across sub-Saharan Africa, where HIV prevalence is among the highest in the world, condom use varies widely among different sub-sectors of the population and in different contexts. It is crucial to specify any broad patterns within this variation to identify areas of particular high-risk and target prevention efforts.

Some patterns are already evident in the current literature. The literature consistently describes more condom use by men than women. Biraro and others (2009) analyze condom use in rural Uganda between 1996 and 2006. A higher percentage of men consistently report using a condom at last sex than women with 18.1 percent of men reporting condom use at last sex compared to 9.9 percent of women in 2006. Various other studies report similar differences (Gardner et al. 1999; Kamali et al. 2000; Ahmed et al. 2001; Fylkesnes et al. 2001; Hartung et al. 2002; Ukwuani et al. 2003; Mumtaz et al. 2005; Pullum et al. 2005; Gregson et al. 2006; Chimbiri 2007).

Another consistent result in the literature is that condom use within marriage is very low. The level of condom use for unmarried individuals was more than double that of the married respondents in a study done in Kenya (Bauni and Jarabi 2003). Cleland and others (2006) compare condom use for single and married women in 1993 and 2001 using nationally representative data sets from 13 countries. While single women reporting condom use at last sex increased from 19.3 percent to 28.1 percent, married women reporting condom use at last sex was much lower and hardly increased (3.7 percent to 4.5 percent). Numerous other studies demonstrate that condom use with a

spouse is very low (Maharaj and Cleland 2004; Chimbiri 2007; Hendrikson et al. 2007; Biraro et al. 2009).

A promising trend described in the current literature is increased condom use among young people, as exemplified in a recent study by UNAIDS (2010). Based on data from national surveys and antenatal clinics from 21 countries with adult HIV prevalence of more than two percent, ten countries reported increased condom use at last sex among women, 13 countries reported increased condom use at last sex among men, and three countries reported increased condom use at last sex among both men and women, all aged 15 to 24 years. Some of these countries also showed a drop in HIV prevalence, which may be associated with such behavior change. Gouws and others (2008) found similar trends among young people in six countries in Southern Africa, though they caution against associating trends based on data from different sources and that subjects may become increasingly unlikely to report risky behavior (such as sex without a condom) in countries with mature epidemics.

One of the most striking examples of this increased condom use among youth is in South Africa. Shisana and others (2009) report that reported condom use at last intercourse for men aged 15 to 24 years old increased from 57.1 percent in 2002 to 87.4 percent in 2008 and, similarly, women in the same age group went from 46.1 percent in 2002 to 73.1 percent 2008. Two other slightly less recent studies about the same age group in South Africa found 48 percent of women and between 53 and 59 percent of men reported using a condom at last intercourse (Hendriksen et al. 2007; Simbayi et al. 2004). Shisana and others additionally find that men and women aged 25 to 49 more than

doubled their reported condom use at last intercourse between 2002 and 2008 but overall levels were lower than those for youth at 56.4 and 58.1 percent respectively.

Much less has been said in the current literature about condom use during extramarital intercourse, defined as sexual intercourse between a married person and someone other than his/her spouse. There seems to be agreement among researchers that men report significantly higher instances of extramarital sex than women and condom use is higher in extramarital sex than within marriage, especially for men. A study in Tanzania shows that 40 percent of married men but only three percent of married women reported having non-marital partners in the last year (Nnko et al. 2004). Based on a nationally representative sample for Uganda, Kirungi and others (2006) report that 12 percent of men versus three percent of women report extramarital sex in the previous 12 months. In Zimbabwe, 30 percent of married men compared with ten percent of married women reported partners outside their marriage in the last year (Mumtaz et al. 2005). Other studies show similar results (Kamali et al. 2000; Allen et al. 2003).

However, few studies describe condom use in these extramarital situations and none use nationally representative data sets for a variety of countries. Condom use in extramarital intercourse is of concern because of the substantial chances of contracting HIV through having multiple partners and then passing it to a spouse. In a study in rural Uganda, the most recent data in the study shows that 63 percent of married men and 38 percent of married women used a condom at last sex with a casual partner though women reported fewer extramarital intercourses overall (Biraro et al. 2009). Although results are not divided by gender, another study shows that 2.3 percent of married subjects reported using a condom at last intercourse with a spouse and 18.2 percent reported using a

condom at last intercourse with an extramarital partner (Chimbiri 2007). Based on these studies, condom use in extramarital intercourse seems low for such high-risk sex, however information on this subject in the current literature is limited.

An additional pattern and concern throughout the current literature is that condom use is uneven throughout the population, as illustrated in the previously described patterns, and not sufficiently high in many sub-sectors of the population to prevent the continued spread of HIV. Largarde and others (2001) conclude that condom use in a variety of urban areas in sub-Saharan Africa is too low overall to substantially decrease the level of HIV infection. They compare reported condom use, which was between 21 and 25 percent for men and between 11 and 24 percent for women, between regions with higher HIV prevalence and lower HIV prevalence to determine if condom use can account for the differences in HIV. The study determines that "variations in levels of condom use in African populations, including those in our study, all ranged below the necessary threshold to achieve a significant impact on the level of the HIV epidemic, and that the slight variations we observed were not sufficient to modulate overall levels of HIV/STI infections" (Lagarde et al. 2001, p. S77). These insufficient levels of condom use are highlighted when looking at condom use by those known to be HIV positive. 54.4 percent of sexually active recently diagnosed HIV positive study participants had not used a condom during their most recent intercourse (Olley et al. 2005) and Bunnell et al. (2008) show 83 percent of last sex acts of an HIV positive sample in Uganda were unprotected, though many of these were with a married or cohabitating partner. While these examples of low condom use are important to consider when analyzing condom use in sub-Saharan Africa, these studies, similar to many others referenced here, draw from

non-representative samples or representative samples from only one country thereby limiting their widespread applicability.

While the literature describes condom use among different sub-sectors of the population to varying degrees, a more comprehensive review of the differing levels of condom use (depending on geography, gender, marital status, etc.) is important in understanding how HIV/AIDS prevention efforts through condom use can be improved and more properly targeted. Although there have been some notable recently recorded increases in condom use that may be attributed to specific prevention activities (Simbayi et al. 2004, Foss et al. 2007, Shisana et al. 2009, UNAIDS 2010), there is substantial room for improved condom use in most sub-sectors of the population in many countries. This study, using nationally representative data from 13 sub-Saharan African countries to describe and compare condom use by different sectors of the population, can help fill the gap in the current literature on condom use. By analyzing and contrasting condom use by men, women, married and unmarried individuals with different types of partners (any type, spouse, someone other than a spouse), patterns emerge that both substantiate findings from earlier studies and provide new insights into high risk behavior that can be used to better guide prevention efforts.

Section 2: Methodology

This analysis uses nationally representative and comparable data from 13 sub-Saharan African countries. Data from Burkina Faso, Cameroon, Ethiopia, Ghana, Guinea, Kenya, Lesotho, Malawi, Rwanda, Senegal, and Zimbabwe all comes from the most recent DHS which all have similar questions (Burkina Faso 2003, Cameroon 2004, Ethiopia 2005, Ghana 2003, Guinea 2005, Kenya 2003, Lesotho 2004, Malawi 2004, Rwanda 2005,

Senegal 2005 and Zimbabwe 2005/06). The data from Côte d'Ivoire and Tanzania (Côte d'Ivoire 2005 and Tanzania 2004) are from the HIV/AIDS Indicator Survey (AIS), which includes more limited socio-demographic variables than the DHS but are sufficient for this study. At the time of analysis, these were the 13 recent DHS/AIS data sets that were available for sub-Saharan Africa. For Lesotho, there is only data for women because men were not asked the questions about condom use. The data is weighted using the sample weights suggested by the data provider and the standard errors are clustered at the enumeration area level.

The samples of the surveys include women ages 15 to 49. There is more variation in the ages of the men; in Burkina Faso, Cameroon, Ethiopia, Ghana, Guinea, Lesotho, Rwanda, and Senegal, men are ages 15-59, in Kenya, Malawi, and Zimbabwe, men are ages 15-54, and in Côte d'Ivoire and Tanzania, the men are ages 14-49.

Our analyses compare condom use among different categories of partners for men and women, and also compare condom use among married versus non-married individuals. Marriage is defined as currently legally or formally married or not formally married but living with a partner in a consensual union. We extend the analysis by doing bivariate and multivariate regressions for similar comparisons, with the results shown as odds ratios. In Côte d'Ivoire, Lesotho, Rwanda, Tanzania and Zimbabwe, no information about ethnicity was collected, and in Lesotho there was no information about polygamy so it was not possible to adjust for these factors in these countries.

It is important to note that condom use is a self-reported variable so is therefore likely to suffer from some reporting bias. This possible bias will be explored in more detail in the discussion section of this article.

Section 3: Results

Table 1 compares condom use with different categories of partners for men and women, with statistical significance indicated by the p-values from T-tests. The analysis in table 1c includes single, divorced, separated and widowed individuals who, by definition, do not have a spouse. It also includes any condom use in extramarital sex by a married person.

Table 1a gives the percentages and standard errors for whether men and women used a condom during the last sexual intercourse they had, regardless of with whom it was. For all countries, men report that they used a condom at their last sexual intercourse more than women and the difference was consistently statistically significant at the one percent confidence level (table 1a). This difference could not be calculated for Lesotho because there is no data for men. Men reported condom use varied between almost 30 percent (Cameroon) and five percent or under (Ethiopia and Rwanda). Between 20 and 30 percent of men in Burkina Faso, Cameroon, Côte d'Ivoire, Senegal, Tanzania and Zimbabwe used a condom at their last intercourse. Between 14 and 19 percent of men from Ghana, Guinea, Kenya, and Malawi reported that they used a condom at their last sexual intercourse. Fewer than ten percent of women used a condom in most countries. Only in Cameroon, Côte d'Ivoire, Ethiopia, Lesotho and Tanzania was condom use by women higher than ten percent but all were still below 20 percent.

Table 1b shows the percentages and standard errors for men and women for condom use at the last sexual intercourse with a spouse. The p-values indicate whether the results are significantly different by gender. Interestingly, when we limit the analysis

to those who used a condom during the last intercourse with a spouse, there are often still significant differences between what men and women report. In all countries, except in Rwanda, men report a higher condom use within marriage and that difference is statistically significant at the one or five percent confidence level for all countries, except in Ethiopia and Tanzania where it is only significant at the ten percent level. More men than women still report condom use but overall, usage is lower than with condom use with any person, spouse or otherwise (compare with table 1a). Only ten percent of men or fewer reported using condoms with their spouse in all countries and five percent or fewer men reported condom use in Ethiopia, Guinea, Kenya, Rwanda, and Senegal. Women always reported less condom use than men and five percent or fewer of them reported condom use with their spouse, with the exception of women from Cameroon (5.7 percent) and Lesotho (11 percent).

Table 1c shows whether a condom was used at the last sexual intercourse with someone other than a spouse. When respondents were asked whether they used a condom during their last intercourse with someone other than their spouse (whether they are married or not), the differences between the response from men and women are statistically significant for all countries, always with more men reporting condom use. Between 67 percent (Burkina Faso) and 32 percent (Rwanda) of men reported condom use at last sex not with their spouse. Between 40 and 50 percent of men from half of the countries reported using a condom with a person other than their spouse. Less than 40 percent of women from most countries reported condom use with someone other than their spouse with 19 percent of women from Rwanda being the lowest percentage (others are: Côte d'Ivoire, Ethiopia, Ghana, Guinea, Kenya, Malawi, Rwanda, Senegal and

Tanzania). In all other countries, less than 55 percent of women reported condom use with someone other than their spouse.

The remaining tables compare those married to those not married across countries in order to investigate the relative degree of condom use by married individuals, especially in extramarital situations. Table 1d has the percentages and standard errors for whether a condom was used at last intercourse with any person, spouse or non-spouse. In table 1e, the same comparison is made for whether the individual used a condom at the last intercourse with someone other than his/her spouse. In tables 1d and 1e, the p-values indicate whether the results are significantly different by marital status (married vs. non-married).

When asked if they had used a condom the last time they had intercourse with anyone, the differences in table 1d between married and unmarried individuals were statistically significant for all countries. With the exception of men from Burkina Faso (13 percent) and Cameroon (16 percent), eleven percent or less of married men reported condom use at last intercourse. Five percent or less of all married women reported condom use during last sex except for nine percent of Cameroon's and eleven percent of Lesotho's women. In contrast, between 67 percent (Burkina Faso) and 37 percent (Guinea and Rwanda) of unmarried men reported condom use at last intercourse. 40 to 50 percent of unmarried men from half of the countries said they used a condom at last sex. As seen in table 1d, women overall report using a condom less than men do. The range for unmarried women is between 53 percent (Burkina Faso) and 13 percent (Ethiopia) for condom use at last intercourse, with between 20 and 40 percent of women from most countries reporting condom use.

The last descriptive analysis in table 1e reports the percentages of married men and women who used a condom at their last intercourse that was not with their spouse (extramarital sex) compared to unmarried men and women. The differences between the married and unmarried groups were not as consistent as in the other analyses however there are still a number of countries with statistically significant differences. These differences indicate that those engaging in extramarital sex do not seem to be using condoms as much as unmarried individuals. The differences are statistically significant for women from over half of the countries at the one percent confidence level (Cameroon, Côte d'Ivoire, Ghana, Kenya, Lesotho, Rwanda, and Zimbabwe), in Burkina Faso at the five percent level, and in Ethiopia at the ten percent level. Differences for men are also significant at the one percent confidence level for Côte d'Ivoire, Ethiopia, Rwanda and Zimbabwe and at the ten percent in Ghana. Overall, condom use for married women is low at last intercourse with someone other than their spouse compared to men. In most countries, 20 percent or fewer of married women report condom use during extramarital sex. The exceptions are married women from Cameroon, Guinea, Malawi, Senegal, and Tanzania, of whom between 21 and 41 percent reported using a condom in extramarital relations. Between 30 and 40 percent of married men from Côte d'Ivoire, Ghana, Guinea, Kenya, and Malawi report condom use in sex with someone other than their spouse. Between 47 and 60 of married men in Burkina Faso, Cameroon, Tanzania, and Zimbabwe reported condom use in extramarital sex. The highest percentage of married men reporting was from Senegal (65 percent) and the lowest were from Ethiopia (13 percent) and Rwanda (three percent). For unmarried individuals, most countries show over 40 percent of men reporting condom use (with the exception of only

men from Guinea and Rwanda). Between 40 and 50 percent of unmarried men from Côte d'Ivoire, Ghana, Kenya, Malawi, and Tanzania reported condom use and 50 to 70 percent of unmarried men from Burkina Faso, Cameroon, Ethiopia, Senegal, and Zimbabwe said they used a condom at last intercourse. The results for condom use by unmarried women were generally higher than married women with a non-spousal partner. The lowest percentages of unmarried women reporting condom use was between 20 and 30 percent (only from Ethiopia, Guinea, Kenya, and Rwanda). The highest percentage was 57 percent of unmarried women from Burkina Faso reporting condom use at last intercourse.

The remaining results are from bivariate and multivariate regression analyses. Table 2a includes the unadjusted results for whether a married individual (compared to an unmarried individual, the reference group) used a condom at their last sexual intercourse with any partner. The multivariate regression results that follow under table 2b are also for whether a condom was used at the last sexual intercourse with any partner but they adjust for age, education, wealth, urban location, religion, ethnicity, and polygamy as potential confounding factors. The last results are the bivariate (table 2c) and multivariate (table 2d) odds ratios for whether a condom was used at the last intercourse with someone other than his/her spouse. As a basis for comparison, tables 2a and 2b first show that married men and women from all countries are significantly less likely to use a condom during their last sexual intercourse with any partner than unmarried men or women at the one percent confidence level for both unadjusted and adjusted regressions. However, when we examine behavior if the last sexual intercourse was with someone other than a spouse in tables 2c (unadjusted) and 2d (adjusted), the results are more

varied. When asked if they used a condom during their last intercourse with someone other than their spouse, most differences between the responses of married and unmarried men were not significant. The only countries where married men were less likely to use a condom than unmarried men during sex outside of marriage for both unadjusted and adjusted regressions at the one percent confidence level were Ethiopia, Rwanda, and Zimbabwe. Married men from Côte d'Ivoire were also less likely to use condoms outside of marriage but when the results were adjusted for age, education, wealth, urban location, religion, ethnicity, and polygamy, the results are no longer significant. The same is true for men from Ghana but the unadjusted odds ratios were only significantly less than one at the ten percent confidence level.

For women, however, the differences are more widespread. In over half of the countries, married women are significantly less likely to use condoms during extramarital sex than unmarried women. When unadjusted, married women from Cameroon, Côte d'Ivoire, Ghana, Kenya, Lesotho, Rwanda, and Zimbabwe all use condoms significantly less than unmarried women at the one or five percent confidence level. Married women from Burkina Faso also use condoms significantly less but to the ten percent confidence level. After adjusting for potential confounding factors, the differences for married women from Côte d'Ivoire and Kenya lose their significance and results from Ghana are now significant at the ten percent confidence level but the difference in Burkina Faso becomes significant to the five percent confidence level. After adjusting, married women from Cameroon, Lesotho, Rwanda, and Zimbabwe still report using condoms significantly less than unmarried women at the one or five percent confidence level.

Section 4: Discussion

The results from this analysis confirm a number of findings from earlier studies. First, we corroborate that men generally report using condoms more frequently than women. We also substantiate that unmarried individuals use condoms more frequently than married individuals with their spouse. Lastly, overall, reported condom use is fairly low, despite the grave dangers posed by HIV throughout sub-Saharan Africa. This study also highlights a little documented finding that married women often use condoms significantly less than unmarried women in extramarital situations while married men tend to use condoms during extramarital sex at similar rates to unmarried men.

An important aspect of this study is that the data comes from nationally representative samples that are comparable across all the 13 sub-Saharan African countries included. These provide a powerful tool to understand condom use in many contexts and be able to generalize the findings much more than with data from smaller or more isolated sample populations common in the current condom literature.

It has been established in a number of previous studies that men report using condoms more often than women (see references in introduction). This study confirms that men consistently report using condoms more often at last intercourse than women both inside and outside of marriage for married and unmarried individuals in all countries with differences significant to the one percent confidence level, except for Rwanda. In Rwanda, there is not a significant difference between condom use between men and women at last intercourse with a spouse, however the differences are still significant to the one percent confidence level for the last intercourse with any partner and specifically with someone other than a spouse. Differences in condom use for men and women

cannot be determined for Lesotho because men were not asked about condom use in that DHS. Overall, these results are a powerful indicator that men report using condoms more frequently than women across sub-Saharan Africa.

This analysis also shows that condoms are used much more often in the last intercourse with someone that is not a spouse than the last intercourse with any partner or with a spouse. The category of last intercourse with someone that is not a spouse includes single, divorced, separated or widowed individuals who have intercourse with any type of partner because, by definition, they do not have spouses. This category also includes married individuals who have extramarital sex. While some of these people may be in committed relationships, these results are consistent with other studies that show condom use is higher in extramarital situations, by unmarried individuals, and in casual relationships (Ahmed et al. 2001; Biraro et al. 2009). It is logical that condom use is higher in less committed relationships where more risk may be perceived, however, we have shown in more specific analyses that condom use is still very low among certain groups even in very high risk situations.

We reinforce the above results by comparing condom use during the last intercourse for married and unmarried individuals. In all countries studied, both unmarried men and women use condoms more than married individuals with their spouses. All these differences are statistically significant to the one percent confidence level. Previous studies have reported similar findings (see introduction).

In analyzing levels of condom use for purposes of improvement of prevention of HIV/AIDS, it is helpful to consider the reasons one may use a condom as well as the reasons one may not use a condom. People generally use condoms for contraception,

protection against sexually transmitted diseases, or both. Maharaj (2006) found that the main reason for condom use among 64 percent of young people in KwaZulu-Natal, South Africa was protection against both pregnancy and disease. Cleland and Ali (2006) assert that over 60 percent of young women in a multi-country representative sample use condoms to, at least in part, prevent pregnancy. The often-complex motivation for condom use is likely to influence the type of partners condoms are used with and the level of consistency of condom use. According to a study in Lesotho, condom use is generally higher in intercourse perceived as risky, such as in transactional sex and with a casual partner, compared to perceived lower risk relationships, such as a long term partner or spouse (Khobotlo et al. 2009b).

Just as important, there are a variety of reasons someone may decide not to wear a condom, often depending on a combination of beliefs relating to condoms themselves, gender roles, the perception of risk, and the type of partner. In sub-Saharan Africa, there are many negative attitudes about condoms. For example, participants in a qualitative study in Lesotho explained in a variety of ways that condoms decrease sexual pleasure and cause diseases (including HIV and kidney disease) instead of prevent them (Khobotlo et al. 2009). The most commonly cited motive by respondents from eight sub-Saharan African countries for not using a condom at last sex with a casual partner was a dislike of condoms (Agha et al. 2002). Thomsen and others also found that, according to the participants, the decrease in pleasure due to condoms was not worth the benefits derived from using a condom (2004).

Because of traditional gender roles relating to sexual relations, even if a woman did want to use a condom, there may be cultural barriers that could prevent her from

negotiating condom use with her partner (Gardner et al. 1999). In a qualitative study of condom use in southern and eastern Africa, there was consensus among participants that it is not acceptable for women to ask their partners to use a condom, though there was more flexibility if the partner was not a spouse or not regular (Pullum et al. 2005).

There are additional reasons that condoms are used even less in marriage. Based on a qualitative analysis, Chimbiri (2007) describes the perception among a sample of married people in Malawi that bringing up a discussion of condoms is akin to bringing an intruder into the marriage because it implies that one partner is having extramarital sex and it interferes with the marriage as something created by God for the purpose of enjoyment of sex and procreation. In a study of condom use in cohabitating and marital partnerships in KwaZulu Natal, South Africa, Maharaj and Cleland (2004), also find both men and women have strong negative attitudes towards condom use in marriage because it implies infidelity and a lack of trust.

A common explanation for not using a condom is that a person trusts his/her partner so there is little perceived risk of HIV infection. This belief can be misguided and may have deadly consequences in contexts with high HIV prevalence rates and low testing rates, as in much of sub-Saharan Africa. In a study about HIV transmission risk behavior of HIV positive adults in Uganda, Bunnell and others (2008) reported that almost half of those HIV positive adults who did not use condoms during the last sexual encounter gave as the reason that they trusted their partner was not infected. Almost all of these unprotected sex acts were with spouses or regular partners (84 percent with cohabitating partners and 13 percent with steady partners). However, 87 percent of these HIV positive adults did not know that, in fact, they themselves were infected and only 9

percent actually knew their partner's status. De Walque (2007) also demonstrates that there is serious risk of HIV infection, even within cohabitating, committed relationships. Based on DHS data for Burkina Faso, Cameroon, Ghana, Kenya, and Tanzania, at least two thirds of HIV positive couples were discordant, in which only one partner is HIV positive. This means that, in the absence of consistent condom use, the HIV negative partner is at great risk for infection.

This study has a number of limitations that are important to consider. The study uses cross-sectional data, which gives a potentially incomplete picture because it does not take into account changes over time and because endogeneity and reverse causality are more likely to bias results in cross-sectional results.

Also, the dependent variable in this study is whether a condom was used at last intercourse. Condom use at last intercourse may not be a perfect proxy for typical condom use by that subject. The subject may not usually use a condom but happened to use one just before the time of the interview or vice versa and answered accordingly. This study is aimed at understanding condom use as a means to prevent HIV infection however HIV infection is prevented through consistent condom use, not just condom use at last intercourse. Ahmed and others (2001) show that HIV incidence of consistent condom users was less than half the HIV incidence of inconsistent condom users. However, given that the DHS only ask about condom use at the last sexual intercourse with each partner and given that the interview dates can be considered as random, condom at last sexual intercourse is, on average, a fairly good approximation of consistent condom use.

Additionally, because these results are based on self-reported sexual behavior data, they should be considered with caution. Self-reported sexual behaviors, including both condom use and sexual intercourse, have been shown to be unreliable in certain instances and it is very difficult to independently validate the data because, apart from biological evidence of sexually transmitted diseases (STD), there is no objective indicator of the reported sexual behavior (Weinhardt et al. 1998). Using biological markers, Allen and others (2003) show that reported condom use in discordant couples was also not reliable by showing that sperm was present in 15.1 percent of vaginal smears when no unprotected sex was reported compared with 24.7 percent of smears when unprotected sex was reported. Another study found that, based on data from 23 countries (mostly in sub-Saharan Africa), men over-report contraception use, though to widely varying degrees (Becker and Costenbader 2001). In this study, married men report significantly more condom use than married women during the last intercourse with a spouse in all countries. It would make more sense if there were little or no difference between what men and women report for condom use within marriage because the condom use is only within this closed group. This points to inaccuracies in self-reports of condom use.

In addition to inaccurate reporting of condom use, participants may also over or under-report intercourse, especially extramarital intercourse. Married women in this study reported fewer instances of extramarital sex than married men. These differences may be valid, however, reports of intercourse are also difficult to validate. Gersovitz (2005) explains that the DHS show inconsistencies with women who often report less sexual activity than men. Nnko and others (2004) find that women under-report the number of sexual partners though they do so consistently and that men also may mis-

report their sexual partners but in a less consistent way. In a study of discordant couples, de Walque (2007) shows that, though few women report extramarital sex, a substantial number of discordant couples are ones in which the woman is HIV positive and the man is HIV negative. This is very difficult to explain if women are not under-reporting their extramarital intercourse. In many African societies, there may be negative ramifications for women who have extramarital relations including divorce or expulsion from a community. Often men would not suffer the same consequences as extramarital sex for men can be more acceptable. These societal pressures can be a deterrent for women to report extramarital intercourse.

Reports of sexual behavior may also be inaccurate because of various other influences including recall bias and social pressure. Subjects may intend to report condom use or sexual encounters accurately, but they may not remember correctly or tend to remember differently from the reality based on their belief about what a good answer would be. One study showed that couples had a high level of agreement on the number of recent sexual intercourse but then men tended to over-report sexual encounters if more than a week had passed since the encounter (Lagarde et al. 1995). Though this study uses data about the last sexual intercourse, that intercourse could have happened more than a week before, possibly increasing the likelihood of recall bias. The knowledge that not using a condom use is considered risky may cause subjects to report more condom use because they are trying to appear they practice safer sex to the researcher. This type of perceived social pressure may cause subjects to over-report condom use. In contrast however, there are many negative views of condoms (Maharaj and Cleland 2004) that may cause people to under-report their use.

The results from this study that show that married women use condoms in extramarital intercourse less frequently than unmarried women may be subject to the above-discussed biases. However, while there is a strong argument for women reporting less extramarital sex because of possible negative outcomes, it does not seem as likely that women would under-report condom use in the extramarital intercourse they have already reported. These tendencies may make the sample size smaller than it should be which also may affect the results by making the degree of statistical significance lower than it would be if there had been more observations but condom use within these observations should be more or less accurate. This lends more credibility to the finding that condom use is low during sex among married women with extramarital partners.

These married women are acting like single women in that they have multiple sexual partners, however in terms of their condom use, they are acting more like married women, even though the level of risk of HIV is greatly increased by their extramarital relations. It is not clear why married women use condoms less frequently than unmarried women. It may be that it is more difficult for a married woman to obtain a condom without her husband's or anyone else's knowledge. She also may not have the financial resources at her discretion that a single women may have who is employed. Further research investigating the reasons for low condom use in women's extramarital relations could help make prevention efforts more effective.

Section 5: Conclusion

Based on nationally representative samples from 13 sub-Saharan African countries, we reinforce and expand previous findings that men report using condoms more frequently

than women and that unmarried individuals report they use condoms more frequently than married individuals with their spouse. Based on descriptive, bivariate and multivariate analyses, we also demonstrate to a degree not previously shown in the current literature that married men from most countries report using condoms with extramarital partners about as frequently as unmarried men. However, in over half of the countries, married women report using condoms in extramarital sex significantly less than unmarried women. This result, one yet to be found in the literature across this many countries, is especially troubling because HIV is primarily spread in Africa through heterosexual intercourse and having multiple partners is a risk factor for HIV infection. Being married usually ensures regular sexual intercourse, providing more opportunities to pass HIV from extramarital partner to spouse than an unmarried person who may also have multiple partners but not as regular sexual intercourse.

Prevention efforts aimed at increasing condom use in general need to be more widely instituted. However, using this research as a starting point, prevention can be aimed at the groups that tend to use condoms less frequently, such as married women. Prevention for this group can be geared towards encouraging condom use during sex outside of marriage and also discouraging extramarital sex. While increasing condom use is a daunting proposition, Foss and others (2007) investigated the effects of 62 condom use interventions and found that, despite many different approaches, it is possible to increase condom use. However, there was less evidence about the intervention impacts on casual sex because this has not been studied as much. More research on the reasons for not using a condom, especially for women in extramarital sex, and effective interventions may help to contain the HIV epidemic.

References

Agha, Sohail, Thankian Kusanthan, Kim Longfield, Megan Klein, and John Berman. 2002. "Reasons for non-use of condoms in eight countries in sub-Saharan Africa." www.aidsmark.org.

Ahmed, Saifuddin, Tom Lutalo, MariaWawer, David Serwadda, Nelson K. Sewankambo, Fred Nalugoda, Fred Makumbi, Fred Wabwire-Mangen, Noah Kiwanuka, Godfrey Kigozi, Mohamed Kiddugavu, and Ron Gray. 2001. "HIV incidence and sexually transmitted disease prevalence associated with condom use: a population study in Rakai, Uganda." *AIDS* 15: 2171±2179.

Allen, Susan, Jareen, Meinzen-Derr, Michele Kautzman, Isaac Zulu, Stanley Trask, Ulgen Fideli, Rosemary Musonda, Francis Kasolo, Feng Gao, and Alan Haworth. 2003. "Sexual behavior of HIV discordant couples after HIV counseling and testing." *AIDS* 17: 733–740.

Bauni, Evasius K., and Ben Obonyo Jarabi. 2003. "The Low Acceptability and Use of Condoms within Marriage: Evidence from Nakuru District, Kenya." *African Population Studies/Etude de la Population Africaine* 18(1): 51-65.

Becker, Stan and Elizabeth Costenbader. 2001. "Husbands' and wives' reports of contraceptive use." *Studies in Family Planning* 32(2): 111-129.

Biraro, S, L A Shafer, I Kleinschmidt, B Wolff, A Karabalinde, A Nalwoga, J Musinguzi, W Kirungi, A Opio, J Whitworth, and H Grosskurth. 2009. "Is sexual risk taking behaviour changing in rural south-west Uganda? Behaviour trends in a rural population cohort 1993_2006." *Sexually Transmitted Infections* 85: i3-i11.

Bunnell, Rebecca, Alex Opio, Joshua Musinguzi, Wilford Kirungi, Paul Ekwaru, Vinod Mishra, Wolfgang Hladik, Jessica Kafuko, Elizabeth Madraa, and Jonathan Mermin. 2008. "HIV transmission risk behavior among HIV infected adults in Uganda: results of a nationally representative survey." *AIDS* 22: 617–624.

Burkina Faso Government and ORC Macro. 2004. *Enquête Démographique et de Santé du Burkina Faso 2003.* Institut National de la Statistique et de la Démographie. Ouagadougou, Burkina Faso.

Cameroon Government and ORC Macro. 2004. *Enquête Démographique et de Santé du Cameroun 2004.* Institut National de la Statistique. Yaoundé, Cameroon.

Chimbiri, Agnes M. 2007. "The condom is an 'intruder' in marriage: Evidence from rural Malawi." *Social Science & Medicine* 64: 1102-1115.

Cleland, John and Mohamed M Ali. 2006. "Sexual abstinence, contraception, and condom use by young African women: a secondary analysis of survey data." *Lancet* 368: 1788–93.

Cleland, John, Mohamed M. Ali, and Iqbal Shah. 2006. "Trends in Protective Behaviour among Single vs. Married Young Women in Sub-Saharan Africa: The Big Picture." *Reproductive Health Matters* 14(28): 17–22.

Côte d'Ivoire Government et ORC Macro. 2006. *Enquête sur les Indicateurs du Sida, Côte d'Ivoire 2005.* Institut National de la Statistique (INS) et Ministère de la Lutte contre le Sida. Calverton, Maryland, U.S.A.: INS et ORC Macro.

Davis, Karen R. and Susan C. Weller. 1999. "The Effectiveness of Condoms in Reducing Heterosexual Transmission of HIV." *Family Planning Perspectives* 31(6): 272–279.

de Walque, Damien. 2007. "Sero-Discordant Couples in Five African Countries: Implications for Prevention Strategies," *Population and Development Review* 33(3): 501-523.

Ethiopia Government and ORC Macro. 2006. *Ethiopia Demographic and Health Survey 2005.* Central Statistical Agency. Addis Ababa, Ethiopia and Calverton, Maryland.

Foss A.M., M. Hossain, P.T. Vickerman, and C.H. Watts. 2007. "A systematic review of published evidence on intervention impact on condom use in sub-Saharan Africa and Asia." *Sexually Transmitted Infections* 83: 510-516.

Fylkesnes, Knut, Rosemary Musonda, Moses Sichone, Zacchaeus Ndhlovu, Francis Tembo, and Mwaka Monze. 2001. "Declining HIV prevalence and risk behaviours in Zambia: evidence from surveillance and population based surveys." *AIDS* 15:907±916.

Gardner, Robert, Richard D. Blackburn, and Ushma D. Upadhyay. 1999. "Closing the condom gap." Population Report Health Series, Number 9. Baltimore: Johns Hopkins Population Information Program, Johns Hopkins School of Public Health.

Gersovitz, Mark. 2005. "The HIV epidemic in four African countries seen through the Demographic and Health Surveys." *Journal of African Economies* 14(2): 191-246.

Ghana Government and ORC Macro. 2004. *Ghana Demographic and Health Survey 2003.* Ghana Statistical Service and Noguchi Memorial Institute for Medical Research. Accra, Ghana.

Gouws, Eleanor, Karen A Stanecki, Rob Lyerla, and Peter D Ghys. 2008. "The epidemiology of HIV infection among young people aged 15-24 years in southern Africa." *AIDS* 22 (Supplement 4): S5-S16.

Gregson, Simon, Geoffrey P. Garnett, Constance A. Nyamukapa, Timonthy B. Hallett,

James J.C. Lewis, Peter R. Mason, Stephen K. Chandiwana, and Roy M. Anderson. 2006. "HIV Decline Associated with Behavior Change in Eastern Zimbabwe." *Science* 311: 664-666.

Guinea Goverment and ORC Macro. 2006. *Guinea Demographic and Health Survey 2005.* Direction Nationale de la Statistique Ministère du Plan Conakry, Guinée. Calverton, Maryland.

Hartung, T.K., J. Nash, N. Ngubane, and V. G. Fredlund. 2002. "AIDS awareness and sexual behaviour in a high HIV prevalence area in rural northern Kwazulu-Natal, South Africa." *International Journal of STD & AIDS* 13: 829± 832.

Hendriksen, Ellen Setsuko, Audrey Pettifor, Sung-Jae Lee, Thomas J. Coates, and Helen V. Rees. 2007. "Predictors of condom use among young adults in South Africa: the reproductive health and HIV research unit national youth survey." *American Journal of Public Health* 97: 1241–1248.

Kamali, Anatoli, Lucy Mary Carpenter, James Alexander Grover Whitworth, Robert Pool, Anthony Ruberantwari, and Amato Ojwiya. 2000. "Seven-year trends in HIV-1 infection rates, and changes in sexual behaviour, among adults in rural Uganda." *AIDS* 14: 427-434.

Kenya Government and ORC Macro. 2004. *Kenya Demographic and Health Survey 2003.* Central Bureau of Statistics and Ministry of Health. Nairobi, Kenya.

Khobotlo, Motlalepula Shadrack, Mikaela Hildebrand, Kathleen M. MacQueen, Susan Kasedde. 2009. "Gender and Multiple and Concurrent Sexual Partnerships in Lesotho." National AIDS Commission Lesotho, UNAIDS, and Family Health International, Funders: UNAIDS and USAID.

Khobotlo, Motlalepula, Relebohile Tshehlo, John Nkonyana, Mahlape Ramoseme, Mokete Khobotle, Abhimanyu Chitoshia, Mikaela Hildebrand, and Nicole Fraser. 2009b. "Lesotho HIV Prevention Response and Modes of Transmission Analysis." Lesotho National AIDS Commission, UNAIDS, World Bank Global HIV/AIDS Program.

Kirungi, W. L., J. Musinguzi, E. Madraa, N. Mulumba, T. Callejja, P. Ghys, and R. Bessinger. 2006. "Trends in antenatal HIV prevalence in urban Uganda associated with uptake of preventive sexual behaviour." *Sexually Transmitted Infections* 82 (supplement I): i36-i41.

Lagarde, Emmanuel. Catherine Enel, and Gilles Pison. 1995. "Reliability of reports of sexual behavior: A study of married couples in rural West Africa." *American Journal of Epidemiology* 141(12): 1194-2000.

Lagarde, E., B. Auvert, J. Chege, T. Sukwa, J.R. Glynn, H.A. Weiss, E. Akam, M. Laourou, M. Carael, A. Buve, and the Study Group on the Heterogeneity of HIV

Epidemics in African Cities. 2001. "Condom use and its association with HIV/sexually transmitted diseases in four urban communities in of sub-Saharan Africa." *AIDS* 15(supplement 4): S71-S78.

Lesotho Government and ORC Macro. 2005. *Lesotho Demographic and Health Survey 2004.* Ministry of Health and Social Welfare (MOHSW) [Lesotho], Bureau of Statistics (BOS) [Lesotho]. Calverton, Maryland.

Maharaj, Pranitha and John Cleland. 2004. "Condom Use Within Marital and Cohabiting Partnerships in KwaZulu-Natal, South Africa." *Studies in Family Planning* 35(2): 116-124.

Maharaj, Pranitha. 2006. "Reasons for Condom Use Among Young People In KwaZulu-Natal: Prevention of HIV, Pregnancy or Both?" *International Family Planning Perspectives* 32(1): 28–34.

Malawi Government and ORC Macro. 2005. *Malawi Demographic and Health Survey 2004.* National Statistical Office (NSO). Calverton, Maryland.

Mumtaz, Zubia, Emma Slaymaker, and Sarah Salway. 2005. "Condom use in Uganda and Zimbabwe: exploring the influence of gendered access to resources and couple-level dynamics" in A Focus on Gender, Collected Papers on Gender Using DHS Data. USAID and ORC Macro. Calverton, Maryland, USA. p. 117-141.

Nnko, Soori, J.Ties Boerma, Mark Urassa, Gabriel Mwaluko, and Basia Zaba. 2004. "Secretive women or swaggering men? An assessment of the quality of sexual partnership reporting in rural Tanzania." *Social Science & Medicine* 59: 299–310.

Olley, B.O., S. Seedat, F. Gxamza, H Reuter, and D.J. Stein. 2005. "Determinants of unprotected sex among HIV-positive patients in South Africa." *AIDS Care* 17(1): 1-9.

Pullum, Thomas, John Cleland, and Iqbal Shah. 2005. "Consensus, Power and Trust in the Use of Family Planning and Condoms by Couples in Eastern and Southern Africa." Prepared for the XXV International Population Conference of the International Union for the Scientific Study of Population (IUSSP), Session 124, Tours, France, 18-23 July, 2005.

Rwanda Government and ORC Macro. 2006. *Rwanda Demographic and Health Survey 2005.* Institut National de la Statistique du Rwanda (INSR). Calverton, Maryland.

Senegal Government, Ndiaye, Salif, Mohamed Ayad, et ORC Macro. 2006. *Enquête Démographique et de Santé au Sénégal 2005.* Centre de Recherche pour le Développement Humain [Sénégal]. Calverton, Maryland, USA.

Shisana O, Rehle T, Simbayi LC, Zuma K, Jooste S, Pillay-van-Wyk V, Mbelle N, Van Zyl J, Parker W, Zungu NP, Pezi S, and the SABSSM III Implementation Team. 2009.

"South African national HIV prevalence, incidence, behaviour and communication survey 2008: A turning tide among teenagers?" Cape Town: HSRC Press.

Simbayi, L.C., J. Chauveau, and O. Shisana. 2004. "Behavioural responses of South African youth to the HIV/AIDS epidemic: A nationwide survey." *AIDS Care* 16(5): 605-618.

Tanzania Government and ORC Macro. 2005. *Tanzania HIV/AIDS Indicator Survey 2003-04.* Tanzania Commission for AIDS and National Bureau of Statistics. Dar es Salaam, Tanzania.

Thomsen, S, M Stalker, and C Toroitich-Ruto. 2004. "Fifty ways to leave your rubber: how men in Mombasa rationalise unsafe sex." *Sexually Transmitted Infections* 80: 430-434.

Ukwuani, Festus A, Amy O. Tsui, and Chirayath M. Suchindran. 2003. "Condom Use for Preventing HIV Infection/AIDS in Sub-Saharan Africa: A Comparative Multilevel Analysis of Uganda and Tanzania." *Journal of Acquired Immune Deficiency Syndrome* 34(2): 203-213.

UNAIDS. 2010. "Outlook Breaking News: Young People are Leading the HIV Prevention Revolution." *www.unaids.org* document no. 20100713_outlook_youngpeople_en.pdf

Weinhardt, Lance S., Andrew D. Forsyth, Michael P. Carey, Beth C. Jaworski, and Lauren E. Duran. 1998. "Reliability and Validity of Self-Report Measures of HIV-Related Sexual Behavior: Progress Since 1990 and Recommendations for Research and Practice." *Archives of Sexual Behavior* 27(2): 155-180.

Zimbabwe Government and ORC Macro. 2007. *Zimbabwe Demographic and Health Survey 2005-06.* Central Statistical Office (CSO). Calverton, Maryland.

Table 1, parts 1a-1e: Percentage of men, women, married and unmarried who used a condom from thirteen Demographic and Health Surveys and AIDS Indicator Surveys.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Burkina Faso 2003		Cameroon 2004		Cote d'Ivoire 2005		Ethiopia 2005		Ghana 2003		Guinea 2005		Kenya 2003	
	men	women	men	women	men	women	men	women	men	women	men	women	men	women
Table 1a: Percentage who used condom at last intercourse with any partner and T-test (P-value) for difference by men and women.														
	0.2707	0.0944	0.2971	0.1516	0.2847	0.1375	0.043	0.0102	0.182	0.0857	0.1667	0.0463	0.167	0.0549
	[0.0173]	[0.0119]	[0.0121]	[0.0081]	[0.0197]	[0.0133]	[0.0050]	[0.0021]	[0.0090]	[0.0059]	[0.0112]	[0.0052]	[0.0090]	[0.0042]
N	2376	2842	4084	7977	3057	3662	3684	4197	3302	3852	2420	5266	2575	5678
P-value	<0.0001		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001	
Table 1b: Percentage who used condom at last intercourse with spouse and T-test (P-value) for difference by men and women.														
	0.1013	0.0425	0.0729	0.0572	0.0954	0.0458	0.0078	0.0039	0.0781	0.0346	0.0285	0.0104	0.0327	0.0193
	[0.0102]	[0.0055]	[0.0069]	[0.0044]	[0.0226]	[0.0069]	[0.0018]	[0.0012]	[0.0066]	[0.0037]	[0.0064]	[0.0019]	[0.0047]	[0.0024]
N	1607	2483	2150	5812	1571	2566	3259	4035	2433	3131	1473	4588	1803	4735
P-value	<0.0001		0.021		0.014		0.077		<0.0001		0.005		0.002	
Table 1c: Percentage who used condom at last intercourse with someone other than spouse and T-test (P-value) for difference by men and women.														
	0.6673	0.5358	0.5528	0.415	0.4711	0.321	0.5186	0.2453	0.452	0.2823	0.3784	0.2606	0.4615	0.2365
	[0.0294]	[0.0445]	[0.0166]	[0.0140]	[0.0212]	[0.0263]	[0.0437]	[0.0560]	[0.0210]	[0.0188]	[0.0226]	[0.0243]	[0.0213]	[0.0173]
N	891	487	1928	2148	1486	1094	422	160	868	719	944	677	772	943
P-value	0.007		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001	
Table 1d: Percentage who used condom at last intercourse with any partner and T-test (P-value) for difference by married and non married.														
Married	0.1325	0.0442	0.1596	0.0901	0.1083	0.0503	0.008	0.0042	0.0938	0.0377	0.0757	0.02	0.0393	0.0195
	[0.0109]	[0.0062]	[0.0104]	[0.0061]	[0.0135]	[0.0069]	[0.0019]	[0.0013]	[0.0072]	[0.0038]	[0.0093]	[0.0030]	[0.0052]	[0.0025]
N	1700	2501	2576	6459	1734	2592	3223	3955	2538	3175	1678	4685	1826	4646
Non married	0.672	0.5266	0.539	0.4243	0.4865	0.3246	0.4521	0.1278	0.4558	0.286	0.3723	0.235	0.457	0.2179
	[0.0330]	[0.0464]	[0.0179]	[0.0169]	[0.0251]	[0.0258]	[0.0417]	[0.0300]	[0.0221]	[0.0198]	[0.0251]	[0.0240]	[0.0218]	[0.0161]
N	676	341	1508	1518	1323	1070	461	242	764	677	742	581	749	1032
P-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Table 1e: Percentage who used condom at last intercourse with somebody other than a spouse and T-test (P-value) for difference by married and non married.														
Married	0.5932	0.202	0.5445	0.3433	0.334	0.1642	0.1394	0.0965	0.3685	0.1629	0.3906	0.3096	0.3497	0.074
	[0.0588]	[0.1514]	[0.0279]	[0.0207]	[0.0404]	[0.0536]	[0.1147]	[0.0835]	[0.0496]	[0.0350]	[0.0399]	[0.0497]	[0.0763]	[0.0408]
N	226	169	477	755	178	66	14	22	125	99	209	138	45	39
Non married	0.6813	0.5659	0.5556	0.4552	0.4862	0.3347	0.5309	0.2697	0.4661	0.3014	0.3747	0.248	0.4676	0.2449
	[0.0329]	[0.0463]	[0.0182]	[0.0174]	[0.0226]	[0.0259]	[0.0437]	[0.0607]	[0.0225]	[0.0208]	[0.0250]	[0.0251]	[0.0218]	[0.0174]
N	665	318	1451	1393	1308	1028	408	138	743	620	735	539	727	904
P-value	0.194	0.026	0.71	<0.0001	0.001	0.001	0.001	0.063	0.065	<0.0001	0.717	0.234	0.133	<0.0001

Table 1, parts 1a-1e *continued*: Percentage of men, women, married and unmarried who used a condom from thirteen Demographic and Health Surveys and AIDS Indicator Surveys.

	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
	Lesotho 2004	Malawi 2004		Rwanda 2005		Senegal 2005		Tanzania 2004		Zimbabwe 2005/6	
	women	men	women	men	women	men	women	men	women	men	women
Table 1a: Percentage who used condom at last intercourse with any partner and T-test (P-value) for difference by men and women.											
	0.195	0.1508	0.052	0.052	0.0269	0.2262	0.0334	0.204	0.1157	0.2443	0.0826
	[0.0104]	[0.0102]	[0.0036]	[0.0052]	[0.0026]	[0.0148]	[0.0033]	[0.0100]	[0.0080]	[0.0093]	[0.0054]
N	4971	2590	9169	2763	5848	2308	9443	4161	5294	4620	5846
P-value		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001	
Table 1b: Percentage who used condom at last intercourse with spouse and T-test (P-value) for difference by men and women.											
	0.1104	0.0695	0.0304	0.0135	0.0124	0.0336	0.0127	0.0619	0.0515	0.0753	0.0347
	[0.0077]	[0.0069]	[0.0027]	[0.0023]	[0.0017]	[0.0058]	[0.0017]	[0.0052]	[0.0045]	[0.0053]	[0.0030]
N	3509	2057	8438	2401	5357	1529	8888	2806	4264	3301	5089
P-value		<0.0001		0.653		<0.0001		0.078		<0.0001	
Table 1c: Percentage who used condom at last intercourse with someone other than spouse and T-test (P-value) for difference by men and women.											
	0.4019	0.4613	0.3033	0.3193	0.1952	0.6185	0.3897	0.4908	0.3778	0.678	0.4188
	[0.0197]	[0.0280]	[0.0218]	[0.0307]	[0.0217]	[0.0234]	[0.0306]	[0.0200]	[0.0228]	[0.0228]	[0.0245]
N	1457	533	727	362	491	775	539	1355	1030	1319	757
P-value		<0.0001		0.001		<0.0001		<0.0001		<0.0001	
Table 1d: Percentage who used condom at last intercourse with any partner and T-test (P-value) for difference by married and non married.											
Married	0.1093	0.0722	0.0307	0.0136	0.0115	0.1098	0.0262	0.0875	0.0508	0.081	0.0322
	[0.0078]	[0.0068]	[0.0027]	[0.0023]	[0.0016]	[0.0117]	[0.0028]	[0.0065]	[0.0045]	[0.0055]	[0.0029]
N	3488	2069	8070	2446	5226	1815	9158	2928	4198	3328	4983
Non married	0.395	0.4645	0.2088	0.3689	0.1609	0.6047	0.231	0.4708	0.3581	0.6734	0.3762
	[0.0195]	[0.0285]	[0.0173]	[0.0304]	[0.0176]	[0.0277]	[0.0336]	[0.0212]	[0.0219]	[0.0233]	[0.0226]
N	1483	521	1099	317	622	493	285	1233	1096	1292	863
P-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Table 1e: Percentage who used condom at last intercourse with somebody other than a spouse and T-test (P-value) for difference by married and non married.											
Married	0.1868	0.3606	0.2218	0.0335	0.0102	0.6453	0.4112	0.54	0.2449	0.4745	0.0775
	[0.0425]	[0.0920]	[0.0889]	[0.0195]	[0.0107]	[0.0362]	[0.0364]	[0.0451]	[0.0914]	[0.0641]	[0.0287]
N	117	38	29	66	21	287	372	161	38	66	84
Non married	0.4179	0.4696	0.307	0.3921	0.2029	0.6075	0.3578	0.4845	0.3821	0.688	0.4559
	[0.0203]	[0.0296]	[0.0221]	[0.0320]	[0.0224]	[0.0277]	[0.0466]	[0.0219]	[0.0231]	[0.0239]	[0.0261]
N	1340	495	698	296	470	488	167	1194	992	1253	673
P-value	<0.0001	0.262	0.337	<0.0001	<0.0001	0.376	0.336	0.273	0.137	0.002	<0.0001

Note: Standard errors in square brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. *Source*: Demographic and Health Surveys (Burkina Faso 2003, Cameroon 2004, Ethiopia 2005, Ghana 2003, Guinea 2005, Kenya 2003, Lesotho 2004, Malawi 2004, Rwanda 2005, Senegal 2005 and Zimbabwe 2005/06) and AIDS Indicator Surveys (Côte d'Ivoire, 2005 and Tanzania, 2004)

Table 2, parts 2a-2d: Unadjusted and adjusted odds ratios for condom use by married and unmarried men and women from thirteen Demographic and Health Surveys and AIDS Indicator Surveys.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Burkina Faso 2003		Cameroon 2004		Cote d'Ivoire 2005		Ethiopia 2005		Ghana 2003		Guinea 2005		Kenya 2003	
	men	women	men	women	men	women	men	women	men	women	men	women	men	women
Table 2a: Unadjusted odds ratio for using a condom at last sexual intercourse with any partner.														
Married	0.07***	0.04***	0.16***	0.13***	0.13***	0.11***	0.01***	0.03***	0.12***	0.10***	0.14***	0.07***	0.05***	0.07***
	[0.05 - 0.10]	[0.03 - 0.06]	[0.14 - 0.19]	[0.11 - 0.16]	[0.10 - 0.17]	[0.08 - 0.16]	[0.01 - 0.02]	[0.01 - 0.06]	[0.10 - 0.16]	[0.08 - 0.13]	[0.10 - 0.19]	[0.05 - 0.09]	[0.04 - 0.07]	[0.05 - 0.10]
Observations	2376	2842	4084	7977	3057	3662	3684	4197	3302	3852	2420	5266	2575	5678
Table 2b: Adjusted odds ratio for using a condom at last sexual intercourse with any partner. Adjusted for age, education wealth, urban location, religion, ethnicity, and polygamy.														
Married	0.13***	0.17***	0.32***	0.26***	0.20***	0.34***	0.01***	0.01***	0.24***	0.21***	0.36***	0.11***	0.04***	0.06***
	[0.08 - 0.21]	[0.10 - 0.30]	[0.25 - 0.42]	[0.21 - 0.32]	[0.13 - 0.30]	[0.21 - 0.55]	[0.00 - 0.01]	[0.00 - 0.02]	[0.17 - 0.34]	[0.14 - 0.30]	[0.22 - 0.59]	[0.07 - 0.18]	[0.03 - 0.08]	[0.04 - 0.08]
Observations	2261	2566	3973	7733	3033	3214	3010	1987	3252	3705	2049	4460	2504	5031
Table 2c: Unadjusted odds ratio for using a condom with someone other than spouse.														
Married	0.68	0.19*	0.96	0.63***	0.53***	0.39**	0.14**	0.29	0.67*	0.45***	1.07	1.36	0.61	0.25**
	[0.39 - 1.20]	[0.03 - 1.32]	[0.75 - 1.21]	[0.50 - 0.78]	[0.36 - 0.79]	[0.19 - 0.80]	[0.02 - 0.88]	[0.05 - 1.83]	[0.43 - 1.04]	[0.27 - 0.76]	[0.74 - 1.54]	[0.83 - 2.22]	[0.31 - 1.20]	[0.08 - 0.78]
Observations	891	487	1928	2148	1486	1094	422	160	868	719	944	677	772	943
Table 2d: Adjusted odds ratio for using a condom with someone other than spouse. Adjusted for age, education wealth, urban location, religion, ethnicity, and polygamy.														
Married	1.33	0.11**	1.21	0.65***	0.96	0.8	0.09***	0.03	0.94	0.59*	1.18	0.6	0.61	0.25
	[0.36 - 4.90]	[0.02 - 0.60]	[0.88 - 1.67]	[0.50 - 0.84]	[0.60 - 1.54]	[0.35 - 1.84]	[0.02 - 0.47]	[0.00 - 3.03]	[0.50 - 1.75]	[0.33 - 1.03]	[0.69 - 2.04]	[0.29 - 1.23]	[0.22 - 1.72]	[0.03 - 2.13]
Observations	880	459	1886	2122	1456	1026	387	92	850	681	920	621	751	894

Table 2, parts 2a-2d *continued*: Unadjusted and adjusted odds ratios for condom use by married and unmarried men and women from thirteen Demographic and Health Surveys and AIDS Indicator Surveys.

	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
	Lesotho 2004	Malawi 2004		Rwanda 2005		Senegal 2005		Tanzania 2004		Zimbabwe 2005/6	
	women	men	women	men	women	men	women	men	women	men	women
Table 2a: Unadjusted odds ratio for using a condom at last sexual intercourse with any partner.											
Married	0.19***	0.09***	0.12***	0.02***	0.06***	0.08***	0.09***	0.11***	0.10***	0.04***	0.06***
	[0.16 - 0.23]	[0.07 - 0.12]	[0.09 - 0.15]	[0.02 - 0.03]	[0.04 - 0.09]	[0.06 - 0.11]	[0.06 - 0.13]	[0.09 - 0.13]	[0.08 - 0.12]	[0.03 - 0.05]	[0.04 - 0.07]
Observations	4971	2590	9169	2763	5848	2308	9443	4161	5294	4620	5846
Table 2b: Adjusted odds ratio for using a condom at last sexual intercourse with any partner. Adjusted for age, education wealth, urban location, religion, ethnicity, and polygamy.											
Married	0.13***	0.10***	0.12***	0.02***	0.06***	0.14***	0.18***	0.12***	0.11***	0.02***	0.03***
	[0.10 - 0.18]	[0.06 - 0.15]	[0.09 - 0.17]	[0.01 - 0.04]	[0.03 - 0.10]	[0.08 - 0.25]	[0.09 - 0.37]	[0.08 - 0.16]	[0.08 - 0.15]	[0.02 - 0.03]	[0.02 - 0.04]
Observations	4881	2516	8927	2463	5525	2111	8870	4160	5234	4583	5605
Table 2c: Unadjusted odds ratio for using a condom with someone other than spouse.											
Married	0.32***	0.64	0.64	0.05***	0.04***	1.18	1.25	1.25	0.52	0.41***	0.10***
	[0.18 - 0.56]	[0.28 - 1.45]	[0.24 - 1.75]	[0.02 - 0.17]	[0.01 - 0.31]	[0.82 - 1.69]	[0.79 - 2.00]	[0.84 - 1.86]	[0.20 - 1.38]	[0.24 - 0.70]	[0.04 - 0.23]
Observations	1457	533	727	362	491	775	539	1355	1030	1319	757
Table 2d: Adjusted odds ratio for using a condom with someone other than spouse. Adjusted for age, education wealth, urban location, religion, ethnicity, and polygamy.											
Married	0.30***	0.88	1.34	0.11***	0.05**	1.34	1.82	1.52	0.99	0.21***	0.09***
	[0.15 - 0.58]	[0.30 - 2.61]	[0.50 - 3.64]	[0.03 - 0.44]	[0.00 - 0.61]	[0.78 - 2.33]	[0.84 - 3.96]	[0.88 - 2.63]	[0.33 - 2.97]	[0.10 - 0.43]	[0.03 - 0.26]
Observations	1424	519	687	306	450	745	462	1352	1004	1306	727

Note: 95% confidence intervals in brackets, * significant at 10%; ** significant at 5%; *** significant at 1%. *Source*: Demographic and Health Surveys (Burkina Faso 2003, Cameroon 2004, Ethiopia 2005, Ghana 2003, Guinea 2005, Kenya 2003, Lesotho 2004, Malawi 2004, Rwanda 2005, Senegal 2005 and Zimbabwe 2005/06) and AIDS Indicator Surveys (Côte d'Ivoire, 2005 and Tanzania, 2004). No data about ethnicity in DHS/AIS from Côte d'Ivoire, Lesotho, Rwanda, Tanzania, and Zimbabwe so not adjusted for in tables 2b or 2d. No data about polygamy in DHS from Lesotho so not adjusted for in tables 2b or 2d.