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Discordant couples

HIV infection among couples in Burkina Faso, Cameroon, Ghana, Kenya, and Tanzania

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Abstract

Most analyses of the determinants of HIV infection are performed at the individual level. The recent Demographic and Health Surveys which include results from HIV tests allow studying HIV infection at the level of the cohabiting couple. This paper exploits this feature of the data for Burkina Faso, Cameroon, Ghana, Kenya and Tanzania. The analysis yields two surprising findings about the dynamics of the HIV/AIDS epidemic which have important implications for policy. First, at least two-thirds of the infected couples are discordant couples, i.e. couples where only one of the two partners is infected. This implies that there is scope for prevention efforts among infected couples. Second, between 30 and 40 percent of the infected couples are couples where the female partner only is infected. This is at odds with levels of self-reported marital infidelity by females and with the common perception that unfaithful males are the main link between high risk groups and the general population. This study investigates and confirms the robustness of these findings. For example, even among couples where the woman has been in only one union for ten years or more, the fraction of couples where only the female partner is infected remains high. These results indicate that extramarital sexual activity among cohabiting women, whatever its causes, is a substantial source of vulnerability to HIV that should be, as much as male infidelity, targeted by prevention efforts. Moreover, this paper uncovers several inconsistencies between the sexual behaviors reported by male and female partners, suggesting that, as much as possible, prevention policies should rely on evidence including objectively measured HIV status.

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I Introduction

The HIV/AIDS epidemic is probably the greatest challenge facing Africa. According to UNAIDS (2005b), in 2005, between 23.8 and 28.9 million people were infected by HIV/AIDS in Sub-Saharan Africa (this represents around 65 percent of the worldwide total and implies that 7.2 percent of adults living in that region are HIV positive), between 2.1 and 2.7 million died from the virus and between 2.8 and 3.9 million became newly infected.

It is only recently that individual level data including the results of an HIV test have become available for nationally representative samples. Previously, studies of the HIV epidemic were relying either on aggregate data or on HIV status data from non-representative samples or on data from self-reported sexual behaviors. The new wave of Demographic and Health Surveys (DHS) which include HIV status now allows analyzing the socio-economic determinants of HIV infection for nationally representative samples (Akwara et al. 2005; Beegle and Ozler 2006; De Walque 2006; Lachaud 2005). This study of discordant couples uses an additional feature of the HIV data available in the Demographic and Health Surveys. The data make it possible to look at cohabiting couples (formally married or not) to assess the HIV status of both partners as well as to compare sexual behavior as reported by the man and the woman.

One limitation of the study is that, contrary to the analysis at the individual level, it excludes people who are not in a stable union, since only the characteristics and the HIV status of cohabiting partners can be found in data sets including couples only[1]. But the main advantage of looking at HIV status at the level of the couple is that, even in cross-sections, it gives an interesting picture of the dynamics of the HIV/AIDS epidemic. In order to understand how HIV infection is spread and therefore how it can be prevented, it is important to figure out whether, if one partner is infected, the other one is almost always infected. For prevention purposes, it is also useful to investigate through which partner –male or female – the virus is more likely to enter in a couple.

[1] Helleringer and Kohler (2006) use an interesting data set from Malawi in which they are able to track the HIV status of all sexual partners – marital as well as extra-marital – living in the same village.

This paper will focus on these two questions by analyzing sero-concordance and sero-discordance among cohabiting couples. A couple is described as concordant negative when both partners are HIV negative and concordant positive when both are HIV positive. A discordant couple is a couple where one partner is HIV positive and the other one is HIV negative. I will call "discordant male" a couple where the male is HIV positive, and the female HIV negative and "discordant female" a union where the man is negative and the woman positive. Once an individual is infected, he or she remains HIV positive for life. Anti-retroviral therapies allow treating the disease, but do not cure the infection. It is not possible for somebody to infect someone else without being himself HIV positive. In Africa, transmission of the HIV virus is thought to occur primarily through heterosexual intercourse.

Table 1 reports the fraction of couples in each of these four categories in Burkina Faso (2003), Cameroon (2004), Ghana (2003), Kenya (2003) and Tanzania (2003-2004). The second column for each country includes the fraction of concordant positive, discordant male and discordant female among all HIV infected couples, i.e. couples with at least one of the partners who is HIV positive. The very simple statistics in table 1 include two surprising findings which have important consequences for prevention policies.

The first surprise is that, in the five countries, at least two-thirds of the infected couples are discordant couples, i.e. couples where only one of the two partners is HIV. This means that there is scope for prevention among couples, even though this is rarely mentioned as a priority in prevention efforts. For example, a recent policy position paper by UNAIDS, the United Nations agency for AIDS (UNAIDS, 2005a), mentions the following groups as being "key populations" to whom prevention programs should be specifically targeted: women and girls, youth, men who have sex with men, injecting and other drug users, sex workers, people living in poverty, prisoners, migrant laborers, people in conflict and post-conflict situations and refugees and internally displaced persons. This is a very broad list, but it doesn't mention HIV negative cohabiting partners of HIV positive individuals as a group that should be specially targeted for prevention.

The second surprising result is that, across the five countries, between 30 and 40 percent of the infected couples are discordant female couples where the female partner only is infected. This is at odds with the common perception or assumption in the public and in the HIV/AIDS community that unfaithful males are the main link between high risk groups and the general population. The following excerpts from a recent report by United Nations agencies (UNAIDS, UNFPA and UNIFEM 2004) illustrate how male infidelity is often perceived as the main source of infection for women.

"At its heart, this is a crisis of gender inequality, with women less able than men to exercise control over their bodies and lives. Nearly universally, cultural expectations have encouraged men to have multiple partners, while women are expected to abstain or be faithful. There is also a culture of silence around sexual and reproductive health. Simply by fulfilling their expected gender roles, men and women are likely to increase their risk of HIV infection." (UNAIDS, UNFPA and UNIFEM 2004, p.7).

"With less ability to control sexual encounters, and increased physiological susceptibility to HIV, many women are finding that commonly accepted methods of prevention are insufficient. While the ABCs—Abstain, Be faithful and use Condoms—have been successful in some countries, such as Uganda, there is mounting evidence that the approach needs to be expanded to meet the needs of women and girls (…) For example, abstinence is meaningless to girls and women who are coerced or forced into sexual activity. Faithfulness offers little protection to wives whose husbands have several partners or were infected before they were married. Condoms require the cooperation of men, who may refuse to use them". (UNAIDS, UNFPA and UNIFEM 2004, p.16).

These statements, which are very relevant in many respects, are also examples of the pervasive assumption in the HIV/AIDS community that male infidelity is, by and large, the main culprit for infection among cohabiting couples.

Analyses of HIV discordant couples have mainly been published in the medical literature. Serwadda and others (1995), Quinn and others (2000) and Gray and others (2001) use data from discordant couples from the same community based study in the Rakai district in Uganda to explore the dynamics of HIV transmission, to measure HIV incidence per person year, the rates of male-to-female and female-to-male transmission and the probability of HIV transmission per coital act. Interestingly, Quinn and others (2000) found that out of 415 discordant couples in their study area, in 228 couples the male partner was HIV positive, while it was the female partner in 187 couples. This ratio of discordant male over discordant female couples is in the range of the ratios reported in table 1 and confirms that in rural Uganda as well, there is a substantial fraction of the discordant couples where it is the woman who is HIV positive. Carpenter and others (1999) also find, in a neighboring district in Uganda, that the proportion of discordant female couples is similar to the proportion of discordant males.

Siriwasin and others (1998) find that in Bangkok twenty-six percent of partners of HIV-positive pregnant women are HIV negative and consider this an unexpected result. Read from this angle, table 1 reveals results than are even more unexpected that the ones from Thailand: comparing the rows for concordant positive and for discordant female indicates that in the five African countries, the proportion of discordant female couple is always higher and that therefore certainly more than one half of the married or cohabiting women who are HIV positive have not been infected by their current partner. A similar conclusion can be made for HIV positive men, except in Kenya.

The remainder of the paper will investigate the robustness of the two surprising findings about the large fraction of discordant couples and of couples who are discordant female. Section II presents the data and the methodology. Section III investigates the fact that the majority of infected couples are discordant while section IV focuses on verifying that the finding on the substantial proportion of discordant female couples is robust. Section V compares discordance in HIV status among couples with discordances in self-reported sexual behaviors. Section VI concludes.

II Data and methodology

The five data sets used are very similar since four of them are standard Demographic and Health Surveys which in addition include HIV testing for a sub-sample of the sample. The Tanzanian Survey is an HIV/AIDS Indicator Survey (AIS) which also includes HIV testing as well as socio-demographic variables (but those are more limited than in the standard DHS)[2]. However, the HIV prevalence among all adults (not only the cohabiting adults included in the sample in Table 1) differs substantially across the five African countries. It is substantially higher in Cameroon (3.9 percent for males, 6.6 percent of females), Kenya (4.6 percent and 8.6 percent), and Tanzania (6.2 percent and 7.6 percent) than in Burkina Faso (1.9 percent and 1.8 percent) and Ghana (1.6 and 2.7 percent). For each of the five countries, I use the couple recode in the survey data. These data sets have been reorganized so that all variables pertaining to a woman and to her male cohabiting partner are assigned to one observation, the couple[3]. Couples include married people as well as people cohabiting but not formally married. The couple recode is then merged with the data set containing the HIV status of the males and females.

It is important to stress that the Demographic and Health Surveys are nationally representative surveys. Previous studies of discordant couples in the medical literature have used non representative samples either because they follow a specific cohort in a particular location (Carpenter and others, 1999; Quinn and others, 2000) or because their sample is a group of pregnant women (Siriwasin and others, 1998) or a group of patients who already know they are HIV positive and are seeking treatment (Carael and others, 1988; N'Gbichi and others, 1995). In the case of a sample where one of the partners at least is a patient, the proportion of concordant positive couples is usually higher because being a patient implies that the individual is seeking some treatment, therefore that he or

[2] The Demographic and Health Surveys can be downloaded from the website: http://www.measuredhs.com

[3] The data from the Tanzania HIV/AIDS Indicator Survey (2003-2004) is not immediately available in couple recode on the web, but I constructed a couple recode based on the instructions of the data provider. The Demographic and Health Survey (DHS) for Lesotho in 2004 will also allow an analysis at the level of the couple, but the data is not yet publicly available. For Lesotho (2004), the final report of the DHS (Lesotho Government and ORC Macro. 2005) includes the statistics about HIV infection in couples, which I discuss briefly in the next sections. The Demographic and Health Surveys for Mali (2001), Zambia (2001-2002) and the Dominican Republic (2002) included HIV testing results, but the HIV data cannot be merged with the socio-economic variables.

she is more likely to be at an advanced and symptomatic stage of the disease and that his or her partner would have been exposed for a longer period to the virus[4].

The methodology used in the study is very simple, since I only report sample means. In section IV, I vary the composition of the samples to verify that the findings are robust and that the proportion of discordant female couples is not mainly due to HIV infection prior to the marriage or cohabitation. The means are calculated using population weights provided in the data sets[5]. Given the relatively small number of HIV infections among couples, especially in Burkina Faso and Ghana, standard errors are such that confidence intervals around the means are relatively large. The fact that the findings about the large proportion, among HIV infected couples, of discordant couples and the substantial fraction of discordant couples where the female is infected is confirmed across different compositions of the sample and across five different countries reinforces, however, their robustness.

Some individuals who had been sampled for HIV testing have refused to be tested or were absent. If the absence of a test is not random, this could be a source of bias. In an analysis at the level of the couple, this bias due to a less than complete coverage of the HIV test could be aggravated because the absence of the test for one of the two partners implies that the entire couple cannot be used as an observation. I address this issue in Section IV.

III A large majority of infected couples are discordant

The first finding that this paper investigates is the result that at least two-thirds of the infected couples are couples where only one the two partners is HIV positive. Indeed, only 14.8 percent of the infected couples in Burkina Faso are concordant positive. This

[4] The median time between HIV infection and the first symptoms of AIDS is between 7 and 9 years.
[5] For Cameroon, Ghana, Kenya and Tanzania, I am able, in table 1, to replicate the statistics reported in the final reports of the DHS (Cameroon Government and ORC Macro. 2004; Ghana Government and ORC Macro. 2004; Kenya Government and ORC Macro. 2004; Tanzania Government and ORC Macro. 2005). While I am using exactly the same procedure as in the four other countries, I am not able to exactly replicate the figures reported in the Burkina Faso 2003 DHS (Burkina Faso Government and ORC Macro. 2005). The results, however, are qualitatively, if not numerically, the same.

proportion is 22 percent in Ghana, 24.7 percent in Tanzania, 31.6 percent in Cameroon and 33.3 percent in Kenya[6]. Those are smaller percentages than reported in earlier studies (see for example Carael and others, 1988 and N'Gbichi and others, 1995). However, the sample of these studies was not nationally representative but recruited among patients visiting treatment centers, implying a bias towards concordant positive couples, as suggested in the previous section.

A possible hypothesis to explain why at least two-thirds of the infected couples are discordant might be that once one of the partners is infected the couple uses effective strategies to prevent the infection of the HIV negative partner. If this would be the case, there would be no specific need to target prevention efforts towards HIV negative partners of HIV positive individuals. But unfortunately, behaviors reported in tables 2 and 3 cast serious doubts on this optimistic hypothesis. Tables 2 and 3 are constructed by analogy with table 1, but instead of considering HIV status as the outcome, they focus on self-reported behaviors. I have also extended the analogy for the terminology: concordant negative means that both partners do not report the behavior; concordant positive that both partners report the behavior; discordant male that only the man reports the behavior and discordant female that only the woman does. Section V will investigate discordance in self-reported behaviors among couples more explicitly, but table 2 indicates that at least 88.9 percent (in the case of Burkina Faso) of the cohabiting couples agree that they did not use a condom at their last sexual intercourse. This suggests that preventive behavior among couples is not widespread. Table 2 however reports results for all couples and not only discordant couples. Table 3 shows that there is at least 71.5 percent (in the case of Cameroon) of the couples in which none of the partners has done a voluntary HIV test before the survey[7]. If most of the couples are not aware of their

[6] Notice, however, that the same type of calculations for Lesotho (Lesotho Government and ORC Macro. 2005) yields a fraction of 60.1 percent of HIV infected couples which are concordant positive. The HIV prevalence among all adults in Lesotho is much higher than in the other countries mentioned in this study: 26.4 percent among all females aged 15-49 and 23.5 percent among all males in the same age range. This compares with the substantially lower prevalence rates mentioned in section 2 for Burkina Faso, Cameroon, Ghana, Kenya and Tanzania.

[7] The data on HIV testing before the survey is not available for women in Burkina Faso and explains why the analysis at the couple level is not possible for that survey. But only 6.1 percent of males in Burkina Faso report that they obtained the result of an HIV test before the survey (De Walque 2006).

respective HIV status, it is unlikely that the large proportion of discordant couples is due to an effective prevention inside the couple.

It is more likely that the large fraction of discordant couples is due to the fact that once the first partner is infected, this does not automatically imply that the other partner will be infected rapidly. Quinn and others (2000) estimate, in the Rakai study in Uganda, that the HIV incidence rate among 415 initially HIV negative partners of HIV positive individuals was 11.8 per 100 person years. At that rate, it takes several years for a discordant couple to become concordant positive. Obviously, this rate per person year depends on the frequency of sexual intercourse. Using data from the same Rakai study, Gray and others (2001) estimate that the average probability of HIV transmission per coital act is 0.0011.

The fact that a large majority of infected couples are actually discordant (Lesotho, with one the highest HIV prevalence in the world, being an exception) represents an opportunity for prevention. Prevention among couples is not easy given cultural resistances, but policy makers should be imaginative and increase their prevention efforts towards the partners of individuals who have been identified as HIV positive. Encouraging, and possibly giving explicit incentives for, joint voluntary counseling and testing might be such a strategy. Couple testing programs have been piloted and have shown promising results (Kamenga and others, 1991; Allen and others, 1992; Roth and others, 2001; and Allen and others 2003). One concern is that joint testing could lead to domestic violence, but pilot studies have shown that HIV testing and counseling of couples has beneficial long term effects on HIV-related communications (Van der Straten and others, 1995 and 1998).

IV A substantial fraction of infected couples are "discordant female"

According to table 1, between 30.2 percent (Burkina Faso) and 40.6 percent (Kenya) of infected couples are "discordant female", i.e. couples where the woman is infected and

not the man[8]. These results are at odds with the common perception that unfaithful males are the "bridging" population between high-risk groups and the general population. This perception is pervasive in the HIV/AIDS community, as illustrated by the statements quoted in the introduction. These statistics appear also difficult to reconcile with self-reported levels of extra-marital sexual activity among women in union. Table 4, constructed on the model of tables 2 and 3, displays self-reported levels of infidelity (sexual activity outside marriage or outside a non formal cohabiting union) during the last year. In the first columns for each country, adding the rows for concordant positive and discordant male yields the level of infidelity as reported by men, while adding the rows for concordant positive and discordant female yields levels of self-reported female infidelity. Men are much more likely to report being unfaithful than women. Women in unions are very unlikely to report infidelity in the last year: less than 1 percent in Burkina Faso and Ghana, just above 1 percent in Kenya, just above 3 percent in Tanzania - but compared to 22 percent among males - and close to 4 percent in Cameroon - compared to close to 26 percent among males-. For years, that type of self-reported data has been the only source of information about sexual behaviors in Africa. And based on very low levels of self-reported infidelity among women and such a large discrepancy with the levels of infidelity reported by males, the prevalent model of the HIV epidemic became one where male infidelity is the main factor responsible for transmitting the HIV virus from high risk group to the general population. This paper claims that the substantial fraction of couples, among HIV infected couples, where only the female is infected seriously challenges that prevalent model.

The remainder of this section investigates the robustness of the conclusion that a substantial fraction of HIV infected couples are discordant female. I consider successively several potential explanations which are not related to female infidelity: greater biological susceptibility to HIV infection among females, HIV infection in a previous marriage or before marriage, polygyny and bias in the coverage of HIV testing in the survey.

[8] Notice, however, that the same type of calculations for Lesotho (Lesotho Government and ORC Macro. 2005) yields a smaller fraction, 13.3 percent, of HIV infected couples which are discordant female.

First, it is important to realize that most concordant positive couples were, at some point in the past, a discordant couple (only if both partners were HIV positive at the time they started their union, did the couple start as concordant positive). In a cross-section, it is not possible to determine whether a concordant positive couple started as discordant male or discordant female. Studies of discordant couples in the US or in Europe have generally concluded that the rate of male-to-female transmission was higher than the transmission rate from female to male (Royce and others. 1997; Masto and Kitayaporn. 1998; Padian and others. 1991 and Nicolosi and others. 1994).

However, some studies in an African setting, in rural Uganda, have reported very similar rates for the male-to-female and the female-to-male transmissions. Quinn and others (2000) report that the rate of male-to-female transmission (12.0 per 100 person-years) was not significantly different from the rate of female-to-male transmission (11.6 per 100 person years). Gray and others (2001), in the same setting, further report that the probability of transmission per coital act was higher from HIV positive women to their HIV negative partner (0.0013) than in the other direction (0.0009), although the difference was not statistically significant. According to that Ugandan study, there is no biological reason to believe that the majority of concordant positive couples were initially discordant male. However, in another study in Uganda, Carpenter and others (1999), report that among those with HIV-positive spouses, the HIV incidence of women was twice that of men, leaving this issue unresolved for Africa.

Under the hypothesis that women are more susceptible biologically to be infected, it is likely that a majority of concordant positive couples are couples where the man was infected first. Even if one would make the extreme assumption that all concordant positive couples were previously discordant male, it remains that between 30.2% and 40.6% of infected couples are discordant female, and that is not a negligible fraction. The point of this paper is not to estimate whether men or women are more likely to bring HIV infection into a marriage. It might very well be the case that men are more likely to do so, but the cross-sectional data used do not allow to conclude with certainty. More

importantly for prevention policies, however, this paper discusses the unexpected result that a significant fraction of infected couples are couples where only the woman is infected.

One potential explanation for the substantial proportion of infected couples which are discordant female could be that in many of these couples, the woman was infected in a previous marriage or before her marriage. De Walque (2006) shows that having been in successive marriages is an important risk factor for HIV infection, especially for females in Cameroon and Ghana. I investigate this potential explanation in tables 5 and 6. Table 5 investigates discordance in HIV status in couples excluding from the sample all couples where the woman has been in successive unions. The fraction of HIV infected couples which are discordant female remains almost identical for Burkina Faso, Cameroon and Kenya. That fraction decreases in Ghana (from 37.6 to 28.4 percent) and Tanzania (from 33.2 to 27 percent) but remains substantial in both cases. The results in table 5 suggest that HIV infection in previous marriages is not the driving force behind the substantial fraction of discordant female couples.

Table 6 goes one step further by considering only couples who have been living together for at least ten years in order to verify whether HIV infection before marriage is not the main explanation for the large number of discordant female couples. In the absence of treatment – which was not yet widespread in the countries included in the study-, ten years is the median period between HIV infection and death, so that it is very likely that if a couple is sero-discordant after more than ten years in union, the infection occurred during the union and that its source was sexual activity outside of the union. Because the survey only includes information about the duration of the current union, I have taken only couples in which the woman has only been in one union and for more than ten years. For each of the five countries, the proportion of discordant female couples decreases, but only slightly, except in Ghana and Tanzania. For Burkina Faso, Cameroon and Kenya, the proportion of discordant female couples is still around 30 percent of HIV infected couples, still a very sizeable fraction. In Ghana and Tanzania, the percentage of discordant female couples in table 6 decreases to 19.5 and 21.9 percent respectively,

suggesting that infection before marriage might explain some, but definitely not all, of the cases of couples where only the woman is infected. Certainly for the three other countries, and to a large extent for Ghana and Tanzania, HIV infection before the marriage or the union does not seem to be the main reason behind the substantial proportion of discordant female couples.

Polygyny is relatively frequent in Africa. 48.3 percent of married women in Burkina Faso are living in polygynous unions. That percentage is 30.5 in Cameroon, 22.7 in Ghana, 18.6 in Kenya and 9.7 in Tanzania. A priori, there is no particular reason to think that polygyny would be the reason behind the substantial portion of discordant female couples. The couple recodes used in the analysis are constructed starting from the interviewed women in the survey to whom the variables pertaining to her male partners are added. From the point of view of the woman, even in a polygynous union, she has only one regular male partner. The fact that this male partner has more than one wife might be a risk for HIV infection (the analysis in De Walque 2006, however, does not suggest so). But in the scenario where the male partner would be first infected by another wife and then would infect the wife surveyed, the couple formed by the latter wife and the husband will be considered as concordant positive. Another reason to investigate whether polygyny has an impact on the fraction of discordant female couples could be that women in a polygynous union are more likely to have extra-marital sex. De Walque (2006) reports results that suggest that this might be the case in some countries. Table 7 therefore reports discordance in HIV status among couples in non-polygamous unions. Excluding couples in polygamous unions does not modify the fraction of discordant female couples (between 30 and 40 percent in the five countries) among infected couples.

The existence of a bias in the coverage of HIV testing in the Demographic and Health Surveys could be another explanation for the substantial fraction of discordant female couples. Some individuals, who had been sampled for HIV testing have refused to be tested, were absent or there was a technical problem with the test (very rare). If the absence of a test is not random, this could be a source of bias. In an analysis at the level of the couple, this bias due to a less than complete coverage of the HIV test could be

aggravated because the absence of the test for one of the two partners implies that the entire couple cannot be used as an observation. If one makes the hypothesis that HIV positive individuals are more likely to refuse the test, it is possible to imagine a scenario where if men are more likely to refuse, this would reduce the number of discordant male couples in the sample and therefore increase the proportion of discordant female couples. Recent studies (Mishra and others 2006; Obare 2006 and Reniers and others 2006), however, suggest that refusal to be tested does not appear to be an important source of bias in estimating HIV prevalence.

Nevertheless, tables 8 and 9, constructed on the model of tables 2 to 4, take seriously the possibility of bias due to the coverage of the HIV test. Table 8 deals with the coverage of the HIV test and with cases where the test result is absent. It displays the proportion of couples in which both partners have a test, couples in which both do not have a test, couples in which the man has no test but the woman has one and couples where only the woman has no test. The coverage of the test is generally high, especially in Burkina Faso (92.1) and Cameroon (93.9) where there are test results for both partners in the union in more than 90 percent of the cases. The absence of the test result, however, is more likely among males, not so much in Cameroon, but more substantially in Burkina Faso, Kenya and Tanzania and especially in Ghana.

Table 9 looks at the refusal of the test by individuals[9]. This is the cause for the absence of a test which is the most likely to induce bias. Table 9 displays the proportion of couples in which both partners did not refuse to be tested, couples in which both refused, couples in which the man refused but the woman accepted and couples where only the woman refused. On the one hand, the results indicate that males are more likely to refuse the test, in particular in Burkina Faso and Ghana. On the other hand, the acceptance rate of the HIV test is relatively high: the fraction of concordant negative couples where both partners did not refuse is above 90 percent in Burkina Faso (95.0), Cameroon (94.4) and Ghana (90.5). It is somewhat lower in Kenya (81.6 percent), but in Kenya the percentage

[9] Notice that the different reasons for the absence of the test are not reported in the Tanzania AIS 2003-2004, only whether or not the sampled individual has a test result is reported. This explains why no result can be reported for Tanzania in table 9.

of couples where the man refused but the woman accepted is only slightly higher than the opposite case (6.5 vs. 5.2 percent). It seems that it is only in Ghana, where there are 5.7 percent of couples where the man refused but the woman accepted the test in comparison with only 1.4 percent of couples in the opposite configuration, that bias due to non-random refusal of the test could contribute significantly to the proportion of discordant female couple.

Comparing HIV prevalence for men and women in a cohabiting union in the individual level data set and in the couple level data set is another way to investigate whether there is a bias due to the coverage of HIV testing, potentially aggravated by the fact that studying couples rather than individuals might reinforce that bias. In the couple recode, if one of the partners refuses to be tested, the entire couple is lost as an observation, even if the other partner accepted to be tested.

Table 10 reports the results of this comparison. In most cases, the HIV prevalence calculated from the couple recode (which corresponds, in table 1, to adding the concordant positive and the discordant male rows for males and adding the concordant positive and the discordant female rows for females) is very similar to the HIV prevalence obtained from the individual recode[10]. Only for males in Burkina Faso (2.8 vs. 2.1 percent) and for females in Cameroon (6.2 vs. 5 percent) and for both genders in Tanzania (7.8 vs. 6.9 percent for males and 6.9 vs. 6.1 percent for females) is the HIV prevalence larger when calculated for people in union in the individual recode than from the couple recode. This suggests that looking at couples might slightly underestimate HIV prevalence among married individuals, but there does not seem to be a systemic pattern of bias by which only the HIV prevalence among males would be underestimated and which would therefore inflate the proportion of discordant female couple.

[10] The sample size is larger in the individual recode than in the couple recode, especially for women, because the Demographic and Health Survey does not systematically interview the male partners of the interviewed women, but only a sub-sample of them. It is however surprising that in Burkina Faso, for males, the sample size is smaller in the individual recode than in the couple recode.

As a conclusion, the finding that a substantial proportion of HIV infected couples are discordant female appears robust to alternative explanations, with the potential exception of Ghana, an to a lesser extent Tanzania, where HIV infection before marriage and bias due to covering of HIV testing might be concurring – but not alternative - explanations. It therefore seems that this result is difficult to explain without infidelity among married women, even if, as illustrated in table 4, very few women report sexual activity outside their union. This suggests either that extra-marital sex by women in union is more common than reported or that this is a very risky activity. De Walque (2006) reports that married women who engage in extra-marital sex are less likely to use a condom than single women or married men. In both cases, this implies that extramarital sexual activity among cohabiting women, whatever its causes, is a substantial source of vulnerability to HIV that should be, as much as male infidelity, targeted by prevention efforts.

The discrepancy between the substantial fraction of HIV infected couple where only the female is HIV positive and the very low levels of self-reported infidelity among married women also suggests that self-reported sexual behaviors might be particularly prone to bias and that this bias might vary in direction or magnitude according to the gender of the respondent. When an HIV test is taken, it is not possible to lie about one's HIV status. It is much easier to be less accurate about one's sexual life. The next section investigates further how couples diverge in reporting their behaviors.

V Discordance in reported behaviors

Gersovitz (2005) discusses the issue of self-reporting sexual behaviors in the Demographic and Health Surveys and shows several inconsistencies, in particular regarding the age at first sexual intercourse and virginity. This section addresses the bias in self-reported behaviors from two angles.

First, I compare the way male and female partners in the same union report sexual behaviors. For some behaviors, like infidelity (table 4) and voluntary counseling and testing (table 3) discordant reports by husband and wife are possible: one partner can be

faithful while the other is not, one can go for an HIV test and the other not. For some other behaviors like condom use and discussions with the regular partner, however, one would, in theory, expect a concordant answer[11]. This would be the case for whether or not the two partners used a condom during their last sexual intercourse with each other. But table 2 reveals, when adding the rows for discordant male and discordant female, that in Burkina Faso, Cameroon, Ghana and Tanzania between 5 and 10 percent of couples give a different answer on whether or not they used a condom the last time they had sex[12]. Men are more likely to report using a condom. Similarly, table 11 reports on the combination of answers for whether not the partners ever discussed about AIDS with their spouse[13]. For that question, discordant reports among the partners in the couple are widespread. Between 31 (in Kenya) and 47 percent (Burkina Faso) of the couples have discordant answers to that question. Men are much more likely to report that they have had such a discussion with their spouse. It might be that men and women have a different definition of what constitutes a discussion with their spouse about AIDS (the questions in the surveys were formulated identically, however). But it remains that the level of discordance is sizeable and suggests that there might be systematic biases, different by gender, in the way sexual and HIV/AIDS related behavior are reported.

The second angle through which this study challenges the reliability of self-reported behaviors is by comparing the conclusions taken from the analysis of such reports with the results from the analysis of biomarkers like HIV tests. The previous section has shown that, while married women are very unlikely to report extra-marital sex during the last 12 months, it is extremely difficult to explain the sizeable fraction (between 30 and 40 percent) of HIV infected couples in which only the woman is HIV positive without

[11] Polygyny, however, might be advanced as reason for the discordance in reported behavior. For example, in a polygynous union, when asked about condom use during the last sexual intercourse with their regular partner, the woman will always refer to the same husband, but the man could refer to another wife than the one who is interviewed. The same could happen when males are asked whether they discussed about AIDS with their partner. I have taken this possibility into consideration and I have performed the same analysis as in tables 2 and 11 for non polygamous unions only (following the example of table 7). The results are very similar to the ones reported for all unions in tables 2 and 11. These results are available on request.

[12] De Boer and others (1998) find, similarly, that in Northern Thailand, there are cases of disagreement among couples on their reports about condom use.

[13] The variable on discussion about AIDS with the partner was not available in the Tanzania AIS 2003-2004.

female infidelity as a driving factor. Potential alternative explanations fail to reduce significantly the magnitude of that fraction.

From both angles, it seems that self-reported sexual behaviors are not very reliable. The new wave of Demographic and Health Surveys includes HIV tests. Both policy and research on the HIV/AIDS epidemic should take full advantage of the existence of this new data source and be careful about evidence that relies exclusively on self-reported behaviors without the possibility to confront them with objective information about the individual's HIV status.

VI Conclusions

This paper takes a departure from the standard approach for analyzing the determinants of the HIV/AIDS epidemic. Most of the literature either uses aggregate measures at the country (see for an example, Oster 2005) or the local level, or more recently, individual level data. This study exploits the couple recode in the new wave of Demographic and Health Surveys including HIV tests, and investigates the determinants of HIV infection at the level of the couple. This approach offers new perspectives on the dynamics of HIV transmission. Two results challenge common perceptions of the HIV/AIDS epidemic. While it would be interesting to confirm them in the forthcoming Demographic and Health Surveys in other African countries, these findings suggest that some prevention efforts should be better targeted.

The first finding is that, in the five African countries under investigation, at least two-thirds of HIV infected couples are discordant couples in which only one of the partners is infected. This implies that prevention efforts towards the partners of individuals who have been identified as HIV positive should be a priority. Encouraging joint voluntary counseling and testing might be an important option in that respect.

The second finding is that a substantial proportion of HIV infected couples are discordant female couples in which only the female is infected. This is very much in contradiction with self-reported levels of female infidelity and is at odds with the common perception

that unfaithful males are the channel through which HIV gets transmitted from high risk groups to the general population. The paper goes to great lengths to explore other potential explanations that could be the driving force behind that result. But it concludes that the sizeable fraction of discordant female couples is extremely difficult to explain without infidelity among married women. It might be because infidelity is more common than reported, or because, even if infrequent, women are very vulnerable to infection during extra-marital sex, for example, because they are less likely to use condoms than single women and than married men.

The point of this paper is not to play some type of "blame game" where married women would be shown to be equally "guilty" as married men in transmitting the HIV epidemic. The fact that female marital infidelity can be, in many cases, forced should certainly be kept in mind. But, in any event and whatever its causes, female marital infidelity seems to be an important source of vulnerability to the HIV/AIDS epidemic that should not be ignored and needs to be targeted, as much as male infidelity, in prevention efforts.

The two findings from this paper emerge from a very simple analysis, but an analysis that relies on data that contain results from HIV tests, an objective bio-marker. The contradiction between self-reported female infidelity and the proportion of discordant female couples, as well as the examples of discordance in couples about their reported behaviors, suggest that such self-reported behaviors are likely to be biased and that they should be treated carefully as a source of information for prevention policy. As much as possible, policies should rely on evidence including objectively measured HIV status.

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Table 1: Discordance in HIV status among cohabiting couples										
HIV status of the couple	**Burkina Faso (n = 2157)**		**Cameroon (n = 2015)**		**Ghana (n = 1825)**		**Kenya (n = 1086)**		**Tanzania (n=2214)**	
Concordant negative	0.9690	n.a.	0.9257	n.a.	0.9584	n.a.	0.8906	n.a.	0.8952	n.a.
	[0.0058]		[0.0074]		[0.0058]		[0.0126]		[0.0087]	
Concordant positive	0.0045	0.1483	0.0235	0.3168	0.0091	0.2205	0.0364	0.3336	0.0259	0.2479
	[0.0016]	[0.0492]	[0.0043]	[0.0445]	[0.0024]	[0.0505]	[0.0071]	[0.0509]	[0.0038]	[0.0311]
Discordant male	0.0169	0.5492	0.0242	0.3261	0.0167	0.4026	0.0284	0.2601	0.0439	0.4195
	[0.0046]	[0.0826]	[0.0035]	[0.0362]	[0.0032]	[0.0606]	[0.0058]	[0.0419]	[0.0055]	[0.0377]
Discordant female	0.0093	0.3024	0.0265	0.3569	0.0156	0.3768	0.0444	0.4062	0.0348	0.3324
	[0.0022]	[0.0627]	[0.0037]	[0.0405]	[0.0032]	[0.0617]	[0.0070]	[0.0507]	[0.0046]	[0.0367]

n.a.: not applicable. Sample means with standard errors in brackets. *Source*: Demographic and Health Surveys (Burkina Faso 2003, Cameroon 2004, Ghana 2003, Kenya 2003, Tanzania 2003-04). The data are weighted with the sample weights given by the data provider.

Table 2: Condom use at the last sexual intercourse with spouse										
Condom use with spouse	**Burkina Faso (n = 1630)**		**Cameroon (n = 1764)**		**Ghana (n = 1830)**		**Kenya (n = 1361)**		**Tanzania (n=2497)**	
Concordant negative	0.8891	n.a.	0.9079	n.a.	0.9188	n.a.	0.9694	n.a.	0.9087	n.a.
	[0.0122]		[0.0092]		[0.0077]		[0.0047]		[0.0070]	
Concordant positive	0.0195	0.1760	0.0222	0.2414	0.0191	0.2357	0.0099	0.3256	0.0157	0.1727
	[0.0039]	[0.0372]	[0.0040]	[0.0351]	[0.0042]	[0.0444]	[0.0029]	[0.0798]	[0.0038]	[0.0263]
Discordant male	0.0693	0.6251	0.0420	0.4567	0.0497	0.6123	0.0176	0.5779	0.0432	0.4739
	[0.0104]	[0.0481]	[0.0059]	[0.0428]	[0.0059]	[0.0478]	[0.0036]	[0.0809]	[0.0046]	[0.0366]
Discordant female	0.0220	0.1987	0.0277	0.3018	0.0123	0.1519	0.0029	0.0963	0.0322	0.3533
	[0.0049]	[0.0397]	[0.0043]	[0.0397]	[0.0030]	[0.0355]	[0.0013]	[0.0420]	[0.0042]	[0.0357]

n.a.: not applicable. Sample means with standard errors in brackets. *Source*: Demographic and Health Surveys (Burkina Faso 2003, Cameroon 2004, Ghana 2003, Kenya 2003, Tanzania 2003-2004). The data are weighted with the sample weights given by the data provider. Concordant negative means that both partners agree that they did not use a condom at their last sexual intercourse, concordant positive means that both agree they did use one, discordant male means that the man reports using one while the woman reports the contrary, while discordant female describes the opposite case.

Table 3: HIV test before the DHS survey								
HIV testing before the survey	**Cameroon (n = 2050)**		**Ghana (n = 2076)**		**Kenya (n = 1401)**		**Tanzania (n=2724)**	
Concordant negative	0.7159	n.a.	0.8385	n.a.	0.7377	n.a.	0.7598	n.a.
	[0.0166]		[0.0111]		[0.0143]		[0.0132]	
Concordant positive	0.0674	0.2375	0.0175	0.1088	0.0452	0.1726	0.0437	0.1822
	[0.0071]	[0.0187]	[0.0040]	[0.0236]	[0.0075]	[0.0258]	[0.0056]	[0.0184]
Discordant male	0.0980	0.3450	0.0815	0.5050	0.1203	0.4588	0.1169	0.4871
	[0.0078]	[0.0239]	[0.0082]	[0.0362]	[0.0095]	[0.0300]	[0.0072]	[0.0247]
Discordant female	0.1185	0.4173	0.0623	0.3860	0.0966	0.3684	0.0793	0.3306
	[0.0098]	[0.0224]	[0.0065]	[0.0327]	[0.0099]	[0.0282]	[0.0070]	[0.0215]

n.a.: not applicable. Sample means with standard errors in brackets. *Source*: Demographic and Health Surveys (Cameroon 2004, Ghana 2003, Kenya 2003, Tanzania 2003-2004). The data are weighted with the sample weights given by the data provider. Concordant negative means that both partners have not been tested before the DHS survey, concordant positive means that both have been tested previously, discordant male means that the man reports having been tested before while the woman reports that she has not been tested before, while discordant female describes the opposite case. The data on HIV testing before the survey is not available for women in Burkina Faso and explains why the analysis at the couple level is not possible for that survey.

Table 4: Sexual activity with a non cohabiting or marital partner during the last year										
Extra-marital sex	**Burkina Faso (n = 2326)**		**Cameroon (n = 2118)**		**Ghana (n = 2165)**		**Kenya (n = 1432)**		**Tanzania (n=2718)**	
Concordant negative	0.9090	n.a.	0.7189	n.a.	0.9000	n.a.	0.9062	n.a.	0.7528	n.a.
	[0.0101]		[0.0140]		[0.0082]		[0.0097]		[0.0116]	
Concordant positive	0.0028	0.0308	0.0175	0.0625	0.0005	0.0055	0.0031	0.0331	0.0143	0.0578
	[0.0019]	[0.0209]	[0.0032]	[0.0111]	[0.0005]	[0.0055]	[0.0015]	[0.0163]	[0.0024]	[0.0090]
Discordant male	0.0841	0.9248	0.2414	0.8590	0.0950	0.9509	0.0810	0.8647	0.2058	0.8329
	[0.0654]	[0.0337]	[0.0126]	[0.0148]	[0.0080]	[0.0165]	[0.0087]	[0.0342]	[0.0103]	[0.0162]
Discordant female	0.0040	0.0443	0.0220	0.0784	0.0043	0.0434	0.0095	0.1021	0.0269	0.1091
	[0.0017]	[0.0184]	[0.0033]	[0.0111]	[0.0016]	[0.0158]	[0.0032]	[0.0321]	[0.0034]	[0.0130]

n.a.: not applicable. Sample means with standard errors in brackets. *Source*: Demographic and Health Surveys (Burkina Faso 2003, Cameroon 2004, Ghana 2003, Kenya 2003, Tanzania 2003-2004). The data are weighted with the sample weights given by the data provider. Concordant negative means that both partners report that they did not have sex outside of marriage or outside of their cohabiting union during the last year, concordant positive means that both report such sexual activity, discordant male means that the man reports having extra-marital sex while the woman does not report it, while discordant female describes the opposite case.

Table 5: Discordance in HIV status among couples where the woman has not been in more than one marriage										
HIV status of the couple	**Burkina Faso (n = 1850)**		**Cameroon (n = 1564)**		**Ghana (n = 1421)**		**Kenya (n = 1014)**		**Tanzania (n=1845)**	
Concordant negative	0.9709	n.a.	0.9356	n.a.	0.9674	n.a.	0.8944	n.a.	0.9124	n.a.
	[0.0058]		[0.0076]		[0.0054]		[0.0131]		[0.0085]	
Concordant positive	0.0039	0.1377	0.0224	0.3490	0.0097	0.2999	0.0346	0.3276	0.0235	0.2691
	[0.0016]	[0.0524]	[0.0044]	[0.0529]	[0.0029]	[0.0720]	[0.0072]	[0.0530]	[0.0040]	[0.0384]
Discordant male	0.0165	0.5715	0.0191	0.2985	0.0135	0.4160	0.0268	0.2540	0.0402	0.4600
	[0.0049]	[0.0989]	[0.0035]	[0.0436]	[0.0032]	[0.0717]	[0.0060]	[0.0447]	[0.0058]	[0.0473]
Discordant female	0.0084	0.2907	0.0226	0.3524	0.0092	0.2840	0.0442	0.4182	0.0237	0.2708
	[0.0023]	[0.0627]	[0.0039]	[0.0469]	[0.0027]	[0.0617]	[0.0074]	[0.0548]	[0.0040]	[0.0401]

n.a.: not applicable. Sample means with standard errors in brackets. Couples where the female has been in successive marriages have been excluded from the sample. *Source*: Demographic and Health Surveys (Burkina Faso 2003, Cameroon 2004, Ghana 2003, Kenya 2003, Tanzania 2003-2004). The data are weighted with the sample weights given by the data provider.

Table 6: Discordance in HIV status among couples where the woman has not been in more than one marriage and has been in the union for 10 years or more										
HIV status of the couple	**Burkina Faso (n = 1002)**		**Cameroon (n = 748)**		**Ghana (n = 812)**		**Kenya (n = 482)**		**Tanzania (n=784)**	
Concordant negative	0.9701	n.a.	0.9565	n.a.	0.97	n.a.	0.9224	n.a.	0.9079	n.a.
	[0.0089]		[0.0078]		[0.0063]		[0.0169]		[0.0123]	
Concordant positive	0.0048	0.1617	0.0175	0.4033	0.0105	0.3507	0.0321	0.4147	0.0320	0.3484
	[0.0025]	[0.0762]	[0.0053]	[0.0948]	[0.0039]	[0.1077]	[0.0104]	[0.1136]	[0.0071]	[0.0632]
Discordant male	0.017	0.5709	0.0113	0.2604	0.0135	0.4535	0.0217	0.2808	0.0397	0.4317
	[0.0074]	[0.1462]	[0.0037]	[0.0785]	[0.0041]	[0.1097]	[0.0082]	[0.0818]	[0.0080]	[0.0698]
Discordant female	0.0079	0.2673	0.0146	0.3361	0.0058	0.1957	0.0235	0.3043	0.0202	0.2197
	[0.0030]	[0.0953]	[0.0045]	[0.0884]	[0.0030]	[0.0913]	[0.0082]	[0.0806]	[0.0057]	[0.0518]

n.a.: not applicable. Sample means with standard errors in brackets. Couples where the female has been in successive marriages have been excluded from the sample as well as unions with duration shorter than 10 years. *Source*: Demographic and Health Surveys (Burkina Faso 2003, Cameroon 2004, Ghana 2003, Kenya 2003, Tanzania 2003-2004). The data are weighted with the sample weights given by the data provider.

Table 7: Discordance in HIV status among non-polygamous couples										
HIV status of the couple	**Burkina Faso (n = 1119)**		**Cameroon (n = 1547)**		**Ghana (n = 1433)**		**Kenya (n = 957)**		**Tanzania (n=2090)**	
Concordant negative	0.961	n.a.	0.9196	n.a.	0.9551	n.a.	0.8995	n.a.	0.8987	n.a.
	[0.0076]		[0.0081]		[0.0064]		[0.0126]		[0.0088]	
Concordant positive	0.0071	0.1869	0.0228	0.284	0.0088	0.1983	0.0352	0.3508	0.0252	0.2490
	[0.0028]	[0.0655]	[0.0039]	[0.0406]	[0.0027]	[0.0526]	[0.0076]	[0.0571]	[0.0039]	[0.0330]
Discordant male	0.0193	0.5055	0.0278	0.3465	0.0187	0.419	0.0261	0.2605	0.0436	0.4314
	[0.0053]	[0.0987]	[0.0043]	[0.0397]	[0.0038]	[0.0660]	[0.0056]	[0.0451]	[0.0057]	[0.0392]
Discordant female	0.0117	0.3075	0.0296	0.3693	0.0171	0.3825	0.0390	0.3885	0.0323	0.3195
	[0.0037]	[0.0758]	[0.0044]	[0.0415]	[0.0038]	[0.0657]	[0.0070]	[0.0590]	[0.0047]	[0.0400]

n.a.: not applicable. Sample means with standard errors in brackets. Couples in polygamous unions have been excluded from the sample. *Source*: Demographic and Health Surveys (Burkina Faso 2003, Cameroon 2004, Ghana 2003, Kenya 2003, Tanzania 2003-2004). The data are weighted with the sample weights given by the data provider.

Table 8. Coverage: Absence of HIV test result										
HIV status of the couple	**Burkina Faso (n = 2341)**		**Cameroon (n = 2134)**		**Ghana (n = 2167)**		**Kenya (n = 1429)**		**Tanzania (n=2724)**	
Concordant negative	0.9212	n.a.	0.9396	n.a.	0.8505	n.a.	0.7703	n.a.	0.7955	n.a.
	[0.0094]		[0.0066]		[0.0107]		[0.0153]		[0.0145]	
Concordant positive	0.0165	0.2108	0.0246	0.4076	0.0406	0.2716	0.0892	0.3886	0.0771	0.3772
	[0.0032]	[0.0390]	[0.0043]	[0.0538]	[0.0057]	[0.0305]	[0.0092]	[0.0299]	[0.0080]	[0.0228]
Discordant male	0.0429	0.5456	0.0200	0.3324	0.0914	0.6120	0.0848	0.3693	0.0825	0.2192
	[0.0070]	[0.0557]	[0.0038]	[0.0550]	[0.0080]	[0.0332]	[0.0087]	[0.0297]	[0.0075]	[0.0225]
Discordant female	0.0191	0.2435	0.0156	0.2598	0.0173	0.1162	0.0555	0.2420	0.0448	0.4035
	[0.0047]	[0.0519]	[0.0032]	[0.0463]	[0.0030]	[0.0191]	[0.0072]	[0.0272]	[0.0056]	[0.0297]

n.a.: not applicable. Sample means with standard errors in brackets. *Source*: Demographic and Health Surveys (Burkina Faso 2003, Cameroon 2004, Ghana 2003, Kenya 2003, Tanzania 2003-2004). The data are weighted with the sample weights given by the data provider. The reasons for the absence of an HIV test in the survey can be refusal (see table 9), absence of the individual or technical problem with the test. Concordant negative means that both partners have a test result, concordant positive means that both don't have a test result; discordant male means that the man has no test result while the woman has one, while discordant female describes the opposite case.

Table 9: Refusal of the HIV test in the survey								
Refusal of HIV test	**Burkina Faso (n = 2337)**		**Cameroon (n = 2134)**		**Ghana (n = 2157)**		**Kenya (n = 1429)**	
Concordant negative	0.9503	n.a.	0.9444	n.a.	0.9055	n.a.	0.8167	n.a.
	[0.0071]		[0.0064]		[0.0076]		[0.0134]	
Concordant positive	0.0145	0.2932	0.0239	0.4321	0.0262	0.2777	0.0652	0.3559
	[0.0030]	[0.0562]	[0.0042]	[0.0567]	[0.0039]	[0.0341]	[0.0081]	[0.0338]
Discordant male	0.0259	0.5226	0.0183	0.3306	0.0537	0.5691	0.0657	0.3589
	[0.0055]	[0.0698]	[0.0037]	[0.0570]	[0.0053]	[0.0379]	[0.0075]	[0.0340]
Discordant female	0.0091	0.1841	0.0131	0.2372	0.0144	0.1531	0.0522	0.2851
	[0.0030]	[0.0560]	[0.0029]	[0.0469]	[0.0028]	[0.0271]	[0.0068]	[0.0312]

n.a. : not applicable. Sample means with standard errors in brackets. *Source*: Demographic and Health Surveys (Burkina Faso 2003, Cameroon 2004, Ghana 2003, Kenya 2003). The data are weighted with the sample weights given by the data provider. Concordant negative means that both partners have not refused to be tested in the DHS survey, concordant positive means that both have refused to be tested; discordant male means that the man refused the test while the woman accepted, while discordant female describes the opposite case. The variable on refusal of the HIV test in the survey is not available in the Tanzania AIS and explains why the analysis at the couple level is not possible for that survey.

Table 10: HIV prevalence among married individuals as derived from the individual and from the couple recode						
		Burkina Faso	Cameroon	Ghana	Kenya	Tanzania
HIV prevalence married males	In couple recode, only if both tested	0.0215 [0.0049] N = 2157	0.0472 [0.0058] N = 2015	0.0261 [0.0043] N = 1825	0.0644 [0.0096] N = 1086	0.0699 [0.0071] N = 2215
	In individual recode	0.0282 [0.0051] N = 1838	0.0484 [0.0048] N = 2540	0.0255 [0.0037] N = 2317	0.0688 [0.0085] N = 1507	0.0783 [0.0067] N = 2578
HIV prevalence married females	In couple recode, only if both tested	0.0139 [0.0030] N = 2157	0.0500 [0.0057] N = 2015	0.0248 [0.0042] N = 1825	0.0808 [0.0100] N = 1086	0.0608 [0.0061] N = 2214
	In individual recode	0.0158 [0.0026] N = 3210	0.0622 [0.0052] N = 3544	0.0290 [0.0030] N = 3445	0.0797 [0.0074] N = 1934	0.0692 [0.0056] N = 3874

Sample means with standard errors in brackets. *Source*: Demographic and Health Surveys (Burkina Faso 2003, Cameroon 2004, Ghana 2003, Kenya 2003, Tanzania 2003-2004). The data are weighted with the sample weights given by the data provider. The couple recode is a data set where a couple is the unit of observation, as opposed to the individual recode where the individual is the unit of observation.

Table 11: Discussion about AIDS with partner								
Discussion about AIDS with the partner	**Burkina Faso (n = 2222)**		**Cameroon (n = 2052)**		**Ghana (n = 2077)**		**Kenya (n = 1404)**	
Concordant negative	0.2619	n.a.	0.0900	n.a.	0.1336	n.a.	0.0858	n.a.
	[0.0168]		[0.0101]		[0.0096]		[0.0108]	
Concordant positive	0.2653	0.3595	0.5167	0.5678	0.5021	0.5796	0.6013	0.6577
	[0.0136]	[0.0159]	[0.0177]	[0.0163]	[0.0154]	[0.0147]	[0.0167]	[0.0155]
Discordant male	0.3638	0.4930	0.3251	0.3573	0.2531	0.2921	0.2525	0.0659
	[0.0167]	[0.0184]	[0.1427]	[0.0164]	[0.0116]	[0.0140]	[0.0137]	[0.0080]
Discordant female	0.1087	0.1473	0.0680	0.0747	0.1110	0.1281	0.0603	0.2762
	[0.0086]	[0.0122]	[0.0063]	[0.0070]	[0.0081]	[0.0093]	[0.0073]	[0.0151]

n.a.: not applicable. Sample means with standard errors in brackets. *Source*: Demographic and Health Surveys (Burkina Faso 2003, Cameroon 2004, Ghana 2003, Kenya 2003). The data are weighted with the sample weights given by the data provider. Concordant negative means that both partners agree that they never discussed about AIDS, concordant positive means that both agree they discussed about it, discordant male means that the man reports discussing it while the woman reports the contrary, while discordant female describes the opposite case. The variable reporting discussion about AIDS with the partner is not available in the Tanzania AIS and explains why the analysis at the couple level is not possible for that survey.