POLICY RESEARCH WORKING PAPER 4421

The Determinants of HIV Infection and Related Sexual Behaviors:

Evidence from Lesotho

Lucia Corno
Damien de Walque

The World Bank
Development Research Group
Human Development and Public Services Team
December 2007

Policy Research Working Paper 4421

Abstract

This paper analyzes the socioeconomic determinants of HIV infection and related sexual behaviors using the 2004 Lesotho Demographic and Health Survey. The authors find that in Lesotho education appears to have a protective effect: it is negatively associated with HIV infection (although not always significantly) and it strongly predicts preventive behaviors. The findings also show that married women who have extra-marital relationships are less likely to use a condom than non-married women. This is an important source of vulnerability that should be addressed in prevention efforts. The paper also analyzes HIV infection at the level of the couple. It shows that in 41 percent of the infected couples, only one of the two partners is HIV infected. Therefore, there are still opportunities for prevention inside the couple.

This paper—a product of the Human Development and Public Services Team, Development Research Group—is part of a larger effort in the group to understand the determinants of the HIV/AIDS epidemic. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The authors may be contacted at lucia.corno@unibocconi.it and ddewalque@worldbank.org.

The determinants of HIV infection and related sexual behaviors: Evidence from Lesotho

Lucia Corno

lucia.corno@unibocconi.it

Bocconi University

Damien de Walque*

ddewalque@worldbank.org

Development Research Group

The World Bank

* We thank John Nkonyana, Noosi Nkone, Mahlapane Lekometsa, Mahlape Ramoseme at the Ministry of Health and Social Welfare in Lesotho as well as Charles Annor Frampong Preeti Arora, Elena Bardasi, Louise Fox, T. Mpoy-Kamulayi, Rachel Kline, Oscar Picazo, Elizabeth Sherwood and Ritva Reinikka at the World Bank for useful discussions and suggestions. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the view of the World Bank, its Executive Directors, or the countries they represent.

1 Introduction

The HIV/AIDS epidemic is the greatest challenge Lesotho is facing. According to UNAIDS, Lesotho is the country with the third highest HIV prevalence rate in the world, after Swaziland and Botswana. In 2005, the estimated adult HIV prevalence was 23.2 percent, equal to 270,000 people infected with HIV (UNAIDS, 2006). Access to anti-retroviral treatment (ART) is progressing at a rapid pace in Lesotho. According to statistics provided by the Ministry of Health and Social Welfare in Lesotho in July 2007, out of an estimated 56,000 people in need of ART, 24,700 had received ART treatment (compared to 8,000 in September 2005) (Lesotho Governement, 2007). However, prevention remains a key strategy in the fight against the HIV/AIDS pandemic. Moreover, most HIV prevention programs in Africa provide general HIV/AIDS information on only the average risk population, without taking into account the fact that some categories are more at risk of being infected than others.

This paper analyzes the socioeconomic determinants of HIV/AIDS and related sexual behaviors in Lesotho, both at the individual level and the level of the couple. Understanding the determinants of HIV infection and of sexual related habits is crucial for targeting prevention. The present paper sheds light on the key categories in the society that policy makers should target in Lesotho in order to prevent HIV/AIDS.

The socioeconomic profile of the HIV/AIDS epidemic in Africa has been analyzed in the epidemiological literature and, to a lesser extent, in the economics literature. Few of these studies have used nationally representative samples. Datasets which include the results of individual HIV tests are generally drawn from surveillance data taken from pregnant women attending ante-natal care clinics (Fylkesnes and others, 1997; Kilian and others, 1999) or from high risk groups (Nagot and others, 2002). A further limitation of this literature is that most of these data sets have only a limited number of socio-demographic variables and most of them cannot claim to be representative. More recently, Clark and Vencatachellum (2003) used a nationally representative sample from South Africa. Fylkesnes and others (2001) compare results from surveillance data among pregnant women and from population

based surveys. De Walque (2006) presents a comparison of the determinants of HIV infection and associated sexual behaviors using data from five Demographic and Health Surveys (Burkina Faso, Cameroon, Ghana, Kenya, Tanzania). The paper also fits in the literature related to prevention campaigns through randomized evaluation, even if we use non-experimental data. Duflo et al. (2006) conducted a randomized evaluation comparing three school-based HIV/AIDS interventions in Kenya; training teachers, encouraging students to debate the role of condoms and write essays on how to protect themselves against HIV/AIDS, and reducing the cost of education. After two years, girls in schools where teachers had been trained were more likely to be married in the event of a pregnancy and the condom debates increased practical knowledge and self-reported use of condoms without increasing self-reported sexual activity. Dupas (2006) carried on a campaign that provided Kenyan teenagers with the information that HIV prevalence was much higher among adult men than among teenage boys because of their longer exposure to the HIV virus. As a result of this campaign, she found a 65 percent decrease in the incidence of pregnancies by adult partners among teenage girls.

Analyses of HIV within a couple 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 Rakai district in Uganda to explore the dynamics of HIV transmission, the rates of male-to-female and female-to-male transmission and the probability of HIV transmission per coital act. In the economics literature, De Walque (2007a) studied HIV infection at the level of the cohabiting couple for Burkina Faso, Cameroon, Ghana, Kenya and Tanzania using Demographic Health Surveys.

As main results of our study, we show that in Lesotho education appears to be an important aspect of preventing HIV infection and adopting less risky behaviors. We also highlight the vulnerability of married women who engage in extra-marital sex without using a condom. In addition, we show that more than 40 percent of HIV infected couples are discordant couples, i.e. couples where only one of the two partners is infected. This result suggests that there is still room for prevention inside couples.

The present paper uses data from the first Demographic and Health Survey conducted in Lesotho in 2004. The Lesotho Demographic and Health Survey (LDHS) is particularly appropriate to study the determinants of HIV/AIDS for different

reasons. First, interviewed women and men were asked if they consented to be tested for HIV. Further, the HIV results obtained can be merged with the socio-demographic data collected in the individual questionnaires. Compared to previous surveys including information on HIV/AIDS, the LDHS has the great advantage of including this bio-marker and not relying exclusively on self reported behavior. In addition, the survey questionnaire includes relevant sections on both health and sexual behavior. Finally, the data is nationally representative and the variables are defined similarly in DHS implemented in different countries, so it is possible to perform useful international comparisons.

The remainder of the paper is organized as follows: Section 2 gives some insights about the background of HIV/AIDS diffusion in Lesotho, Section 3 describes the data and summary statistics, Section 4 shows the empirical analysis and reports the main findings, Section 5 investigates HIV infection among couples, and section 6 concludes.

2 Background of HIV/AIDS in Lesotho

Lesotho is a small mountain state, located in the southern part of Africa and completely surrounded by the Republic of South Africa. The country is divided into ten administrative districts: Butha-Buthe, Leribe, Berea, Maseru, Mafeteng, Mohale's Hoek, Quthing, Qacha's Nek, Mokhotlong, and Thaba-Tseka. The population of Lesotho is estimated at 2.1 million with a population growth rate of 0.144% (Central Intelligence Agency, 2007). The population estimates for Lesotho explicitly take into account the effects of excess mortality due to AIDS, resulting in lower life expectancy (49.9 years) (Central Intelligence Agency, 2007), higher infant mortality and death rates, and lower population and growth rates. The number of single and dual orphans has risen to 100,000 children aged between 0 and 17 years old and 40 percent of households have at least one orphan (DHS 2004).

The principal mode of transmission of HIV in Lesotho is heterosexual contact and specifically multiple concurrent partnership (UNAIDS 2006). In the past decade, 60% of the total Lesotho workforce was employed in the mines in South Africa. The mines host a large sex industry, and, anecdotal evidence suggests that, once away from their families, men might be more likely to have multiple sexual partners. Once

they have contracted HIV, they might infect their partners when they return to their families in Lesotho. At the same time, women, waiting for their husbands to come back from the mines, have been known to engage in sexual relationships with other partners as well. This has the potential to create a dangerous "network effect" in the transmission of HIV through multiple partners.

The poor socio-cultural status of women might be another reason for the spread of the disease, making it more complicated to implement effective policies to prevent HIV/AIDS in Lesotho. According to law, a Basotho woman must obtain her husband's approval to have surgery, take contraceptives, take out a loan, run for public office, and until recently (before the Sexual Offence Act passed in 2003) had no power to refuse any sexual relations or insist on condom use. Women cannot own property, leaving them socio-economically vulnerable. Many engage in other unsafe means of survival, including prostitution, early marriage, or sexual favors for older men. The country has recently passed a bill providing equal status to married women. The enactment of this bill is considered a first step to remove barriers for the access to HIV prevention, treatment, care and support services for women and girls (UNAIDS 2006).

A number of institutions are currently implementing HIV/AIDS prevention programs in Lesotho. One of these is the Life Skill Curriculum, proposed by the Ministry of Education, in which HIV/AIDS education has been integrated into the primary school curriculum. It includes information on the biology of HIV/AIDS, its transmission channels and the consequences of the epidemic. It emphasizes abstinence until marriage and the importance of "Saying NO" to sex before marriage. Unfortunately, the curriculum provides only a limited scope for discussing contraception or safer sex. Discussions about condoms and safe sex are not encouraged through the formal education channel.

Another initiative proposed by the Ministry of Health is the "Know Your Status" campaign, with the aim of getting every person in Lesotho to know their HIV status. Around 3,600 community health workers will be trained to do a simple HIV test that involves pricking a finger to get a drop of blood for testing. This is a very ambitious undertaking. Its full impact still needs to be assessed.

Finally, the country has been exposed to a huge distribution of condoms, especially through Population Services International (PSI), a nonprofit organization that addresses health problem in low income countries. PSI markets three male

condom brands and it also distributes low cost, high quality, condoms, both in rural and urban areas. Since the launch of this program, called Condom Social Marketing (CSM) in 2001, PSI has tripled the number of condoms that are sold and the number of shops where condoms can be purchased.

3 Data and Descriptive Statistics

The data used for this study come from the 2004 Lesotho Demographic and Health Survey, collected by the Ministry of Health and Social Welfare (MOHSW) in collaboration with the Bureau of Statistics (BOS) in Lesotho and ORC Macro International.

The LDHS was conducted using a representative sample of women and men of reproductive age living in 8,592 households in the ten districts of Lesotho, both in urban and rural areas. The survey utilized a two-stage sample design. In the first stage, 405 clusters (109 in the urban and 296 in the rural areas) were selected from a list of enumeration areas from the 1996 Population Census frame. In the second stage, a complete listing of households was carried out in each selected cluster. Households were then systematically selected for participation in the survey. All women age 15-49 who were either permanent household residents in the 2004 LDHS sample or visitors present in the household on the night before the survey were eligible to be interviewed. In addition, in every second household selected for the survey, all men aged 15-59 years were eligible to be interviewed if they were permanent residents or visitors present in the household on the night before the survey. The final sample includes 7,095 women between 15-49 years of age and 2,797 men between 15-59 years old.

[Insert figure 1]

Figure 1 shows the age profile of HIV prevalence for males and females in Lesotho. 26 percent of females in Lesotho are HIV positive, compared to 18.8 percent of males. In many other sub-Saharan African countries the prevalence of HIV is considerably higher among women then men, reflecting that, biologically, the probability of transmission from male to female is substantially higher than from

female to male. The percentage of HIV positive women is greater compared to infected men in almost all age groups. The HIV infection rate is higher for men from 40 years and older. The prevalence of HIV is considerably higher among young women than among young men. Recent studies in Africa (Dupas, 2006) suggest an explanation for this pattern: unprotected sex between teenage girls and adult men. Men involved in sexual relationships with younger women are more likely to be HIV infected compared to younger boys because they have been sexually active for longer. Moreover, older men generally have a higher income and, therefore, have more power to negotiate unprotected sex.

[Insert table 1]

The LDHS includes specific variables describing the coverage of HIV testing for 7140 individuals randomly selected to be tested. Among these eligible individuals, HIV tests were conducted for about 75 percent of women and men. Among the sample of all individuals eligible to be tested, about 11 percent were not interviewed in the DHS. Table 1 reports the coverage rate for HIV testing among eligible people selected for the HIV test as well as the test coverage among interviewed individuals, both for women and men. Women are more likely to have been tested than men: 86.2 percent of interviewed women and 81.4 percent of interviewed men took the HIV test respectively. About 15 percent of individuals refused testing when asked for consent, 0.37 percent who were interviewed in the survey were not at home at the time testing was conducted in the household, and others were missing test results for other reasons (e.g. technical problem prevented taking blood).

Table A1 in the appendix presents summary statistics by gender for the variables used in the empirical analysis. All the variables are weighted with the sample weights given by the data provider. In addition to HIV infection and HIV test, we used behaviors and attitudes related to HIV prevention as dependent variables. 40 percent of females tend to use condoms during extramarital intercourse, while 11 percent use this preventive method within the marriage. Unfortunately, the data provides this information only for women. As expected, males always report higher levels of extra marital sex. This could reflect actual behavior or could be due to over-reporting by males and/or under-reporting by females. There is a limited discrepancy across gender regarding abstinence in the last 12 months, but the proportion of single

women who report that they have never had sex is higher than among single men. For age at the first intercourse, table A1 in the appendix shows that, in general, females tend to report having initiated sexual activity later; 19 and 16 years respectively for females and males. There are no large differences across gender in reporting having obtained the results from an HIV/AIDS test prior to the survey. On average, more than half of married people report having discussed AIDS with their spouse and the percentages are very similar between males and females. The knowledge that an HIV positive individual can be asymptomatic is fairly widespread but it is lower among men. Stigmatization for HIV seems to be slightly more common among males; 50 percent of men answer that they would not buy vegetables from an infected vendor.

The analysis of the independent variables shows that a higher percentage of women than men live in urban areas, respectively 23.7 and 21.5 percent. An interesting feature of Lesotho emerges from the education statistics. Education, measured by the highest grade achieved, is higher for females than for males, both at the primary and the secondary levels. This is peculiar to Lesotho since in most other African countries educational achievement is higher for boys. Households in Lesotho seem to allocate more resources in education for girls, since boys are generally in charge of herding cattle (the so called “herdboys”). The variables describing marital status are defined as follows. The omitted category is composed of individuals who have never been married. Marriage is defined as being legally married or living with a partner with the intention of staying together and therefore it covers both formal and informal marriage. Approximately, 52 percent of the women interviewed were married at the time of the survey compared to 42 percent of men. This can be explained either by polygamy, by migration or by the age differences between spouses: men tend to marry younger women. Formerly married includes widowed, divorced and separated individuals. In the sample, 14 percent of women are formerly married compared to 6.8 percent of men. Widowhood is defined as having lost one spouse and not being remarried. The proportion of widows is higher than widowers, either because women get married to older men, or because it is easier for males to remarry after the death of their spouse. The mean for the variable for having been in successive marriages is taken on the entire sample and can apply both to currently and formerly married persons. Approximately 3 percent of men reported having been in more than one marriage and this percentage is slightly higher than among women, confirming that for males it is easier to remarry. Being in a polygamous union is

calculated as a fraction of currently married individuals and this fraction is fairly low in Lesotho: about 2 percent of males in the sample are polygamous and that variable is not defined for women.

The measure of wealth is a set of dummies for each quintile of a wealth index calculated by the data provider and based on a list of assets. We grouped the religious affiliation in three categories: Catholic (Roman Catholic Church), Protestant (Evangelical, Methodist, Anglican, Adventist, Pentecostal, other Christian) and no religion. In the empirical analysis we include in all regressions controls for age, districts and ecological zones. We defined five years age groups as follows: between 15-19 and 45-49 for women and between 15-19 and 55-59 for men.

[Insert table 2]

Table 2 reports HIV prevalence by education, wealth level, male circumcision and religion. This bivariate analysis is a useful starting point for the analysis of HIV/AIDS in Lesotho. HIV infection appears to decrease with educational achievement, although not linearly. Individuals with no education have a higher infection rate. The pattern of HIV infection by wealth quintile is not linear either. It appears to slightly increase with wealth for females, while the richest men have the lowest HIV prevalence rate. At first sight, the results about the effects of male circumcision on HIV prevalence are surprising given recent studies on the protective role of male circumcision. This hypothesis has been recently confirmed by a randomized trial in South Africa (Auvert and others, 2005). Table 2 suggests that in Lesotho the percentage of HIV infection is higher among circumcised males. This finding might be explained by the particular type of circumcision performed in Lesotho. In the Basotho culture, many young males are sent by their parents to the so called "initiation schools" that represents a passage from adolescence to adulthood. Traditionally, initiation schools are places where young people are given information about sexual relations and reproductive health. During their stay at the initiation school, these boys are circumcised. This circumcision has a symbolic meaning and the procedure is very different from the circumcision adopted in most other African countries, especially by those in the Muslim tradition. It is not a complete removal of the foreskin bur rather a more symbolic incision. It is also likely to be performed in unhygienic conditions. Moreover, after the initiation school, boys consider themselves

adults and may engage more readily in sexual intercourse. It is also possible that their recent “circumcision” make them more vulnerable to infection.

[Insert figure 2]

Figure 2 reports the percentage of males circumcised by age. The table shows that the proportion of boys circumcised increases with age. This result confirms that in Lesotho male circumcision takes place during the teenage years and not during childhood, like in many other African countries. It should be noted that the above explanation about the surprising relationship between male circumcision and HIV infection in Lesotho relies more on anecdotal than on scientific evidence. An in-depth study of initiation schools and the practice of male circumcision in Lesotho might be useful, especially now that the message that male circumcision is proven to be protective is more and more likely to be disseminated.

4 Empirical Analysis

This section analyzes HIV prevalence and sexual behaviors using a multivariate analysis. Compared to the bivariate results included in table 2, multivariate regressions allow considering the effect of a variable “ceteris paribus”, i.e. holding the other variable constant. Contrary to what is frequently done in the epidemiological literature, we have chosen not to enter self-reported sexual behaviors as controls in the HIV status regressions. In a cross-section analysis, the estimates derived from such regressions would suffer from reverse causality or from endogeneity. For example, condom use could prevent HIV infection (possible negative association) but on the other hand, HIV positive people or high-risk people may be more likely to use condoms because of their higher exposure (possible positive association).

Therefore, we run two separate sets of regressions. The first one uses HIV status and the probability of being tested for HIV as dependent variables. The second set of regressions uses as dependent variables sexual behaviors and other attitudes related to HIV/AIDS epidemic such as condom use, extra marital sex, abstinence, virginity and age at sexual initiation. Specifically, we tested attitudes related to the so-

called “ABC” prevention campaign (Abstain, Be Faithful or otherwise Use a Condom), the most widespread information campaign on HIV prevention in Lesotho and in many other African countries. Understanding the dynamic of sexual behaviors is key to designing efficient prevention policies. We also analyze practices which are not sexual behaviors but are strongly related to the HIV/AIDS epidemic, such as using voluntary counselling and testing services, talking about AIDS in the household and knowledge about HIV/AIDS symptoms. In both set of regressions, we chose to include as independent variables the following characteristics: location (urban vs. rural, district and ecological zones), age, marital status, education, wealth and religion. A potential source of endogeneity remains in the regressions specified: most of those individuals characteristics cannot be defined as completely exogenous. Location, marital status, education, wealth and religion are often considered choice variables for the individual or his family. Since the dataset does not offer sources of exogenous variations for those variables, the estimated coefficient should be interpreted with caution. The reported coefficients should be interpreted as indicating that a specific group in the population is more likely to be infected, which is very useful to focus and target prevention efforts. They should not be read as indicating that a specific characteristic *causes* HIV infection. All tables display marginal effects of probit coefficients, except in the regressions with age at first sexual intercourse as a dependent variable where a linear model is used. We include in each regression controls for five years age groups, district and ecological zones.

4.1 HIV Status and HIV tests

[Insert table 3]

Table 3 looks at the main determinants of HIV infection and presents the marginal effects of a probit model where the dependent variable is an indicator equal to one if the individual is HIV positive, and zero otherwise. It is interesting to note that HIV infection and urban locations are not significantly associated, contrary to what is often found in other African countries. The probability of HIV infection is positively correlated with being currently married among males and the coefficient is statistically significant at the 5 percent level. There is a strong positive association

between being formerly married and HIV status both for females and males. Ceteris paribus, being formerly married increases the probability of being HIV positive by 13.9 percentage points for men and 26.2 percentage points for women. It is possible that marital disruption is a consequence rather then a cause of HIV infection – a case of reverse causality, so these coefficients must be interpreted with caution. Surprisingly, being a widow/er and having been in successive marriages does not affect significantly the likelihood of being HIV infected. It should be noted that the widow/er variable is constructed as an interaction with formerly married, so the result should be interpreted as indicating that compared to other formerly married individuals, widows or widowers are not more likely to be HIV positive.

The probability of being HIV positive decreases with education, suggesting an important role for education in preventing HIV infection. This finding is particularly interesting because the question of the effect of education on HIV infection has different answers depending on the countries analyzed. For example, an analysis of five Demographic and Health Surveys in Burkina Faso, Cameroon, Ghana, Kenya and Tanzania did not find any correlation between HIV and education (De Walque, 2006), while in a rural cohort in Uganda a negative gradient between schooling and HIV infection appeared over time among young women (De Walque, 2007b). However, the coefficient is statistically significant only for males who have attended primary school.

Wealth tends to be positively associated with HIV infection, but only until the fourth quintile. Table 3 also shows no significant association between HIV prevalence and religion.

[Insert table 4]

Some individuals who were randomly selected to be tested in the survey do not have a test result either because they refused to be tested or because they were absent. Table 4 reports the marginal effect of probit estimates of the probability of being tested for HIV during the survey. Urban status is strongly negatively associated with the probability of being tested. The coefficient is always significant at the 1% level. One potential reason might be that people in urban areas are less likely to be present at the time of the test. Widowers are also less likely to be tested, while the probability of

being tested increases both for currently and formerly married women. Compared to individuals with no education, men who have been to primary school are more likely to be tested, but women who have been to secondary school are less likely to be tested. The latter result could suggest that educated women are more likely to be tested before the survey and they think they do not need to be tested again or they may have a greater probability of working outside the household and therefore were absent during the test. Wealth and religion do not seem to have an important role in the probability of being tested for HIV.

The fact that some socio-economic factors (location, marital status and education) have an impact on the probability of being tested indicates that there is a potential risk of bias in the interpretation of the results in table 3. The sign and the magnitude of the bias would depend on whether we expect individuals who were not tested even though they were selected to be more or less likely to be HIV positive than the average individual.

4.2 Condom use

We move next to the analysis of the determinants of reported behaviors. It is important to note that all those behaviors are self-reported and therefore more subjective than the result of an HIV test. The first set of regressions focuses on the probability of using a condom during the last intercourse. This aspect is particularly interesting for Lesotho, where condoms use is still relatively limited. The Demographic Health Survey asks whether the last intercourse occurred with a spouse or with another partner, thus we can compare this behavior inside and outside the marriage. The use of a condom is recommended in both situations, but the absence of a condom during extra-marital sex is considered even more risky. Unfortunately, in the survey, precise questions about condom use at the last intercourse were only asked to females, so that we have to limit our analysis to them.

[Insert table 5]

Table 5 reports the results of the analysis. Urban status is positively and strongly correlated with the likelihood of using a condom, both inside and outside

marriage. People living in urban districts are generally more exposed to information campaigns promoting the use of condoms and there is higher availability in urban areas. As expected, being currently and formally married is negatively and significantly associated with condom use in the last intercourse with the spouse. However, married women (both currently and formerly married) are less likely than single women to use a condom when they have extramarital sex. This is a potential source of vulnerability which should be taken into consideration for prevention efforts. The same result was found in Burkina Faso, Cameroon and Kenya (De Walque 2006). Before the end of the apartheid regime in South Africa, about 60% of the Lesotho male workforce was employed in the mining industry in South Africa. During this period anecdotal evidence suggests that some married women started to engage in sexual relationships with other partners. In the Demographic and Health Survey, 11.6% of married women report having had extramarital sex in the last 12 months. This is substantially higher than in other African countries (De Walque, 2006)[1]. The existence of long-term extra-marital relationships might increase the trust between partners and therefore the use of condoms might not appear necessary anymore.

The probability of using a condom inside and outside the marriage increases with educational achievement. The relationship is robust, but statistically significant only for individuals with secondary education or more. As expected, wealth positively affects condom use, both for sexual intercourse with the spouse and with other partners.

4.3 Fidelity in the last 12 months

This section shows the results of the likelihood of having had extra-marital sex in the last year.

[Insert table 6]

The dependent variable we used in table 6 is equal to one if an individual had extra-marital sex during the last 12 months. We include only currently married or

[1] It is not clear whether this is due to an actual difference in behavior or to a difference in reporting.

cohabiting individuals because others, by definition, have only non marital sex if they are sexually active. Married men in cities are more likely to have extra marital relationships, while the urban status does not influence the dependent variable for married women. The probability of having sexual intercourse outside marriage increases for females who have been in successive marriages, suggesting difficulty committing to one partner for women married more then once. This could be a potential source of endogeneity; individuals that have extra-marital sexual intercourse could have a higher probability of divorce and therefore a greater likelihood of being in more then one marriage. Secondary education is negatively correlated with the likelihood of having extra-marital sex for females, but there is no evidence on the impact of education for males. Compared to Protestants, females Catholics appear more likely to have extra-marital affairs in Lesotho.

4.4 Abstinence during the last 12 months

Abstinence is another strategy to prevent AIDS, in addition to fidelity and condom use. The LDHS investigates if the interviewed did not have sexual intercourse in the last year.

[Insert table 7]

In table 7, we consider the probability of not having had sex in the last 12 months as the dependent variable. As expected, the probability of not having had sex decreases for currently married individuals. Abstinence is also negatively associated with being formerly married, both for males and females. Being a widow increases the likelihood of not having had sex in the last 12 months, while having been in more than one marriage decreases abstinence for women. Women with some primary education are more likely to have abstained during the last year. The likelihood of not having had sex decreases with wealth. Finally, being a Catholic man or a woman with no religion tends to decrease the probability of abstinence, compared with being Protestant.

4.5 Virginity

The next step was to study the probability of never having had sex. The analysis is done for the sub-sample of single individuals since the data shows that all ever married individuals report having had sexual activity.

[Insert table 8]

In table 8, the dependent variable is a dummy equal to one if the individual has never had sexual intercourse. The likelihood of being a virgin decreases with educational achievement for males, but there is no statistical association with education among women. It is interesting to note that none of the variables considered seem to have an impact on female virginity.

4.6 Age at the first intercourse

[Insert table 9]

Table 9 reports linear estimates of the age of sexual debut for individuals who have initiated their sexual activity. A later age of sexual initiation is also considered a way to prevent HIV/AIDS or at least to delay the risk of infection.

Women living in urban areas are more likely to delay sexual debut. Not surprisingly, the age of the first sexual intercourse decreases for married (currently and formerly) women, suggesting that marriage corresponds to the sexual debut of a substantial group of women. Women who have been in successive marriages tend to have started their sexual activity earlier.

As expected, the relationship between education and the dependent variable is positive and statistically significant for females, both with primary and secondary education. The age of first sexual intercourse increases with wealth for women in the fourth and fifth quintiles of the asset distribution.

It is interesting to note that none of the variables considered seem to have an impact on age at first sexual intercourse among males. It is actually quite puzzling to realize that for females the same set of socio-demographic characteristics have no effect on self-reported virginity (Section 3.6), but have substantial effects on self-reported age at first sex, while exactly the opposite is true for males. In theory,

virginity and age at first sex should be highly correlated. The fact that we don't find this correlation might be due to different biases in reporting virginity and age at first sex. Gersovitz (2005) has found that, after their marriage, women tend to "correct" their age at first sex to make it coincide with their age at marriage.

4.7 Use of voluntary counselling and testing

The survey asks whether the individuals have already been tested for HIV and obtained the results prior to the survey. We therefore analyze the probability of using voluntary counselling and testing services before the DHS survey.

[Insert table 10-10a]

Females living in urban areas are more likely to have received results of an HIV test. Table 10 shows that the probability of using voluntary counselling and testing facilities increases for married individuals. The same is true for formerly married women, while formerly married men are less likely to try to know their HIV status. One hypothesis to explain this difference by gender, that would require further research to be confirmed, is that women who get tested and are HIV positive would be rejected by their husband. Widowers are more likely to seek testing, suggesting that males are more likely to decide to learn their HIV status after their wife's disease or death. As expected, education (especially secondary education) is always positively associated with obtaining information about one's HIV status. The same is true for wealth, but less strongly.

In table 10a we report statistics for the use of voluntary counselling and testing (VCT) at the level of married or cohabiting couples. The results show that in almost 73 percent of couples, neither of the partners had a voluntary HIV test before the survey. In only 5 percent of the couples both partners have used VCT. In 12.9 percent of couples, only the male has had an HIV test before the survey and in 9.3 percent of couples, only the woman visited a VCT centre.

4.8 Discussion about AIDS between spouses

We study next the determinants of discussing AIDS between spouses. Open conversation within the household about HIV/AIDS related issues is assumed to facilitate prevention.

[Insert table 11]

Table 11 includes an analysis of the probability of having spoken with one's partner about AIDS. Males who have been in more than one marriage are less likely to have discussed AIDS with their spouses. The results also confirm the important role of education in certain attitudes and behaviors preventing HIV/AIDS. The probability of discussing AIDS between spouses increases with schooling, especially secondary education. Ceteris paribus, secondary education increases the probability of discussing AIDS between spouses by 21 percentage points for men and 44.9 percentage points for women. Wealth appears to be another important factor in increasing the likelihood of discussing HIV/AIDS between husbands and wives.

4.9 Knowledge that an HIV positive individual can be asymptomatic

Another relevant component for prevention is knowledge about HIV/AIDS. An important fact to know about the disease is that a healthy looking person can be HIV positive.

[Insert table 12]

Table 12 considers the determinants of knowing that an HIV positive person can be asymptomatic. Urban status is positively associated with that knowledge, both for males and females. Currently married males are more likely to know that fact. Being a widow or a widower increases that knowledge, suggesting that they might know this from their own experience with HIV/AIDS in their household. Primary and secondary education, as well as wealth is also positively linked with better knowledge.

4.10 Stigmatization

In many African countries, HIV positive individuals are excluded from and stigmatized by the community. The indicator of stigmatization used in the regressions in table 14 is the self reported declaration from the survey respondent that he or she would not to buy vegetables from an HIV infected vendor.

[Insert table 13]

Urban status is negatively correlated with stigmatization. Results in table 13 report that currently married men and formally married men and women are more likely to declare that they would avoid buying food from an HIV infected seller, while widows are less likely to declare this. As expected, education is an important factor in avoiding stigmatization. The same is true for belonging to the richest wealth quintile.

4.11 Male circumcision

[Insert table 14]

The first column of table 14 contains the same regression as in table 3 for males but male circumcision has been added as a control. It is somewhat surprising that there is no protective effect of male circumcision, given the recent results on the protective role of male circumcision. As discussed before, this result might be explained by the particular type of circumcision performed in Lesotho: it is not performed in early childhood, but during adolescence while boys are sent to "initiation schools". Generally, it does not involve a complete removal of the foreskin but rather a more symbolic cut. The second column shows that male circumcision is negatively associated with virginity, controlling for age, suggesting that circumcised males are more prone to engage in sexual activity, maybe because they consider themselves men after their initiation.

5 HIV infection among couples

In the previous sections we focused on the determinants of HIV infection at the individual level. The Lesotho Demographic and Health Survey also allows studying HIV/AIDS infection at the level of cohabiting couples. This section exploits this feature of the data, focusing on understanding the dynamics of HIV/AIDS with the couple as unit of observation. This study sheds light on how and through which partner -male or female- the virus is more likely to enter in a couple. For prevention purposes, it is also important to figure out the likelihood that the other partner is infected if one partner is infected.

We define as a couple all formally married couples as well as couples in unions, i.e. living together for at least 12 months. 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 is HIV negative. We define "discordant male" as a couple where the male is HIV positive and the female is HIV negative and "discordant female" a union where the female is HIV positive and the male man is HIV negative. Once an individual is infected, he or she remains HIV positive for life. Anti-retroviral therapies treat the disease, but do not cure the infection.

[Insert table 15]

Table 15 reports the fraction of couples in each of these four categories in Lesotho. The second column includes the fraction of concordant positive, discordant male and discordant female among HIV infected couples, i.e. couples with at least one HIV positive partner. The very simple statistics in table 16 include important findings which have important consequences for prevention polices. The first point is that more than 40 percent of the infected couples are discordant couples, i.e. couples where only one of the two partners is HIV positive. This means that there are opportunities 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 (2005) mentions the following groups as being the vulnerable groups to which 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 labourers, people in conflict and post-conflict situations and refugees and internally displaced persons. This is a very broad list, but it does not mention HIV negative cohabiting partners of HIV positive individuals as a group that should be specifically targeted for prevention. Table 16 shows that the 14 percent of all infected couples are "discordant female", where the woman is infected and not the man, and that 27 percent are "discordant male", where the man is infected and not the woman. This seems to be in line with the common assumption that unfaithful males are the main link between high risk groups and the general population.

This picture is quite different than in five other African countries (De Walque, 2007a) where the percentage of discordant couples is much larger.

[Insert table 16]

In the other African countries, at least 55 percent and very often more than two-thirds of the infected couples are discordant couples and between 30 and 40 percent of the infected couples are couples where the only female partner is infected. A potential explanation for this result might be that extra-marital sex among women is more common than reported, or that, even if infrequent, women are very vulnerable to infection during extra-marital sex (for example, because they would be less likely to use condoms than single women and than married men).

6 Conclusions

This paper analyzes the socioeconomic determinants of HIV infection and related sexual behaviors using the 2004 Lesotho Demographic and Health Survey. This is the first nationally representative survey in Lesotho to include an HIV test.

We find that education appears to have a protective effect: it is negatively associated with HIV infection (not always significantly though) and it strongly predicts preventive behaviors like condom use, the absence of non marital sex, delayed sexual debut, voluntary counseling and testing and knowledge about AIDS. This adds to the many reasons for supporting the current efforts by the Government of Lesotho in expanding access to primary and secondary education.

Some of the individuals selected in the sample to be tested for HIV did not get tested. We find that some socio-economic factors (location, marital status and education) have an impact on the probability of being tested. This indicates that there is a potential risk of bias in the interpretation of the results. This caveat applies to the results of this study and should be considered in further studies as well.

Some of our findings directly suggest policy recommendations for increased or more focused prevention efforts. For example, we show that married women who have extra-marital relationships are less likely to use a condom than non-married women. This is an important source of vulnerability that should be addressed in prevention efforts.

We do not find a protective effect of male circumcision, somewhat surprisingly given the recent results on its protective role. This result might be explained by the particular type of circumcision performed in Lesotho: it is not performed in early childhood, but during adolescence while boys are sent to "initiation schools". Generally, it does not involve a complete removal of the foreskin but rather a more symbolic cut. We suggest that future research explore the role of “initiation schools” in Lesotho and the way they shape sexual behavior in Lesotho as well as the type of male circumcision practiced in Lesotho. Such a study would be particularly relevant now that the message that male circumcision is proven to be protective is being disseminated in Africa.

Finally, we analyze HIV infection at the level of the couple and we find that in 41% of the infected couples, only one of the two partners is infected. This means that there are still opportunities for prevention inside the couple. Prevention in discordant couples should be a priority.

Bibliography

Adair T., "Desire for Children and Unmet need for Contraception among HIV-Positive women in Lesotho", DHS working paper series, No. 3244, March 2007

Auvert B., Buvé A., Lagarde E., Kahindo M., Chege J., Rutenberg N., Musonda R., Laourou M., Akam E., Weiss H. A., "Male Circumcision and HIV Infection in four cities in sub-Saharan Africa", *AIDS*, 15 (suppl.4): S31-40, 2001.

Brown L., Thurman T., Bloem J. Kendall C., "Sexual Violence in Lesotho", *Reports*, Volume 37 Number 4, December 2006.

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

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

Carpenter L. M., Kamali A., Ruberantwari A., Malamba S. S and Whitworth J. A. G., "Rates of HIV-1 transmission within marriage in rural Uganda in relation to the HIV sero-status of the partners", *AIDS*, 13: 1083-1089, 1999.

Central Intelligence Agency, "The World Fact Book", Lesotho, 2007. https://www.cia.gov/library/publications/the-world-factbook/index.html

Clark R., Vencatachellum D., "Economic Development and HIV/AIDS Prevalence", Scientific Series 2003s-25, Centre interuniversitaire de recherche en analyse des organisations (Cirano), Montréal, Canada, 2003.

De Walque D., "Who Gets AIDS and How? The determinants of HIV infection and sexual behaviors in Burkina Faso, Cameroon, Ghana, Kenya and Tanzania". World Bank Policy Research Working Paper # 3844, 2006

De Walque D., Sero-*Discordant Couples in Five African Countries: Implication for Prevention Strategies.* in *Population and Development Review* 33(3): 501-523. 2007a.

De Walque D.,"How Does the Impact of an HIV/AIDS Information Campaign Vary with Educational Attainment? Evidence from Rural Uganda". *Journal of Development Economics*, 84, 686-714. 2007b.

Dinkelman T., Levinsohn J., Majelantle R., "When knowledge is not enough: HIV/AIDS information and risky behavior in Botswana", NBER working paper No. 12418, 2006

Duflo E., Dupas P., Kremer M., Sinei S., Education and HIV/AIDS Prevention: Evidence from a randomized evaluation in Western Kenya, 2006

Dupas P., “Relative Risks and the market for sex: Teenagers, Sugar Daddies and HIV in Kenya”, 2006

Ethiopia Central Statistical Agency and ORC Macro, “Ethiopia Demographic and Health Survey 2005”. *Central Statistical Agency*, Addis Ababa, Ethiopia, 2006.

Fylkesnes K., Musonda R. M., Sichone M., Ndhlovu Z., Tembo F., Nonze M, ”Declining HIV prevalence and risk behaviors in Zambia: evidence from surveillance and population-based surveys”, *AIDS*, 15, 907-16, 2001.

Fylkesnes K., Musonda R. M., Kasumba K., Ndhlovu Z., Mluanda F., Kaetano L., Chipaila C., ”The HIV epidemic in Zambia: socio-demographic prevalence patterns and indications of trends among childbearing women”, *AIDS*, 11, 339-45, 1997.

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

Guinea Government and ORC Macro, “Enquête Démographique et de Santé Guinée 2005”, *Direction National de la Statistique, Ministère du Plan*, Conakry Guinée, 2006.

Gray R. H., Wawer M. J., Brookmeyer R., Sewankambo N. K., Serwadda D., Wabwire-Mangen F., Lutalo T., Li X. , VanCott T., Quinn T. C., and the Rakai Project Team, “Probability of HIV-1 transmission per coital act in monogamous, heterosexual, HIV-1 discordant couple in Rakai, Uganda”, *The Lancet*, 357: 1149-53, 2001.

Gersovitz M., “The HIV epidemic in four African countries seen through the Demographic and Health Surveys”, *The Journal of African Economies*, 14: 191-246, 2005.

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

Kilian A. H. D., Gregson S., Ndyanabangi B., Walusaga K., Kipp W., Sahlmuller G., Garnett G. P., Asiime-Okiror G., Kabagambe G., Weis P., Von Sonnenburg F., “Reductions in risk behaviour provide the most consistent explanation for declining HIV-1 prevalence in Uganda”, AIDS, 13, 391-98, 1999.

Lesotho Government and ORC Macro, “Lesotho Demographic and Health Survey 2004”, *Bureau of Statistics and Ministry of Health and Social Welfare*. Maseru, Lesotho, 2005.

Lesotho Government , “Sustaining Treatment for AIDS in Lesotho”, *Ministry of Health and Social Welfare*. Maseru, Lesotho, 2007.

Malawi Government and ORC Macro, "Malawi Demographic and Health Survey 2004", *National Statistical Office*, Zomba, Malawi, 2005.

Nagot N., Ouangré A., Ouedraogo A., Cartoux M., Huygens P., Defer M. C., Zékiba T., Meda N., Van de Perre P, "Spectrum of Commercial Sex activity in Burkina Faso: classification Model and Risk of exposure to HIV", *Journal of Acquired Immune Deficiency Syndromes*, 29: 517-521, 2002.

Quinn T. C., Wawer M. J., Sewankambo N., Serwadda D., Li C., Wabwire-Mangen F., Meehan M. O., Lutalo T., Gray R. H., for the Rakai Project Study Group, "Viral Load and heterosexual Transmission of Human Immunodeficiency Virus Type I", *New England Journal of Medicine*, 342: 921-9, 2000.

Rwanda Government and ORC Macro, "Rwanda Demographic and Health Survey 2005", *Institut National de la Statistique, Ministère de Finances et de la Planification économique*. Kigali, Rwanda, 2006.

Serwadda D., Gray R. H., Wawer M. J., Stallings R.Y., Sewankambo N. K., Konde-Lule J. K., Lainjo B., Kelly R., "The social dynamics of HIV transmission as reflected through discordant couples in rural Uganda", *AIDS*, 9: 745-50, 1995.

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

Uganda Government and ORC Macro, "Uganda Demographic and Health Survey 2000-2001", *Uganda Bureau of Statistic*, Entebbe, Uganda, 2001.

UNAIDS, "AIDS Epidemic update: December 2006", Geneva, Switzerland, 2006.

UNAIDS, "Intensifying HIV prevention: a UNAIDS policy position paper", Geneva, Switzerland, 2005.

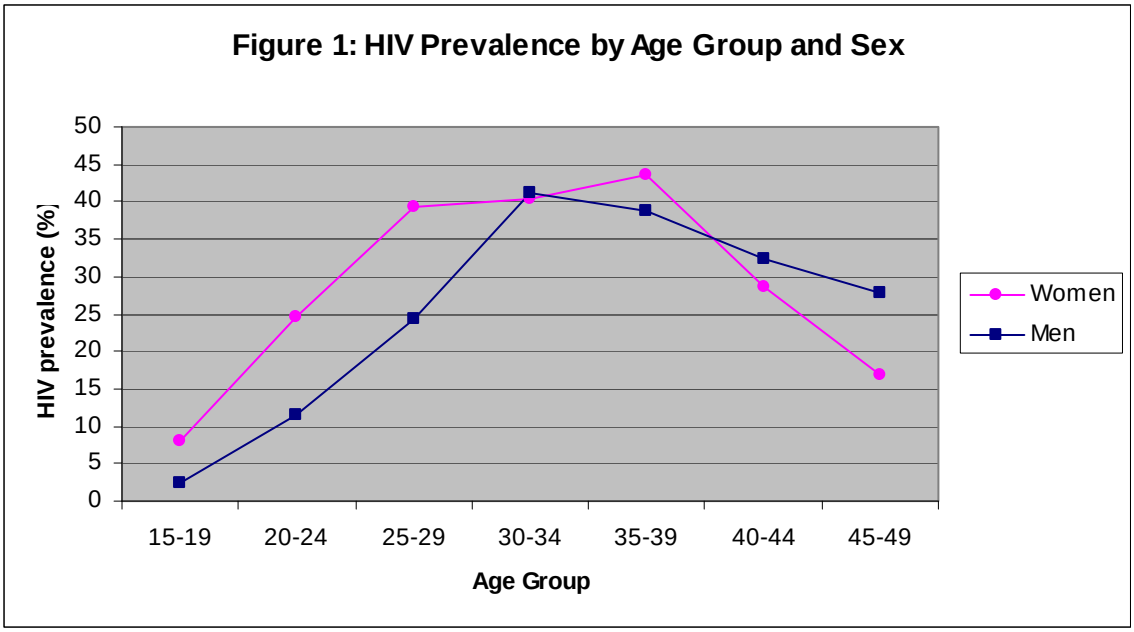
Figure 1: HIV Prevalence by Age Group and Sex
HIV prevalence (%)
50
45
40
35
30
25
20
15
10
5
0
15-19
20-24
25-29
30-34
35-39
40-44
45-49
Age Group
Women
Men

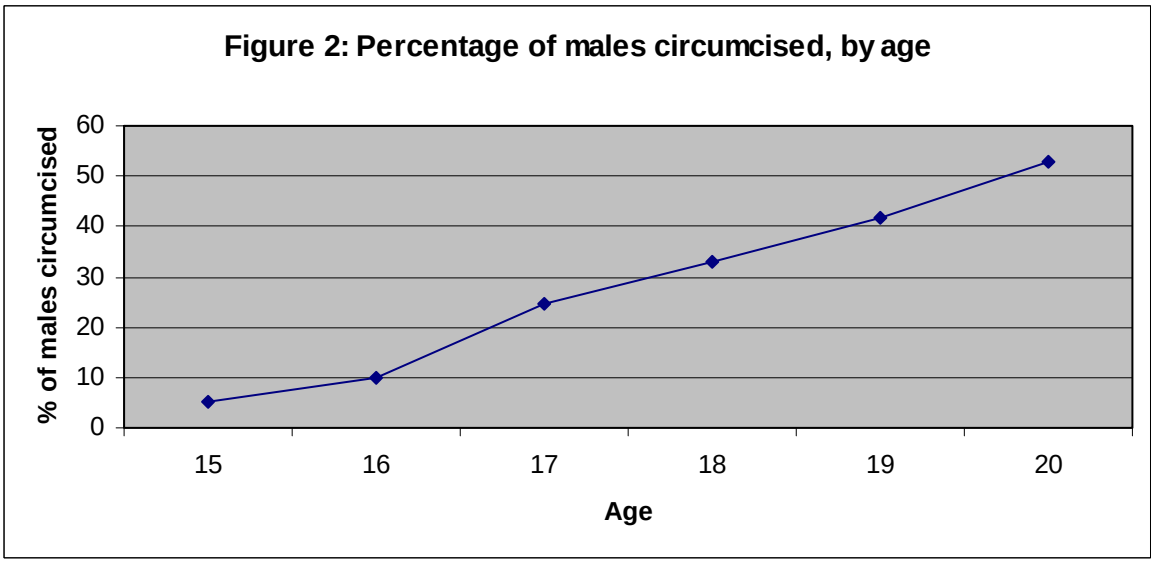
Figure 2: Percentage of males circumcised, by age
% of males circumcised
60
50
40
30
20
10
0
15
16
17
18
19
20
Age

Table1: Testing Status

		Total		Women		Men	
		% of eligible people selected for hivtest	Coverage of HIV testing among interviewed individuals	% of eligible people selected for hivtest	Coverage of HIV testing among interviewed individuals	% of eligible people selected for hivtest	Coverage of HIV testing among interviewed individuals
TEST	INTERVIEW	Percent	Percent	Percent	Percent	Percent	Percent
Tested	Interviewed	75.04	84.1	80.10	86.23	69.2	81.42
	Not interviewed	0.34		0.31		0.38	
Absent	Interviewed	0.33	0.37	0.29	0.32	0.37	0.44
	Not interviewed	6.59		4.38		9.14	
Refused	Interviewed	12.97	14.61	11.85	12.85	14.26	16.83
	Not interviewed	2.4		1.42		3.54	
Technical	Interviewed	0.05	0.06	0.02	0.02	0.09	0.11
	Not interviewed	0.08		0.53		0.17	
Other	Interviewed	0.75	0.85	1.11	0.58	1	1.2
	Not interviewed	1.45				1.85	
	Total	7,140	6,294	3,836	3,513	3,304	2,781

Note: The data are from the 2004 Lesotho Demographic and Health Survey and have been weighted with the sample weights recommended by the data provider.

Table 2: HIV prevalence by selected characteristics

	Females	Males
No education	0.3074	0.2801
	[0.0666]	[0.0279]
Primary education	0.2596	0.1662
	[0.0131]	[0.0118]
Secondary education or above	0.2687	0.1782
	[0.0177]	[0.0228]
1 quintile wealth index	0.1961	0.1790
	[0.0192]	[0.0195]
2 quintile wealth index	0.2790	0.1668
	[0.0221]	[0.0215]
3 quintile wealth index	0.2550	0.2318
	[0.0208]	[0.0227]
4 quintile wealth index	0.2732	0.2173
	[0.0226]	[0.0245]
5 quintile wealth index	0.2886	0.1424
	[0.0214]	[0.0222]
Male circumcised: yes	n.a.	0.2281
	n.a.	[0.0142]
Male circumcised: no	n.a.	0.1424
	n.a.	[0.0221]

Note: Standard Errors in brackets. N.a.:Not Applicable.
The data are from the 2004 Lesotho Demographic and Health Survey and have been weight with the sample weights recommended by the data provider and the standard errors take into account the clustering at the enumeration area level.

Table 3: Determinants of HIV prevalence in Lesotho

(Dependent variable=1 if hiv positive)		
	(1)	(2)
	Males	Females
Urban	0.0219	0.0414
	[0.0303]	[0.0278]
Currently married	0.0689**	0.0126
	[0.0270]	[0.0310]
Formerly married	0.1329**	0.2671***
	[0.0631]	[0.0628]
Widow/er	-0.0104	-0.0364
	[0.0557]	[0.0460]
>1 marriage	0.0573	0.1141
	[0.0572]	[0.0763]
Primary education	-0.0503**	-0.0249
	[0.0256]	[0.0589]
Secondary/More education	-0.0400	-0.0479
	[0.0275]	[0.0607]
2° Quintile Wealth Index	0.0113	0.0992***
	[0.0282]	[0.0344]
3° Quintile Wealth Index	0.0908**	0.0906**
	[0.0354]	[0.0378]
4° Quintile Wealth Index	0.0825**	0.0938**
	[0.0386]	[0.0423]
5° Quintile Wealth Index	-0.0140	0.0674
	[0.0362]	[0.0432]
Catholic	0.0202	-0.0161
	[0.0187]	[0.0196]
No religion	-0.0289	0.0851
	[0.0301]	[0.0932]
Age Group Dummies	yes	yes
Region Dummies	yes	yes
Ecolog. Zone Dummies	yes	yes
Observations	2232	3013

Notes: Robust standard errors in brackets. * significant at 10%; * significant at 5% significant at 1%

The data are from the 2004 Lesotho Demographic and Health Survey and have b weighted with the sample weights recommended by the data provider and the sta errors take into account the clustering at the enumeration area level.

Table 4: Determinants of being tested for HIV

(Dependent variable=1 if HIV tested)		
	(1) Males	(2) Females
Urban	-0.0957**	-0.0906***
	[0.0392]	[0.0339]
Currently married	0.0008	0.0378**
	[0.0251]	[0.0188]
Formerly married	0.0705**	0.0543**
	[0.0353]	[0.0229]
Widow/er	-0.1847*	-0.0237
	[0.1011]	[0.0426]
>1 marriage	-0.0059	-0.0080
	[0.0493]	[0.0536]
Primary education	0.0468*	-0.0440
	[0.0253]	[0.0448]
Secondary/More education	-0.0073	-0.0820
	[0.0302]	[0.0525]
2° Quintile Wealth Index	-0.0103	-0.0238
	[0.0292]	[0.0294]
3° Quintile Wealth Index	-0.0292	-0.0351
	[0.0335]	[0.0344]
4° Quintile Wealth Index	-0.0449	-0.0614
	[0.0367]	[0.0390]
5° Quintile Wealth Index	-0.0713	-0.0656
	[0.0448]	[0.0400]
Catholic	-0.0148	-0.0134
	[0.0189]	[0.0144]
No religion	-0.0252	-0.1055
	[0.0370]	[0.0948]
Age Group Dummies	yes	yes
Region Dummies	yes	yes
Ecolog. Zone Dummies	yes	yes
Observations	2779	3505

Notes: Robust standard errors in brackets.* significant at 10%; ** significant at 5%
*** significant at 1%

The data are from the 2004 Lesotho Demographic and Health Survey and have been weighted with the sample weights recommended by the data provider and the standard errors take into account the clustering at the enumeration area level.

Table 5: Determinants of using a condom in the last intercourse

(Dependent variable=1 if condom used)		
	(1)	(2)
	With Spouse	*Not With Spouse*
	Females	Females
Urban	0.0576***	0.0842*
	[0.0210]	[0.0447]
Currently married	-0.3156***	-0.2047***
	[0.0258]	[0.0504]
Formerly married	-0.1007***	-0.1536***
	[0.0197]	[0.0562]
Widow/er	-0.0040	0.0358
	[0.0329]	[0.0632]
More than one marriage	0.0382	-0.0663
	[0.0454]	[0.1054]
Primary education	0.0584	0.1400
	[0.0523]	[0.1272]
Secondary/More education	0.1609**	0.2959**
	[0.0655]	[0.1256]
2° Quintile Wealth Index	0.0232	-0.0484
	[0.0246]	[0.0525]
3° Quintile Wealth Index	0.0675**	0.1151*
	[0.0269]	[0.0654]
4° Quintile Wealth Index	0.0964***	0.1879***
	[0.0297]	[0.0664]
5° Quintile Wealth Index	0.1560***	0.3085***
	[0.0321]	[0.0639]
Catholic	-0.0028	0.0317
	[0.0147]	[0.0363]
No Religion	-0.0220	-0.0198
	[0.0601]	[0.1620]
Age Group Dummies	yes	yes
Region Dummies	yes	yes
Ecolog. Zone Dummies	yes	yes
Observations	4964	1457

Notes: Robust standard errors in brackets.* significant at 10%; ** significant at 5%; *** significant at 1%

The data are from the 2004 Lesotho Demographic and Health Survey and have been weigh with the sample weights recommended by the data provider and the standard errors take into account the clustering at the enumeration area level.

Table 6: Determinants of having non marital sex in the last 12 months (currently married)

Dependent variable=1 if number of non marital partner>0 in the last 12 months		
	(1) Males	(2) Females
Urban	0.1158**	0.0239
	[0.0584]	[0.0202]
More than one marriage	0.0615	0.0848*
	[0.0736]	[0.0444]
Primary education	0.0328	-0.0442
	[0.0374]	[0.0302]
Secondary/More education	0.0212	-0.0701***
	[0.0546]	[0.0258]
2° Quintile Wealth Index	0.0418	0.0101
	[0.0446]	[0.0170]
3° Quintile Wealth Index	0.0453	-0.0121
	[0.0519]	[0.0177]
4° Quintile Wealth Index	0.0188	-0.0073
	[0.0598]	[0.0212]
5° Quintile Wealth Index	-0.0184	-0.0156
	[0.0701]	[0.0229]
Catholic	0.0540	0.0230**
	[0.0343]	[0.0113]
No religion	-0.0374	-0.0414
	[0.0580]	[0.0472]
Age Group Dummies	yes	yes
Region Dummies	yes	yes
Ecolog. Zone Dummies	yes	yes
Observations	1204	3715

Notes: Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%

The data are from the 2004 Lesotho Demographic and Health Survey and have been weighted with the sample weights recommended by the data provider and the standard errors take into account the clustering at the enumeration area level.

Table 7: Abstinence during the last 12 months

Dependent variable=1 if no sexual intercourse in the last 12 months	(1) Males	(2) Females
Urban	-0.0301	-0.0044
	[0.0284]	[0.0178]
Currently married	-0.3316***	-0.4977***
	[0.0270]	[0.0178]
Formerly married	-0.0665*	-0.1559***
	[0.0377]	[0.0203]
Widow/er	-0.0172	0.0613*
	[0.0696]	[0.0341]
More than one marriage	0.0196	-0.1148***
	[0.0626]	[0.0360]
Primary education	-0.0480	0.0861*
	[0.0304]	[0.0466]
Secondary/More education	-0.0545	0.0784
	[0.0353]	[0.0521]
2° Quintile Wealth Index	-0.0461	-0.0355*
	[0.0313]	[0.0208]
3° Quintile Wealth Index	-0.0589*	-0.0431*
	[0.0309]	[0.0233]
4° Quintile Wealth Index	-0.0134	-0.0525**
	[0.0353]	[0.0235]
5° Quintile Wealth Index	-0.0851**	-0.0594**
	[0.0342]	[0.0244]
Catholic	-0.0408**	-0.0017
	[0.0206]	[0.0132]
No Religion	-0.0322	-0.1177***
	[0.0340]	[0.0369]
Age Group Dummies	yes	yes
Region Dummies	yes	yes
Ecolog. Zone Dummies	yes	yes
Observations	2783	7078

Notes: Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%

The data are from the 2004 Lesotho Demographic and Health Survey and have been weighted with the sample weights recommended by the data provider and the standard errors take into account the clustering at the enumeration area level.

Table 8: Determinants of never having had sex (singles)

Dependent variable=1 if virgin		
	(1) Males	(2) Females
Urban	0.0067	0.0297
	[0.0474]	[0.0429]
Primary education	-0.1077*	-0.0824
	[0.0638]	[0.1852]
Secondary/More education	-0.1772***	-0.0986
	[0.0610]	[0.1861]
2° Quintile Wealth Index	-0.0184	-0.0612
	[0.0537]	[0.0541]
3° Quintile Wealth Index	0.0097	0.0074
	[0.0597]	[0.0535]
4° Quintile Wealth Index	0.0584	0.0364
	[0.0614]	[0.0578]
5° Quintile Wealth Index	0.0406	0.0054
	[0.0633]	[0.0592]
Catholic	-0.0169	-0.0175
	[0.0315]	[0.0264]
No Religion	0.0032	0.1780
	[0.0661]	[0.1365]
Age Group Dummies	yes	yes
Region Dummies	yes	yes
Ecolog. Zone Dummies	yes	yes
Observations	1390	2349

Notes: Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%.

The data are from the 2004 Lesotho Demographic and Health Survey and have been weighted with the sample weights recommended by the data provider and the standard errors take into account the clustering at the enumeration area level.

Table 9: Age of the first sexual intercourse

	(1) Males	(2) Females
Urban	-0.2731	0.3164**
	[0.2421]	[0.1330]
Currently married	-0.0656	-0.5860***
	[0.2934]	[0.1342]
Formerly married	-0.3902	-0.8942***
	[0.5147]	[0.2058]
Widow/er	-0.2831	0.0952
	[0.5735]	[0.2041]
More than one marriage	-0.2798	-0.7705***
	[0.4493]	[0.2787]
Primary education	0.1252	0.9614***
	[0.2275]	[0.2616]
Secondary/More education	0.3696	1.8871***
	[0.3005]	[0.2740]
2° Quintile Wealth Index	0.0171	0.1589
	[0.2700]	[0.1344]
3° Quintile Wealth Index	-0.2023	0.1314
	[0.2895]	[0.1510]
4° Quintile Wealth Index	0.0910	0.3239**
	[0.3267]	[0.1584]
5° Quintile Wealth Index	-0.2552	0.3844**
	[0.3905]	[0.1589]
Catholic	0.0029	-0.0724
	[0.1657]	[0.0831]
No Religion	0.0218	-0.4078
	[0.4503]	[0.3420]
Age Group Dummies	yes	yes
Region Dummies	yes	yes
Ecolog. Zone Dummies	yes	yes
Observations	2255	5465
R-squared	0.32	0.16

Notes: Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%.

The data are from the 2004 Lesotho Demographic and Health Survey and have been weighted with the sample weights recommended by the data provider and the standard errors take into account the clustering at the enumeration area level.

Table 10: Determinants of having obtained the results of an HIV test before the survey

Dependent variable=1 if individual obtained HIV results before the survey		
	(1) Males	(2) Females
Urban	-0.0035	0.0234*
	[0.0144]	[0.0133]
Currently married	0.0454**	0.0421***
	[0.0197]	[0.0149]
Formerly married	-0.0347**	0.0898***
	[0.0169]	[0.0301]
Widow/er	0.1185*	-0.0183
	[0.0837]	[0.0222]
>1 marriage	0.0222	0.0431
	[0.0320]	[0.0354]
Primary education	0.0129	0.0629*
	[0.0174]	[0.0365]
Secondary/More education	0.0720**	0.1040**
	[0.0295]	[0.0436]
2° Quintile Wealth Index	0.0172	0.0324*
	[0.0253]	[0.0188]
3° Quintile Wealth Index	0.0295	0.0375*
	[0.0285]	[0.0204]
4° Quintile Wealth Index	0.0535*	0.0333*
	[0.0315]	[0.0198]
5° Quintile Wealth Index	0.0247	0.0415*
	[0.0297]	[0.0214]
Catholic	-0.0115	-0.0070
	[0.0109]	[0.0091]
No Religion	-0.0172	0.0391
	[0.0197]	[0.0646]
Age Group Dummies	yes	yes
Region Dummies	yes	yes
Ecolog. Zone Dummies	yes	yes
Observations	2568	6541

Notes: Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%.

The data are from the 2004 Lesotho Demographic and Health Survey and have been weighted with the sample weights recommended by the data provider and the standard errors take into account the clustering at the enumeration area level.

Table10a: Having obtained the results of an HIV test before the DHS survey at the couple level

	(1)
Both partners haven't used VCT	0.726
	[0.0244]
Both partner have used VCT	0.0507
	[0.0109]
Male has used VCT	0.1295
	[0.0190]
Female has used VCT	0.0932
	[0.0131]
Observations	656

Note: descriptive statistics. Standard errors in brackets

Table 11: Determinants of having spoken about AIDS with spouse

Dependent variable=1 if individual spoke about AIDS with spouse

	(1) Males	(2) Females
Urban	-0.0688	0.0239
	[0.0550]	[0.0341]
>1 marriage	-0.1668**	-0.0706
	[0.0823]	[0.0647]
Primary education	0.0919**	0.3222***
	[0.0433]	[0.0710]
Secondary/More education	0.2126***	0.4492***
	[0.0515]	[0.0566]
2° Quintile Wealth Index	0.0948**	0.0646**
	[0.0480]	[0.0322]
3° Quintile Wealth Index	0.0934	0.1116***
	[0.0584]	[0.0331]
4° Quintile Wealth Index	0.1791***	0.1387***
	[0.0591]	[0.0345]
5° Quintile Wealth Index	0.2049***	0.1887***
	[0.0672]	[0.0374]
Catholic	-0.0235	0.0191
	[0.0412]	[0.0214]
No Religion	-0.2059***	-0.0011
	[0.0719]	[0.1090]
Age Group Dummies	yes	yes
Region Dummies	yes	yes
Ecolog. Zone Dummies	yes	yes
Observations	1120	3385

Notes: Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%.

The data are from the 2004 Lesotho Demographic and Health Survey and have been weighted with the sample weights recommended by the data provider and the standard errors take into account the clustering at the enumeration area level.

Table 12: Knowing that a healthy looking person can have HIV

Dependent variable=1 if individual knows that a healthy looking person can have HIV		
	(1) Males	(2) Females
Urban	0.0545*	0.0520***
	[0.0301]	[0.0152]
Currently married	0.0691**	0.0234
	[0.0305]	[0.0164]
Formerly married	-0.0468	-0.0177
	[0.0612]	[0.0289]
Widow/er	0.1143**	0.0527**
	[0.0458]	[0.0206]
>1 marriage	-0.0660	-0.0298
	[0.0615]	[0.0380]
Primary education	0.0811***	0.0917***
	[0.0265]	[0.0337]
Secondary/More education	0.2553***	0.2066***
	[0.0236]	[0.0294]
2° Quintile Wealth Index	0.0582**	0.0188
	[0.0242]	[0.0164]
3° Quintile Wealth Index	0.0814***	0.0537***
	[0.0262]	[0.0166]
4° Quintile Wealth Index	0.0389	0.0841***
	[0.0312]	[0.0177]
5° Quintile Wealth Index	0.1058***	0.0933***
	[0.0341]	[0.0199]
Catholic	-0.0251	0.0057
	[0.0196]	[0.0107]
No Religion	-0.0122	-0.0525
	[0.0408]	[0.0564]
Age Group Dummies	yes	yes
Region Dummies	yes	yes
Ecolog. Zone Dummies	yes	yes
Observations	2573	6531

Notes: Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%

The data are from the 2004 Lesotho Demographic and Health Survey and have bee weighted with the sample weights recommended by the data provider and the standard errors take into account the clustering at the enumeration area level.

Table 13: Stigmatization

Dependent variable=1 if would not buy vegetables from an HIV positive vendor		
	(1) Males	(2) Females
Urban	-0.0768**	-0.0510**
	[0.0354]	[0.0241]
Currently married	0.0917***	0.0288
	[0.0349]	[0.0221]
Formerly married	0.1371*	0.0924**
	[0.0711]	[0.0360]
Widow/er	-0.0325	-0.1281***
	[0.0956]	[0.0339]
>1 marriage	-0.0851	0.0191
	[0.0624]	[0.0534]
Primary education	-0.0028	-0.0665
	[0.0314]	[0.0447]
Secondary/More education	-0.2731***	-0.2261***
	[0.0387]	[0.0451]
2° Quintile Wealth Index	-0.0121	0.0082
	[0.0368]	[0.0240]
3° Quintile Wealth Index	-0.0701*	-0.0290
	[0.0383]	[0.0280]
4° Quintile Wealth Index	-0.0852**	-0.0155
	[0.0398]	[0.0267]
5° Quintile Wealth Index	-0.1023**	-0.1247***
	[0.0467]	[0.0293]
Catholic	0.0076	0.0304**
	[0.0249]	[0.0145]
No Religion	0.0545	0.0170
	[0.0419]	[0.0739]
Age Group Dummies	yes	yes
Region Dummies	yes	yes
Ecolog. Zone Dummies	yes	yes
Observations	2795	7083

Notes: Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%.

The data are from the 2004 Lesotho Demographic and Health Survey and have been weighted with the sample weights recommended by the data provider and the standard errors take into account the clustering at the enumeration area level.

Table 14: Including male circumcision in the analysis

Dependent Variable	*HIV Prevalence* Males	*Virginity for singles* Males
Urban	0.0217	-0.0424
	[0.0302]	[0.0287]
Currently married	0.0683**	na
	[0.0271]	na
Formerly married	0.1316**	na
	[0.0631]	na
Widow/er	-0.0108	na
	[0.0555]	na
>1 marriage	0.0564	na
	[0.0572]	na
Primary education	-0.0518**	-0.0559*
	[0.0260]	[0.0321]
Secondary/More education	-0.0425	-0.0696*
	[0.0293]	[0.0364]
2° Quintile Wealth Index	0.0100	-0.0628**
	[0.0280]	[0.0317]
3° Quintile Wealth Index	0.0890**	-0.0694**
	[0.0357]	[0.0328]
4° Quintile Wealth Index	0.0814**	-0.0322
	[0.0383]	[0.0376]
5° Quintile Wealth Index	-0.0151	-0.1215***
	[0.0358]	[0.0348]
Catholic	0.0197	-0.0497**
	[0.0184]	[0.0214]
No Religion	-0.0296	-0.0048
	[0.0301]	[0.0388]
Male circumcision	-0.0037	-0.1241***
	[0.0208]	[0.0242]
Age Group Dummies	yes	yes
Region Dummies	yes	yes
Ecolog. Zone Dummies	yes	yes
Observations	2229	2779

Notes: Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%

The data are from the 2004 Lesotho Demographic and Health Survey and have been weighted with the sample weights recommended by the data provider and the standard errors take into account the clustering at the enumeration area level.

Table 15: Discordance in HIV status among

		In Infected couples
	(1)	(2)
Concordant positive	0.1953	0.5899
	[0.0236]	[0.0447]
Concordant negative	0.6690	n.a
	[0.0259]	n.a
Discordant male	0.0896	0.2706
	[0.0123]	[0.0374]
Discordant female	0.0462	0.1395
	[0.0114]	[0.0326]
Infected couple	0.3310	
	[0.0259]	
Observations	652	

Notes: Robust standard errors in brackets. N.a. not applicable.

The data are from the 2004 Lesotho Demographic and Health Survey and have been weighted with the sample weights recommended by the data provider and the standard errors take into account the clustering at the enumeration area level.

Table 16: Discordance in HIV status among cohabiting couples: cross-coutry comparison

	Lesotho	Burk. Faso	Cameroon	Ethiopia	Ghana	Guinea	Kenya	Malawi	Rwanda	Tanzania	Uganda
Infected couples	33.6	3.0	7.42	2.1	4.14	2.1	10.92	16.7	3.9	10.46	8
Among them:											
Concordant positive	60.12	14.83	31.68	14.29	31.68	19.05	33.36	41.92	43.59	24.79	42.50
Discordant male	26.49	54.92	32.61	38.10	40.26	47.62	26.01	34.13	35.90	41.95	35.00
Discordant female	13.39	30.24	35.69	47.62	37.68	33.33	40.62	23.95	20.51	33.24	22.50
Observations	652	2157	2015	2674	1825	1873	1086	1324	2231	2214	3896

Sources: Health Demographic Surveys (Lesotho 2004, Burkina Faso 2003, Cameroon 2004, Ethiopia 2005, Ghana 2003, Guinea 2005, Kenya 2003, Malawi 2004, Rwanda 2005, Tanzania 2004, Uganda 2000-2001).

APPENDIX

Table A1: Summary Statistics

	Definition	Gender	Obs.	Mean	SE
	Dependent variables				
HIV positive	Equal 1 if the individual is HIV positive, 0 otherwise[1]	Female	3020	0.26	[0.009]
		Male	2234	0.18	[0.010]
HIV test	Equal 1 if the individual has been tested for HIV in the survey, 0 otherwise	Female	3084	0.80	[0.016]
		Male	2298	0.75	[0.016]
Used condom (not with spouse)	Equal 1 if used condom during the last sexual intercourse, if not with spouse	Female	1457	0.40	[0.019]
		Male	n.a.	n.a.	n.a.
Used condom (with spouse)	Equal 1 if used condom during the last sexual intercourse with spouse	Female	3509	0.11	[0.007]
		Male	n.a.	n.a.	n.a.
Extra marital sex	Equal 1 if currently married individual had extra marital sex in the last 12	Female	3723	0.11	[0.006]
		Male	1204	0.28	[0.015]
No sex last 12 months	Equal 1 if abstinent in the last 12 months, 0 otherwise	Female	7090	0.29	[0.006]
		Male	2785	0.28	[0.010]
Never had sex	Equal 1 if the individual has never had sex (define for singles only)	Female	2352	0.49	[0.015]
		Male	1397	0.35	[0.015]
Age at first sex	Age of the first sexual intercourse	Female	7082	19.4	[0.313]
		Male	2789	16.4	[0.251]
HIV results	Equal 1 if the individual was tested and got HIV results before DHS	Female	3394	0.14	[0.007]
		Male	1124	0.15	[0.014]
Spoken AIDS with spouse	Equal 1 if individual spoke about AIDS with spouse, 0 otherwise	Female	3392	0.58	[0.011]
		Male	1120	0.57	[0.017]
Male circumcision	Equal 1 if he is circumcised	Female	n.a.	n.a.	n.a.
		Male	2790	0.48	[0.015]
Healthy person aids	Equal 1 if knows that an healthy person may have HIV, 0 otherwise	Female	6541	0.80	[0.008]
		Male	2575	0.74	[0.012]
Stigma	Equal 1 if would not buy vegetables from an HIV positive vendor	Female	7095	0.47	[0.009]
		Male	2797	0.50	[0.014]
	Independent Variables				
Urban	Equal 1 if the individual is in urban area, 0 otherwise	Female	7095	0.23	[0.026]
		Male	2797	0.21	[0.026]
Years of Education	Years of education achieved	Female	7082	7.28	[0.071]
		Male	2791	5.44	[0.139]
Primary education	Equal 1 if achieved at least some primary education	Female	7095	0.59	[0.011]
		Male	2797	0.55	[0.014]
Secondary/Tertiary educ.	Equal 1 if achieved at least some secondary education or more	Female	7095	0.38	[0.011]
		Male	2797	0.27	[0.016]
Current married	Equal 1 if the individual is married (formally or not), 0 otherwise	Female	7095	0.52	[0.008]
		Male	2795	0.42	[0.008]
Former married	Equal 1 if the individual is divorced, separated or widow/er, 0 otherwise	Female	7095	0.14	[0.005]
		Male	2795	0.06	[0.005]
Widow/er	Equal 1 if the individual is widow/er, 0 otherwise	Female	7095	0.08	[0.004]
		Male	2795	0.02	[0.003]
More than 1 marriage	Equal 1 if the individual had successive marriages , 0 otherwise	Female	7095	0.02	[0.002]
		Male	2795	0.03	[0.004]
Polygamous	Equal 1 if the individual has currently more than one wife , 0 otherwise	Female	n.a.	n.a.	n.a.
		Male	2795	0.02	[0.003]
Catholic	Equal 1 if roman catholic church, 0 otherwise	Female	7083	0.45	[0.011]
		Male	2797	0.46	[0.017]
Protestant	Equal 1 if evangelical, methodist, anglican, adventist, pentecostal and	Female	7083	0.54	[0.011]
		Male	2797	0.47	[0.016]

[1] In these percentage aren't included the indeterminant test results, equal to 0.65% of tested individuals.

Notes: Standard errors in brackets. N.a: not applicable, variable not included. The data are from the 2004 DHS and have been weighted with the sample weights recommended by the data provider. Standard errors take into account the clustering at the enumeration area level.