The Determinants of HIV Testing Behavior in Kenya: Implications for ARV Scale-Up

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Abstract

The provision of antiretroviral therapy (ART) has emerged as a key component of the global response to HIV/AIDS. As access to ART increases in sub-Saharan Africa, increasing the numbers of people who get tested for HIV has become a priority. This paper examines factors associated with uptake of HIV testing in Kenya. Among various factors, the paper explores the determinants of individuals' perceptions of their own risk of having HIV. Several key determinants of perceived risk (such as beliefs about the faithfulness of sexual partners) are found to strongly influence HIV testing behavior. In addition, individual characteristics as well as personal knowledge of people who have died of AIDS are found to have a significant association with the probability of having gone for an HIV test. Important from the standpoint of scaling-up ART, knowledge about the availability of treatment has a positive and significant association with the probability of having gone for an HIV test. The causal effect of ART availability on testing probability, however, is difficult to establish. Finally, important differences are found between the determinants of testing at ANC clinics and VCT clinics.

1. Introduction

Despite tremendous progress in the global scale-up of antiretroviral therapy (ART) to treat people with AIDS, the number of new HIV infections each year continues to remain extremely high, at about 2.5 million in 2011 (UNAIDS 2012). The lack of a siginifcant reduction in new infections is of special concern as it contributes to burgeoning treatment costs. HIV counseling and testing (HCT) is the primary entry point into prevention and care services. Increasing the proportion of individuals who have been tested in high prevalence settings is therfore essential for stemming the epidemic. Several randomized controlled trials completed in the last two years have demonstrated the efficacy of ART-based interventions in reducing HIV transmission. Mathematical modeling has found that a strategy called "test and treat," which would require annual testing for HIV and immediate initiation of ART for HIV infected individuals irrespective of CD4 count, could drive the epidemic to an elimination phase within 5 years (Cohen et al. 2007). It has also been shown that ART provided to HIV infected individuals with CD4 counts of 350-500 can reduce transmission to uninfected partners by 96% (Cohen et al. 2011). Further, pre-exposure prophylaxis (PreP) has been shown to significantly reduce acquisition of the virus when taken by HIV un-infected individuals (Grant 2010; Baeten et al. 2012). The tremendous success of these prevention interventions has been heralded by the HIV community and offers hope of making a significant impact on the epidemic. However, without a substantial proportion of the population accessing HIV testing, these interventions will fail to achieve their potential. In the absence of major reductions in the number of new infections, the government and donor organizations will face significant long-term costs stemming from hospitalizations and treatment provision.

The provision of HIV testing services has also become a major component of HIV prevention efforts in developing countries because of the possibility that knowledge of HIV serostatus will lead HIV-infected individuals to take steps to avoid infecting other individuals. According to UNAIDS, the number of people using HIV testing and counseling services grew from nearly 4 million people 2001 to 16.5 million persons in 2005 (UNAIDS, 2006). Despite these encouraging trends, a very small fraction of individuals in developing countries have received HIV testing services, and correspondingly it is estimated that nearly 90 percent of people living with HIV are unaware of their status (Global HIV Prevention Working Group, 2004).

Understanding the determinants of individuals' decisions to seek HIV testing can be viewed as essential for improving the success of antiretroviral (ARV) treatment programs. HIV testing sites often identify and refer persons testing HIV-positive to sites where ARV treatment is provided. Moreover, in sub-Saharan Africa and other developing countries, many of patients initiating treatment often present with advanced HIV infection (see, for example, Coetzee et al., 2004; Koenig, Leandre, and Farmer, 2004; and Wools-Kaloustian et al., 2006). While these studies have documented that ARV therapy dramatically reduces morbidity and mortality among HIV-infected individuals, it is also well-known that ARV therapy is less effective when it is initiated in very sick patients (Hogg et al., 2001; Wools-Kaloustian et al., 2006). Since many HIV testing services (particularly voluntary counseling and testing services) often identify persons at early stages of HIV infection, these services may hold the key to initiating ARV therapy early enough so as to maximize its effectiveness. The scale-up of ARV treatment programs could therefore result in improved clinical and laboratory outcomes among treated patients if HIV testing services are widely utilized.

This paper makes use of data from a household survey in western Kenya, where HIV testing and ARV treatment programs have been established recently. In particular, the presence of a large antiretroviral treatment program—the Academic Model for Providing Access to Healthcare (AMPATH)—in the survey area presents an opportunity to examine the determinants of HIV testing behavior in a setting where treatment is available. Using data on various socio-economic characteristics of individuals and their partners, it is possible to explore the role of various factors in individual decisions of go for testing.

There are likely to be numerous costs and benefits associated with learning HIV status. A general understanding of these costs and benefits is useful for guiding the empirical work in this paper. For infected individuals, the key benefits of learning HIV status are that they may then be able to access life-saving ARV treatment and also take steps to prevent transmission of the virus to their sexual partners. For example, studies in several countries have shown that individuals reduce their risky sexual behaviors once they learn that they are HIV-positive (Voluntary HIV-1 Counseling and Testing Efficacy Study Group, 2000). There is also growing anecdotal evidence that the prospect of ARV treatment has contributed to growing numbers of voluntary counseling and testing (VCT) services. Since these benefits apply primarily to individuals who are HIV-positive, individuals' subjective beliefs about their risk of being HIV-positive are likely to play a role in testing decisions. In particular, the level of risky behavior that individuals are engaged in and beliefs about their main partner's faithfulness are likely to contribute to their risk profile, and thus their testing decision.

A major barrier to going for an HIV test is often the fear or stigma and discrimination associated with being HIV-positive. For an uninfected individual, there may even be fear associated with the possibility that their partner would find out about the visit to a testing center.

The negative consequences of testing HIV-positive, particularly for women, may include being forced to leave the household. As a result, the presence of domestic violence in the individual's household as well as extended family members in nearby areas may play a role in testing decisions. In addition to these costs associated with going for an HIV test, other considerations such as travel time and transportations costs are also likely to be significant.

Finally, testing decisions can also depend on how knowledgeable an individual is about HIV/AIDS and its consequences. For example, individuals who know how HIV is transmitted may be more likely to go for an HIV test. More general characteristics of individuals when it comes to health-related behavior are also likely to play a role. To examine the significance of these factors in HIV testing decisions, I analyze self-reported information about HIV testing from a population-based household survey in Kenya. During 2004 and 2005, two rounds of interviews were conducted with household heads and spouses in 503 households. The survey respondents reside in the area served by the Mosoriot Rural Health Training Center, a government-run health center where HIV testing services as well as ARV treatment are available. When analyzing the respondents' self-reported information on whether they have ever gone for an HIV test, I also make a distinction between HIV tests that occurred in settings where it is somewhat routine (such as antenatal care, or ANC, clinics) and HIV tests that occurred at VCT clinics. In particular, all pregnant women coming to the Mosoriot antenatal clinic (regardless of whether they intend to deliver in the clinic or not) are offered an HIV test as part of an effort to prevent mother-to-child transmission of HIV/AIDS.[1] The persons who test at the VCT clinic, on the other hand, are much more likely to have initiated the decision to test by themselves.

[1] The HIV testing at the Mosoriot antenatal clinic is distinct from the HIV testing that occurs due to Mosoriot being one of Kenya's sentinel surveillance sites.

With the exception of a few studies, very little empirical research has explored the determinants of HIV testing behavior in sub-Saharan Africa. Hutchinson and Mahlalela (2006) use population-based household survey data from the Eastern Cape Province in South Africa to examine factors influencing utilization of VCT services. Based on population-based survey data from a rural Malawi district, deGraft-Johnson et al. (2005) explore the determinants of ever being tested and desire for being tested. Both studies find an association with several key variables such as age, education, and socioeconomic status. Variables such as distance to clinic and HIV-related stigma are also found to be relevant in the former study. In a recent study, Thornton (2006) reports the results from an experiment in which adults in rural Malawi were tested for HIV and then offered randomly assigned monetary incentives (vouchers) to obtain their test results. While only 39 percent of those who received no monetary incentive learned their results, small amounts of incentives resulted in large increases in the probability of learning HIV status. Distance to the centers where test results were provided, on the other hand, had a significantly negative effect on the probability of learning HIV status. Furthermore, very small changes sexual behavior were found among those who did learn their HIV status, suggesting that these individuals placed little value on information about their HIV status. While this study provides evidence that monetary incentives influence the HIV testing decisions of individuals, it should be noted that the study was conducted in an area where ARV treatment was unavailable. However, ARV treatment programs are becoming increasingly available in many regions of sub-Saharan Africa, and in these settings the costs and benefits of learning one's HIV status might be altered quite dramatically.

The results in this paper provide a range of additional insights into HIV testing behavior, particularly in a setting where ARV treatment is available. First, the paper explores the

determinants of individuals' perceptions of their own risk of having HIV. Several key determinants of perceived risk (such as beliefs about the faithfulness of sexual partners) are then found to strongly influence HIV testing behavior. In addition, individual characteristics as well as personal knowledge of people who have died of AIDS are found to have a significant association with the probability of having gone for an HIV test. Important from the standpoint of scaling-up ARV treatment programs, knowledge about the availability of treatment has a positive and significant association with the probability of having gone for an HIV test. The causal effect of ARV treatment on testing probability, however, is difficult to establish. Finally, important differences are found between the determinants of testing at ANC clinics and VCT clinics.

This paper is organized as follows. Section 2 provides a description of the household survey and the region in which it was conducted. Section 3 summarizes the major household and individual characteristics pertaining to HIV testing, such as knowledge about HIV/AIDS and behaviors that may be associated with HIV testing. In Section 4, I present the results from examining the determinants of whether or not adult respondents in the random sample of households have ever been tested for HIV. After examining the overall HIV testing behavior, I focus separately on the decision to test at VCT clinics and, for pregnant women, at ANC clinics. I argue that testing at these two clinics represents separate decision-making processes, and is therefore influenced by different sets of variables. Section 5 contains concluding remarks.

2. Background and Survey Data

The household survey was conducted in Kosirai Division, a rural area located about 25 kilometers south of Eldoret town and in the Nandi North District of western Kenya. Kosirai division has an area of 195 square kilometers (76 square miles) and a population of 35,383 individuals and 6,643 households (Central Bureau of Statistics, 1999). The survey households

are scattered across more than 100 villages where crop farming and animal husbandry is the primary economic activity. This paper studies HIV testing decisions in a representative sample of households in Kosirai division.

A range of factors was considered when designing the sample of households in the survey. The random sample of 503 households was chosen from a household census of all villages in Kosirai division. Information from these households thus presents an opportunity to understand the health and socio-economic characteristics of the population and their HIV testing behavior. In the random sample, the HIV status of respondents is usually unknown, unless the respondent reported having gone for an HIV test and testing HIV-positive or negative.

The Mosoriot Rural Health Center is located in the center of Kosirai division and is the main health care provider in the survey area. It provides primary care services and is mainly an outpatient facility. The survey area also contains several smaller dispensaries and clinics, but the services provided at these facilities are minimal. In 2001, a collaboration between medical schools led to the creation of the Academic Model for the Prevention and Treatment of HIV/AIDS (AMPATH). AMPATH's first rural HIV clinic was opened in Mosoriot in November 2001 (Cohen et al., 2004; Mamlin et al., 2004). Beginning in late-2003, the HIV clinic at Mosoriot has experienced rapid growth, with the number of patients rising from less than 100 in 2003 to over 2,000 by September 2005 (AMPATH data). To further examine specific issues relating to treatment of HIV/AIDS, a separate sample of HIV-positive patients in AMPATH's HIV clinic was chosen. In this paper, however, all analysis is conducted using data from the random sample.

Of special interest for this paper, the Mosoriot health center has also contained a government-run voluntary counseling and testing (VCT) clinic since early 2003. In a typical

month during the survey period about 75-100 persons visit the VCT clinic. The number of VCT clients each month has grown considerably between 2003 and 2005. Unlike the usual practice in the United States and other regions, the VCT clinic in the survey area and other testing facilities in Kenya have been using rapid diagnostic HIV tests rather than the laboratory-based enzyme-linked immunoassays (EIAs).[2] The rapid testing protocol typically produces results within 15 minutes and as a result, clients do not need to return on a later date to learn their status.[3] When laboratory-based testing protocol with long turn-around times are used in low-income settings, large fractions of individuals who provide blood specimens are unlikely to return to testing centers for their test results. A typical VCT session in Kenya therefore lasts for about 30-45 minutes, consisting of both pre- and post-test counseling. The sessions are highly confidential and clients' personal information and HIV status are never recorded. In cases where a client is found to be HIV-positive, the VCT clinic at the Mosoriot health center refers the client to the HIV clinic for appropriate treatment.

It is important to recognize that HIV testing services are available at other facilities in the region (such as the hospitals in nearby towns, as well as rural health centers in neighboring divisions), although not in any other dispensary or clinic in the survey area itself. The availability of these testing services has also been increasing over time. The number of sites providing VCT services grew from 3 in 2000 to 680 by the end of 2005, with the number of people receiving VCT services increasing from 1,100 to 545,000 over the same period (Marum, Taegtmeyer, and Chebet, 2006). Despite this rapid increase in the utilization of VCT services, however, access to VCT services is limited in rural areas.

[2] Clinical studies have demonstrated that the sensitivity and the specificity of rapid HIV tests are comparable to those of EIAs often used for HIV screening.
[3] Similar tests are also used in the antenatal clinics within Kenya.

For the random sample of households in the survey, all interviews were conducted at the homes of respondents. Teams of male and female survey enumerators interviewed the household head and spouse (if both were present) as well as a randomly chosen youth in the household. Interviews were conducted after respondents were informed about the purposes of the survey and agreed to participate in the survey. The first round of the survey was conducted between March and August 2004 and the second round was conducted between September 2004 and March 2005. The follow-up interviews obtained longitudinal information on all survey households and also collected more detailed information on HIV testing behavior and intrahousehold issues.

Multiple questionnaires were used in the survey, each one focusing on different issues such as health, education, agriculture, and income/employment. Each interview began with a listing of all household members and their characteristics such as age, sex, relationship to household head, education, health status, and participation in income-earning activities. For children under the age of 5 years, height and weight measurements were also taken. In addition, the household and individual questionnaires also addressed the following additional topics including ownership and purchases/sales of assets such as land, livestock, and durable goods; agricultural production and investment; allocation of time to income-earning and other activities; food consumption and expenditures; financial and non-financial transfers to and from the respondent; knowledge about diseases such as malaria and HIV/AIDS; and health-related behavioral practices (including sexual behavior and HIV testing).

In the second round, data were collected on additional topics such as housing characteristics; mortality within the household; marriage and family background (such as tribe, religion, inheritances, etc); and health-related social networks. Information was also gathered on

the respondents' knowledge about a range of topics related to HIV/AIDS, as well as testing behavior and sexual behavior.

Table 1 summarizes some of the key characteristics of 499 households that are in the random sample in both rounds of the survey. Households have 6.1 members on average. In 23 percent of the households, the household head is single. The average quantity of land owned is 7.1 acres, and 13 percent of the households own no land. Typically, the households that own no land are located in market centers and are engaged in non-farm employment activities. As noted earlier, the survey villages are located around the Mosoriot health center. Using the GPS location information for each household and the health center, it is possible to calculate the linear distance between households and the health center. As shown in Table 1, the average distance to the health center is 13.4 kilometers. However, this may not accurately represent the accessibility of the health center. The survey also asked respondents how long it would take them to walk from their home to the paved main road that bisects the survey area. The average travel time to the main road is 58 minutes.

Table 2 provides information on the adults that were interviewed in the random sample of households. In total, 350 men and 464 women were interviewed. One reason why the number of women interviewed is considerably larger than the number of men interviewed is that, as noted above, 23 percent of households in the random sample are single-headed households. Typically, these are households in which the head is a woman who has been widowed. Indeed, 20 percent of the women interviewed are household heads. Another reason for the discrepancy is that men were more likely to be away from the home for an extended period. In such cases, the interview was conducted with only the spouse of the household head, resulting in women being more likely to be interviewed. It is worth pointing out the implications of this for the analysis of testing

behavior. If men who are away from home are more or less likely to be have gone for an HIV test, then the analysis of testing behavior in the sample of adults interviewed as part of the survey may not result in a comprehensive understanding of testing behavior.

As Table 2 indicates, the average age of men interviewed in the random sample is 46.4 years, compared to 41.6 years for women. Men have completed an average of 7.5 years of schooling, whereas women have completed 6.4 years. Among adults ever married, the average age at marriage for men is 26.5 years, significantly higher than the average age at marriage for women (19.2 years). It should be noted that the analysis of HIV testing behavior in this paper applies primarily to household heads and their spouses, rather than all adults in the community. This is a reasonable group to focus on given that they are likely to be sexually active. However, the AIDS-related knowledge and HIV testing behavior of another important group, young adults who are often not yet married, might be very different from the behavior studied in this paper.

3. HIV-Related Knowledge and Behavior in the Random Sample

Efforts to prevent the spread of HIV/AIDS are most likely to be successful when based on a good understanding of knowledge levels in the population as well as the key characteristics of individual behavior. The data from the random sample of households provide a useful depiction of AIDS-related knowledge levels and behavioral practices in the general population of the survey area. Table 3 presents summary statistics for several key variables from interviews with the household heads and spouses in the random sample of households. Where possible, I provide comparisons of the results in this paper to those obtained in the 2003 Kenya Demographic and Health Survey (Central Bureau of Statistics, 2004). In most cases, I rely on the KDHS results reported for the sample in Rift Valley Province, which is a large region that includes the survey area of Kosirai Division. In future analysis, I will make use of the KDHS data files to conduct

detailed comparisons to my survey data. For example, several other questions and topics in this survey were also covered in the 2003 KDHS.

As Panel A of Table 3 shows, a large majority of adults in the survey area are well informed about HIV/AIDS. This can be observed by examining the responses to questions about whether HIV/AIDS (a) can be treated; (b) can be cured; (c) can be transmitted from a mother to her child; and (d) whether it is possible to have HIV and look healthy.[4] While these statistics suggest that most adults in the communities have at least some basic awareness about HIV/AIDS, it remains to be seen whether this awareness also translates into greater rates of HIV testing. It is worth noting that the results in the 2003 KDHS (for Rift Valley Province) closely parallel the results from my survey.

The impacts of HIV/AIDS on the communities are made clear by the large fraction of adults who report that they know somebody who died from HIV/AIDS (87 percent of men and 69 percent of women). This compares to figures of roughly 70 percent (for men and women) that were obtained in the 2003 KDHS in Rift Valley Province. Many adults in the villages also know somebody who is receiving treatment for HIV/AIDS.[5] However, here again men are more likely to report knowing someone: 58 percent of men and 32 percent of women claim to know somebody receiving treatment. People have a range of beliefs about the ease with which treatment is available. An interesting result is that men are much more likely to say that treatment is "easily available" (84 percent of men compared to 52 percent of women). This is consistent with the finding above that more men report knowing somebody on treatment. These

[4] For these questions, responses of "don't know" are treated as incorrect answers. Questions for which such responses were quite common (particularly for female respondents) are noted in the discussion below.

[5] The survey did not establish whether this treatment referred specifically to antiretroviral therapy. It is therefore possible that respondents were referring to traditional medicines or other treatment such as HIV prophylaxis.

results are somewhat surprising, however, in light of the fact that in most HIV clinics in the region (including the Mosoriot HIV clinic) there are a greater number of female patients than male patients.

Information on other health-related behaviors and risky behaviors could also be useful when studying the determinants of HIV testing decisions. In particular, these characteristics may reveal traits about individuals or couples that would feature prominently in whether or not they value HIV testing. As panel B of Table 3 illustrates, only 29 percent of men and 26 percent of women report that some household members use bednets to prevent malaria. Respondents generally seemed to be well aware of how to treat a child with diarrhea. Turning to the consumption of alcohol, there are significant differences in the responses of men and women. 38 percent of men and 8 percent of women report having consumed alcohol in the past month. Several questions were included in domestic violence as well. Roughly 70 percent of men and women report that they had argued with their partner in the past year, and 20 percent report that there had been physical violence during the same time period. In the analysis below, I explore the role of these factors in testing decisions.

As Panel C of Table 3 shows, 14 percent of men and 30 percent of women report that they have gone for an HIV test before. One reason for the large and significant difference in testing rates by sex is that women are generally offered an HIV test during their visit to an ANC clinic. To understand whether individuals take advantage of passive testing opportunities such as those at VCT clinics, a follow-up question in the survey inquired about the type of clinic at which the HIV test occurred. As Table 3 shows, all of the men who report ever being tested had gone to a VCT clinic for the HIV test, compared to only one-third of the women who report ever being tested (10 percent of women tested at a VCT clinic, and 20 percent tested at an ANC

clinic). As a result, I present estimates below of not only the overall testing decision but also the decision to test at VCT clinic and ANC clinic in particular. Among the respondents who report ever being tested, 6 percent of men and 4 percent of women said they tested HIV-positive. It should be noted that since the random sample of households includes a few households of patients at AMPATH's HIV clinic, almost all of these infected individuals are also patients who are receiving HIV care at the clinic. It is difficult to establish whether any of the 94-96 percent of individuals tested HIV positive, since some respondents may conceal the results of their HIV test.

In addition to information about HIV testing behavior, the survey also attempted to elicit the respondents' subjective expectations or perceptions about their own HIV status. Knowing about these expectations may be particularly useful in light of the fact that many respondents have not yet gone for an HIV test. Furthermore, the data on subjective expectations can prove to be useful in understanding how individuals make decisions (Manski, 2003). DeGraft-Johnson et al. (2005), for example, find that higher perceived HIV risk is associated with a significantly lower desire to be tested for HIV. Subjective expectations in my survey were recorded by two questions that asked respondents to report how likely they think it is they are HIV-positive, in quantitative (percentage) and qualitative (high, moderate, low, no risk) terms. As Panel C of Table 3 shows, on average, men and women report an 8 percent chance of having HIV/AIDS. For the qualitative question about perceived HIV risk, 4 percent of men and 5 percent women report that they think they have a high or moderate risk of having HIV/AIDS. Since questions about perceptions of HIV risk are inherently difficult to answer, particularly for those who have never gone for an HIV test, some adults responded by saying they did not know their chances of having HIV/AIDS. As Table 3 shows, 1 percent men and 6 percent of women did not offer a

response to the questions about perceived HIV risk. In the next section, I examine the determinants of the responses to these questions about perceived HIV risk.

To gather additional information on the respondents' knowledge as well as their perceptions of HIV/AIDS in the community, the survey asked respondents to estimate the HIV prevalence rate in the survey area of Kosirai Division. Surprisingly, the estimated prevalence rates are extremely high. Men report an average prevalence rate of 33.4 percent and women report a significantly higher prevalence rate of 39.8 percent. 5 percent of men and 13 percent of men were not able to respond to this question, however, and some of those that did respond may well have difficulty responding to the question if they did not understand the concept of percentages.[6]

Levels of stigma associated with HIV/AIDS are an important factor to consider when designing treatment and prevention programs (Hutchinson and Mahlalela, 2006). Perceptions of stigma within a community are likely to be critical in influencing individual behavior such as the decision to be tested for HIV, to breastfeed if HIV-positive, or to seek treatment when sick. In order to measure stigma in the survey area and also understand individual attitudes about HIV/AIDS, respondents were asked for their own personal opinion and their assessment of community opinion on several specific statements concerning the disease. Examples of these statements include:

- "Most people I know would agree that a female teacher who has AIDS but is not sick should be allowed to continue teaching in the school"
- "If I was a teacher infected with the AIDS virus but was not sick, I would find that I should be allowed to continue teaching in the school"

Respondents were asked to rate (on a scale of 1 to 5) how strongly they agreed or disagreed with such statements. Panel D of Table 3 presents the average sum of the responses to five statements

[6] However, interviewers were trained to rephrase the questions if the respondent did not understand percentages. In particular, interviewers would ask for the number of people who had HIV/AIDS for every 10 people.

about HIV/AIDS. A value of 25 for this index would indicate extremely negative attitudes toward HIV/AIDS. When asked for their own opinion, the mean value of the stigma index is 8.1 for men and women. This suggests that respondents themselves have moderate views and are accepting of people with HIV/AIDS. When asked about the attitudes of their community members, however, respondents report more negative views. The mean value of the stigma index for the public is 12.5 for men and 11.7 for women. Only 16 percent of male respondents and 24 percent of female respondents said that their community members feel that a female teacher who is HIV-positive should *not* be allowed to continue teaching. This compares to results in the 2003 KDHS, which indicate that roughly 42 percent of men and 47 percent of women in Rift Valley Province feel that a female teacher should *not* be allowed to continue teaching. Thus, it appears that levels of stigma in the survey area are considerably lower than the levels in Rift Valley Province. When asked about their own opinion, respondents generally expressed more moderate views on each of the statements.

Finally, the survey also collected information on sexual behavior, with most questions administered being similar to those used in other surveys conducted in the region such as the Behavioral Surveillance Surveys and Demographic and Health Surveys. As Panel E of Table 3 shows, the average age at first intercourse is 16.8 years for men and 17.3 years for women. Men report having had significantly more partners in their lifetime than women (8.7 compared to 1.6). These large differences suggest that questions about sexual behavior may not elicit truthful responses, and that patterns in truthfulness may differ for men and women (for a lengthier discussion, see Gersovitz, Jacoby, Dedy, and Tape, 1998). While these questions were asked in round 1, in the following round a number of questions related to sexual activity were asked to only male respondents under the age of 59 years and female respondents under 49 years. This

was done in order to avoid asking sensitive questions to older respondents. Among respondents in this restricted age group, 90 percent of men and 77 percent of women report being sexually active in the past six months. Reports of multiple partners were rare, with 9 percent of men and none of the women saying that they had more than one sexual partner in the past six months. There is also evidence that most respondents know whether their partner has ever gone for an HIV test, as the fraction of female respondents who say their partner has been tested corresponds closely to the fraction of male respondents who report they have gone for an HIV test. For women's HIV testing, there is some indication that male respondents over-estimate the testing rates of their female partners (36 percent of men say their partner has gone for an HIV test, whereas only 30 percent of women report having gone for an HIV test).

Beliefs about a partner's sexual promiscuity are likely to contribute to individuals' subjective expectations about their HIV status, and therefore their likelihood of having gone for an HIV test. To this end, the survey included questions about whether respondents suspected that their partner had other sexual partners and about the respondents' assessments of their partner's chances of having HIV/AIDS. For both of these questions, there are significant differences between men and women. 14 percent of women report that they think their main partner also has other sexual partners, compared to 1 percent of men.[7] This corresponds with the higher fraction of women who think their partner has a high chance of having HIV/AIDS (5 percent for female respondents compared to 2 percent of male respondents).

In Table 4, I examine the determinants of respondents' perceptions (subjective expectations) of HIV risk. As noted above, the survey data yield two measures of perceived risk:

[7] Another 30 percent of the women respond that they don't know if their spouse/partner has other partners, suggesting to some degree that these women also do not trust their partner is faithful. Among male respondents, an additional 10 percent respond that they don't know.

percentage chance of having HIV/AIDS, and a dummy variable indicating whether the respondent reports a high or moderate risk of having HIV/AIDS (as opposed to low or no risk). The results indicate that younger adults (ages 15-29 years) report percentage chance of having HIV/AIDS that is 4.8 percentage points lower than that reported by adults between the ages of 30-39 years. For the qualitative indicator of perceived risk, younger adults are significantly less likely to report that their chances of having HIV/AIDS are high or moderate. Adults between the ages of 50-59 years also report a significantly lower risk of HIV/AIDS. There are no significant differences in perceived risk by sex or education of the respondents. It is noteworthy that knowing somebody who died from AIDS is associated with significantly higher perceived risk in qualitative terms (column 2) but not in quantitative terms (column 1). In addition, men who report having consumed alcohol in the past month also have significantly higher perceived HIV risk. Interestingly, women who consumed alcohol have significantly lower perceived HIV risk, by over 11 percentage points. Finally, perceived risk is significantly higher for adults who believe their partner is unfaithful. The increase in perceived risk is large and significant, with a 12.2 point increase in the percentage chance of having HIV and a 17 percentage point increase in the probability of reporting high or moderate risk of having HIV. Finally, higher estimates of HIV prevalence in the community as well as the occurrence of domestic violence is not associated with higher perceived HIV risk.

4. HIV Testing Behavior in the Random Sample

Apart from increasing knowledge of HIV/AIDS in the general population, encouraging people to learn their HIV status is another important component of many prevention programs. In this section, I examine the central factors associated with the decision to go for an HIV test. The first part of the analysis focuses on HIV testing at either ANC clinics or VCT clinics. However, since

HIV testing at ANC clinics is more routine as part of broader antenatal care, the second part of the analysis focuses on HIV testing at VCT clinics specifically. Finally, a third part of the analysis focuses on HIV testing decisions of pregnant women at ANC clinics.

4.1. Determinants of Ever Having Tested

The analysis of testing behavior explores the role of many of the variables discussed in the previous section by estimating probit equations in which the dependent variable indicates whether or not the respondent has gone for an HIV test. I examine the role of variables that are likely to be associated with the costs of testing, the potential benefits of testing, as well as information about HIV/AIDS. Table 5 presents the results from examining the broader measure of HIV testing (including testing as VCT and ANC clinics) as the outcome variable.

Demographic Characteristics

Beginning with the role of demographic characteristics, the results in columns 1-4 suggest that older respondents are significantly less likely to have gone for an HIV test. Marital status is not associated with significantly different testing rates. Since one of the main reasons why testing rates are much higher women is that they use ANC clinics, the equations include an indicator of whether or not the respondent has given birth in the past three years. As the results show, this is associated with much greater likelihood of having gone for an HIV test. Among the women in the random sample, those who have given birth in the past three years are between 40-50 percent more likely to have gone for an HIV test.

Interestingly, there are no significant differences by gender when controlling for birth history. In almost all of the equations estimated, the number of years of school completed is associated with a higher probability of having gone for an HIV test. This is consistent with the theory that educated individuals are more able to absorb health-related information and seek

health services. However, there is no evidence that wealth has a significant effect on testing behavior. The coefficient on the variable that indicates whether the adult's household owns land is not significant. In results that are not reported here, several other measures of wealth such as quantity of land owned and livestock holdings were not found to be significant either.

Knowledge about HIV/AIDS and Availability of Treatment

As discussed earlier, a number of other factors may play a role in decisions to seek an HIV test. The results show a large and significant association between personally knowing somebody who died of AIDS and having gone for an HIV test. One reason for this relationship could be that individuals are more likely to recognize the consequences of HIV/AIDS when somebody they know if affected by the disease. As a result, these individuals may take greater initiate to learn their HIV status. Also, as shown in Table 4, these individuals may also feel their own HIV risk is higher, and therefore be more likely to seek an HIV test. Given the high fraction of respondents who reported knowing somebody who died of AIDS, it is unlikely that the relationship to HIV testing behavior is driven by the possibility that the deceased individuals were sexual partners of the respondents.

More general knowledge about HIV/AIDS may also be associated with individuals' likelihood of going for an HIV test. However, in results that are not reported here, none of the measures of AIDS-related knowledge are significantly related to HIV testing behavior. These measures include knowledge about ways that HIV/AIDS in transmitted, whether the disease can be cured, and whether an individual can look healthy and have HIV. Surprisingly, another factor that may be relevant in the survey area—knowledge about whether treatment is available—does not have a significant associated with likelihood of testing. Since the outcome variable in Table 5 includes HIV testing at ANC clinics with routine HIV testing, the availability of treatment for

AIDS may not play an important role. In addition, as I discuss further below, due to a variety of reasons it is difficult establish causality in the relationship between treatment availability and the likelihood of having gone for an HIV test.

Costs of Going for an HIV Test

Among the costs of getting tested for HIV, transport costs and travel time to the clinic is likely to feature prominently in the survey area. One of the proxy variables for travel time and transport costs is the amount of time it takes to walk to the main paved road. This variable is appropriate here because the government health center is located on the main road that bisects the survey area and there are no dispensaries or other clinics within the survey area that offer HIV testing. I explore the relationship between HIV testing and a variable that indicates whether the respondent's reported time taken to walk to the main road exceeds 60 minutes (recall that the mean of reported travel time is 58 minutes). However, as columns 2-8 of Table 5 show, this variable is not found to be significant in any of the specifications estimated. Likewise, there is no significant association between point-to-point distance to clinic and HIV testing either, as column 2 shows. This result is noteworthy since it suggests that travel costs and distance to clinic are not the main obstacle to HIV testing. However, the result could again be driven by the fact that the determinants of going to ANC clinics are less sensitive to travel costs and are very different from the determinants of decisions to take advantage of more passive testing services such as VCT. The lack of any association with distance could also be due to the possibility that travel costs and distances in the survey area are below threshold levels at which distance becomes an important obstacle to testing.

Health-Related Individual Characteristics and Perceived HIV Risk

Since individual characteristics with regard to health-related behavior may also contribute to the decision to go for an HIV test, the regressions also explore the role of alcohol consumption and the use of bednets. As shown in column 3 of Table 5, a strong negative association is found between alcohol consumption and testing behavior. Adults who reported consuming alcohol in the past month are significantly less likely to have gone for an HIV test. It is important to stress that since alcohol consumption is a choice variable that is likely to be endogenous, the estimated relationship is not causal, and the estimates may be biased due to omitted variables that are correlated with alcohol consumption and HIV testing decisions. For this reason, the dummy variable indicating alcohol consumption is not included in most equations that are estimated. Another variable that may inform us about health-related behavior is the use of bednets for malaria prevention. However, in results that are not reported in Table 5, no association is found between the use of bednets and HIV testing behavior.

Given that the benefits of going for an HIV test are likely to be highest for infected individuals, the respondents' assessments of their chances of having HIV/AIDS should contribute positively to the testing decision. To explore this possibility, the regressions also test for the role of variables that measure beliefs about community HIV prevalence and partner faithfulness. As shown in Table 4, beliefs about partner faithfulness in particular were strongly associated with respondents' perceptions about their own risk of having HIV/AIDS. As column 4 of Table 5 shows, adults who think the prevalence in the survey area exceeds 40 percent (since this is the median of the estimated prevalence rates) are 10 percent more likely to have gone for an HIV test. Although beliefs about community prevalence are found to have a significant association with HIV testing in column 4, the relationship is not found to be significant when equations with other variables are estimated (columns 7-8). It should also be noted that the

sample size in column 4 decreases because some respondents could not provide an estimate of the community prevalence rate. Turning to beliefs about partner sexual activity, the results in columns 6-9 indicate that adults who suspect their partner is unfaithful (has other sexual partners) are not significantly more likely to have gone for an HIV test. The sample size for the regressions decreases substantially when this variable is included because the question about partner faithfulness was not asked for older adults as well as adults who are not married or do not have a main partner. Thus, these results provide support for the hypothesis that HIV testing decisions are being driven by respondents' beliefs about their own risk of having HIV/AIDS.

One of the risk factors for HIV is likely to be the presence of domestic violence in the household (Maman et al., 2002), particularly if the violence is related to suspicions of extra-marital sexual activity. In this case, adults who report domestic violence may be more likely to have gone for an HIV test. Alternatively, violence among partners may also be associated with a reluctance to be tested due to fear of retaliation from the partner, particularly for women (higher cost of testing). As columns 6-8 of Table 5 show, no significant relationship is found between HIV testing and reports of arguments or physical violence between the adult and his or her partner. The coefficient of the interaction of this variable with the sex of the respondent suggests that the relationship between domestic violence and HIV testing behavior does not differ between men and women. To proxy for their bargaining power, women were asked whether they have to ask permission from their partner in order to visit a clinic. Likewise, men were asked whether their spouse or partner had to seek permission from them. In results that are not reported here, this variable is not found to be associated with HIV testing behavior. In particular, it does not appear to be the case that the bargaining power of women—as measured by this variable—is strongly associated with their probability of going for an HIV test.

As columns 7 and 8 of Table 5 show, having a partner who has tested for HIV/AIDS is associated with a much greater likelihood of having gone for an HIV test. However, this does not establish causality since it could be the result of joint decision-making among couples or due to the efforts one partner to learn his/her status and then convince the other to test.

The survey also tried to assess respondents' perceptions of stigma toward HIV/AIDS in their communities. There is a possibility that individuals who experience negative attitudes toward HIV/AIDS in their community will be less likely to go for an HIV test since these attitudes might increase the costs associated with testing. However, the analysis indicates that the measures of stigma are not significantly associated with testing behavior. The only exceptions are in columns 5 and 6, in which individuals who perceive more negative attitudes in the community (higher stigma) are significantly more likely to have gone for an HIV test.

Since information about HIV/AIDS may play an important role in testing decisions, in column 8 of Table 5 I test whether adults living in a village where there were community meetings (*barazas*) about HIV or health issues are more likely to have tested. The results do not provide evidence that information provided at these meetings is associated with a higher probability of HIV testing.

4.2. Determinants of Testing at VCT Clinics

Given the prominence of VCT services in HIV prevention efforts, it is useful to examine the determinants of individual decisions to take advantage of these services in particular. Moreover, adults deciding whether to test at VCT clinics are likely to face different considerations than women deciding whether to test at ANC clinics. For example, in addition to the association with PMTCT in the case of HIV testing at ANC clinics, HIV testing at ANC clinics may be viewed as less costly simply because the women do not have travel to a clinic solely for the purpose of

getting tested (they can also obtain other ANC services while at the clinic). For the case of VCT clinics, however, adults may incur non-trivial travel costs solely for the purpose of getting tested. While the analysis so far has focused on testing behavior at both ANC and VCT clinics together, it is important to recognize the different decision processes for ANC and VCT clinics. In this section, I estimate regressions in which the dependent variable indicates whether an adult in the random sample of households has gone for an HIV test at a VCT clinic. Following this, in the next section I focus on the decision of pregnant women to have an HIV test at ANC clinics.

Demographic Characteristics

The results in Table 6 show that there are several noteworthy differences in the determinants of VCT testing alone in comparison to all HIV testing. When the sample includes all adults, the results indicate that older adults are significantly less likely to have gone for testing. Unlike what was found when the dependent variable included HIV testing at all clinics, there is no significant difference between men and women in VCT testing probabilities. There is also considerable evidence that more educated adults are more likely have tested at VCT clinics, as the amount of schooling completed is associated with a significant increase in the testing probability. Likewise, in some of the specifications, adults with lower wealth (as proxied by an indicator of whether or not the adults' household owns any land) are significantly less likely to have tested at VCT clinics.

The results also indicate that individual characteristics such as gender and marital status do not have a strong association with the probability of testing at a VCT clinic. Moreover, women who were pregnant in the past three years are not significantly less likely to have tested at a VCT clinic. In Table 5, where the dependent variable included HIV tests at ANC clinics, the results indicated that these women are significantly more likely to have tested. It is noteworthy

that even after controlling for birth history in the past three years, testing probabilities for men and women are not significantly different.

Knowledge about HIV/AIDS and Availability of Treatment

Decisions to test at a VCT clinic are also found to be strongly associated with knowing somebody who has died of AIDS. This is associated with an increased testing probability of between 6 to 12 percent. One interpretation of this result is that adults who have directly been made aware of the consequences of AIDS are likely to place a much higher value on learning their HIV status and seeking treatment, if necessary. Other variables pertaining to knowledge and awareness about HIV/AIDS were not found to have a significant association with testing behavior (results not reported). In columns 6 and 7, there is no significant association between testing behavior and residence in villages where there were community meetings about HIV or health issues in the past year.

Most adults are likely to consider the availability of treatment for people with HIV/AIDS as a key benefit of going for an HIV test, particularly if they suspect that there is some chance that they are infected. Given the growing evidence that testing services are more highly utilized once treatment is made available (Global HIV Prevention Working Group, 2004; Warwick, 2006), it is noteworthy that a strong association is found in Table 6 between knowledge about the availability of treatment and the decision to test at a VCT clinic. In particular, adults who responded that treatment for AIDS was easily or somewhat easily available in the survey area are 5 to 9 percent more likely to have tested at a VCT clinic. However, since the questions about treatment availability and testing behavior were asked in the same interview, it is not possible to establish whether knowing about the availability treatment has a causal effect on testing behavior. In particular, it is possible that adults who have tested at a VCT clinic are informed

about the availability of treatment during their counseling session. It is also important to note that there was no association between knowledge about the availability of treatment and the broader indicator of testing behavior in Table 5. This is reasonable given that decisions to test at VCT clinics should be more sensitive to beliefs about treatment availability than decisions to test at ANC clinics.

Costs of Going for an HIV Test

In contrast to the benefits stemming from the availability of treatment, the costs stemming from travel to the clinic may exert an opposite influence on testing behavior. However, in columns 2-8, the effect of travel time to a main road is found to be negative but statistically insignificant. Likewise, in column 2, distance to the main health center is the survey (which is the nearest facility that offers HIV testing services) is also found to have an insignificant effect on testing behavior. Other costs of testing such as those associated with stigma also have no significant effect on testing behavior.

Health-Related Individual Characteristics and Perceived HIV Risk

Another result in Table 6 that provides important insights into HIV testing decisions has to do with the role of adults' beliefs about the sexual activity of their partner. In particular, adults who suspect their partner is unfaithful are more likely to be infected, and therefore have a stronger incentive to learn their HIV status. As columns 5-8 of Table 6 show, for the restricted sample of adults who were asked the question, those who think their partner is unfaithful are about 30 percent more likely to have gone for an HIV test. Thus, there is strong evidence that adults who feel their risk of having HIV/AIDS is higher are also more likely to go for HIV testing. Since this variable was shown to be strongly associated with perceived HIV risk in Table 4, the result here suggests that adults with higher perceived risk are also more likely to have tested at a VCT

clinic. Another variable that may correspond to the risk of having HIV/AIDS, the adults' beliefs about HIV prevalence in the survey area, is found to have insignificant effect on testing behavior (columns 4-8 of Table 6).

As in the previous results, there is evidence in column 3 of Table 6 that adults who reported consuming alcohol are significantly less likely to have gone for an HIV test. The estimates indicate that these adults are about 5 percent less likely to have tested. Another variable that proxies for individual characteristics with regard to health-related behavior—reported use of bednets in the household—is not found to have a significant association with testing behavior (results not reported).

Various other intrahousehold characteristics are also likely to influence testing decisions. I focus on several aspects of the relationship that adults have with their main partner. The role of domestic violence is examined in columns 6-8. The results indicate that adults who report violence or arguments with their partner are about 7 percent less likely to go for an HIV test. This negative association could be due to several factors. First, women who report domestic violence may have less bargaining power and may worry about adverse consequences should their partner learn that they gone for an HIV test at a VCT clinic. Second, men who report domestic violence may have characteristics that correspond to poorer health-related behavior. When an interaction term between the domestic violence variable and sex of respondent is included, the results suggest that there is no significant differences in the effect of domestic violence for men or women (results not reported). This is most likely due a lack of statistical power to identify a separate effect for men and women.

As columns 7 and 8 of Table 6 show, having a partner who has tested for HIV/AIDS is associated with a much greater likelihood of having gone for an HIV test. However, this does

not establish causality since it could be the result of joint decision-making among couples or due to the efforts one partner to learn his/her status and then convince the other to test. Finally, another aspect of intrahousehold relationships is captured by responses to questions about whether women need to get permission from their partner before visiting a health center. As column 8 of Table 6 shows, this variable is not significantly associated with HIV testing behavior.

4.3. Determinants of Testing at ANC Clinics

As noted earlier, the decision to have an HIV test at ANC clinics represents a different process than the decision to visit a VCT clinic. In particular, pregnant women who visit ANC clinics have typically been offered an HIV test at the Mosoriot Rural Health Center so that it is possible to prevent the transmission of HIV from mother-to-child with the ARV medicine called nevirapine. Similar procedures have also been followed at government health centers outside the survey area. More recently, the Mosoriot Rural Health Center has used a combination of ARV medicines to increase the likelihood that HIV will not be transmitted from mother-to-child. HIV testing procedures have also changed in such a way that all women are tested for HIV unless they specifically decline to be tested (the exact date when the testing policy changed from opt-in to opt-out is being verified).

Since the determinants of whether or not pregnant women in the survey area have been tested for HIV are likely to be different from the determinants of whether or not adults have gone to a VCT clinic, this section focuses on the testing behavior of female respondents in the sample who were pregnant in the past three years. Since the survey did not record a detailed birth history for women, information on pregnancy is deduced from the roster of the women's children (resident in the household as well as non-resident). As a result, an accurate record of pregnancy

would not be obtained for women who were pregnant in the past three years but whose children died during or after birth.

Focusing on the limited sample of 158 female respondents who were pregnant in the past three years, Table 7 examines the determinants of whether or not these women were tested for HIV. It should be noted that there are two reasons why a pregnant woman may have not been tested for HIV for at an ANC clinic. First, it is possible that the woman chose not to seek antenatal care at all, even though it is common for most women in the survey area to visit the ANC clinic at least once prior to delivery. Second, it is possible that the woman did visit an ANC clinic but was not offered or declined an HIV test. Unfortunately, the survey did not record information on visits to ANC clinics. The dependent variable therefore represents the result of both the decision to visit an ANC clinic and the decision to get an HIV test.

As the results in Table 7 indicate, the small sample size may be a key limitation of the analysis of pregnant women's testing behavior. No effect is found for age or education. Distance to the main ANC clinic in the survey area (which is in the Mosoriot Rural Health Center) is also not associated significantly with testing behavior. A key result in Table 7 is that women who believe their partner is unfaithful are more than 20 percent more likely to have tested for HIV at an ANC clinic. Likewise, women whose partner has been tested for HIV are more likely to have tested at an ANC clinic, although the channel of causality cannot be established through this result. Another noteworthy result in Table 7 is that women who report that they experienced domestic violence in the year prior to interview are not significantly less likely to have tested for HIV at an ANC clinic.

5. Conclusion

As HIV testing services become widespread in sub-Saharan Africa as part of broader HIV prevention and treatment efforts, understanding the factors affecting individual decisions to seek an HIV test may prove useful for increasing the success of HIV testing campaigns. This paper highlights the major factors associated with HIV testing decisions in a rural area of Kenya where ARV treatment has become available. Indeed, one of the important results in this paper is that the availability of treatment appears to increase the likelihood that adults will take advantage of VCT services. This result is encouraging since it suggests important complementarities between treatment and testing services. In addition, knowing people who have died of AIDS is also associated with greater probability of testing. Other factors that are strongly associated with testing behavior include respondents' beliefs about their sexual partner's faithfulness, which are found to be correlated with the respondents' own perceived risk of having HIV. These results provide some evidence that individuals compare the costs and benefits when deciding whether to go for an HIV test.

Future analysis of these survey data will explore other aspects of HIV testing behavior. For example, among the group of adults who report they have gone for an HIV test, it is worth examining whether those who tested early (prior to 2003, when ARV treatment was not available in the survey area) have significantly different characteristics than those who testing more recently. This is useful for understanding whether selection patterns for HIV testing are changing over time, possibly in response to the availability of testing and treatment services. Likewise, the strong correlation that is observed between own- and partner-testing behavior suggests that an analysis of the probability that one, both, or none of the members of a couple testing behavior could provide useful insights. This could be accomplished through the

estimation of equations that model the joint decision of a couple to test for HIV. The testing behavior and HIV-related knowledge of HIV-positive patients who are part of HIV sample of the survey can also be examined in greater detail. The analysis of testing behavior in this paper suggests there are important lessons that can be learned from exploring the reasons why individuals decide to seek HIV testing.

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Table 1. Characteristics of the Random Sample of Households

	Mean	Std. Dev.
Number of households	499	
Household size	6.1	2.8
Single-headed households	23%	
Quantity of land owned (acres)	7.3	11.8
Fraction of households without land	0.13	
Value of land owned (thousand Shillings)	657.3	989.0
Value of livestock owned (thousand Shillings)	61.2	93.1
Distance to nearest testing facility - MRHTC (kms)	13.4	6.4
Travel time to paved road on foot (minutes)	58.1	43.2
Travel time greater than 60 minutes	37%	

Notes: The 499 households are randomly chosen from a household census of Kosirai Division.

Table 2. Characteristics of Adult Respondents in the Random Sample of Households

	Men		Women		
	Mean	Std. Dev.	Mean	Std. Dev.	P-value
Number of respondents	350		464		
Age	46.4	15.6	41.6	14.9	0.0000
Years of school completed	7.5	3.7	6.4	3.8	0.0000
Household head	99%		20%		
Spouse to household head	0%		80%		
Marital status					
Married	92%		81%		
Divorced or separated	3%		2%		
Widowed	2%		12%		
Never married	2%		5%		
Age at marriage (for adults ever married)	26.4	5.7	19.2	3.7	0.0000

Notes: The sample consists of all adult respondents in the 499 households chosen randomly from a household census of Kosirai Division. Typically, the adult respondents are household heads and spouses of the household heads.

Table 3. Summary Statistics for AIDS- and Health-Related Knowledge and Behavior

	Men			Women			
	N	Mean	SD	N	Mean	SD	P-value
A: Knowledge about HIV/AIDS (questions asked in round 1)							
Person can look healthy and have HIV	332	77%		444	65%		0.0004
AIDS can be cured (or doesn't know)	332	12%		444	19%		0.0054
AIDS can be treated	332	74%		444	87%		0.0000
HIV can be transmitted from mother to child	332	91%		444	86%		0.0159
Personally know someone who died from AIDS	332	87%		444	69%		0.0000
Personally know someone receiving treatment	332	58%		444	32%		0.0000
Availability of treatment in Kosirai Division	349			464			
Easily available		84%			52%		0.0000
Available, but not for everyone in need		7%			22%		0.0000
Not available at all or doesn't know		9%			26%		0.0000
B: Other behaviors							
Somebody in household uses bednets	350	29%		464	26%		0.2734
If child has diarrhea, give more water	350	81%		464	85%		0.1339
Consumed alcohol in past month	350	38%		464	8%		0.0000
Among spent on alcohol in past month (Shillings)	350	207	728	464	8	42	0.0000
Ever argued with partner in past year	323	74%		374	71%		0.2750
Any physical violence with partner in past year	323	22%		374	20%		0.4194
C: HIV Testing							
Ever been tested for HIV	350	14%		464	30%		0.0000
Ever been tested at a VCT clinic	350	14%		464	10%		0.0607
Result of HIV test among those who tested	48			140			
HIV-Positive		6%			4%		
HIV-Negative		94%			96%		
Won't say		0%			1%		
Percent chance of having HIV/AIDS	347	8.1	15.8	437	8.68	16.1	0.6271
Percent who responded "don't know"		1%			6%		
Changes of having HIV/AIDS high or moderate	346	4%		437	5%		0.5491
Percent who responded "don't know"		1%			6%		
Percent of adults who have HIV/AIDS in Division	331	33.4	15.6	401	39.8	15.4	0.0000
Percent who responded "don't know"		5%			13%		

Table continued on next page

Table 3 (continued). Summary Statistics for AIDS- and Health-Related Knowledge and Behavior

	Men			Women			
	N	Mean	SD	N	Mean	SD	P-value
D: Measures of Stigma							
Overall index of self stigma (1-25)	350	8.1	4.3	464	8.1	4.6	0.9918
Overall index of public stigma (1-25)	350	12.5	4.0	464	11.7	4.5	0.0057
E: Sexual behavior							
Age at first sex (asked in round 1)	330	16.8	3.2	443	17.3	2.8	0.0112
Number of sexual partners in life (asked in round 1)	330	8.7	10.1	443	1.6	1.3	0.0000
Questions asked to women<=49 and men<=59							
Sexually active in past 6 months	265	90%		299	77%		0.0000
Has a partner other than spouse/main partner	265	9%		299	0%		0.0000
Thinks main partner has other partners	265	1%		299	14%		0.0000
Thinks main partner has other partners or doesn't know	265	11%		299	44%		0.0000
Thinks partner has a high chance of having HIV/AIDS	265	2%		299	5%		0.0387
Has partner ever gone for an HIV test	265	36%		299	15%		0.0000

Notes: The sample consists of all adult respondents in the 499 households chosen randomly from a household census of Kosirai Division. Typically, the adult respondents are household heads and spouses of the household heads. For questions were only asked in round 1, the sample consists of adults who were re-interviewed in round 2 (i.e., do not attrite from the sample between rounds). P-values are from t-tests of equality of means for men and women.

Table 4. Determinants of HIV Risk Perceptions

	(1)	(2)
Dependent variable:	Percent chance	High or Moderate Risk
Age 15-29	-4.81341	-0.05127
	(1.84946)***	(0.01766)***
Age 40-49	-2.93635	-0.01708
	(1.93189)	(0.01949)
Age 50-59	-4.46915	-0.03786
	(2.78098)	(0.01954)*
Age 60-69	-1.73872	
	(11.35655)	
Age 70+	0.00000	
	(0.00000)	
Female	3.13950	0.03109
	(1.91367)	(0.02575)
Years of school completed	0.16646	0.00249
	(0.24305)	(0.00320)
Knows someone who died from AIDS	2.89268	0.05093
	(1.85532)	(0.01649)***
Alcohol in past month	3.90364	0.03341
	(2.18175)*	(0.03819)
Alcohol in past month * Female	-11.80095	
	(5.86951)**	
Estimated prevalence > 40%	-0.31741	0.01165
	(1.58638)	(0.02139)
Thinks partner is unfaithful	12.23726	0.17970
	(3.60880)***	(0.10043)*
Reports domestic violence	0.09592	0.00658
in past year	(1.65485)	(0.02143)
Partner been tested for HIV	0.39386	0.01119
	(1.73047)	(0.02317)
Constant	5.79955	
	(3.46699)*	
Observations	484	465
R-squared	0.07	

Notes: The dependent variable in column 1 is the respondent's self-report of the percentage chance that he or she has HIV/AIDS. The dependent variable in column 2 is an indicates whether the respondent thinks the chance that he or she has HIV/AIDS is high or moderate. A value of zero for the dependent variable in column 2 corresponds to the respondent's report that he or she has either a low or no chance of having HIV/AIDS. Results in column 1 are estimates from a linear regressions, whereas results in column 2 are marginal effects based on the estimation of a probit equation. Samples exclude women older than 49 years and men older than 59 years, as well as adults who are not married or do not have a main partner.

Table 5. Determinants of HIV Testing Decisions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age 15-29	0.04170	0.04227	0.03319	0.02527	0.06342	0.05731	0.04258	0.04127
	(0.04239)	(0.04263)	(0.04143)	(0.05065)	(0.05973)	(0.06107)	(0.06123)	(0.06222)
Age 40-49	-0.01059	-0.00928	-0.01935	-0.01186	0.01949	0.02582	0.05219	0.05278
	(0.03990)	(0.04063)	(0.03891)	(0.05040)	(0.06281)	(0.06390)	(0.06739)	(0.06841)
Age 50-59	-0.10424	-0.10865	-0.11065	-0.11477	-0.06024	-0.05588	0.06053	0.06055
	(0.03745)***	(0.03725)***	(0.03592)***	(0.05272)**	(0.08730)	(0.08852)	(0.10977)	(0.11108)
Age 60-69	-0.17750	-0.18078	-0.17785					
	(0.02865)***	(0.02790)***	(0.02681)***					
Age 70+	-0.16724	-0.16871	-0.16611	-0.19267				
	(0.03205)***	(0.03115)***	(0.03006)***	(0.06062)***				
Female	0.02853	0.03166	-0.00741	0.00607	0.00447	-0.00463	0.12787	0.13022
	(0.03657)	(0.03680)	(0.04054)	(0.04796)	(0.06491)	(0.09537)	(0.09923)	(0.10087)
Cohabitating	0.05395	0.05526	0.07549	0.06137	0.06357	0.01607	0.07395	0.06598
	(0.18066)	(0.18562)	(0.18972)	(0.20829)	(0.22913)	(0.21558)	(0.23811)	(0.24002)
Divorced	0.00875		0.03427	0.01882				
	(0.16809)		(0.17794)	(0.20634)				
Separated	0.26046	0.25733	0.25610	0.30827				
	(0.20167)	(0.20402)	(0.20229)	(0.20986)				
Widowed	0.05293	0.05340	0.07197	0.08818	0.40159			
	(0.07885)	(0.07904)	(0.08119)	(0.10088)	(0.20597)*			
Never Married	-0.07312	-0.07528	-0.07268	-0.07094	-0.13021			
	(0.06223)	(0.06158)	(0.06209)	(0.09114)	(0.11483)			
Pregnant in past 3 yrs	0.40796	0.41163	0.41018	0.47896	0.50875	0.50557	0.53195	0.53914
	(0.05977)***	(0.05987)***	(0.06054)***	(0.06017)***	(0.06196)***	(0.06358)***	(0.06506)***	(0.06481)***
Years of School	0.01065	0.01046	0.00981	0.01708	0.01869	0.01901	0.01532	0.01415
	(0.00503)**	(0.00507)**	(0.00502)*	(0.00642)***	(0.00798)**	(0.00812)**	(0.00821)*	(0.00836)*
Landless household	-0.02443	-0.02834	-0.02677	-0.04022	-0.02279	-0.03796	-0.02513	-0.01966
	(0.03902)	(0.03907)	(0.03855)	(0.04953)	(0.06207)	(0.06181)	(0.06284)	(0.06463)
Knows someone who	0.06205	0.06225	0.05885	0.08323	0.15787	0.17688	0.15230	0.15533
died from AIDS	(0.03249)*	(0.03269)*	(0.03235)*	(0.04211)**	(0.04888)***	(0.04780)***	(0.04905)***	(0.05032)***
Says treatment easily/	0.05548	0.04897	0.05004	0.02876	0.04192	0.03499	0.01642	0.02658
somewhat available	(0.03976)	(0.04090)	(0.04007)	(0.05950)	(0.07618)	(0.07719)	(0.08104)	(0.08178)
Travel time to main road		-0.02430	-0.03174	-0.01605	0.00408	0.01922	0.00220	0.00763
> 60mins		(0.03112)	(0.03006)	(0.03947)	(0.04815)	(0.04997)	(0.05049)	(0.05614)
Distance to Mosoriot		-0.00808						
		(0.00926)						
Distance-squared		0.00027						
		(0.00031)						
Public Stigma		0.00345	0.00354	0.00485	0.00824	0.01016	0.00575	0.00594
		(0.00351)	(0.00346)	(0.00440)	(0.00538)	(0.00544)*	(0.00555)	(0.00568)
Alcohol in past month			-0.09753					
			(0.03907)**					
Alcohol in past month			0.12864					
* Female			(0.14364)					
Estimated prevalence > 40%				0.09638	0.11352	0.08531	0.08344	0.07261
				(0.04178)**	(0.04972)**	(0.05076)*	(0.05159)	(0.05244)
Thinks partner is unfaithful					0.04820	0.06700	0.04822	0.03867
or doesn't know					(0.05806)	(0.06038)	(0.06175)	(0.06235)
Reports domestic violence						-0.12091	-0.06853	-0.07206
in past year						(0.08200)	(0.08356)	(0.08465)
Reports domestic violence						0.04344	0.00359	0.01402
in past year * Female						(0.10189)	(0.10303)	(0.10527)
Partner been tested for HIV							0.36541	0.36421
							(0.06193)***	(0.06234)***
Village had health-related								-0.02801
meeting in past year								(0.08750)
Observations	758	751	757	624	503	484	484	477

Notes: Dependent variable indicates whether respondent has ever gone for an HIV test (at a VCT clinic, ANC clinic, or other lab). Results are marginal effects based on the estimation of probit equations. Samples for columns 5-8 exclude women older than 49 years and men older than 59 years, as well as adults who are not married or do not have a main partner.

Table 6. Determinants of HIV Testing at VCT Clinics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age 15-29	0.03704	0.03664	0.03011	0.03790	0.07464	0.05732	0.04084	0.04167
	(0.03316)	(0.03313)	(0.03145)	(0.03968)	(0.04424)*	(0.04287)	(0.03895)	(0.03973)
Age 40-49	0.01659	0.01804	0.00985	0.02301	0.04293	0.03613	0.04864	0.05055
	(0.02965)	(0.03014)	(0.02810)	(0.03730)	(0.04242)	(0.04180)	(0.04159)	(0.04262)
Age 50-59	-0.03467	-0.03648	-0.03731	-0.03335	-0.02054	-0.01958	0.04151	0.04307
	(0.02753)	(0.02726)	(0.02598)	(0.03839)	(0.04922)	(0.04868)	(0.06524)	(0.06674)
Age 60-69	-0.08790	-0.08837	-0.08602					
	(0.01881)***	(0.01847)***	(0.01754)***					
Age 70+	-0.06768	-0.06687	-0.06598	-0.05980				
	(0.02808)**	(0.02822)**	(0.02643)**	(0.05641)				
Female	-0.00989	-0.01058	-0.02957	-0.03104	-0.05989	-0.04537	-0.00002	0.00022
	(0.02486)	(0.02491)	(0.02707)	(0.03327)	(0.04028)	(0.03971)	(0.03751)	(0.03842)
Cohabitating	0.13417	0.12966	0.18019	0.16253	0.10166	0.03864	0.10443	0.10373
	(0.17332)	(0.17325)	(0.19474)	(0.19684)	(0.18193)	(0.14478)	(0.18569)	(0.18765)
Divorced	0.02088		0.04899	0.03832				
	(0.11998)		(0.13734)	(0.15673)				
Separated	0.23414	0.21327	0.20545	0.27347				
	(0.18013)	(0.17702)	(0.17233)	(0.19908)				
Widowed	0.04233	0.04457	0.05820	0.07739	0.03239			
	(0.05757)	(0.05828)	(0.06093)	(0.07944)	(0.13494)			
Never Married	-0.03465	-0.03567	-0.03245	-0.02927	-0.08638			
	(0.04375)	(0.04257)	(0.04333)	(0.06657)	(0.04043)**			
Pregnant in past 3 yrs	-0.01845	-0.01690	-0.01798	-0.01109	-0.00392	-0.00949	-0.00517	-0.00541
	(0.02765)	(0.02785)	(0.02671)	(0.03774)	(0.04360)	(0.04254)	(0.04009)	(0.04089)
Years of School	0.00732	0.00710	0.00615	0.01145	0.01074	0.01000	0.00800	0.00791
	(0.00341)**	(0.00342)**	(0.00333)*	(0.00438)***	(0.00492)**	(0.00493)**	(0.00456)*	(0.00465)*
Landless household	-0.03639	-0.03742	-0.03494	-0.05880	-0.05791	-0.05470	-0.04309	-0.04331
	(0.02355)	(0.02329)	(0.02274)	(0.02904)**	(0.03227)*	(0.03194)*	(0.02992)	(0.03077)
Knows someone who died from AIDS	0.06154	0.06162	0.05835	0.06490	0.12349	0.13022	0.11202	0.11473
	(0.02032)***	(0.02028)***	(0.01979)***	(0.02782)**	(0.02469)***	(0.02347)***	(0.02203)***	(0.02252)***
Says treatment easily / somewhat available	0.05439	0.05093	0.04956	0.06092	0.08848	0.09399	0.07721	0.07929
	(0.02450)**	(0.02509)**	(0.02445)**	(0.03537)*	(0.03388)***	(0.03013)***	(0.02872)***	(0.02919)***
Travel time to main road > 60mins		-0.02287	-0.02794	-0.02314	-0.01064	-0.00322	-0.01010	-0.00948
		(0.02058)	(0.01962)	(0.02644)	(0.02956)	(0.03024)	(0.02727)	(0.03007)
Distance to Mosoriot		-0.00422						
		(0.00603)						
Distance-squared		0.00016						
		(0.00020)						
Public Stigma		0.00003	0.00041	0.00023	0.00203	0.00280	0.00018	0.00006
		(0.00237)	(0.00231)	(0.00304)	(0.00340)	(0.00336)	(0.00313)	(0.00321)
Alcohol in past month			-0.05556					
			(0.02212)**					
Alcohol in past month * Female			-0.01277					
			(0.07587)					
Estimated prevalence > 40%				0.04193	0.04035	0.01836	0.02100	0.01949
				(0.02950)	(0.03277)	(0.03218)	(0.02997)	(0.03068)
Thinks partner is unfaithful					0.17835	0.33987	0.28065	0.28252
					(0.10663)*	(0.13340)**	(0.13276)**	(0.13347)**
Reports domestic violence in past year						-0.08566	-0.05903	-0.06041
						(0.03808)**	(0.03469)*	(0.03569)*
Partner been tested for HIV							0.21506	0.21502
							(0.04563)***	(0.04585)***
Village had health-related meeting in past year								-0.00162
								(0.04858)
Observations	758	751	757	624	503	484	484	477

Notes: Dependent variable indicates whether respondent has ever gone for an HIV test at a VCT clinic. Results are marginal effects based on the estimation of probit equations. Samples for columns 5-8 exclude women older than 49 years and men older than 59 years, as well as adults who are not married or do not have a main partner.

Table 7. Determinants of HIV Testing at ANC Clinics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Age 15-29	-0.05192	-0.05064	-0.05906	-0.10422	-0.07435	-0.07704	-0.09641
	(0.08269)	(0.08293)	(0.08346)	(0.08515)	(0.08646)	(0.08566)	(0.08631)
Age 40-49	-0.03616	-0.03839	-0.04205	-0.09415	0.02218	0.01856	0.01608
	(0.15806)	(0.15981)	(0.16378)	(0.16731)	(0.16282)	(0.16175)	(0.16491)
Cohabitating	0.02975	0.01745	-0.00076	0.05351	-0.03508	-0.04888	0.01803
	(0.27187)	(0.27487)	(0.28560)	(0.25312)	(0.29906)	(0.30303)	(0.27905)
Widowed	0.07974	0.10896	0.13058	0.08656			
	(0.23398)	(0.22164)	(0.21716)	(0.23079)			
Never Married	-0.35265	-0.35072	-0.39431	-0.41499	-0.55233		
	(0.27765)	(0.27752)	(0.26082)	(0.26635)	(0.20473)***		
Years of school completed	0.00403	0.00500	0.00483	0.00465	0.00301	0.00497	0.00316
	(0.01395)	(0.01403)	(0.01405)	(0.01498)	(0.01520)	(0.01532)	(0.01530)
landless	0.00235	-0.01864	-0.01255	0.02588	0.03073	0.00914	0.02111
	(0.09842)	(0.10251)	(0.10287)	(0.10502)	(0.10622)	(0.10861)	(0.10607)
Knows someone who died	0.00171	0.01140	-0.00234	0.08245	0.08006	0.08380	0.05465
from AIDS	(0.08669)	(0.08872)	(0.08891)	(0.09431)	(0.09648)	(0.09667)	(0.09565)
Says treatment easily /	-0.03311	-0.03751	-0.03256	-0.08276	-0.06330	-0.07201	-0.08453
somewhat available	(0.10760)	(0.10760)	(0.10813)	(0.10732)	(0.11170)	(0.10935)	(0.10763)
Travel time to main road >		0.00245	0.01688	0.02793	0.06196	0.06067	0.03160
60mins		(0.08189)	(0.08437)	(0.08473)	(0.08569)	(0.08512)	(0.08788)
Distance to Mosoriot			-0.02761				
			(0.02727)				
Distance-squared			0.00068				
			(0.00093)				
Public Stigma		0.00816	0.00858	0.00790	0.00983	0.01075	0.01140
		(0.00912)	(0.00916)	(0.00919)	(0.00928)	(0.00925)	(0.00927)
Estimated prevalence > 40%				0.07874	0.04230	0.02781	0.01951
				(0.08082)	(0.08286)	(0.08297)	(0.08309)
Thinks partner is unfaithful					0.23641	0.22145	0.20863
					(0.11554)**	(0.11990)*	(0.12480)*
Reports domestic violence						-0.03713	-0.01077
in past year						(0.08360)	(0.08528)
Partner been tested for HIV							0.22600
							(0.08299)***
Observations	158	158	158	149	145	142	142

Notes: Dependent variable indicates whether respondent has ever gone for an HIV test at an ANC clinic. The sample consists only of women who were pregnant in the past year (based on reports of resident and non-resident children). Results are marginal effects based on the estimation of probit equations. Samples for columns 5-7 exclude women older than 49 years and women who are not married or do not have a main partner.