HIV Testing and Infection Expectations in Malawi

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July 2008

Abstract

The response of an individual's subjective expectations about being infected with HIV to information about his/her HIV status is a critical aspect in assessing whether expansion of HIV testing and counseling services in developing countries will result in the adoption of risk reduction strategies and reduced HIV incidence. To investigate this issue, we use a longitudinal dataset from rural Malawi that combines innovative probabilistic expectations about HIV infection with a randomized design for HIV testing to investigate whether providing an individual with information about his/her HIV status results in more accurate beliefs about his/her own infection status two years after the HIV test. We find that learning about one's HIV-positive status has no impact on medium-term subjective beliefs about one's own HIV infection. We also show that learning one's HIV-negative status results in *higher* subsequent beliefs about one's own infection, as well as larger prediction errors about one's HIV status.

JEL codes: I10, J10, D83.

* RAND Corporation and Universidade Nova de Lisboa; University of Pennsylvania. We thank Chuck Manski, Pascaline Dupas and participants of the 2008 AEA meeting for comments.

I. Introduction

About 6.1% of the adults living in Sub-Saharan Africa (SSA) are estimated to be infected with HIV, with HIV prevalence reaching 30% in some countries (UNAIDS, 2006). Policies aiming at curtailing the epidemic are thus crucial, and in many countries, national HIV prevention strategies include the promotion and expansion of *HIV counseling and testing* (HCT) services.[1] The rationale for this roll-out of HCT is mostly based on claims that informing individuals about their HIV status eliminates uncertainty about own – and, to the extent that information is shared – also family members' HIV status, and that individuals subsequently engage in less risky behavior or take precautions to reduce the risk of further sharing the virus (UNAIDS 2006). Yet, the existing empirical evidence on the effectiveness of HCT in reducing HIV transmission or risky behavior in high prevalence environment is mixed and ambiguous (e.g. Sherr et al., 2007; Matovu et al., 2005; UNAIDS, 2005; Weinhardt et al., 1999). The reasons for the failure of existing studies to document a clear relationship between the participation in HCT and the adoption of behavioral changes, including the adoption of risk reduction strategies such as increased condom use or increased fidelity, are at least twofold. First, the selectivity of participating in HCT, and second, the potentially complex effects of learning one's HIV status on subjective expectations about one's own and others' HIV status, which are are critical for shaping individual's decision-making about sexual and related behaviors. The ambiguous evidence on the behavioral consequences of HCT participation could therefore be due to the fact that learning one's HIV status

[1] The term "voluntary testing and counseling" (VCT) is also often used to describe HIV counseling and testing services.

does not result in more accurate subjective beliefs about one's own infection status that are sustained sufficiently long to affect behavioral outcomes and HIV infection risks.

In this paper, we investigate the effect of learning one's HIV status on subjective beliefs about being infected with HIV by using a unique dataset on *probabilistic subjective expectations* about individuals HIV infection risk that we have been collected in 2006 in rural Malawi from respondents who had been tested for HIV in 2004 as part of a randomized experiment that provided differential monetary incentives for learning one's HIV status subsequent to the test (Thornton, forthcoming). Typically, comparisons of infection expectations between those who obtained their HIV test results, and those who did not, do not provide consistent estimates for the causal effect of learning one's HIV status on subsequent expectations due to potential self-selection into HCT. For example, factors influencing the decision to learn HIV results may be correlated with risk perceptions, which would bias the estimates of the impact of learning HIV results on subsequent beliefs. An important contribution of the analyses in this paper is that we can avoid this selection bias by taking advantage of the 2004 randomized experiment during which respondents were tested for HIV in their homes. Specifically, as part of the experimental design, respondents were given randomly assigned vouchers between zero and three dollars, redeemable upon picking up their HIV test results at local HCT clinics that were established about 2 months after collecting the HIV tests.[2] In addition to the monetary incentives, the location of the HCT clinics was randomly varied relative to the village center, resulting in random variation in the distance between respondents' home and the HCT clinic where the results could be obtained. Thornton (forthcoming) finds that learning one's HIV results was highly responsive to the

[2] The average voucher amount (including zeros) was one dollar, the equivalent of approximately one day's wage.

financial incentives and the distance of the results center. Utilizing the random assignment of monetary incentives and distance to HCT clinics, and the responsiveness of learning one's HIV status to these randomly assigned variables, our analyses can therefore use instrumental variables techniques to control for the potential selection associated with the self-selection of respondents into learning their HIV status.

II. Data

This paper uses data collected in three region of rural Malawi as part of the Malawi Diffusion and Ideational Change Project (MDICP), a panel survey started in 1998.[3] In 2006, the MDICP included more than 3,200 male and female respondents aged 17 to 60 who were asked about a wide range of demographic, health and socio-economic characteristics.[4] An innovation of the 2006 round of data collection was the inclusion of an *interactive elicitation technique for subjective expectations* that was based on asking respondents to allocate up to ten beans on a plate to

[3] Detailed descriptions of the MDICP sample selection, data collection and data quality are provided on the project website http://www.malawi.pop.upenn.edu/, in a Special Collection of the online journal Demographic Research that is devoted to the MDICP (Watkins et al. 2003), and in a recent working paper that incorporates the 2004 and 2006 MDICP data (Anglewicz et al., 2007).

[4] Comparisons with the Malawi Demographic and Health Survey showed that the MDICP sample population is reasonably representative of the rural Malawi population (Anglewicz et al., 2007).

express the likelihood that an event will be realized (Delavande and Kohler, 2007).[5] In particular, after a short introduction to subjective beliefs and uncertainty assessments that began about half-way through the overall survey, respondents were asked their subjective expectations about a wide range of health and economic outcomes, including the subjective likelihood about being *currently infected with HIV* and other AIDS-related outcomes. Respondents were instructed that one bean reflects one chance out of 10, and that zero (or ten) beans reflect certainty that a certain even does not (or does) occur. To measure respondents subjective probability of being infected with HIV, for example, respondents were asked "Pick the number of beans that reflects how likely you think it is that you are infected with HIV/AIDS now." After dividing the number of beans by 10, the answers to this and the other expectation question can be interpreted as subjective probabilities.

The expectations module including the above and other health-related expectations was administered to all MDICP respondents ($N \approx 3{,}200$). A detailed analysis and evaluation of the elicited probabilistic expectations is provided by Delavande and Kohler (2007, 2008). The key findings of these earlier analyses, for example, include that: (*a*) item non-response in these expectation questions range between 0.4 to 1.3%[6], which is substantially lower than non-response levels to expectation questions in the Health and Retirement Study or other developed country surveys; (*b*) in basically all the considered domains, subjective beliefs are heterogeneous and vary considerably across individuals; (*c*) the central tendencies and percentiles of the distributions of elicited subjective probabilities vary systematically with observable characteristics, such as gender, age,

[5] See Manski (2004) for an overview and discussion on the state of knowledge about expectations data in developed countries.

[6] Item non-response is equal to 0.71% for the subjective expectation about HIV infection.

education, and region of residence in the same way that actual outcomes vary with these variables (e.g., expectations about infant mortality exhibit regional differences that are similar to actual outcomes, and expectations about economic outcomes vary with socio-economic status in the expected directions); and (*d*) expectations about future events vary across individuals in the same way past experience does. The elicited expectations also reveal that respondents have overall a good understanding of the effect of HIV/AIDS on health and mortality: 95% of the respondents answered 10 beans – and thus expressed certainty – when asked to assess the likelihood that somebody who is sick with AIDS will die within 10 years, and they considered the mortality risk to be lower for shorter time horizons as well as for individuals who are infected with HIV but not yet sick with AIDS, or for HIV-positive individuals who have access to antiretroviral treatment.[7] In summary, our previous analyses in Delavande and Kohler (2007, 2008) provide strong evidence that individuals in a poor developing country context are able to provide meaningful answers when asked about their beliefs in a probabilistic manner, despite low levels of numeracy and literacy.

III. HIV infection expectations subsequent to HIV testing

The 2004 MDICP offered a lab-based HIV test to all respondents. All but 9% of respondents who were asked to provide a biomarker sample for the lab-based HIV test agreed to do so, and about 68% obtained the result of their HIV test local HCT clinics that were established by the MDICP team when the results were available about two months after the test (Obare et al, 2007). In order to study the effect of learning one's HIV status on subjective expectations about being

[7] The levels of the mortality expectations are however overestimated when compared to the corresponding life table probabilities for Malawi.

infected, we focus our analyses in this paper on respondents who were tested in 2004 and re-interviewed in 2006, i.e., the survey wave in which the detailed subjective probabilities were collected. [8]

In this section, we focus on the 2006 infection expectations of respondents who *learned* their HIV status in 2004. This sample is composed of 1,524 respondents, of whom 4% were HIV-positive in 2004. Table 1 presents the distributions of the 2006 subjective beliefs about current HIV infection according to the 2004 HIV status. It shows that, surprisingly, only 10% of the respondents who were told they were HIV-positive in 2004 provided 10 beans in response to the question about one's own subjective probability of being infected with HIV, while 37% report 0 beans. The most common answers are 0, 1 and 3 beans. Though these responses are on average higher than the responses among respondents who were HIV-negative in 2004 (2.8 versus 0.9 beans[9]), the average response of 2.8 beans – corresponding to a 28% subjective probability of being infected with HIV in 2006 – seems remarkably low among respondents who were told that they were HIV-positive in 2004. In light of this astonishing response pattern in Table 1, one may wonder if these responses are specific to the format we use to elicit beliefs. However, a similar response pattern prevails when respondents were asked in a different part of the questionnaire to

[8] There are 2,880 respondents for whom we know the 2004 HIV status, out of which 68.4% went to pick their test results. Sixty-eight percent of the respondents who went to pick their test results in 2004 were re-interviewed in 2006 and answered the HIV infection expectation question. Anglewicz et al. (2007) show that HIV+ respondents who learned their status were more likely to attrite, partially related to mortality and partially related to higher propensities to migrate outside the survey villages.

[9] Using a t-test, we can reject the hypothesis that the two means are equal (P-value<0.001).

assess their likelihood of current HIV infection using a verbal scale in which response categories ranged from “no likelihood” to “high likelihood”: 45% of the HIV-positive respondents report that they have “no likelihood” of being infected in 2006, while 25% report that they have a “low likelihood.” Moreover, there is a close correspondence between the two question formats. For example, out of the 28 HIV-positive respondents who report that they have “no likelihood” of being currently infected on the verbal scale, 21 allocated 0 beans in the probabilistic expectation format.

Several factors potentially contribute to the surprising response pattern in Table 1: (*a*) respondents may not have trusted the test result provided in 2004 and thus have never believed that they were HIV-positive; (*b*) respondents may have believed the test result at first, but have “forgotten” about it as time elapses, specifically if they had continued to feel fairly healthy (see estimation results in Section III); and (*c*) respondents may actually have believed that they are HIV-positive, but were embarrassed to acknowledge it vis-à-vis the interviewer during the 2006 survey. Given the lack of data on expectations immediately after the HIV testing, and the small sample size of HIV positive individuals in our data, it is hard to test these hypotheses at this point.[10]

Table 1 also shows that about two-third of the respondents who were told that they were HIV-negative in 2004 believe that their chance of being infected is very low in 2006 by allocating 0 beans on the plate. A third of them, however, have now strictly positive beliefs, most of them allocating 1 to 5 beans.

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[10] Thornton (forthcoming) who re-interviewed a subset of the respondents 2 months after testing found similarly that a large proportion of the HIV-positive who learned their results reported that they had a low likelihood of being infected.

IV. The impact of HIV testing on subjective HIV expectations

To better understand the surprising results documented in the previous section, we now investigate whether learning HIV status in 2004 had any (causal) impact on the 2006 subjective expectations about HIV status for both HIV-positive and HIV-negative individuals. To allow for a differential impact of learning test result by HIV status, we report analyses separately for individuals who tested positive and negative for HIV in 2004. Descriptive statistics for our analysis sample, which includes all respondents who were tested for HIV in 2004 and re-interviewed in 2006, are reported in Table 2.

Table 3 reports our regression analyses of the impact of learning one's HIV status on subsequent subjective beliefs about one's own HIV infection. The key explanatory variable is therefore a dummy variable indicating whether a respondent has learned his/her HIV status in 2004, and we additionally control for gender, age category, education and region of residence.[11] In addition to OLS regressions, we use instrumental variable techniques to control for the self-selection into learning the HIV test results, which can distort the evaluation of the causal effects of HCT on subsequent beliefs in standard OLS analyses. Our instruments for the dummy variable indicating that a respondent learned his/her HIV status in 2004 include indicators of the incentive amount offered to the respondent (zero Kwacha, 10 to 100 Kwacha, 110 to 200 Kwacha,

[11] For most respondents, education has been completed well before they were tested for HIV in 2004; and for many it was completed prior to the HIV/AIDS era. The magnitude of the coefficients and standard errors associated with "learned HIV status" is basically unchanged if we exclude education from the regressions.

210 to 300 Kwacha) and the distance between respondent's home and the HCT clinic where the result could be obtained (less than 1km, 1 to 2.5km, more than 2.5km).[12]

The first two columns of Table 3 shows that in the sample of HIV-positive individuals the coefficient associated with learning HIV status in 2004 is not statistically significantly different from zero at conventional levels for both the OLS and the IV specifications. This is surprising as one would expect *a priori* to find a large positive and significant coefficient associated with learning HIV status. Table 3 thus suggests that HCT has no medium-term impact on subjective infection expectations among HIV-positive individuals across a two-year time period. This is consistent with the findings of Section II showing that HIV-positive individuals who learned their status have very low infection expectations on average. We find, however, that other explanatory variables have predictive power for the infection expectations. In columns 3 and 4 of Table 3, we include as additional controls self-reported health status, AIDS-related expectations (including the subjective probability that someone of the respondent's gender who is healthy would become HIV-positive within 12 months under various scenarios), perceived local HIV prevalence and number of partners in the last 12 months. Interestingly, respondents who report that they feel in good or excellent health report a lower likelihood of infection, which may reflect that HIV-positive people may doubt (or forget) the test results if they feel healthy. Having more land, more sexual partners, higher subjective HIV prevalence in the village are associated with higher subjective likelihood of being infected in 2006.

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[12] The instruments are very strong predictor of learning HIV status in the first stage. The F-statistics for the identifying instruments as a group are all above 10. Over-identification tests do not reject the validity of our choice of instruments at conventional levels.

The 4th and 5th column of Table 3 show the OLS and IV results for HIV-negative respondents. In those two columns, we clearly see the effect of the selection issue mentioned above: it biases downward the estimator of the impact of learning HIV results on subsequent beliefs about infection. In the OLS specification, HIV-negative respondents who learned their HIV status tend to report a *lower* probability of being infected in 2006. In the preferred IV specification, on the contrary, HIV-negative respondents who learned their HIV status in 2004 tend to report a *higher* probability of being infected in 2006, and this effect of learning one's HIV statust is statistically significant at 1%. The downward bias of the OLS results as compared to the IV results is consistent with the hypothesis that HCT uptake is selective, and that individuals in 2004 who believed they had a higher chance of being infected were less likely to pick up their HIV test results and learn their HIV status. The IV estimates suggest that HIV-negative respondents who learned they were HIV-negative in 2004 allocated on average 0.34 additional beans when asked about their infection status in 2006, indicating that learning a HIV-negative status in 2004 was associated with a 3.4 percentage point *higher* subjective probability of being HIV positive in 2006.

When adding additional controls, we find that demographic characteristics such as age, education or indicators of wealth have limited predictive power. Being a female is associated with higher beliefs, which is consistent with the facts that women have a higher HIV prevalence rates in our data (and in many sub-Saharan African contexts, UNAIDS 2006). Sexual histories and AIDS-related expectations have statistically significant coefficients at conventional levels. Having additional partners is perceived as increasing the likelihood of being infected. For example, respondents having 3 partners or more allocated, on average, 1 additional bean compared to those who did not have sex in the last 12 months. Thus, respondents seem to accurately identify whether they belong to a group with elevated risk of HIV infection. Higher beliefs about the likelihood of becoming infected with "normal" behavior, if one has several sex partners and about village prevalence are associated with higher infection expectations.

The fact that people who learned they were HIV-negative in 2004 have *higher* expectations of being HIV-positive in 2006 might be surprising, since those individuals have learned two years ago that they were not infected. This higher expectation might be the results of differences in information sets or beliefs about other AIDS-related events, or differences in risk behaviors since testing. For example, upon learning that one is HIV-negative in 2004, an individual could potentially revise his/her expectations about her current HIV status, the HIV status of her sexual partners, and the risk of HIV transmission associated with various behaviors, such as unprotected and protected sexual encounters. These revision processes are however intricate as the individual may face a basic identification problem: if he/she had unprotected sex with a partner and learns that she is HIV-negative, he/she could infer that his/her partner is HIV-negative or that the infection risk per unprotected act is very low.

Table 4 investigates the potential reasons for why HIV-negative respondents who learned their HIV status tend to have higher subsequent beliefs about being infected with HIV. We first look at difference in risk behavior using IV regressions on the instrumented dummy variable of whether a HIV-negative respondent learned his/her HIV status in 2004. Dependent variables include: the number of partners in the last 12 months, an indicator for whether the respondent had a new sex partner in the last 12 months; whether a respondent has condom at home; whether he/she never used condom with the three most recent partners; and the frequency of sexual intercourse.[13] The only risk behaviors where the instrumented learning of one's HIV status is statistically significant at 10% are condom use and having condom at home. Respondents who learned their status are less likely to have never used condom with their three most recent sexual partners, and more likely to have condom at home. This is consistent with people who know they are HIV-negative engaging in risk-reduction strategy more than those who ignore their status in order to preserve their HIV-negative status. Such a difference in behavior would lead respondents who learned their status to believe they are *less* likely to be infected, and thus cannot explain the results of Table 3. In Table 4 we therefore also report corresponding regression for various measures of respondents beliefs and information sets. In particular, when looking at these AIDS-related expectations in Columns 6–10 of Table 4, we see that HIV-negative respondents who learned their HIV status have lower subjective beliefs about the chance of contracting HIV in the next 12 months if one is married to someone who is HIV-positive, or has several partners in addition to spouse. This might be the result of the updating they conducted upon learning their results. Holding behavior constant, this difference in AIDS-related expectations would lead HIV-negative respondents who learn their status to have lower expectations about own infection in 2006 compared to those who did not learn it. Such a change in beliefs might however have led respondents to increase some other risky behaviors we do not observe. There is also another difference in information between the two groups: Having learned one's HIV-negative status in 2004 is associated with knowing more people who shared their HIV test results, which be due to the fact that HIV-negative individuals disclose their status in a reciprocate way to other sexual

[13] Sherr et al. (2007) find that that testing HIV negative was associated with increased risk behavior in terms of partner acquisition rates in rural Zimbabwe, though they cannot address the selection issue of HIV testing.

partners and friends, some of whom are likely to be HIV positive. This difference could partially explain why respondents who learned their status have higher beliefs of infection: they might be aware that some of their sex partners are HIV-positive and update their beliefs about own infection accordingly.

V. HIV testing and accuracy of subsequent beliefs

In the final part of our analyses we investigate whether learning HIV status in 2004 helps respondents to have more accurate beliefs about their HIV status two years later. For this, we focus on respondents who were tested for HIV in 2006 (irrespective on whether they learned their results in 2006). We take the absolute value of the difference between actual 2006 HIV status and subjective probabilities about being HIV-positive in 2006 (i.e. the number of beans divided by 10) as a measure of the accuracy of knowledge about HIV status – or error in prediction about one's HIV status – among respondents who were HIV negative in 2004. About 1.2% of the respondents who were HIV-negative in 2004 became HIV-positive by 2006, and the average error in predicting their 2006 HIV status among the 2004 HIV-negative respondents is 0.10.

The last two columns of Table 3 determine the impact on having learned ones' results in 2004 on the error in prediction using OLS and IV. Most importantly, the IV specification reveals that, among 2004 HIV-negative respondents, those who learned their HIV status in 2004 tend to have a larger prediction error about their own HIV status than those who did not. This result is driven by the fact that those who learned their results believe to be at a higher risk in 2006 than HIV-negative respondents who did not learn their results in 2004, while very few of the 2004 HIV-negative respondents have actually become infected by 2006.

VI. Conclusion

Improving access to HIV counseling and testing (HCT) services in sub-Saharan Africa is potentially an important policy for facilitating long-term behavior change if individuals who get tested for HIV revise their subjective beliefs about being infected with HIV and change their behavior upon learning their status. Yet, despite a widespread expansion of HCT services in SSA, little is known about how providing information on an individual's HIV status causally affects their infection expectations. In this paper, we therefore investigate the impact of learning HIV status on subsequent beliefs of being infected, utilizing a randomized experiment that provided varying incentive for individuals to learn their HIV status. From a methodological perspective, our results show that selection into learning HIV status is important, and that inference based on non-randomized knowledge of HIV status might be misleading. From a substantive perspective, we show that learning that one is HIV-positive has *no* medium-term impact on beliefs about infection. This finding might explain why there is so little evidence of behavioral change among HIV-positive individuals subsequent to HCT. More research is necessary to understand how HIV-positive individuals process information about their HIV status in a high prevalence context. We also find that learning that one is HIV-negative results in *higher* subsequent subjective beliefs about being HIV-positive, and a *larger* prediction error about one's own HIV status. These results might partly be explained by the fact that respondents who learned their test results are more likely to be aware of the HIV status of other people, and thus know that some of their sex partners are HIV-positive. While we find that people who learned they were HIV-negative are more likely to use condom, infrequent HIV testing may potentially increase risky behavior among HIV-negative individuals if people have fatalistic behavior and engage more in risky sex when believing to be infected (Kremer, 1996; Auld, 2003). In light of our results, we conclude that uptake of HCT services in high prevalence environment may have to be relatively frequent in order to have a sustained impact on subjective infection beliefs and, indirectly, on sexual and other risk behaviors.

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Table 1: Distribution of 2006 expectations about current HIV infection among those who learned their HIV status in 2004

Number of beans	HIV+ in 2004	HIV- in 2004
0	37.1	68.7
1	14.5	10.0
2	1.6	7.2
3	12.9	4.5
4	6.5	2.3
5	11.3	4.9
6	1.6	0.6
7	1.6	0.5
8	3.2	0.7
9	0.0	0.6
10	9.7	0.3
Mean	2.82	0.91
Standard deviation	3.25	1.78
N	*62*	*1,462*

Table 2: Descriptive statistics: respondents who were tested for HIV in 2004 and who answered the infection expectations question in 2006

	HIV+ in 2004	HIV- in 2004
Female	69.1	54.2
Marital status		
married/living together	73.2	79.7
separated / divorced / widowed	24.7	6.1
Never married	2.1	14.3
Age		
less than 20 years old	2.1	11.2
20 to 29	20.6	26.5
30 to 39	30.9	23.0
40 to 49	27.8	18.4
50+	14.4	16.9
missing	4.1	4.0
Education		
No School	21.7	20.9
Primary level	66.0	63.7
Secondary level +	12.4	15.2
missing	0.0	0.2
Size of owned land		
less than 2 acres	32.0	40.7
2 to 4 acres	43.3	32.9
more than 4 acres	23.7	25.8
missing	1.0	0.6
Number of sex partners in the last 12 months		
0	18.6	12.7
1	76.3	77.6
2	1.0	7.4
3 or more	4.1	2.1
missing	0.0	0.2
Learned HIV status in 2004	63.9	72.2
Average HIV infection beliefs (in beans)	3.0	1.0
N	*97*	*2,021*

Table 3: The impact of learning HIV status on subsequent beliefs about own infection and error in prediction

Dependent variables	Subjective beliefs about own HIV status (in # beans)								Error in prediction	
	HIV+ in 2004				HIV- in 2004				HIV- in 2004	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Learned HIV status in 2004	**-0.863**	**-0.264**	**-0.429**	**0.760**	**-0.232****	**0.343*****	**-0.253****	**0.338*****	**-0.031****	**0.059*****
	[0.832]	**[0.426]**	**[0.613]**	**[1.208]**	**[0.069]**	**[0.118]**	**[0.049]**	**[0.068]**	**[0.007]**	**[0.012]**
Female	0.382	0.448	1.353	1.533**	0.479**	0.483***	0.462**	0.479***	0.049**	0.051***
	[1.852]	[1.477]	[0.801]	[0.624]	[0.104]	[0.084]	[0.111]	[0.096]	[0.010]	[0.008]
Less than 20 years old	-	-	-	-	-	-	-	-	-	-
20 to 29	0.976	0.930	-0.160	-0.821	0.249*	0.291***	0.134	0.192	0.016	0.021***
	[0.617]	[0.774]	[3.180]	[2.984]	[0.081]	[0.084]	[0.139]	[0.134]	[0.009]	[0.008]
30 to 39	1.821	1.716	-0.941	-1.994	0.361**	0.379***	0.221	0.259**	0.034***	0.036***
	[1.465]	[1.509]	[4.123]	[4.174]	[0.076]	[0.090]	[0.120]	[0.115]	[0.005]	[0.006]
40 to 49	1.377*	1.302**	-0.716	-1.559	0.235	0.238*	0.106	0.125	0.007	0.005
	[0.495]	[0.593]	[2.389]	[2.645]	[0.146]	[0.144]	[0.126]	[0.139]	[0.017]	[0.014]
50+	0.272	0.250	-0.766	-1.454	0.083	0.092	-0.131	-0.111	-0.010	-0.010*
	[0.530]	[0.690]	[3.479]	[3.274]	[0.045]	[0.058]	[0.099]	[0.086]	[0.007]	[0.006]
No School	-	-	-	-	-	-	-	-	-	-
Primary level	0.536	0.486	-0.134	-0.433	0.065	0.098***	0.035	0.068	0.011	0.018**
	[0.870]	[0.574]	[1.154]	[0.391]	[0.032]	[0.034]	[0.054]	[0.062]	[0.006]	[0.008]
Secondary level +	0.602	0.651	-0.392	-0.649	-0.010	0.062	0.037	0.105*	-0.002	0.009
	[2.198]	[1.830]	[2.479]	[1.566]	[0.129]	[0.088]	[0.067]	[0.060]	[0.006]	[0.008]
Married/partnered			-	-			-	-		
Separated/divorced/widowed			-1.712*	-1.621***			0.342	0.301		
			[0.624]	[0.464]			[0.243]	[0.222]		
Never married			-2.826	-3.628			-0.005	-0.004		
			[2.551]	[2.310]			[0.168]	[0.150]		
Less than 2 acres of land			-	-			-	-		
2 to 4 acres			2.175	2.274***			-0.040	-0.057		
			[1.310]	[0.766]			[0.071]	[0.085]		
More than 4 acres			3.254*	3.638***			0.045	0.070		
			[1.143]	[1.121]			[0.081]	[0.078]		
Report excellent / good health			-2.202***	-2.165***			-0.615	-0.610**		
			[0.147]	[0.205]			[0.329]	[0.273]		

No sexual partner last year			-	-			-	-		
1 partner			-0.481	-0.504			0.179	0.138		
			[0.679]	[0.575]			[0.132]	[0.129]		
2 partners			2.368**	2.074***			0.725**	0.717***		
			[0.679]	[0.687]			[0.216]	[0.186]		
3 partners of more			2.891	3.728***			1.082**	1.059***		
			[1.810]	[1.018]			[0.222]	[0.180]		
Subjective likelihood that a healthy individual becomes HIV+ within 12 months (0 to 10) …										
with normal sexual behavior			0.107	0.168			0.108**	0.106***		
			[0.136]	[0.153]			[0.025]	[0.019]		
if married to HIV+ individual			-0.228	-0.136			0.031	0.040		
			[0.169]	[0.173]			[0.039]	[0.032]		
if several partners in addition to spouse			0.141	0.143			0.021	0.019**		
			[0.142]	[0.104]			[0.010]	[0.008]		
Subjective HIV village prevalence (0 to 10)			0.310*	0.284***			0.147*	0.142***		
			[0.098]	[0.095]			[0.049]	[0.041]		
Constant	2.12	1.744*	2.96	1.951	0.750***	0.254	-0.038	-0.582	0.089***	0.009
	[1.378]	[0.906]	[3.134]	[1.345]	[0.108]	[0.186]	[0.932]	[0.718]	[0.004]	[0.021]
Observations	*97*	*97*	*97*	*97*	*2021*	*2,021*	*2,021*	*2,021*	*1,772*	*1,772*

Robust standard errors in brackets clustered at the region level. All regressions include region dummies and indicators for missing values.
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 4: The impact of learning HIV status on risk behavior and AIDS-related beliefs (IV estimations; HIV-negative respondents only)

	Risk behavior in the past 12 months					*Beliefs and information set*				
	Number of partners	Had a new partner in the last 12 months	Has condom at home	Never used condom with up to 3 most recent partners	Had sex more than 4 times a week with all (up to 3) most recent partners	Chance of contracting HIV with normal sexual behavior	Chance of contracting HIV if married to HIV+	Chance of contracting HIV if several partners	Village prevalence	Number of people who told you their HIV test results
Mean	*1.05*	*0.06*	*0.13*	*0.66*	*0.12*	*2.16*	*9.29*	*7.71*	*2.14*	*2.51*
IV estimations										
Learned HIV status in 2004	0.136	0.000	0.066*	-0.056***	-0.009	-0.203	-0.216***	-0.190*	0.187	0.337***
	[0.144]	[0.008]	[0.040]	[0.012]	[0.015]	[0.395]	[0.082]	[0.106]	[0.139]	[0.120]
Observations	*2,031*	*2,031*	*2,032*	*1,754*	*1,734*	*2,024*	*2,024*	*2,023*	*2,016*	*1,965*

Robust standard errors in brackets clustered at the region level. All regressions include age category, education and region dummies.
* significant at 10%; ** significant at 5%; *** significant at 1%