Knowledge, Attitudes and the Likelihood of Being Tested for HIV-AIDS in Ghana

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Abstract

Abstract: The HIV-AIDS virus has spread rapidly over the last two decades, with countries in the Sub-Saharan region of Africa accounting for nearly 72% of the global AIDS deaths. A key issue facing policy makers is the long gestation period between the time that the HIV positive status of an individual becomes full-blown AIDS. During this period most individuals show no outward sign of their HIV infection. Being knowledgeable of their HIV status is therefore vital to contain and prevent further infections. However, nearly 95% of all Africans are unaware of their HIV status. In this paper, we use the 2003 *Ghanaian Demographic Health Survey* (GDHS) dataset, to estimate the likelihood of voluntary testing for AIDS. Our estimation strategy estimates a series of models that take into account the joint determination of AIDS-related knowledge and the likelihood of being tested. Our analysis finds that individuals with greater knowledge of ways to avoid AIDS were significantly more likely to be aware of the transmission mechanisms of AIDS, belong to the highest wealth quintile and were better educated. However, contingent on knowledge these individuals were significantly less likely to get tested.

JEL Classification: O12, O12, I10, C25.

Key Words: HIV-AIDS, knowledge, Ghana.

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1 Introduction

The HIV-AIDS epidemic has spread rapidly over the last two decades, and according to UNAIDS estimates, between 35-40 million of the 60 million infected people live in Africa (UNAIDS, 2006). Furthermore, there have been more than 13 million AIDS deaths in Africa which represents 72 per cent of the global AIDS deaths. The magnitude of the HIV-AIDS epidemic presents a tremendous policy challenge to policy makers both in Africa but also elsewhere. The immediacy of the problem stems not just from its enormous strain on the public health systems of already burdened poor countries, but also from the much faster rate of adult and child mortality. This has had a serious impact on the labour supply and consequently the incomes of individuals. Despite large international aid flows for HIV/AIDS, the need for prevention and treatment in low and middle-income countries outstrip the resources that are currently available. Given the need to set priorities on how funds should be efficiently allocated to the range of prevention and treatment alternatives, Canning (2006) has persuasively argued for more funding to be allocated to public health campaigns to raise awareness of HIV-AIDS, and to prevent further infections.

Despite the strong correlation between education levels and health outcomes, even after controlling for income (Lleras-Muney 2001), the link between education, knowledge of HIV-AIDS and risky sexual behaviour is not so clear-cut. The issues are complicated by the fact that unlike other public health campaigns, disseminating knowledge about HIV/AIDS in developing countries presents several unique challenges, in part due to the deep fears and prejudices that HIV/AIDS evokes (Aggarwal and Rous, 2006). The main path of transmission of HIV in Africa is through sexual intercourse and several efforts have been mounted to change sexual behaviours by increasing people's knowledge of the disease and changing their attitudes towards it. However, the epidemic has continued to grow. According to UNAIDS (2005), these attitudes, combined with a lack of access to treatment services, help to explain why an estimated 95 per cent of men and women across Africa do not know their HIV status**.** Under these circumstances the success of the current campaigns in preventing further infections is hard to gauge.

One of the key issues facing policy makers is the difficulty of getting an accurate picture of the extent of knowledge of HIV-AIDS and estimates of the HIV prevalence rates in the population. HIV-prevalence data in most African countries relied on Sentinel Surveillance, which was based on anonymous testing of predominantly urban pregnant women visiting antenatal clinics. However, the selectivity of this sample did not provide an accurate measure of the HIV prevalence in the broader community.

In this paper we estimate the likelihood of getting voluntarily tested for HIV in Ghana, a low HIV-prevalence country. Although the AIDS epidemic has reached crisis proportions in a number of east African countries, based on Sentinel surveillance data, Ghana continues to have a low HIV-prevalence rate of 3 per cent (UNAIDS, 2006). However, a key challenge with HIV-AIDS is that AIDS does not develop immediately. The average time from infection with HIV to development of the disease AIDS is about eight years. For most of this period, an HIV positive individual may not exhibit any symptoms and, may be unaware of their HIV status. Indeed data from Africa shows that over 95 per cent of the population are unaware of their HIV status. This can contribute to the spread of HIV, since an HIV- positive individual with no outward sign of the disease can still infect others. Hence, HIV awareness which can translate into voluntary testing is an important means to identifying and limiting the extent of the infection. This data is however not easily available since the likelihood of getting tested is crucially dependent on knowledge of HIV-AIDS and whether the individual knows of ways to avoid getting infected with the HIV-AIDS virus.

The availability of the rich *Demographic Health Survey* (DHS) data for a range of African countries makes it possible to address the issue of whether more knowledgeable and educated people are more likely to better informed about HIV-AIDS, and whether people who engage in more risky behaviour are more likely to get tested. An important feature of this dataset is that it is possible to observe not just the trends in the knowledge of HIV-AIDS, but also the success of public health campaigns. According to a recent report from the National AIDS/STI Control Programme (2006), in Ghana the two transmission mechanisms account for most new HIV infections in the country: heterosexual contact (80 per cent) and mother-to-child (MTC) 15 per cent transmission. While the true number of cumulative AIDS cases in Ghana is not known, the projection model used in their National AIDS/STI Control Programme study estimates the total to be more than 185,000 by the end of 2000. However, more alarming is the estimated 350,000 individuals who are currently infected, most of whom are unaware of their HIV status, and may be likely to spread the epidemic.

In the empirical analysis we argue that the two variables knowledge of HIV-AIDS and the likelihood of being tested are not two randomly distributed variables, but are jointly determined. In the empirical sections we take account of this by estimating a series of models that take into account the joint determination of knowledge and likelihood of being tested. The remainder of the paper is structured as follows. In the next section, we provide some background of the HIV

prevalence rates in Ghana and describe the dataset used in this analysis. In section 3, we describe our econometric methodology, which is followed by a discussion of the results in Section 4 and the conclusions in Section 5.

2. Background and data

National adult HIV prevalence rates are much lower in West Africa than in other parts of sub-Saharan Africa. In Ghana, where adult HIV prevalence was estimated to be at 2.3 per cent in 2005 (UNAIDS, 2006), there are signs that the country's epidemic could be in decline. Having risen steadily to a peak of 3.6 per cent in 2003, HIV infection levels among women attending antenatal clinics declined subsequently to 3.1 per cent in 2004 and 2.7 per cent in 2005 (National AIDS/STI Control Programme, 2006). The 2003 national survey showed that, unlike most countries in sub-Saharan Africa, HIV prevalence in Ghana overall differs only slightly between urban and rural areas of Ghana (2.3 per cent versus 2.0 per cent respectively, see Ghana Statistical Service 2003, Noguchi Memorial Institute for Medical Research, ORC Macro, 2004).

The data for this study comes from the Demographic Health Survey data conducted in Ghana (GDHS) in 2003. The 2003 GDHS was conducted by the Ghana Statistical Service in collaboration with the Noguchi Memorial Institute for Medical Research (NMIMR) and the Ghana Health Service. ORC Macro provided technical support for the survey through the MEASURE *DHS+* programme. Funding for the survey came from the U.S. Agency for International Development (USAID), through its office in Ghana, and the Government of Ghana.

The GDHS 2003 is fourth in a series of national-level population and health surveys conducted in Ghana as part of the worldwide Demographic and Health Surveys Program. The dataset is nationally representative and includes questions on household demographic, labour market, health and economic characteristics. It is particularly ideal for our study since the data set contains a wide range of questions on people's knowledge of HIV, the transmission mechanisms leading to HIV infections, attitudes towards HIV positive people. The DHS data have the added advantage of providing behavioural data linked to HIV prevalence, which can be used to guide HIV prevention programmes. For the purposes of this study we focus on the male sample and use responses from the Men's Questionnaire was which administered to all men age 15-59 in every household in the GDHS sample.

In Ghana, as in most of sub-Saharan Africa, national HIV prevalence estimates have been derived primarily from HIV sentinel surveillance (HSS) in pregnant women attending antenatal clinics.

Currently, the national sentinel surveillance system is predominantly focused on urban areas with 28 of the 30 sites located in urban areas. However, the selectivity of this sample makes it difficult to make any general predictions about the HIV status in the rural population, non-pregnant women, pregnant women that do not attend ante-natal clinics and males. Pregnant women are also at a higher risk of contracting an HIV infection than women who maybe avoiding both HIV and pregnancy, through the use of condoms, or women who are not sexually active and are therefore less likely to become pregnant or expose themselves to HIV.

We focus on males rather than the full sample for a number of reasons. First, pregnant women who visited ante-natal clinics were offered an HIV-test as part of their pregnancy related care. It is unclear from the questionnaire whether those that were tested for the HIV-AIDS virus undertook the test voluntarily. Furthermore, data on testing and HIV-prevalence rates is already available for pregnant women as part of the Sentinel Surveillance System. Third, heterosexual intercourse is the prime transmission mechanism for AIDS in Ghana. In the questionnaire there are a number of questions that ask men but not women several questions about risky sexual behaviour. The ability to relate this to the willingness to submit oneself to a voluntary test for AIDS is a key benefit of the data. We believe that from a public perspective, the willingness to submit voluntarily to an AIDS test is the most relevant measure for limiting and/ or preventing the transmission of the HIV virus. Mandatory tests are likely to be difficult if not impossible to enforce. Moreover, a willingness to submit to a test voluntarily may be related to risky behaviours of individuals and/or knowledge of AIDS as a result of public awareness campaigns. In turn, identifying which group of individuals are more likely to submit to a test is likely to help inform public policy with respect to AIDS prevention.

Our analysis is based on data for 4947 males for whom complete information is available with regard to household, demographic, economic characteristics and behavioural responses. The dependent variables of interest in the present analysis are the likelihood of getting tested for AIDS voluntarily and a variable to capture knowledge of ways to avoid getting AIDS. In our sample, 321 male respondents reported that they had undergone a test for AIDS (on a voluntary basis) and 822 replied that they did not have the knowledge of ways to avoid AIDS.

Table 1 presents the descriptive statistics of the main variables used in the analysis, disaggregated by their voluntary AIDS testing status. It is interesting to note that men who got tested were on average 3 years older than those that did not get the test. Married men were also 018% more likely to be tested rather than not. In the sample of respondents that got tested for AIDS,

members of households from the highest wealth quintile were over-represented. It is noteworthy that in the group of variables capturing knowledge and attitudes towards AIDS, there is very little difference in attitudes towards AIDS between the two groups. When we look at variables that capture knowledge of AIDS however, we see that those individuals who have better knowledge of the transmission mechanisms and those that know of ways to avoid AIDS are much more likely to get tested for AIDS.

The rest of this section describes in greater detail the explanatory variables used in the analysis and the fact that the likelihood of getting tested for AIDS depends on a complex range of economic, social, cultural factors and AIDS-related knowledge.

A shortcoming of this dataset is that it contains no information on wages, household expenditure patterns and community characteristics. Arguably, all of these considerations may have an affect on the likelihood that an individual voluntarily submits to an AIDS test. For example, individuals with higher wages may be more able to afford a test. Similarly, community characteristics such as the presence of a medical facility might be associated with a greater likelihood that an individual is observed undertaking a test. Notwithstanding these limitations, the dataset has other information which facilitates the analysis. For example, it contains a wealth index which divides households into 5 wealth quintiles, which is generated using the principal components analysis. It is a composite measure of the cumulative living standard of a household, which places individual households on a continuous scale of relative wealth. The wealth index is divided into population quintiles, with the lowest quintile representing the poorest 20 percent and the highest quintile representing the wealthiest 20 percent households (see Filmer and Pritchett, 2001). These wealth quintiles have the advantage of providing a reasonably reliable measure of the household's economic status, and it is not affected by the endogeneity and transitory nature of labour income. Further, the dataset also contains information on geographic location so as to allow us to control for regions and rural-urban location. It is also possible to control for religion by constructing three dummy variables- Christians, Muslims with 'all others' being the base.

Education is likely to be a key factor in awareness of AIDS and the importance of being tested. For this reason, our empirical specification includes a set of dummy variables for the education levels of the respondent. While education is a key factor in improving AIDS-related knowledge, we are interested in specifically testing the extent to which public health campaigns on AIDS have been successful in raising awareness about the disease. Hence, we take advantage of the rich set of AIDS related knowledge and attitudinal questions that are available in our dataset. These

questions include a range of dummy variables for whether the respondents know of ways to avoid AIDS; whether they know that they can reduce their chances of getting AIDS by always using condoms during intercourse; or by having only one sex partner. We also use a question which asks the respondent if they are aware that AIDS can be transmitted from mother to child; whether they know of someone who has AIDS or who has died of AIDS. In order to assess the role of public health campaigns on AIDS in increasing AIDS awareness and the likelihood of getting an AIDS test, we include a range of questions on the respondent's knowledge of the public health campaigns, such as whether they were aware of specific AIDS slogans. Since heterosexual intercourse accounts for 80 per cent of all HIV-AIDS infections in Ghana, we also include dummy variables for whether the respondent used condoms at their last intercourse and whether they have ever paid for sex.

3. Econometric methodology

Our goal is to examine the impact of HIV-AIDS related knowledge and the socio-economic characteristics of individuals on the likelihood of undertaking an AIDS test. A key issue for policy makers to make informed decisions on AIDS-related spending is to assess the HIV-prevalence rate in the general population. From a policy perspective therefore, it is important to know the characteristics of individuals that are likely to get tested. This knowledge would help policy makers design more targeted policies towards increasing the testing rates among the general population, and especially to those at-risk groups for whom the probability of transmission is likely to be highest.

The GDHS conducted anonymous HIV-AIDS-testing of all respondents subject to their consent. Our data reveals that a substantial proportion of individuals (10 per cent for Ghana) did not volunteer for the AIDS test conducted as part of the survey. The descriptive statistics indicate that these individuals are more likely to be male, better educated and urban residents. However, a shortcoming of using this question is that it provides us with no information on the likelihood of undertaking a test voluntarily. A benefit of the dataset is that it contains an additional question where respondents were asked if they had been tested for AIDS prior to the survey and whether they voluntarily took this test. We define whether an individual has had an HIV-AIDS test by means of an indicator variable, namely *Tested=0,1*, which takes a value of one if two conditions are simultaneously met:

(i) the individual has been tested prior to the survey and,

(ii) the test was undertaken voluntarily.

Defining out our dependent variable in this way clearly illustrates that individuals for whom *tested* is non-missing, may not be randomly drawn from a sample of Ghanaian males. These individuals are likely to be more knowledgeable about HIV-AIDS. For example, they may be aware of ways to avoid AIDS, they may avoid risky behaviour, they may be in a position to recognise AIDS-related symptoms, they may have the knowledge of places where they can get tested for AIDS. For this reason an interesting comparison is with a Heckman model with sample selection where we estimate the likelihood of getting tested conditional on having knowledge of ways to avoid HIV-AIDS.

Since both our dependent variables are binary variables, we estimate a Heckman selection model in which the selection (first-stage) regression estimates the probability of the individual having knowledge of ways to avoid AIDS[1], that is I*(K=1),* as follows:

$$\Pr ob(K = 1) = f(\mathrm{I}, \mathrm{C}, \mathrm{F}, \mathrm{V}) + \varepsilon_{1\mathrm{i}} \qquad (1)$$

where *I* is a set of individual-specific variables such as age, age squared, marital status, education levels; *C* is a set of geographical characteristics such as rural/urban local, regions, *F* includes, among others variables that specifically examine an individual's attitudes towards HIV-AIDS infected persons, tests their knowledge of different AIDS transmission mechanisms, their ability to identify ways in which AIDS can be avoided. The second stage regression estimates a Probit model for the probability that the individual will voluntarily get an AIDS test. To ensure that the exclusion restrictions are satisfied we include a set of variables that are likely to affect the likelihood of knowledge but not necessarily testing. These include a range of questions on the transmission mechanisms of the HIV-AIDS virus and attitudes towards HIV. Furthermore, in the testing equation we include a range of variables that capture risky sexual behaviour such as having had more than one partner, paid for sex, whether or not they used condoms in their last intercourse.

To test the reliability of these results we also run a regression with an Instrumental variables (IV) Probit specification. We consider the effects of our explanatory variables (such as individual, household, income and social networks etc) on HIV-AIDS knowledge and attitudes towards people infected with HIV-AIDS by utilising the rich set of variables available in the dataset.

4. Results

The main results of the analysis are presented in Tables 2-4. Table 2 presents the probit estimates of the likelihood of getting an AIDS using the dependent variable 'tested' which was defined in the previous section. In table 3 and 4, we present the results of our Heckman probit model and an IV probit model, assuming that individuals who get tested are more likely to indulge in risky sexual behaviour (which is assumed to be endogenous).

To keep the discussion tractable, we discuss only the results from the probit and the Heckman selction probit model (Heck-probit), focusing first on the results from the probit model. Our analysis shows that the likelihood of getting tested increases at a decreasing rate as individuals get older. In terms of regional effects, we find that relative to living in Greater Accra (the capital city and its surrounds), the likelihood of voluntarily getting tested for AIDS increases significantly for males living in Ashanti, Brong, Northern and Upper Western regions. These two results are consistent with *a priori* expectations. For example, HIV-AIDS typically affects people in the 15-39 age categories and *ceterus paribus*, we might expect those aged within this range to be more likely to submit to a test.

Education and wealth surprisingly have no effect on the likelihood of getting tested. However, relatively to unemployed males, those working in the agricultural sector are significantly less likely to get tested. The final result here may reflect, in part, the availability or accessibility of AIDS testing arrangements for those individuals in predominantly rural regions.

In the group of variables that capture an individual's knowledge and attitudes towards AIDS, we observe that knowing someone who has AIDS or someone who has died of AIDS has a significantly positive effect on the likelihood of getting an AIDS test. It is interesting to note here that individuals who know that their chances of contracting AIDS can be reduced by having just one sexual partner are also significantly less likely to get an AIDS test.

To assess the effectiveness of public health campaigns, we include knowledge of a range of questions on public health campaigns on AIDS. Our analysis clearly shows that some are more effective than others. In particular, hearing the AIDS slogan on music videos, radios and through brochures seems to have a positive impact on the likelihood of getting tested.

[1] We use this rather than the question on whether the individual has ever heard of AIDS to get a better picture of knowledge.

The Heckman model

As discussed in the previous section, men who get the HIV-AIDS test are likely to be more knowledgeable individuals. That is, individuals are likely to select into the test based on their knowledge of AIDS and the transmission process. In turn, we estimated a sample selection model with binary dependent variables (Heck-probit). The first point to note is the significant but negative dependence between the two equations. This implies that in our sample, the Ghanaian males with more knowledge of ways to avoid AIDS are significantly less likely to get tested. Our finding is in keeping with raw data from the GDHS where males who are better educated, wealthier and urban residents did not consent to get tested as part of the GDHS survey. Moreover our finding that more knowledgeable males were less likely to get tested has strong policy implications. It emphasises the need to ensure that knowledge of AIDS, including its transmission mechanism are disseminated correctly. It indicates that the lower testing rate may not be a problem because the people who do not get tested are less likely to have AIDS in the first place since they have the knowledge of ways to avoid the infection.

Relative to someone from the lowest wealth quintile, a male whose household wealth was in the highest wealth was significantly more likely to know of ways to avoid AIDS. Similarly, we find that education is positively correlated with knowledge of ways to avoid AIDS. From Table 3, we see that relative to a male with no education, those with primary, secondary and higher secondary are significantly more likely to have knowledge. It is important to note that the size of the coefficient increases with each higher level of education. Not surprisingly, men who were knowledgeable of ways to avoid AIDS, were also significantly more likely to be able to identify two important transmission mechanisms of the HIV virus- namely that chances of getting AIDS could be reduced by always using condoms during sex, and that having only one sex partner can significantly reduce the chances of getting AIDS. The more knowledgeable individuals also agreed that children should be taught about condoms.

The effect of age on both the knowledge of ways to avoid AIDS and the likelihood of getting tested are as expected and are similar to the probit model. In terms of regional influences, relative to Volta (the region with the largest incidence of AIDS), males from Ashanti and Brong are significantly more likely to have knowledge of AIDS, whereas males from Central are significantly less likely to be knowledgeable. However, in the selected sample of knowledgeable males, we find residents of Ashanti, Upper-west and Western regions more likely to voluntarily get tested.

In order to assess the role of risky sexual behaviour on the likelihood of getting tested for the sample of knowledgeable individuals, we included a range of variables that affect the likelihood of getting tested but not necessarily knowledge. In this group of variables, we note that relative to single males, married men were more likely to get tested. Surprisingly, other variables of risky sexual variables do not have any significant effect on the likelihood of getting tested.

Finally, our analysis shows that individuals who knew of someone with HIV-AIDS or knew someone who had recently died of AIDS were both more likely to have knowledge of ways to avoid AIDS were also more likely to get tested voluntarily.

5 Conclusions

A key issue facing policy makers in Africa in their efforts to deal with the AIDS epidemic is a lack of accurate data on HIV prevalence rates, knowledge of HIV-AIDS and its transmission process. In this paper we use a nationally representative sample of Ghanaian males to examine the factors influencing the likelihood of voluntarily getting an AIDS test. From a policy point of view, limiting transmission of AIDS will be enhanced by ensuring that individuals who have AIDS are aware of their status. This is particularly so given the long gestation for the AIDS virus. Carriers may exhibit no outward signs of illness for a lengthy period of time and policies that facilitate or encourage at risk individuals to identify if they are in fact carriers may potentially limit the transmission of the disease over time.

We argue that, in an environment of poor knowledge of AIDS and its transmission mechanisms, the likelihood of getting an AIDS test voluntarily cannot be studied independently of knowledge of AIDS. To this end we estimate a sample selection model. Our analysis confirms that dependencies are important and studying the determinants of getting tested for AIDS, independently of knowledge can lead to inconsistent estimates.

Our analysis finds that individuals with greater knowledge of ways to avoid AIDS were significantly more likely to be aware of the transmission mechanisms of AIDS, belong to the highest wealth quintile and were better educated. However, contingent on knowledge these individuals were significantly less likely to get tested.

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Table 1: Descriptive statistics and variable definitions by the testing status of respondents

	Tested N=321	Not-tested N=4648
Individual characteristics		
Age in years	34.48 (10.31)	31.13(12.15)
Religion- Christian-	0.72	0.65
Religion- Muslim	0.20	0.21
Religion- all others	0.07	0.14
Occupation- unemployed	0.12	0.22
Occupation- professional	0.28	0.13
Occupation- agricultural	0.29	0.46
Occupation- manual services	0.31	0.19
Education level- no education	0.13	0.23
Education level- primary schooling	0.13	0.17
Education level- secondary schooling	0.63	0.55
Education level- higher secondary schooling	0.11	0.06
2^{nd} Wealth quintile	0.11	0.20
3^{rd} wealth quintile	0.17	0.18
4^{th} wealth quintile	0.23	0.18
5^{th} wealth quintile	0.35	0.20
Marital status- never married.	0.21	0.41
Marital status- married	0.67	0.49
Marital status- divorced/widowed	0.06	0.04
Regional characteristics		
Urban	0.53	0.37
Region- Western	0.13	0.09
Region- Central	0.02	0.06
Region- Greater Accra	0.14	0.12
Region- Volta	0.05	0.08
Region- Eastern	0.09	0.09
Region- Ashanti	0.21	0.15
Region- brong	0.13	0.12
Region- Northern	0.09	0.13
Region- Upperwest	0.08	0.08
Region- Uppereast	0.06	0.08
Knowledge and attitude towards AIDS		
Know of ways to avoid AIDS	0.91	0.83
Reduce chances of getting AIDS by using condoms during sex	0.89	0.81
Reduce chances of getting AIDS by having one sex partner	0.98	0.89
Know that AIDS can be transmitted from mother to child	0.92	0.84
Know someone who has AIDS or who has died of AIDS	0.60	0.38
Willing to care for relative with AIDS	0.72	0.73
Person with AIDS should be allowed to continue teaching	0.72	0.71
Should children be taught about condoms	0.69	0.63

Note: The standard deviation for the continuous variable is in parentheses. The data for the non-continuous variables show the proportions.

Table 2: Probit Estmates- Dependent variable 'tested'

variables	coeff	Std.dev
Age	0.0829 ***	(0.0245)
Age-squared	-0.0011 ***	(0.0003)
urban	-0.0331	(0.0936)
Western	0.4141 ***	(0.1331)
Central	-0.2704	(0.2161)
Volta	0 .1536	(0.1608)
Eastern	0.1493	(0.1377)
Ashanti	0.3283 ***	(0.1135)
Brong	0.3115**	(0.1326)
Northern	0.4390***	(0.1656)
Upperwest	0.6438***	(0.194)
Uppereast	0.2560	(0.1710)
Education level-primary	0 .1851	(0.1378)
Education level- secondary	-0.0182	(0.1309)
Education level- higher than secondary	-0.0592	(0.1741)
Religion- Christian	0 .0719	(0.1265)
Religion- muslim	0.0596	(0.1422)
Wealth index- 2nd quintile	-0.1151	(0.1315)
Wealth index- 3rd quintile	0.0584	(0.1295)
Wealth index- 4th quintile	-0.0029	(0.1451)
Wealth index-5th quintile	0.0804	(0.1586)
Occupation- Professional	0.1520	(0.1275)
Occupation- agricultural	-0.2584*	(0.1356)
Occupation- manual and services	0.0908	(0.1225)
Marital status- currently married	0.2562**	(0.1213)
Marital status- Living together	0.1940	(0.1607)
Marital status- Divorced/widowed	0.2280	(0.1570)
Ways to avoid AIDS	-0 .0019	(0.1161)
Reduce chances of getting AIDS by always using condoms	0.0730	(0.1054)
Reduce chances of getting AIDS by having 1 sex partner	0.3346*	(0.1820)
AIDS can be transmitted from mother to child	-0.0332	(0.1169)
Know someone who has AIDS or who has died of AIDS	0.3314***	(0.0658)
otherwife |	-0.0368	(0.0832)
Heard HIV-AIDS messages	-0.2358	(0.3356)
Heard slogan- "reach out show compassion"	0 .0862	(0.0835)
Heard slogan- Stop AIDS love life	-0.0346	(0.2993)
Heard slogan on TV	0 .1215	(0.1122)
Heard slogan on music video	0.2068**	(0.0864)
Heard slogan on radio	0.5909**	(0.2956)
Heard slogan in newspaper	0.1082	(0.0858)
Heard slogan on car stiacker	0 .0072	(0.0997)
Heard slogan on brochures	0.1792**	(0.083)
Constant	-4.5496***	(0.689)
N	4048	

Note: ***, ** and * denote significance at 1%, 5% and 10% levels respectively.

Table 3: Estimation results of the Heckprob model

variables	Stage 2- tested		Stage 1- knows of ways to avoid getting AIDS	
Individual and household characteristics				
Age	0.0579**	(0.0245)	0.0334***	(0.0130)
Age squared	-0.0008***	(0.0003)	-0.0003*	(0.0001)
Religion- christian	0.0579	(0.1196)	0.2535***	(0.0691)
Religion-muslim	0.0236	(0.1327)	0.2837***	(0.0765)
Occupation-professional	0.1873	(0.1211)	-0.0217	(0.1051)
Occupation-agricultural	-0.1930	(0.1266)	0.0387	(0.0807)
Occupation-manual and services	0.0893	(0.1164)	-0.0694	(0.0849)
Education level - primary	0 .0974	(0.1216)	0.1766**	(0.0722)
Education level- secondary	-0.0312	(0.1307)	0.53119***	(0.0715)
Education level- higher than secondary	-0.0291	(0.1735)	0.7006***	(0.1581)
Wealth index-2nd quintile	-0.0124	(0.1159)	-0.0326	(0.0717)
Wealth index- 3rd quintile	0.1324	(0.1183)	0.0431	(0.0791)
Wealth index- 4th quintile	0.1854	(0.1347)	0.0447	(0.0999)
Wealth index-5th quintile	0.2332	(0.1538)	0.3398***	(0.1196)
Marital status- currently married	0.3318***	(0.1143)		
Marital status- living together	0.2427	(0.1524)		
Marital status- widowed/divorced	0.2326	(0.1473)		
Regional characteristics				
Region-Western	0.4065***	(0.1494)	-0.1079	(0.1099)
Region-Central	-0.1076	(0.2083)	-0.2499**	(0.1166)
Region- Greater Accra	0 .0327	(0.1516)	0.0565	(0.1203)
Region- Eastern	0.0232	(0.1550)	0.1149	(0.1157)
Region- Ashanti	0.2412*	(0.1451)	0.3330***	(0.1063)
Region- Brong	0.2340	(0.1529)	0.2692**	(0.1096)
Region-Northern	0.2599	(0.1704)	0.0260	(0.1117)
Region-Upper-west	0.4117**	(0.1774)	0.1864	(0.1200)
Region- Upper-east	0.1984	(0.1826)	-0.1803	(0.1152)
Urban	-0.0340	(0.0905)	0.1295*	(0.0750)
Risky behaviour				
Allowed to keep AIDS infection secret	-0.0901	(0.0644)		
Last intercourse used condom	0.1309	(0.0920)		
Ever paid for sex	-0.0775	(0.1177)		
otherwife	-0.0819	(0.0835)		
Attitudes and Knowledge of AIDS				
Know of someone who has AIDS or who has died of AIDS	0.3036***	(0.0745)	0.1875***	(0.0495)
AIDS can be transmitted from mother to child	0.0144	(0.1053)		
Reduce chances of getting AIDS by always using condoms			0.4520***	(0.0583)
Reduce chances of getting AIDS by having 1 sex partner			0.2677***	(0.0723)
Willing to care for relative with AIDS			0.0752	(0.0516)
Person with AIDS should be allowed to continue teaching			-0.0008	(0.0157)
Should children be taught about condoms			0.1405***	(0.0473)
Constant	-2.802 ***	(0.6187)	-1.1943***	(0.2276)
Rho	-0.5996***	(0.1763)		
Sample size	4125		4947	
LR test of indep. eqns. (rho = 0): chi2(1) = 4.14 Prob > chi2 = 0.0419				

Note: ***, ** and * denote significance at 1%, 5% and 10% levels respectively.

Table 4: IVprobit: Dependent variable tested

	coeff	Std dev
No. of partners*	1.3538***	(0.0827)
Age	0.0457***	(0.0182)
Age-squared	0.0006***	(0.0002)
urban	0.0035	(0.0586)
Western	0.2008**	(0.0888)
Central	-0.1941	(0.1188)
Volta	-0.1211	(0.0975)
Eastern	0.0650	(0.0886)
Ashanti	0.2406***	(0.0757)
Brong	0.1953**	(0.0866)
Northern	0.1349	(0.0988)
Upperwest	0.4225***	(0.1087)
Uppereast	0.2410***	(0.1063)
Education level-primary	0.0446	(0.0749)
Education level- secondary	0.0051	(0.0698)
Education level- higher than secondary	-0.1883*	(0.1081)
Religion- Christian	0.1218*	(0.0698)
Religion- muslim	0.0899	(0.0770)
Wealth index-2nd quintile	0.0621	(0.0710)
Wealth index- 3rd quintile	0.0840	(0.0756)
Wealth index- 4th quintile	0.0779	(0.0875)
Wealth index-5th quintile	0.0690	(0.1014)
Occupation- Professional	-0.1612*	(0.0872)
Occupation- agricultural	-0.2934***	(0.0785)
Occupation- manual and services	-0.2603***	(0.0861)
Marital status- currently married	0.8984***	(0.0729)
Marital status- living together	0.2561***	(0.1028)
Marital status- widowed/divorced	0.0565	(0.1009)
Constant	-0.9663***	(0.4527)
N	4947	
Rho	-0.8391***	(0.0660)
Wald test of exogeneity (/athrho = 0): chi2(1) =	29.79 Prob > chi2 = 0.0000	

Note: **, ** and * denote significance at 1%, 5% and 10% levels respectively.

* instrumented using age, age squared, urban, regions, occupation, education, knowledge of ways to avoid AIDS, know someone who has AIDS or who has recently died of AIDS, willingness to care for someone with AIDS, whether people with AIDS should be allowed to teach, whether children should be taught about condoms, knowledge of transmission mechanisms of AIDS.