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Does HIV/AIDS Related Knowledge Affect Men's Decision to Have Sexual Encounters with Commercial Sex Workers? Evidence from Sub-Saharan Africa

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Does HIV/AIDS Related Knowledge Affect Men's Decision to Have Sexual Encounters with Commercial Sex Workers? Evidence from sub-Saharan Africa*

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Abstract

Using representative samples from populations of 19 sub-Sahara African countries, this paper investigates the effects of different levels of HIV/AIDS knowledge on sexual behavior of males with country specific effects and controls for socioeconomic characteristics and location of residence. The main findings are that HIV/AIDS knowledge increases the likelihood of using condoms with and without commercial sex workers, has no significant effect on the likelihood of paying for sex, and increases both the likelihood of having pre and extra marital sex. These results indicate that increased HIV knowledge on average does not lead to safer sexual behavior of males in sub-Saharan Africa at the macro level.

Key Words: HIV/AIDS, Sexual Behavior, Average Partial Effects
JEL Classification: C13, C25, and O53

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1 Introduction

Over the last 25 years, the HIV epidemic has been one of the leading concerns of politicians, health workers, and social scientists. Sub-Saharan Africa; which has 70% all new infections and 66% of all HIV cases (UNAIDS (2009)), has been the focus of the majority of studies and campaign efforts to contain and reduce the spread of HIV. In the absence of a vaccine, the only alternative solution is to promote safer sexual practices by educating the general population and high risk groups about the importance of using condoms, being faithful to your partner, and abstaining from sex. One of the main goals reported by UNAIDS in the fight against this disease is to "[P]romote widespread knowledge and awareness of how HIV is transmitted and how infection can be averted"; as it has reported that for every 2 individuals put on HIV treatment in sub-Saharan Africa, there are 5 new infections.

In recent years, international and domestic funding for HIV/AIDS has grown immensely. By the end of 2007, HIV/AIDS funding is estimated to be around $10 billion - an almost forty fold increase since 1996, when just $260 million was available. This is an outcome of huge influx of funding programs, primarily the Global Fund for AIDS, Tuberculosis and Malaria (GFFATM), the World Bank's Global AIDS Programme and the US President's Emergency Plan for AIDS Relief (PEPFAR). These programs have witnessed a significant increase in the amount of budget allocated to raise HIV/AIDS awareness. To exemplify, PEPFAR is reported to have spent $48 billion from 2009 to 2013 on campaigns to tackle HIV and AIDS as well as tuberculosis and malaria. Similarly, GFFATM distributed a total of US$5.67 billion by May 2008. Most of these funds have been allocated to sub-Saharan Africa, where two thirds of all HIV cases are currently reported, but there is still a debate as to how effective knowledge campaigns are in reducing HIV risk through improvements in sexual behavior.

The literature investigating sexual behavior trends in Africa due to AIDS knowledge is vast and inconclusive. While some studies indicate a significant movement toward less risky behaviors, others find that this trend is somewhat limited. Meda et al. (1999) using data from Senegal, report very successful prevention efforts in changing sexual behavior in the late eighties and early nineties. More recently, Dupas (2009) using a randomized control trial with

teenagers in Kenya, report a significant reduction in risky behavior due to better knowledge about HIV risks. That is, individuals that find themselves at more risk of contracting HIV tend to reduce the amount of sexual activity. Lindan et al. (1991) and Lagarde et al. (1996) also find a positive relationship between better knowledge about risk and safer sexual behavior for women in Rwanda and Men and Women in rural Senegal respectively; however, their results are not very strong.

Bloom et al. (2000) in a longitudinal study in the nineties finds little evidence that prevention campaigns promoted safer sexual behavior in men and women in Zambia; especially in the later stages of their sample. They suggest that campaigns can only be successful if the initial momentum is not lost. Similar evidence of limited behavior change was also found in Ng'weshemi et al. (1996), Caldwell et al. (1999), Williams et al. (2003), and Stoneburner and Low-Beer (2004).

All of the aforementioned studies on the relationship between HIV awareness and sexual behavior involve either specific segments of a population or a specific region of a particular country. This paper in turn, takes a broader perspective and investigates the association between HIV knowledge and sexual behavior for a representative sample of males for 19 sub-Saharan African countries. To the best of our knowledge, this is the first attempt to tease out these cross-country correlations at the macro level. Our results; however, are not a formal test of how effective campaigns have been in Africa, but just how effective HIV knowledge is in changing the likelihood of unsafe sexual practices. We find that increased knowledge and safer sexual behavior are not always positively correlated.

Epstein (2007) argues that changing sexual behavior in sub-Saharan Africa is very difficult as it requires changing social norms. There is some evidence that this change is possible in the presence of well designed prevention campaigns as might have been the case in Uganda. Green et al. (2006) report that well designed and executed behavior change programs in Uganda promoted a significant reduction in number of sexual partners and a significant increase in condom use in the nineties. Despite the fact that there is no dispute about the change in risky behavior of the Ugandan population, the causes underlying the change are still not clear. Oster (2007) suggests that the behavior change experienced in Uganda during the nineties was closely tied to the price of coffee, which is one of Uganda's major export.

That is, she suggests that the reason Uganda experienced this large change in behavior was not necessarily due to campaigns, but economic conditions instead.

The remainder of the paper is organized as follows: section 2 describes the data and reports descriptive statistics of the variables of interest, section 3 explains the methodology and model used to estimate the results, section 4 discusses the results, and section 5 concludes.

2 Data

Data was collected from the most recent wave of the Demographic Health Surveys for 19 sub-Saharan African countries. Because not every wave of this survey is collected at the same point in time, our data spans from the year 2000 to 2008. Observations were collected at the individual level for 75,268 men.

The rationale for selecting the most recent waves is two fold. First, the most recent surveys have more information on HIV knowledge and sexual behavior for males. Second, because HIV related campaigns have started since the early nineties in sub-Saharan Africa, it is more likely that the responses of males in the most recent surveys embeds even if indirectly the effect of such campaigns. Note however that our results are not a direct measure of the effects of campaigns on knwoledge, but the effects HIV knowledge, either through campaigns or not, on sexual behavior. Also, because it has been shown that males are the main drivers of the HIV epidemic in sub-Saharan Africa (Ulin (1992), Epstein (2007)), this paper solely focuses on their behavior and not that of females.

A description of every sexual behavior and HIV knowledge variable used in this paper is given below:

Sexual Behavior Variables:

- CU: this variable = 1 if a condom was used in last sexual intercourse and = 0 otherwise.
- PFS: this variable = 1 if ever paid for sex and = 0 otherwise.
- CUPFS: this variable = 1 if a condom was used last time paid for sex and = 0 otherwise.
- EMS: this variable = 1 if extra-marital sex in last 12 months and = 0 otherwise.

- PMS: this variable = 1 if pre-marital sex and = 0 otherwise.
- ABT: this variable = 1 if no sex in last 12 months and = 0 otherwise.
- TPIW: this variable = 1 if number of sexual partners including wife > 1 and = 0 otherwise.

Knowledge Variables:

Awareness:

- EHA: this variable = 1 if ever heard of AIDS and = 0 otherwise.

Specific Knowledge - Quality (only individuals who are aware of AIDS):

- KCU: this variable = 1 if knows that a condom must be used every time in order to reduce changes of contracting AIDS and = 0 otherwise.
- KSP: this variable = 1 if knows that only having one sexual partner at a time reduces the changes of contracting HIV and = 0 otherwise.
- HLP: this variable = 1 if knows that a healthy looking person can have AIDS and = 0 otherwise.

Descriptive statistics of all sexual behavior and knowledge variables are displayed in table 1. It is clear that males in sub-Saharan Africa are very aware of AIDS, which is no surprise as HIV has been part of the sub-continent for over 30 years. What is surprising though is that there is still a great fraction of males that cannot answer specific questions about the disease. The proportion of males that correctly answered specific questions about HIV is much smaller than the proportion of males that are aware of HIV for almost every country in the sample. It is important to notice, however, that specific HIV questions were only asked to males that answered yes to the awareness question.

XXX INSERT TABLE 1 ABOUT HERE XXX

The proportion of males that have used condoms during last intercourse is very low, around 20%. Even when this statistic is calculated for only single males the results are around 50%. What is interesting is that for every country in the sample there is a greater proportion

of males who know they should use a condom every time compared to actually using a condom during sex. This result already suggests that even if condom use increases with knowledge, there is evidence that it is not being used every time during sex as recommended by campaigns.

For the countries where the question about paying for sex was asked, the proportion of males who admittedly had sex with commercial sex workers is quite low, ranging from 3 to 1.5%. Out of these males, not many are using condoms when paying for sex[1].

Extra-marital sexual relations exhibits a very large variance. In the Congo, 64% of men admit to having extra-marital affairs, while only 5% admit in Rwanda and 1.6% in Ethiopia. This large variation in response is expected as social norms regarding contingent relationships are very different in different sub-Saharan African countries (Epstein (2007)).

Pre-marital sexual relationships are very high for most countries in the sample and abstinence from sex is very low with the only exception being Namibia. A promising statistic is that the proportion of respondents that confirmed having more than one sexual partner at the same point in time is somewhat low. The average for the entire sample is almost 6%.

Finally, when we look at these simple statistics, it is apparent that still a great proportion of males in sub-Saharan Africa are at risk of contracting HIV. This is also true for females as it has been well documented that one of the important HIV transmission vectors is from promiscuous males to faithful females (wives). In the next section, we describe our model and methodology used to infer the relationship between HIV knowledge and different sexual behavior variables.

3 Methodology

Given the description of the variables above, our empirical strategy involves estimating several limited dependent variable models with sexual behavior as our dependent variable and HIV knowledge as one of the explanatory variables. Because there are many other factors, besides HIV knowledge, affecting sexual behavior, we also include many controls

[1]The question about using condoms when paid for sex was asked in some surveys even if the question about just paying for sex was not.

as explanatory variables in the model. Following de Walque (2006) and others we include variables that capture levels of education and wealth, location of residence (urban or rural), marital status (single, married, or formerly married), religion, and age. We also include country specific effects as many of these countries are in different phases of the HIV epidemic. For example, in our sample HIV incidence varies from 0.7% (Senegal) to 23.4% (Lesotho).

As in Aggarwal and Rous (2006) we estimate an awareness equation and a quality of knowledge equation. In this paper, however, HIV knowledge enters the model as a regressor and not as the dependent variable. We also estimate 3 separate equations with each knowledge specific question as our only HIV knowledge independent variable plus controls. The probit specification is used in every model. The awareness model is given by:

$$P(Y_i = 1) = F(\alpha_a + \beta_a EHA_i + X_i'\Omega_a + \gamma_a C_i). \tag{1}$$

Where Y is one of the seven sexual behavior variables described previously, EHA is the binary variable that measures if an individual male has ever heard of AIDS, X is a vector of controls that includes education, wealth, location of residence, religion, age, and marital status, and C captures country specific effects. The subscript a stands for the awareness equation. The parameter of interest in the model above is β_a as it captures the association between HIV awareness and sexual behavior.

In order to measure quality of HIV knowledge, a variable Q was created that equals zero if all answers to KCU, KSP, and HLP were incorrect. It equals 1 if only one out of the 3 answers is correct. It equals 2 if two out of the 3 answers is correct and equals 3 if all answers are correct. This variable, therefore, captures the degree to which males, who are aware of AIDS, are knowledgable about HIV. Due to the categorical nature of this variable, three dummy variables Q_j for $j = 1, 2, 3$ were created leaving no HIV specific knowledge as the benchmark. The quality of knowledge equation is given by:

$$P(Y_i = 1) = F(\alpha_q + \sum_{j=1}^{3} \beta_{qj} Q_{ij} + X_i'\Omega_q + \gamma_q C_i). \tag{2}$$

Where the only differences between the above equation and equation 1 are the variables Q_j instead of EHA and the subscripts on the parameters. Notice that the estimates of β_{qj}

will allow us to assess how increases in knowledge quality affect sexual behavior.

As a way to check how each specific knowledge question is associated with sexual behavior, we estimate the following model:

$$P(Y_i = 1) = F(\alpha_s + \beta_s S_i + X_i'\Omega_s + \gamma_s C_i). \tag{3}$$

The specification above again is identical to the specifications of equations 1 and 2 with S being the variable that captures specific HIV knowledge. That is, equation 3 is estimated three times with each specific knowledge variable.

One of the problematic outcomes of a probit regression is that the magnitudes of the effects of the estimates of the coefficients are difficult to interpret. The solution, therefore, is to also estimate marginal effects associated with each variable. Because almost every variable in all specifications are categorical, the calculation of average partial effects (APE) is more appropriate and given by equation 4 below.

$$APE = \frac{1}{n}\sum_{i=1}^{n}[F(W_i'\hat{\Psi} + \beta k_i|k_i = 1) - F(W_i'\hat{\Psi} + \beta k_i|k_i = 0)] \tag{4}$$

Where W is a vector of all control variables, $\hat{\Psi}$ is a vector of estimated parameters, and k is a variable that measures HIV awareness or specific knowledge. Notice that in the equation above, APE is calculated as an average effect taking into account every observation in our sample and not just the mean value of every observation.

Because the variable that captures the quality of HIV knowledge (Q) has four categories, equation 4 needs to be slightly modified in order to accurately measure the effect of say, Q_2 relative to Q_0 on sexual behavior. In this case, equation 4 needs to be conditioned on only observations where $Q_2 = 1$. This strategy has been shown (Bartus (2005)) to be more effective in the presence of many categorical explanatory variables and categorical variables with multiple groups as is the case here.

4 Results

All of the results are displayed in figures 1 and 2 and table 2. Because the focus of the paper is in the association between HIV knowledge and sexual behavior, only the estimates of the average partial effects between HIV knowledge and sexual behavior are displayed[2].

The results regarding the association between HIV awareness and sexual behavior are displayed in figure 1. The figure displays both point estimates and 95% confidence intervals of all average partial effects. Overall, HIV awareness has mixed effects in reducing the likelihood of risky sexual behavior. Increases in HIV awareness have no effect on males' decisions to pay for sex or use a condom when paying for sex. The results indicate however that the likelihood of condom use during last sex increases by 15.5%. Despite the evidence in favor of more condom use, HIV awareness also increases the likelihoods of both extra-marital sex (5.9%) and pre-marital sex (29.5%). The effects on abstinence and number of sexual partners, although, significant are very small.

XXX INSERT FIGURE 1 ABOUT HERE XXX

When the effects of increases in quality of HIV knowledge are analyzed, the results are somewhat similar to the findings in figure 1. Some interesting results from figure 2 stands out though. Being aware of HIV, but having no specific knowledge has the same effect on paying for sex as complete specific knowledge. However, complete specific knowledge compared to no specific knowledge increases the likelihood of using condoms when paying for sex by about 18%. That is, specific knowledge has no effect in the likelihood of males paying for sex, but it does increase the likelihood they will use a condom when paying for sex.

Extra-marital sex is only statistically significant and positive for complete knowledge and almost complete knowledge (2 out of 3 questions correct) when compared to no specific knowledge. Also, despite the fact that better specific HIV knowledge increases the likelihood of using condoms, it also increases the likelihood of pre-marital sex. One last interesting result is that despite the fact that HIV awareness increases the likelihood of having multiple sexual partners, males who are fully aware of AIDS and have very good specific knowledge

[2] All of the estimates of the controls are consistent with existing literature. For the complete set of results, please contact the authors.

are less likely to have multiple sexual partners compared to males that are fully aware of AIDS with weak specific knowledge.

XXX INSERT FIGURE 2 ABOUT HERE XXX

These results are somewhat conflicting. On one hand, HIV knowledge is positively associated with more condom use; and on the other hand, it is also positively associated with more promiscuity, with some exceptions. Increases in extra and pre marital sex due to better HIV knowledge goes against the goals of many HIV campaigns of more abstinence and faithfulness. Although, as long as the increase in the number of sexual relations by males is coupled with a substantial increase in condom use during these encounters, increases in knowledge might promote a safer environment. However, due to the small percentage of condom use reported in the sample, it is more likely that HIV knowledge is empowering men to behave in a very unsafe way.

It is also possible that more HIV knowledge makes certain sexual behaviors less risky in the mind of males; that is, more knowledge decreases the risk aversion of having more sex. The reason for this possibility stems from simple rational behavior (Diamond and Stiglitz (1974)). When individuals are more uncertain about the consequences of their actions, they will behave with more caution; that is, they will be more risk averse. Whenever more certainty is present; and more knowledge induces more certainty in this case, we should expect individuals to be more risk loving and increase the amount of sexual relationships. If this is the case, a positive relationship between HIV knowledge and the amount of sex is expected. Evidence of this positive correlation between risk and safer behavior was also found in Lindan et al. (1991), Lagarde et al. (1996), and Dupas (2009).

It has been documented (Oster (2005)) that one of the reasons sexual behavior has not changed much in sub-Saharan Africa is the low life expectancy experienced in that region. According to the U.S. Census Bureau - HIV/AIDS Surveillance 2008, life expectancy in sub-Saharan Africa is not much larger than 50 years. This statistic might complement why more HIV knowledge increases the amount of sexual partners males have. That is, males might become less risk averse and have more sex with better HIV knowledge coupled with the fact that they do not expect to live much longer. This is the reason Oster (2009) concludes

that furthering education campaigns would be ineffective in controlling risky behavior in sub-Saharan Africa. With the evidence presented in this paper, one could support a possible change in strategy in combating the spread of HIV and AIDS in sub-Saharan Africa; however, it is not in the scope of this paper to provide an alternative[3].

As a robustness check, table 2 displays APE of sexual behavior with respect to each specific HIV knowledge variable. It is evident that the results are very similar to the ones reported above, with knowledge about condoms being the variable displaying the larger effects on sexual behavior.

XXX INSERT TABLE 2 ABOUT HERE XXX

Even though the goal of this paper is to simply explore the association between HIV knowledge and sexual behavior, it indirectly suggests that HIV campaigns might not be achieving what they were set out to do, at least at the macro level. It appears that spending resources educating people about the risks involved in having more sex is somewhat ineffective in promoting abstinence and faithfulness.

5 Conclusion

This paper analyzed the association between HIV related knowledge and various measures of sexual behavior for males using data from 19 sub-Saharan African countries. The results indicate that increased knowledge has conflicting effects with respect to safer sexual behavior. While both awareness of HIV and quality of HIV knowledge were positively associated with reductions in condom use, they were also positively associated with increases in pre and extra marital sex. Decreases in abstinence and increases in the number of sexual partners were found to be positively associated with increases in the quality of HIV knowledge.

While this study does not measure the efficacy of HIV related campaigns with respect to increases in abstinence, faithfulness, and condom use, it indirectly points to possible problems regarding these campaigns as they focus primarily in educating the population about the risks associated with contracting HIV. The evidence here, therefore, suggests that changing

[3]For a possible alternative, see de Araujo and Murray (2010)

sexual behavior through education might be very difficult. That is, even when there is some evidence of successful educational campaigns at the micro level; this evidence might not hold up at the macro level.

One of the limitations of this study is that it does not capture the evolution of HIV knowledge through time and how it relates to sexual behavior as data on males is somewhat limited. Once more data becomes available, it will be very important to incorporate this into the framework presented here allowing for the study of the dynamics involved in these correlations.

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Table 1: Summary Statistics Full Sample and by Country (means only)

	Dependent Variables							Knowledge Variables			
	CU	PFS	CUPFS	EMS	PMS	ABT	TPIW	EHA	KCU	KSP	HLP
Zimbabwe	0.2454	0.033	0.6824	0.0852	0.4631	0.0599	0.0467	0.9909	0.8174	0.8638	0.9175
Lesotho	n.a.	n.a.	0.3856	0.2991	0.6464	n.a.	0.0229	0.922	n.a.	n.a.	n.a.
Namibia	0.5703	0.0154	0.7143	0.1383	0.7827	0.782	0.0074	0.9892	0.8744	0.9225	0.9179
Zambia	0.2267	0.0529	0.5278	0.1421	0.6434	0.0738	0.0437	0.9955	0.7532	0.8962	0.8731
Mozambique	0.1526	n.a.	0.2203	0.2489	0.7582	n.a.	0.0862	0.9865	n.a.	n.a.	0.8396
Malawi	n.a.	n.a.	n.a.	0.0695	0.6458	n.a.	0.065	0.9954	n.a.	n.a.	n.a.
Cameroon	0.2916	n.a.	0.65	0.3658	0.6041	n.a.	0.0627	0.9917	0.8256	0.887	n.a.
C.A.R.	n.a.	n.a.	n.a.	1.00	0.6648	n.a.	0.0561	0.9907	n.a.	n.a.	0.7395
Uganda	0.1723	0.029	0.4314	0.228	0.5215	0.0766	0.1055	0.9984	0.8343	0.9496	0.8951
Chad	0.1250	n.a.	0.6212	0.1439	0.498	n.a.	0.1388	0.9162	0.6514	0.9056	0.6331
Congo	0.2478	n.a.	n.a.	0.6454	0.7894	0.0307	0.0366	0.9886	0.8473	0.8802	0.8413
Ethiopia	0.0765	n.a.	0.5974	0.0162	0.2525	n.a.	0.0368	0.9581	0.6662	0.8123	n.a.
Ghana	0.1689	n.a.	0.3916	0.1229	0.4166	n.a.	0.0822	0.991	0.8149	0.9003	0.8512
Kenya	0.1677	n.a.	0.4459	0.103	0.6384	n.a.	0.0531	0.9902	0.7704	0.9558	0.8982
Liberia	0.1399	0.0297	0.4414	0.2965	0.7112	0.0122	0.0466	0.9339	0.7471	0.8191	0.7496
Nigeria	0.1751	n.a.	0.3178	0.1463	0.4982	n.a.	0.1159	0.9731	0.7279	0.9242	0.7632
Rwanda	0.0611	n.a.	0.6216	0.0525	0.387	n.a.	0.0278	0.9994	0.8934	0.86	0.9195
Senegal	0.2248	n.a.	0.64	0.2058	0.4199	n.a.	0.1278	0.9777	0.7555	0.9226	0.7087
Tanzania	0.1876	n.a.	0.4682	0.2422	0.5358	n.a.	0.0649	0.9901	0.7372	0.8485	0.8673
Full Sample	0.2054	0.0342	0.4286	0.204	0.5579	0.0533	0.0584	0.9791	0.7857	0.8815	0.8441

Figure 1: Association between HIV/AIDS Awareness and Sexual Behavior (marginal effects with 95% confidence interval)

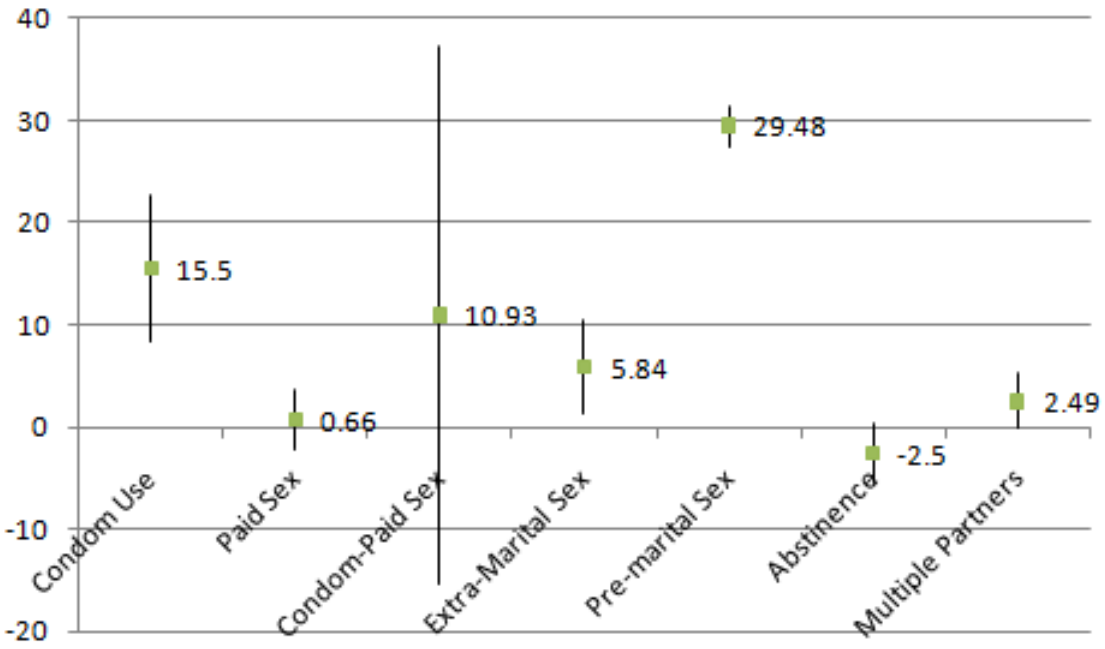

Figure 2: Association between HIV/AIDS Knowledge Quality and Sexual Behavior (marginal effects with 95% confidence interval)

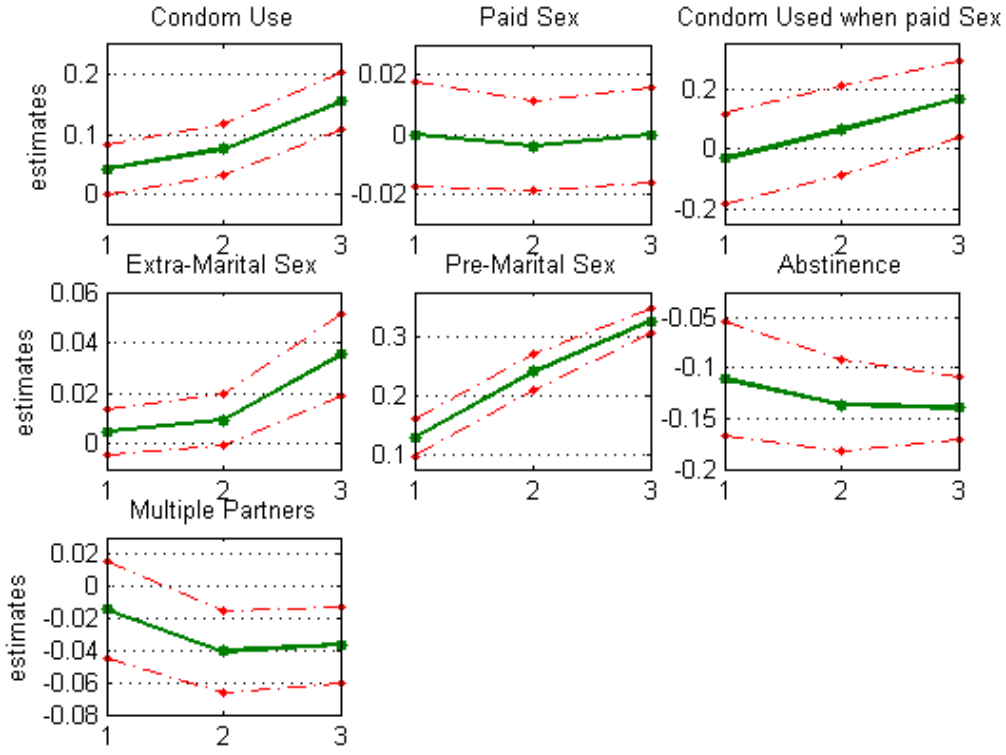

Table 2: Association between HIV/AIDS Specific Knowledge and Sexual Behavior (marginal effects with 95% confidence interval in brackets)

Sexual Behavior Variables	Knowledge Variables		
	Condom Use in Sex	Number Sexual Partners	Healthy Looking Person
Condom Use	0.076* [0.066, 0.086]	0.021* [0.010, 0.033]	0.048* [0.037, 0.059]
Paid Sex	0.003 [-0.002, 0.010]	0.0003 [-0.006, 0.007]	-0.001 [-0.007, 0.003]
Condom in Paid Sex	0.155* [0.117, 0.194]	0.038 [-0,017, 0.093]	0.113* [0.074, 0.151]
Extra-Marital Sex	0.071* [0.060, 0.082]	-0.004 [-0.016, 0.006]	0.018* [0.008, 0.028]
Pre-Marital Sex	0.147* [0.138, 0.157]	0.107* [0.095, 0.119]	0.119* [0.109, 0.129]
Abstinence	-0.021* [-0.028, -0.015]	-0.016* [-0.024, -0.008]	-0.015* [-0.022, -0.008]
Multiple Partners	-0.008* [-0.014, -0.002]	-0.009* [-0.017, -0.001]	-0.003 [-0.010, 0.003]