# HIV testing, HIV/AIDS Knowledge, and Sexual Behavior

Beliyou Haile, Hyuncheol Bryant Kim, Taewha Lee[1]

April, 2014

Preliminary version. Please do not cite without permission

Abstract

This study utilizes a randomized controlled trial (RCT) to explore two important issues regarding HIV/AIDS knowledge and HIV testing: 1) how to promote HIV/AIDS knowledge and demand for HIV testing and 2) what are the causal effects of HIV/AIDS knowledge and HIV testing on sexual behavior. In this paper, we try to understand these questions directly through two rounds of experiments. During the first round experiment, three randomly selected treatment groups are offered three (overlapping) treatments: HIV education only (Group 1), HIV education and home HIV testing (Group 2), and HIV education and a conditional cash transfer for a facility-based HIV testing (Group 3). During the second round experiment, all groups are offered either home HIV testing or a conditional cash transfer. We first find that the level of HIV/AIDS knowledge significantly increases, and also find suggestive evidence of knowledge spill-over. The HIV testing rate increases by 7, 64, and 57 percentage points in Group 1, 2, and 3, respectively. We find suggestive evidence that although test take-up rate is similar in home and facility-based HIV testing, home testing is substantially more efficient to detect those with HIV. In addition, we find that HIV testing take up does not dampen future demand for HIV testing. Infection expectation is also updated for both learned negative and positive result from the testing, but the effect does not persist after six months. These outcomes correspond to the finding that the probability of having multiple partners increases in the short run, but this increase disappeared within six months. (JEL: I10, C93, D80)

[1] Haile: International Food Policy Research Institute (IFPRI); Kim: Department of Policy Analysis and Management, Cornell University, hk788@cornell.edu; Lee: College of Nursing, Yonsei University, twlee5@yuhs.ac. The authors would like to thank Booyuel Kim, Cristian Pop-Eleches, Eric Verhoogen, and Leigh Linden, and seminar participants in Columbia University, Cornell University, and Myoungsung Cristian Medical School in Ethiopia. We acknowledge financial support from the Korea International Cooperation Agency (KOICA), the Program for Economic Research at Columbia University, the Center for the Study of Development Strategies and the Applied Statistics Center, and Yonsei University College of Nursing. In Ethiopia, we acknowledge technical and material support from Arsi Zone and Hetosa District Heath Bureaus, Adama University Department of Public Health, Ethiopian AIDS Resource Center, and Population Services International. We thank Kyuk Suk Chang, Senait Assefa, and Kassahun Mengistie for their excellent research assistance. All errors are our own.

## 1. Introduction

AIDS has caused considerable human suffering and heavily influenced on countries' labor force, health care system, and public spending. However, the percentage of people with a comprehensive knowledge of HIV transmission is still very low. There is also a significant inequality in HIV/AIDS knowledge between rural and urban, across gender, and by level of education. For example, only 19% of adult females and 31% of adult males have a comprehensive knowledge of AIDS in Ethiopia. In addition, 91% and 58% of females in rural and urban area, respectively, know where to get an HIV test, and the corresponding numbers in females are 97% and 78% (Central Statistical Agency [Ethiopia] and ICF International. 2012).

In addition, despite the fact that African governments invest significantly in HIV counseling and testing (VCT) services, the demand for VCT remains low, even when it is free. For example, only 11% of adults in 45 countries in Sub-Saharan Africa received HIV testing in 2009. Also, only one-fourth of the 125 million pregnant women in low- and middle-income countries in 2009 received HIV testing (WHO/UNAIDS/UNICEF 2010). In Ethiopia, only 39% of those aged 15-49 have ever been tested for HIV and only 11 percent of women received HIV counselling ane testing during the antenatal care (Central Statistical Agency [Ethiopia] and ICF International. 2012).

This study utilizes a randomized controlled trial (RCT) to explore two important issues regarding HIV/AIDS knowledge and HIV testing: 1) how to promote HIV/AIDS knowledge and demand for HIV testing and 2) what are the causal effects of HIV/AIDS knowledge and HIV testing on sexual behavior. In this paper, we try to understand these questions directly through two rounds of experiments. During the first round experiment, three randomly selected treatment groups are offered three (overlapping) treatments: HIV education (hereafter "Group 1"), HIV education and home HIV testing (hereafter "Group 2"), and HIV education and conditional cash transfer for a facility-based HIV testing (hereafter "Group 3"). During the second round experiment, randomly selected half of the study participants in each group (including the control group) are offered

home HIV testing and another half are offered conditional cash transfer for the facility-based HIV testing.

This paper first contributes to understanding the role of accessibility to HIV testing. Because of the potential benefits of VCT, determining effective ways to promote HIV testing is currently a very important issue. To meet this challenge, several alternative approaches such as home-based VCT, mobile VCT, and workplace VCT has been employed. Geographic access to health services is identified to play a crucial role in general health service utilization (Arcury et al. 2005, Buor 2003, Joseph and Phillips 1984) as well as HIV test take-up (Thornton 2008). Some literature reports that home-based VCT has showed a very high acceptance rate (Angotti et al. 2009, Mutale et al. 2010, Obare 2009, Yoder et al. 2006, Wolff et al. 2005). Thornton (2008) also shows that a very small cash incentive could significantly promote a demand for learning HIV status. Specifically, we investigate home HIV testing and conditional cash transfer for facility-based HIV testing, and this paper is the first to credibly explore the relative effectiveness of alternative methods of increasing testing take-up.

Second, this study also contributes to understanding the impact of HIV information and education. To our knowledge, this is the first paper that examines the effect of HIV education on the testing decision in the context of a developing country. HIV education is potentially important for HIV test take-up. HIV education can affect the testing decisions because new information may affect individuals' perceptions of the susceptibility to HIV infection, the severity of the AIDS epidemic, the benefits of HIV testing, and perceived barriers to testing. These pieces of information can be particularly important for individuals with limited formal education, little access to HIV/AIDS information through the mass media. On the other hand, HIV/AIDS knowledge may only be a necessary condition for test take-up or change in health behavior. When the socioeconomic cost of receiving testing is high, test take-up can be still quite low. Although HIV counseling and testing is currently offered free of charge in many poor and highly impacted countries, long and arduous hours of travel to a testing clinic can increase the (direct and indirect) cost of testing and reduce willingness to learn one's HIV status. From the public health policy perspective, quantifying and disentangling the effects of information and

cost- considerations on the testing decision is necessary to generate information that can feed into the designing of appropriate policy interventions to promote testing.

Although no previous study has examined the effect of HIV education on the testing decision in a developing country, a number of studies have examined the effect of sex and AIDS education on high-risk sexual behavior (Dupas 2009, Duflo et al. 2006, Tremblay and Ling 2005). Dupas (2009) finds that provision of age-disaggregated information about HIV prevalence in Kenyans reduces teenage pregnancy by older men, a group with high HIV prevalence. In another experimental study in Kenya, Duflo et al. (2006) find that encouraging students to debate about the role of condoms and other ways of reducing the risk of HIV infection increases practical knowledge and self-reported condom use. Duflo, Dupas, and Kremer (2012) find that a government HIV curriculum focused on abstinence until marriage reduces the probability of women being single mothers, but it mitigates the impact of education subsidies on school drop-out and pregnancy. In the U.S., Tremblay and Ling (2005) find that AIDS education increases the likelihood of condom-protected sexual intercourse among youth.

Third, this paper contributes to understanding the causal effects of HIV testing and knowledge on HIV/AIDS on various outcomes such as infection expectation and sexual behaviors. An important assumption on HIV testing scale up project is that testing will lead to declines in risky sexual behavior and subsequent HIV infection (World Bank, 2011). However, one might also increase in risky sexual behaviors. A causal effect on HIV testing is not clear because the optimal level of risky behavior is determined by the tradeoff between perceived benefits and expected cost of risky sexual behavior. Moreover, the belief and behavior after HIV testing might change over time. For example, Thornton (2012) finds that a change in subjective belief about HIV infection does not persist after two years from the testing.

The empirical evidence on the effect of HIV testing on sexual behavior is mixed and, for negative testers, mostly inconsequential and sometimes even unintended. In one of the earliest randomized controlled trials, Coates (2000) finds that learning an HIV-positive result reduces the incidence of unprotected sex with non-primary and primary (for men) partners. Using experimental data from Malawi, Thornton (2008) finds a higher likelihood of condom purchase for positive testers who learned their test result than for those who did not and an insignificant

effect of testing on condom purchase for negative testers and for sexually inactive testers. Delavande and Kohler (2009) find a higher incidence of condom use and reduced number of sexual partners for Malawian HIV-positive testers who learned their status than for those who did not. Gong (2010) finds that testing increases (decreases) the chance of contracting a sexually transmitted infection for HIV-positive (negative) testers with low (high) prior belief of HIV infection expectation. Simulation results in this study suggest an unintended consequence of testing with a net 26% increase in HIV infection rate with testing than without testing. Gong (2014), reevaluating a work by Coates (2000), finds that people who altered their sexual behavior were those whose test results differed from their prior belief. Specifically, those with a low prior belief and positive result increased risky sexual behaviors, while those with a high prior belief and negative result decreased risky sexual behaviors.

Our paper contributes to the small but growing empirical literature on the causal effect of testing on HIV infection expectations and subsequent sexual behavior. We also measure HIV/AIDS knowledge and infection expectation in three and six months after HIV/AIDS education and HIV testing to see the persistency of the effects.

We reach four conclusions. First, HIV door-to-door education significantly increases the level of knowledge on HIV/AIDS and promote HIV testing rate in the short run, but the difference between treatment and control group disappeared after six months potentially due to knowledge spill-over.

Second, home testing and conditional cash transfer substantially increase take-up rate. Those in Group 2 and Group 3 are 64 and 57 percentage points more likely to take HIV testing than those in the control group, respectively. We also find although test take-up rate is similar in home and facility-based HIV testing, home testing is substantially more efficient to detect those with HIV.

Third, we find that previous HIV testing does not dampen the demand for future HIV testing. There is no difference in test take-up rate for those who are offered HIV testing the second time (Group 2 and Group 3) and the first time (Group 1 and control group) in the second round intervention.

Fifth, changes in belief and sexual behavior persist only in the short-term. We find that subjects who learned of an HIV-positive (negative) result tend to revise their prior belief about HIV infection upwards (downwards) in the short run. However this effect, especially for those learn HIV-positive, tends to dissipate over time very quickly. These outcomes correspond to the finding that the probability of having multiple partners or a non-primary partner increases in the short run, but that all these changes disappear within six months.

The remainder of the paper is organized as follows. Section 3 provides background information on the study setting and explains our experiment. Section 4 outlines the empirical estimation strategy to identify treatment effects. Section 5 presents results, and Section 6 concludes the paper.

## 2. Experiment and Data

### 2. 1. Survey and Experiment Design

Our study sample is based on the baseline survey of Korea Ethiopia Yonsei Family Planning (KEYFP), which was implemented in May 2009.[2] It consists of 1,850 individuals in 1,009 households in the randomly selected six villages in Hetosa, a rural area in Ethiopia. In each household, KEYFP randomly selects three individuals: adult male (aged 20 to 49), adult female (aged 20 to 49), and adolescent (aged 15 to 19). A baseline survey collects information on knowledge, attitude, and practice of family planning as well as HIV/AIDS knowledge. The final study sample used in this study includes 1,663 individuals in 959 households who satisfy the age criteria.[3]

As shown in Figure 1, we implement a randomized controlled trial involving two rounds of interventions and follow-up surveys. During the first round intervention in April 2010, the first randomly selected group is offered HIV education (Group1), the second group is offered HIV education and home-based HIV testing (Group 2), the third group is offered HIV education and

[2] KEYFP provides family planning services, educate family planning service providers, and strengthen community support on family planning. It does not include randomized intervention.

[3] We focus on those aged 18 and over. See Appendix A1 for the details on survey sampling.

cash incentives for facility-based testing (Group 3), and the fourth group serves the control group. Randomization was done in household level. During the second round intervention in from Oct to Nov 2010, randomly selected half of the study participants in each of the four research groups are offered home HIV testing, while the other half are offered conditional cash transfer for facility-based HIV testing. Follow-up surveys are conducted around three and six months after the first intervention. In order to overcome the limited reliability of the self-reported sexual behavior we offered up to ten free male condoms based on the study participants' request during each follow-up survey to get an indirect measure of the demand for protected sex.

As part of the HIV education, those in Group 1, 2, and 3 are taught the basic scientific facts about HIV transmission mechanisms, the benefits of HIV testing, and various HIV-related facts pertinent to the study area. As outlined in Appendix 2, the door-to-door HIV education session provided various aspects of HIV/AIDS including mechanisms of HIV transmission, advantages (and potential problems) of HIV testing, ways to learn one's HIV status in the study area, and access to AIDS and other medication that can reduce the risk of mother-to-child HIV transmission. Home-based HIV testing is offered to examine the potential influence of non-economic factors (such as privacy and convenience) on the testing decision. Cash incentives are given to compensate transportation cost and a day of lost farm wages due to a trip to a local testing clinic. The amount of cash incentive ranges from 1.5 to 2.9 dollars, depending upon the distance between a subject's village and the assigned testing clinic. Detailed information on the intervention is provided in Appendix 2.

Table 1 summarizes the study sample and present balance across the treatment groups. Column (1) and (2) of Panel A present summary statistics of the overall sample and control group, respectively. Columns (3) to (5) present the differences across the treatment groups in the first round. Similarly, Panel B presents balance across the treatment groups in the second round. In both Panel A and B, only 9 of 72 (=12.5%) and 19 of 168 (=11.3%) p values are smaller than 0.10, meaning that the randomization successfully creates balanced research groups.

Figure 1 and Table 1 in the Appendix provide information on sample attrition. We begin with 1,663 respondents in 959 households. Of this sample, we are able to track 1,494 (89.8%) and

1,345 (80.8%) in the first and second follow-up survey, respectively. Table 1 in the Appendix examines the attrition rate across the treatment groups. It indicates that treatment groups are more likely to participate in the first follow-up survey, but not in the second follow-up survey except for Group 2. Attrition from the panel is significantly smaller for the married, suggesting that the analysis sample has disproportionally fewer mobile individuals. We also find evidence of differential attrition by HIV status in the first follow-up survey (Columns 2 and 3). Differences in outcomes between the control and treatment group might be driven by the different attrition rate. Thus, the results should be interpreted with this caveat.

Of the 1,000 individuals in 576 households assigned to HIV education (Group 1, Group 2, and Group 3), 152 (15%) did not receive HIV education. Of the subjects in Group 2 and Group 3, around 23% and 28% did not receive HIV testing. Main reasons are temporarily relocated (36%), absent (21%), and refusal (14%). Therefore the results must be interpreted with an intent-to-treat spirit.

The key assumption behind the design of the experiment is that a lack of knowledge about and accessibility to HIV testing could be the determinants of the HIV testing decision. Accordingly, the key first stage outcomes of interest are level of HIV/AIDS knowledge and the HIV test take-up. Moreover, one's level of HIV/AIDS knowledge and knowing one's HIV status potentially have an impact on sexual behaviors; thus, the major outcome variables are about sexual behavior such as multiple sexual partners and demand for condom. Infection expectation is also measured because it could be a channel through which learning one's HIV status influences sexual behaviors.

The main indicator for knowledge of HIV/AIDS consists of five questions about HIV measured in baseline, the first follow-up and the second follow-up surveys. It consists of 1) knowledge of the "ABC" of HIV prevention - Abstinence, Being faithful to one uninfected partner, and using a Condom correctly and consistently, and 2) Knowledge on mother-to-child HIV transmission during pregnancy, delivery, and breastfeeding.[4] HIV test take-up information is collected from

[4] In the first follow-up survey, we additionally asked question on 1) misconception about HIV transmission mechanisms belief, 2) knowledge of availability of special medications for individuals and pregnant women living with HIV, and 3) stigmatizing

two different channels: administrative and survey data. The former captures only the HIV testing we offer and the latter captures HIV testing regardless of the channel.

Outcome variables include infection expectation, sexual behaviors, and fertility desire. Infection expectation is measured indirectly: the chance of being exposed to HIV.[5] A set of questions on sexual behaviors including number of sexual partners, non-primary sexual partner, and use of condom are asked.[6] Sexual behavior, in addition to HIV testing status, may be prone to the "social desirability" bias (Geary et al. 2003, Plummer et al. 2006). Subjects may under-report socially unacceptable behavior (e.g., sex with a non-primary partner) and over-report socially acceptable behavior (e.g., HIV testing), and such bias can be particularly important in culturally and socially conservative communities.[7] Although we are not able to assess the validity of most of the self-reported measures of sexual behavior, we attempt to verify self-reported condom use by the number of free condoms study participants request. Lastly, study participants are asked about current pregnancy, desire for child, and family planning practice.

**3. Empirical Estimation Strategy.**

The experiment gives us a reliable source of exogenous variation on knowledge of HIV/AIDS and HIV testing. Exploiting the peculiar design of our experiment, we employ intention-to-treat (ITT) analysis, instrument variable (IV) approach, and Difference-in-Differences (DID) approach. In each specification, we run a weighted regression, considering the fact that we complete that baseline survey only for 60% of randomly selected households in two villages and 100% in the other four villages.[8] First, we employ ITT analysis and compare post-treatment

---

attitude towards people with HIV. It allows us to construct indexes for an overall knowledge and comprehensive correct knowledge which is developed by USAID and used to measure cross-country differences in knowledge of HIV prevention methods (or lack of it), attitude towards people living with HIV, and local misconceptions about HIV transmission mechanisms. The results on overall knowledge and comprehensive correct knowledge are shown in Table 4 in the appendix.

[5] The exact wording for these questions was "Do you think your chance of being exposed to HIV is high, small, or none?"

[6] A non-primary partner refers to a commercial sex worker or someone with whom the respondent had a casual acquaintance.

[7] In a study in Zambia, Allen et al. (2003) find sperm in 15% of the cases where female subject did not report unprotected sex and a 2% (2.6%) pregnancy rate (HIV seroconversion) among subjects who reported no unprotected sex.

[8] Sample from the villages with 60% random sampling were weighted 1.67. Not reported, results in ordinary least square (OLS) and weighted regression are very similar.

outcomes of all randomized subjects with different treatment statuses, irrespective of their actual testing status. We specify the reduced-form linear probability model in equation 1.

Equation 1: Intention-to-treat (ITT) Analysis 1

$$Y_{ij} = \beta_0 + \beta_1 G1_{ij} + \beta_2 G2_{ij} + \beta_3 G3_{ij} + \mathbf{\Pi}' \boldsymbol{X}_{ij} + \mu_j + \eta_i$$

where $Y_i$ is an outcome variables such as knowledge of HIV/AIDs, HIV testing, sexual behaviors, or fertility desire for individual $i$ in village $j$. G1, G2, and G3 are binary indicators for Group 1, Group 2, and Group 3, respectively. $\boldsymbol{X}$ is a vector of observable baseline characteristics including age, sex, marital status, religion, schooling, employment status, area of residence, and household asset ownership. $\mu_j$ is village fixed effects. $\eta_i$ is a random error term. Standard error estimates from all regressions in this paper are clustered at the household level.

In order to explore the HIV testing decision in the second round, we specify another equation.

Equation 2: Intention-to-treat (ITT) Analysis 2

$$Tested_{ij} = \alpha_0 + \alpha_1 G1Cash_{ij} + \alpha_2 G2Home_{ij} + \alpha_3 G2Cash_{ij} + \alpha_4 G3Home_{ij}$$
$$+\alpha_5 G3Cash_{ij} + \alpha_6 G4Home_{ij} + \alpha_7 G4Cash_{ij} + \mathbf{\Pi}' \boldsymbol{X}_{ij} + \mu_j + \upsilon_i$$

where $Tested_i$ is an indicator of HIV test take-up in the second round, G1Cash is an indicator for being in Group 1 in the first round and the cash incentive group in the second round. G2Home equals one if an individual is assigned to Group 2 in the first round and the home testing group in the second round. G2Cash, G3Home, G3Cash, G4Home, and G4Cash are created in a similar way. G1Home serves as the control group.

HIV test take-up decision in the second round allows us to examine persistence of the effect of incentives on the HIV testing decision. If incentives affect the testing decision and there is persistence in the effect of incentives on test-taking behavior, we expect testing take-up for groups offered incentives during both rounds be at least as high as take-up for groups offered incentives only during the second round intervention.

We also measure the treatment effect on treated using randomly assigned treatments as instrumental variables for level of HIV/AIDS knowledge and actual testing status. We have two endogenous variables, HIV testing and level of HIV/AIDS knowledge, and three exogenous variables. We specify regression equation using two-stage least square (2SLS). In the first stage, we regress HIV testing and level of HIV/AIDS knowledge measured in the first follow-up survey on random assignments.

Equation 3: Instrument Variable (IV) Approach, Stage 1

$$Tested_{ij} = \beta_0 + \beta_1 G1_{ij} + \beta_2 G2_{ij} + \beta_3 G3_{ij} + \mathbf{\Pi}' \boldsymbol{X}_{ij} + \mu_j + \eta_{1ij}$$

$$Knowledge_{ij} = \beta_0 + \beta_1 G1_{ij} + \beta_2 G2_{ij} + \beta_3 G3_{ij} + \mathbf{\Pi}' \boldsymbol{X}_{ij} + \mu_j + \eta_{2ij}$$

where $Tested_i$ is an endogenous (dummy) variable that equals one if the subject learns his or her HIV status and zero if otherwise. $Knowledge_i$ is the level of knowledge. Other variables are as defined earlier. The second stage includes the predicted value of HIV testing and knowledge estimated from the first stage.

Equation 4: Instrument Variable (IV) Approach, Stage 2

$$Y_{ij} = \mathbf{\Pi}' \boldsymbol{X}_{ij} + \alpha 1\, Tested_{ij} + \alpha 2\, Knowledge + \mu_j + \varepsilon_{ij}$$

Since $\alpha 1$ captures impact of HIV testing for both those learn HIV positive and negative, the results are hard to interpret. We rather focus on $\alpha 2$ the causal impact of HIV/AIDS knowledge.

Lastly, to examine potential heterogeneity in the distribution of Y based on actual test results, we use data from two rounds of interventions and employ the Difference-in-Differences (DID) strategy. It requires an assumption that the first round HIV-positive (HIV-negative) testers in an incentivized group (Groups 2 and 3) would not be systematically different from those in the control group (Groups 1 and 4) who eventually test HIV-positive (HIV-negative) in the absence of our intervention. This assumption violates if the composition of non-test takers, negative testers, and positive testers are significantly different in the first and second round.

We directly test these concerns. Table 2 in the Appendix shows the composition and baseline characteristics of non-test takers, negative testers, and positive testers in both rounds. Columns 1 to 4 present the results of Groups 2 and 3, who are offered the HIV test in the first round. Columns 5 to 8 present the results of Groups 1 and 4, who are offered the HIV test in the second round.

In order for Groups 1 and 4 to properly serve as controls, the composition and baseline characteristics of non-test takers, negative testers, and positive testers for Groups 1 and 4 are similar those in Group 2 and 3. Columns 9 and 10 show that non-test taker and negative testers across the two rounds significantly differ, reflecting that the proportion of non-test taker significantly decreases. However, Column 11 presents that positive-testers in the two rounds are comparable. Therefore, we estimate the following DID specification focused on HIV positive testers.

Equation 5: Difference-in-Differences (DID) approach

$$Y_{ij} = \theta_0 + \theta_1 Incentive_{ij} + \theta_2 HIV_{ij}^{Pos} + \theta_3 IncentiveHIV_{ij}^{Pos} + \boldsymbol{\Theta}'\boldsymbol{X}_{ij} + \mu_j + \varepsilon_{ij}$$

where *Incentive* is whether an individual received the home testing offer or conditional cash transfer. $HIV^{Pos}$ equals one when an individual tested HIV-positive.[9] $IncentiveHIV_i^{Pos}$ is an interaction term. A challenge for the DOD specification is that there are only 18 HIV-positive testers. Moreover, two of seven HIV-positive testers in the first follow-up survey do not participate in the second follow-up. Therefore, the results from DID approach should be interpreted as at most suggestive.

[9] $HIV^{Pos}$ = 1 if: (1) subject is initially assigned to home-based (G2) or cash incentives (G3) group and tested HIV-positive during first intervention or (2) subject is initially assigned to control group (G4) and eventually tested positive during second intervention and zero otherwise.

# 4. Empirical Results

## 4.1 First Stage Outcomes

### 4.1.1 Impact on HIV/AIDS knowledge

We first present the causal effect of the door-to-door HIV education and HIV testing incentives on the level of HIV/AIDS knowledge. Figure 2 summarizes the level of HIV/AIDS knowledge in each study group at the baseline, the first follow-up, and the second follow-up survey, respectively. It shows no significant difference across study groups at the baseline survey. The HIV/AIDS knowledge level in the treated groups (Group 1, 2, and 3) substantially increases compared to that in control group in the first follow-up survey. The level of HIV/AIDS knowledge in the treated groups remained almost same, but the knowledge gap between treated and control groups completely disappears in the second follow-up survey because the HIV/AIDS knowledge level of the control group has increased significantly over time.

We present these findings more formally with the results of the Equation (1) in Table 2. Columns 1-2 in Table 2 indicate that the level of HIV/AIDS knowledge increases by around 0.1 standard deviation in three months. The coefficients' size for Group 1, Group 2 and Group 3 are not significantly different, suggesting that the HIV testing offer combined with pre- and post-counseling does not improve participants' level of HIV/AIDS knowledge additionally when it is offered with intensive HIV education. Columns 3-4 in Table 2 present the change in HIV/AIDS knowledge over six months. It confirms that the difference in HIV/AIDS knowledge between the control and treatment group completely disappears within six months.

Potential explanation is a spillover of the HIV/AIDS knowledge. Although we do not provide any HIV information and education to the control group, the HIV/AIDS knowledge level has increased over time. Another explanation is an existing time trend, but it does not explain the changes of the level of HIV/AIDS knowledge in treatment groups.

In panel B of Table 2, we also report the change in HIV/AIDS knowledge by HIV status. We do not find evidence change in the level of HIV/AIDS knowledge does not vary across HIV test result. Appendix Table 4 shows the impact on each specific question on HIV/AIDS knowledge in the first round (Panel A) and the second round (Panel B).

The effect of HIV education on having an accepting attitude towards HIV-positive people is present in Columns 5-6. As part of the information session, subjects are taught that HIV cannot be transmitted through shaking hands, hugging, casual kissing, sharing of dishes, drinking glasses, food, cloth, toilet seats, or by being around someone who has HIV. However, we find a significant improvement in attitudes towards HIV-positive people at least in the short run.

4.1.2 Impact on HIV testing

Next, we look at the effect of HIV education and incentives for HIV testing to testing take-ups. HIV education is expected to affect the testing decision through its effect on subjects' perceived threat of HIV infection. Test take-up might increase through HIV education if the education affects subjects' belief of their susceptibility to HIV infection, the severity of the AIDS epidemic, or the benefits of testing. In addition, we might find an increase in testing uptake for those offered incentives for HIV testing if cost consideration is preventing subjects from learning their HIV status.

Columns 1-2 and 5-8 in Table 3 present the impact on HIV testing status in the last three months and accepting our HIV test offer, respectively. Column 2 in Panel A shows that people in Group 1, Group 2, and Group 3 are more likely to report learning their HIV status by 8, 63, and 57 percentage points than those in the control group in the three months after the intervention. The coefficients of Column 6 for Group 2 and Group 3 are similar to those of Column 2, which suggests that the increase of HIV testing for Group 2 and Group 3 is mostly driven by our offer. The fact that the increase in testing uptake for G1 is only one-eighth of the increase in uptake for Group 2 and Group 3, in spite of comparable improvement in HIV/AIDS knowledge for all the three treatment groups, shows the importance of cost barriers in affecting the testing decision. There is no significant difference in testing uptake between Group 2 and Group 3.

Columns 3-4 and 7-8 present the results of HIV testing in the second round. All participants are offered either home-based testing or conditional cash transfer. We find no evidence that test take-up is different across the groups. Note that it is the second chance for HIV testing for those in Group 2 and Group 3, while it is the first for Group 1 and the control group. Together with the fact that HIV testing does not influence desire for future HIV testing as shown in Columns 9-12, it shows that a previous test might not dampen future demand for HIV testing. Table 2 in the Appendix presents the robustness of this finding, showing HIV testing in the second round. On average, 79% of subjects receive HIV testing, but there is no evidence of a significant difference in testing acceptance rate by treatment status.

In addition, comparing HIV test take-up in the second round between Group 1 and the control group shown in Columns 7-8 of Table 3, disentangles whether HIV education six month prior influences test take-up. Contrary to the significant impact of HIV education on HIV test take-up in the short run, we find no evidence that the HIV education influences test take-up in the long run.

#### 4.1.3 Detection of HIV positive

Table 4 compares the effectiveness of home testing and facility-based testing in terms of detection of HIV positive. Note that either home testing or conditional cash transfer to facility-based HIV testing was randomly offered in both rounds.[10] Even though the testing take-up rate to home and conditional cash transfer is similar, home testing is strikingly better to detect HIV positive (Column 1 and 2). The results of the first and second round are very similar as shown in Column 3 and 4. However, it is a limitation that the total number of HIV positive-testers is only 18.

There are several possible explanations for these findings. Although test take-up rate is similar, a composition of test takers (non-takers) might be different between home and facility testers. We

[10] HIV test is offered to Group 2 and 3, and Group 1 and 4 in the first and second round, respectively.

directly address this consideration in Appendix table 5. It shows that home testers' primary sexual partner is less likely to be a spouse or cohabiting partner than those who received facility HIV testing (Column 6), which suggests that home HIV testers could be those with riskier sexual behaviors, and thus higher change of HIV infection. Another potential explanation is those with HIV is less likely to be healthy enough to go to the assigned clinic that often takes a few hours. We find a subjective health status of home testers is worse than that of facility testers, but it is not statistically significant. Last potential explanation is that home testing provides more secure environments so that potential HIV positive testers might accept the testing offer easily.

### 4.2. Impact of HIV/AIDS knowledge and HIV Testing

#### 4.2.1. Impact on Infection Expectation

If individuals who learn their HIV status revise their prior belief about HIV infection, then HIV testing changes infection expectations. In this section, we present results on the effect of testing on HIV infection expectation after learning one's HIV status. Since behavioral responses to HIV testing might differ by test results, as theorized by Boozer and Philpson (2000) and Delavande and Kohler (2009), ITT and IV estimates can hide potential heterogeneity in behavioral response and can be misleading to the average tester. Therefore we also present DID estimation results in Panel C. In our case, however, ITT and IV estimates for testers in Group 3 can be interpreted as the effect of learning an HIV-negative result because there is no HIV positive tester in Group 3 (See Figure 1).[11]

Figure 3 compares a subjective belief about HIV infection for Group 1 and 4 (no testing offer) and Group 2 and 3 (testing offer). Left and right columns show the subjective belief in the first and second follow-up survey, respectively. Each column presents results of negative (upper) and positive (lower) testers. We find the probability of reporting "no chance of HIV infection" increases among HIV-negative testers, although it is not statistically significant. The results of

[11] Note that all first round testers in Group 3 learned an HIV-negative test result while 7 (=3.2%) testers in Group 2 learned an HIV-positive test result.

HIV positive testers are striking. Everybody who learned HIV positive reported that chance of HIV infection is high in three months after the testing, but only 20% kept the original belief in six months.

We present these results more formally with regression in Table 4. Columns 1-2 and 3-4 present results on infection expectation in the first and second follow-up survey, respectively. Panel A shows that people in Group 3 significantly decrease their chance of HIV infection in the first three months, but that this change does not remained the same as the original after six months. Since there is no positive tester in Group 3, the change in infection expectation is driven solely by those learn HIV-negative. As shown in Panel B, we find no evidence that HIV testing and knowledge do not have an impact on infection expectation, but this is because changes in infection expectation for negative- and positive-testers are cancelled out. We find that infection expectation among the positive-testers significantly increases, as shown in Panel C. All positive-testers actually report their probability is high in the first follow-up. However, surprisingly, this increase disappears in six months.

This change in infection expectation for positive testers suggests that the shock to expectation formation of learning an HIV-positive result dissipates over time. Delavande and Kohler (2009) also find that 70% of subjects who learned of an HIV-positive result two years prior reported "no likelihood" or "low likelihood" of being infected with HIV. They say that such behavior by positive testers might be explained by subjects, especially those who continued to feel healthy, "forgetting" about the test result over time. An alternative explanation is denial. People who learn that they are HIV positive may be shocked at first, but may try to deny their status to mitigate the stress from the result.

To summarize, subjects who learn of an HIV-positive (negative) result tend to revise their prior belief of HIV infection upwards (downwards) in the short run. However, this effect, especially for positive-testers, tends to dissipate very quickly. This leads us to expect a limited change in sexual behaviors in the long run.

4.2.2. Impact on Sexual Behavior

We now explore a causal effect of HIV/AIDS knowledge and HIV testing on sexual behaviors. We first present the results on sexual intercourse in Table 5, including the following indicators: sexually active (Columns 1-4), multiple partners (Columns 5-8), and non-primary partner (Columns 9-12). Columns 5-6 and 9-10 in Panel A indicate that the probability of having multiple partners and a non-primary partner increases in the short run, respectively. The increase of risky sexual behaviors seems to be driven by both HIV education and HIV testing because of the following reasons. First, we find a sizable coefficient for Group 1 in Panel A, indicating HIV education contributes to risky sexual behaviors, and it is supported by the positive and significant coefficients in IV estimation shown in Columns 9-10 of Panel B. The size of the coefficients is bigger in Group 2 and Group 3 than in Group 1 (even though they are not statistically significant). This potentially indicates that HIV testing also contributes risky sexual behaviors, even though the result is HIV-negative (shown in Group 3). The DID estimation results reported in Panel C show an insignificant effect on the likelihood of abstinence, multiple sexual partnerships, and a non-primary partner, perhaps due to the relatively smaller sample size of positive-testers. As for infection expectation, all these changes disappear in six months.

Table 6 presents results on the use of condom. We find a positive and significant effect of learning an HIV-positive result on the probability to take-up a condom in the short run (Columns 5-6, Panel C). This is consistent with Thornton (2008), who finds a higher likelihood of condom purchase for positive testers in the short run. However, we also find a negative and significant effect of learning an HIV-positive result on uptake of free male condoms at the second follow-up (Columns 11-12, Panel C). Reduced demand for protected sex and HIV infection expectation for HIV-positive testers may be consistent with Delavande and Kohler's (2009) explanation of HIV-positive testers "forgetting" test results.

In sum, we find that the probability of multiple partners or a non-primary partner increases in both negative- and positive-testers in the short run, but that all these change disappear in six months. In terms of condom usage, we find suggestive evidence of a *positive (negative)* effect on condom usage in the *first (second)* follow-up among HIV-positive testers.

4.2.3. Impact on Fertility Desire

Learning a HIV status can be a shock to life expectancy, and it also can increase the perceived risk of transmission of the virus to the next generation. Therefore, we may expect changes in fertility and fertility desire. Table 7 presents the results. We find a decrease in fertility desire in male HIV-positive testers after three months (Columns 11-12 in Panel C of Table 7), but this does not translate to absenteeism (Columns 3-4 in Panel C of Table 5) or family planning practice (Columns 13-14 in Panel C of Table 7).

## 5. Conclusion

HIV/AIDS poses a major development and health policy challenge. Voluntary HIV counseling and testing is considered an important prevention strategy in the fight against the AIDS epidemic, but test take-up rate is still low. This paper investigates impact of HIV door-to-door education and easier access to HIV testing services to HIV/AIDS knowledge and HIV test take-up. We also explore the causal effects of HIV/AIDS knowledge and HIV testing on infection expectation and sexual behaviors.

To see this, we implement a randomized controlled trial where we randomly offer two rounds of incentives to encourage them to learn their HIV status. During the first round intervention, we offer HIV education for Group 1, HIV education and home-based HIV counseling and testing for Group 2, and HIV education and cash incentives for facility-based testing for Group 3. The first and second follow-up surveys are conducted around three and six months after the first round intervention. The second round intervention is done right after the second follow-up survey. A randomly selected half of study participants are offered home-based testing and the other half are offered cash incentives for facility-based HIV testing.

We first find that the level of HIV/AIDS knowledge significantly increases, and also find suggestive evidence of knowledge spill-over. The HIV testing rate increases by 7, 64, and 57 percentage points in Groups 1, 2, and 3, respectively. Although test take-up rate is similar in

home and facility-based HIV testing, home testing are substantially more efficient to find those with HIV. In addition, we find that HIV testing take-up does not dampen future demand for HIV testing. Infection expectation is also updated for both learned negative and positive result from the testing, but the effect does not persist after six months. These outcomes correspond to the finding that the probability of having multiple partners increases in the short run, but this increase disappears within six months.

This study provides implications for a movement in the international community fighting for shift voluntary to routine HIV testing. First, easy access is extremely important. Door-to-door intensive HIV education with information of HIV testing facility improves HIV testing by only 8 percentage points, but when it combined with home testing or conditional cash transfer for facility-based HIV testing, test take-up rate increases by around 60 percentage points. This in turn highlights the need to accompany HIV testing promotion campaigns with simultaneous efforts to improve access to testing services (especially home HIV testing) to achieve the goal of universal access to HIV counseling and testing (WHO/UNAIDS/UNICEF. 2010). We also find home HIV testing could be more effective to detect HIV positive than conditional cash transfer. We find that infection expectation and behavioral change is limited in that the change does not persist in the long term, which is consistent to Thornton (2012), However, it is unclear repeated tests would affect infection expectation and behaviors in the long run. Further study will be needed to address this question.

**References**


Angotti, Nicole, Agatha Bula, Lauren Gaydosh, Eitan Zeev Kimchi, Rebecca L. Thornton, and Sara E. Yeatman. "Increasing the acceptability of HIV counseling and testing with three C's: convenience, confidentiality and credibility." Social Science & Medicine 68, no. 12 (2009): 2263-2270.

Arcury, Thomas; Wilbert Gesler; John Preisser; Jill Sherman; John Spencer and Jamie Perin. 2005. "The Effects of Geography and Spatial Behavior on Health Care Utilization among the Residents of a Rural Region." *Health Service Research*, 40(1), 135-55.

Boozer, Michael and Tomas Philipson. 2000. "The Impact of Public Testing for Human Immunodeficiency Virus." The Journal of Human Resources, 35(3), 419-46.

Buor, Daniel. 2003. "Analyzing the Primacy of Distance in the Utilization of Health Services in the Ahafo-Ano South District, Ghana." *International Journal of Health Planning and Management*, 2003(18), 293-311.

Coates, Thomas. 2000. "The Voluntary Hiv-1 Counseling, and Testing Efficacy Study Group, Efficacy of Voluntary Hiv-1 Counselling and Testing in Individuals and Couples in Kenya, Tanzania and Trinidad: A Randomized Trial." *The Lancet*, 356,103-21.

CSA [Ethiopia] and ORC Macro. 2006. "Ethiopia Demographic and Health Survey 2005," Addis Ababa, Ethiopia and Calverton, Maryland, USA: Central Statistical Agency and ORC Macro.

Central Statistical Agency [Ethiopia] and ICF International. 2012. Ethiopia Demographic and Health Survey 2011. Addis Ababa, Ethiopia and Calverton, Maryland, USA: Central Statistical Agency and ICF International.

Delavande, Adeline and Hans-Peter Kohler. 2009. "The Impact of HIV Testing on Subjective Expectations and Risky Behavior in Malawi."

Duflo, Esther; Pascaline Dupas; Michael Kremer and Samuel Sinei. 2006. "Education and HIV/AIDS Prevention: Evidence from a Randomized Evaluation in Western Kenya," World Bank Policy Research Working Paper 4024.

Duflo, Esther, Pascaline Dupas, and Michael Kremer. "Education, HIV, and Early Fertility: Experimental Evidence from Kenya." (2012).

Dupas, Pascaline. 2009. "Do Teenagers Respond to HIV Risk Information? Evidence from a Field Experiment in Kenya," National Bureau of Economic Research Working Paper 14707.

Fylkesnes, Knut and Seter Siziya. 2004. "A Randomized Trial on Acceptability of Voluntary HIV Counseling and Testing." *Tropical Medicine and International Health Economics*, 9(5), 566-72.

Geary, Cynthia; Jean-Paul Tchupo; Laura Johnson; Claude Cheta and Tiburce Nyama. 2003. "Respondent Perspectives on Self-Report Measures of Condom Use." *AIDS Education and Prevention*, 15(6), 499-515.

Gong, Erick. 2014 "HIV testing and risky sexual behavior." Forthcoming, *The Economic Journal*

Joseph, Alun and David Phillips. 1984. *Accessibility and Utilization: Geographical Perspectives on Health Care Delivery*. New York: Harper.

Mutale, Wilbroad; Charles Michelo; Marte Jurgensen and Knut Fylkesnes. 2010. "Home-Based Voluntary HIV Counselling and Testing Found Highly Acceptable and to Reduce Inequalities." *BMC Public Health*, 10(347).

Obare, Francis, Peter Fleming, Philip Anglewicz, Rebecca Thornton, Francis Martinson, Agatha Kapatuka, Michelle Poulin, Susan Watkins, and Hans-Peter Kohler. "Acceptance of repeat population-based voluntary counselling and testing for HIV in rural Malawi." Sexually transmitted infections 85, no. 2 (2009): 139-144.

Plummer, Mary; Daniel Wight; Joyce Wamoyi; Gerry Mshana; Richard Hayes and David Ross. 2006. "Farming with Your Hoe in a Sack: Condom Attitudes, Access, and Use in Rural Tanzania." Studies in Family Planning, 37(1), 29-40.

Thornton, Rebecca. 2008. "The Demand for, and Impact of, Learning HIV Status." *American Economic Review*, 98(5), 1829-63.

Thornton, R. L. (2012). HIV testing, subjective beliefs and economic behavior. *Journal of development economics*, 99(2), 300-313.

Tremblay, Carol and Davina Ling. 2005. "AIDS Education, Condom Demand, and the Sexual Activity of American Youth." *Health Economics*, 14, 851-67.

WHO/UNAIDS/UNICEF. 2010. "Towards Universal Access: Scaling up Priority HIV/AIDS Interventions in the Health Sector: Progress Report 2010," Geneva.

Wolff, Brent; Barbara Nyanzi; George Katongole; Deo Ssesanga; Anthony Ruberantwari and Jimmy Whitworth. 2005. "Evaluation of a Home-Based Voluntary Counselling and Testing Intervention in Rural Uganda." Health Policy and Planning, 20(2), 109-16.

Yoder, P. Stanley; Anne R. Katahoire; David Kyaddondo; Zainab Akol; Rebecca Bunnell and Frank Kaharuza. 2006. "Home-Based HIV Testing and Counselling in a Survey Context in Uganda," Calverton, Maryland, USA: ORC Macro.

Zellner, Arnold. 1962. "An Efficient Method of Estimating Seemingly Unrelated Regressions and Tests for Aggregation Bias." *Journal of the American Statistical Association*, 57(298), 348-68.

## Tables and Figures

### Table 1. Summary of Baseline Characteristics

Panel A. First Round Randomization

| Variable | Obs | All (1) | Control(G4) (2) | G4 vs G1 (3) | G4 vs G2 (4) | G4 vs G3 (5) |
|---|---|---|---|---|---|---|
| Panel A1. Individual Characteristics | | | | | | |
| Age | 1,663 | 31.51 | 31.67 | 0.161 | 0.209 | -1.154 |
| Male | 1,663 | 0.512 | 0.531 | -0.068** | -0.006 | -0.023 |
| Married | 1,663 | 0.738 | 0.742 | 0.002 | -0.025 | 0.003 |
| Engaged in economic activity | 1,663 | 0.802 | 0.828 | -0.017 | -0.067** | -0.044* |
| Had formal education | 1,663 | 0.870 | 0.866 | 0.021 | -0.023 | 0.022 |
| Illiterate | 1,663 | 0.341 | 0.335 | 0.004 | 0.018 | 0.009 |
| Religion | | | | | | |
| Orthodox Christian | 1,663 | 0.605 | 0.644 | -0.046 | -0.052 | -0.097*** |
| Muslim | 1,663 | 0.377 | 0.339 | 0.030 | 0.054* | 0.104*** |
| Health Status | | | | | | |
| Perceived health compared to others | 929 | 0.877 | 0.876 | 0.023 | -0.027 | 0.006 |
| Satisfied with health status | 1,660 | 0.854 | 0.861 | 0.013 | -0.025 | -0.026 |
| HIV/AIDS-Related Knowledge Score | 1,637 | 0.613 | 0.633 | -0.029 | -0.040** | -0.030 |
| Know HIV testing center | 1,663 | 0.608 | 0.591 | 0.028 | 0.024 | 0.032 |
| Have a regular sex partner | 1,410 | 0.892 | 0.893 | -0.016 | -0.009 | 0.022 |
| Relationship with first sexual partner | | | | | | |
| Spouse/Fiance/Cohabiting partner | 716 | 0.451 | 0.458 | -0.064 | 0.018 | 0.008 |
| Non live-in boyfriend/girlfriend | 716 | 0.337 | 0.356 | -0.030 | -0.011 | -0.057 |
| Others | 716 | 0.200 | 0.176 | 0.089** | -0.011 | 0.046 |
| Non primary partner | 1,233 | 0.012 | 0.014 | -0.002 | -0.010 | -0.002 |
| Panel A2. Household Characteristics | | | | | | |
| Area of residence: Rural | 959 | 0.900 | 0.906 | 0.005 | -0.005 | -0.031 |
| Came from another area | 853 | 0.155 | 0.149 | -0.017 | 0.020 | 0.025 |
| Own Land | 848 | 0.875 | 0.880 | 0.005 | 0.015 | -0.045 |
| Own Ox(en) | 960 | 0.763 | 0.783 | -0.023 | -0.044 | -0.038 |
| Own Electricity | 847 | 0.216 | 0.193 | -0.003 | 0.057 | 0.058 |
| Own Radio | 848 | 0.726 | 0.751 | -0.011 | -0.071* | -0.039 |
| Own Television | 850 | 0.073 | 0.081 | -0.023 | -0.017 | 0.001 |

Notes. Table 1 reports means of selected baseline variables. Panel A summarizes individual level information and Panel B summarizes household level information. Columns 1-2 show summary for the whole sample for subjects initially assigned to control group, respectively. Columns 3 - 8 report mean differences (and significance levels for difference of mean tests) between research groups with different treatment status during first round randomization. Column 10 - 19 report mean differences (and significance levels for difference of mean tests) between research groups with different treatment status during second round randomization. † Perception of riskiness of sexual encounters is based on baseline question: "Given your sexual behavior in the past, how safe do you think have your sexual encounters been?" ‡ A non-primary partner refers to a commercial sex worker or someone with whom the respondent had a casual acquaintance. * Significant at 10%, ** Significant at 5%, *** Significant at 1%.

# Table 1. Summary of Baseline Characteristics(Cont')

Panel B. Second Round Randomization

| Variable | Obs | G4Home (6) | G4Home versus G1Home (7) | G4Home versus G1Cash (8) | G4Home versus G2Home (9) | G4Home versus G2Cash (10) | G4Home versus G3Home (11) | G4Home versus G3Cash (12) | G4Home versus G4Cash (13) |
|---|---|---|---|---|---|---|---|---|---|
| Panel B1. Individual Characteristics | | | | | | | | | |
| Age | 1,345 | 32.660 | -0.147 | 0.818 | -0.103 | -0.713 | -1.390 | -1.116 | 0.662 |
| Male | 1,345 | 0.532 | -0.046 | -0.068 | -0.076 | 0.020 | -0.053 | -0.024 | -0.011 |
| Married | 1,345 | 0.796 | 0.038 | 0.028 | -0.009 | -0.046 | 0.012 | 0.023 | 0.017 |
| Engaged in economic activity | 1,345 | 0.822 | 0.019 | -0.038 | -0.084** | -0.046 | 0.000 | -0.072* | -0.014 |
| Had formal education | 1,345 | 0.866 | 0.011 | 0.006 | 0.010 | -0.039 | 0.012 | 0.005 | -0.009 |
| Illiterate | 1,345 | 0.305 | 0.029 | 0.071 | 0.081* | 0.014 | 0.059 | 0.082 | -0.038 |
| Religion | | | | | | | | | |
| Orthodox Christian | 1,345 | 0.669 | 0.005 | -0.125** | -0.097* | -0.040 | -0.062 | -0.169*** | 0.026 |
| Muslim | 1,345 | 0.305 | 0.007 | 0.127** | 0.102** | 0.066 | 0.081* | 0.195*** | -0.038 |
| Health Status | | | | | | | | | |
| Perceived health compared to others | 729 | 0.853 | 0.052 | 0.018 | -0.033 | 0.011 | -0.009 | 0.061 | -0.038 |
| Satisfied with health status | 1,345 | 0.848 | 0.043 | -0.008 | -0.034 | 0.006 | -0.076* | 0.039 | -0.031 |
| HIV/AIDS-Related Knowledge Score | 1,321 | 0.641 | -0.019 | -0.048 | -0.062** | -0.067** | 0.002 | -0.096*** | 0.030 |
| Know HIV testing center | 1,345 | 0.572 | 0.080 | 0.020 | 0.055 | 0.057 | 0.042 | 0.026 | -0.070* |
| Have a regular sex partner | 1,198 | 0.921 | -0.047 | 0.006 | -0.009 | -0.064* | 0.016 | 0.011 | 0.018 |
| Relationship with first sexual partner | | | | | | | | | |
| Spouse/Fiance/Cohabiting partner | 604 | 0.468 | -0.113 | 0.022 | -0.022 | 0.013 | 0.032 | 0.015 | 0.047 |
| Non live-in boyfriend/girlfriend | 604 | 0.365 | -0.010 | -0.120 | -0.008 | -0.050 | -0.098 | -0.065 | 0.012 |
| Others | 604 | 0.167 | 0.124** | 0.079 | 0.030 | 0.000 | 0.050 | 0.033 | -0.044 |
| Non primary partner | 1,213 | 0.008 | 0.015 | -0.008 | -0.008 | 0.001 | 0.007 | 0.000 | -0.012 |
| Panel B2. Household Characteristics | | | | | | | | | |
| Area of residence: Rural | 772 | 0.879 | 0.045 | 0.053 | 0.010 | 0.021 | 0.013 | -0.012 | -0.031 |
| Came from another area | 746 | 0.146 | -0.047 | 0.026 | -0.012 | 0.057 | 0.031 | 0.007 | -0.005 |
| Own Land | 772 | 0.856 | 0.040 | 0.058 | 0.044 | 0.013 | -0.008 | -0.033 | -0.049 |
| Own Ox(en) | 749 | 0.777 | -0.018 | 0.004 | -0.110* | -0.006 | -0.066 | -0.057 | -0.010 |
| Own Electricity | 772 | 0.214 | -0.058 | -0.028 | 0.072 | 0.077 | 0.027 | 0.018 | 0.039 |
| Own Radio | 772 | 0.774 | 0.057 | -0.160** | -0.145** | -0.020 | -0.052 | -0.112* | 0.029 |
| Own Television | 772 | 0.096 | -0.044 | -0.053 | -0.024 | -0.031 | -0.020 | -0.038 | 0.030 |

Notes: Table 1 reports means of selected baseline variables. Panel A summarizes individual level information and Panel B summarizes household level information. Columns 1-2 show summary for the whole sample for subjects initially assigned to control group, respectively. Columns 3 - 8 report mean differences (and significance levels for difference of mean tests) between research groups with different treatment status during first round randomization. Column 10 - 19 report mean differences (and significance levels for difference of mean tests) between research groups with different treatment status during second round randomization. † Perception of riskiness of sexual encounters is based on baseline question: "Given your sexual behavior in the past, how safe do you think have your sexual encounters been?" ‡ A non-primary partner refers to a commercial sex worker or someone with whom the respondent had a casual acquaintance. * Significant at 10%, ** Significant at 5%, *** Significant at 1%.

Table 2. Impact on HIV/AIDS knowledge

| | HIV/AIDS knowledge | | Attitude |
|---|---|---|---|
| | Core HIV/AIDS knowledge (5 points standard) | | Accepting Attitude Towards People with HIV |
| Follow-up round | First | Second | First |
| | (1) | (2) | (3) |
| Panel A. ITT estimation | | | |
| G1 (Edu) | 0.081*** | -0.149 | 0.245*** |
| | (0.016) | (0.098) | (0.063) |
| G2 (Home) | 0.095*** | -0.034 | 0.186*** |
| | (0.015) | (0.095) | (0.062) |
| G3 (Cash) | 0.120*** | -0.046 | 0.189*** |
| | (0.014) | (0.097) | (0.060) |
| Constant | 0.734*** | 0.477* | -0.077 |
| | (0.048) | (0.263) | (0.185) |
| Control group mean | 0.7686 | 0.8700 | 0.7083 |
| R-Squared | 0.099 | 0.082 | 0.181 |
| Observation | 1,469 | 1,071 | 1,459 |
| Control | Yes | Yes | Yes |
| Village Effect | Yes | Yes | Yes |
| F test (Prob > F) | | | |
| Edu = Home | (0.3748) | (0.3293) | (0.3775) |
| Edu = Cash | (0.0129) | (0.3795) | (0.4019) |
| Home = Cash | (0.0998) | (0.9180) | (0.9655) |
| Edu = Home = Cash | (0.0382) | (0.5642) | (0.6100) |
| Panel B. Diff-in-Diff estimation by HIV status | | | |
| Testing Incentive | 0.343*** | 0.009 | 0.108** |
| | (0.048) | (0.073) | (0.046) |
| HIV Positive | 0.276 | 0.004 | 0.083 |
| | (0.278) | (0.329) | (0.216) |
| Incentive*HIV Positive | 0.369 | -0.169 | -0.430 |
| | (0.294) | (0.601) | (0.433) |
| R-Squared | 0.084 | 0.080 | 0.173 |
| Observation | 1,469 | 1,071 | 1,459 |
| Controls | Yes | Yes | Yes |
| Village Fixed Effects | Yes | Yes | Yes |

Notes: Table 2 reports an effect of interventions on HIV/AIDS knowledge and attitude to HIV patients. Controls include age dummy, sex, marital status, religion, education, employment status, area of residence, household asset ownership (indicators for ownership of land, electricity, radio, television, mobile phone, and a measure of scaled livestock units. Reported at the bottom of Panel A are probability values from F tests of the equality of effect estimates for various pairs of treatment groups. Panel A represents the results from ITT regression. Panel B represents DID regression results which is regressed on testing incentive at first intervention (Testing Incentive=1 if offered home VCT or cash incentive), HIV Positive result (=1 if HIV positive, =0 otherwise) and interaction term between incentive and positive test result. Standard errors are in parentheses. * Significant at 10%, ** Significant at 5%, *** Significant at 1%.

Table 3. Impact on HIV Testing

| | Learned HIV Status | | Accept HIV testing offer | | Want to test in the future | |
|---|---|---|---|---|---|---|
| Follow-up round | First | Second | First | Second | First | Second |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| G1 (Edu) | 0.081** | -0.013 | -0.005 | 0.022 | -0.019 | 0.001 |
| | (0.034) | (0.027) | (0.008) | (0.032) | (0.018) | (0.016) |
| G2 (Home) | 0.631*** | 0.013 | 0.668*** | 0.042 | -0.029* | -0.020 |
| | (0.030) | (0.028) | (0.028) | (0.033) | (0.017) | (0.017) |
| G3 (Cash) | 0.567*** | -0.020 | 0.639*** | 0.045 | -0.009 | -0.020 |
| | (0.032) | (0.026) | (0.028) | (0.032) | (0.015) | (0.019) |
| Constant | 0.210** | 0.231** | 0.021 | 0.685*** | 0.911*** | 0.951*** |
| | (0.099) | (0.091) | (0.073) | (0.102) | (0.043) | (0.056) |
| Control Group Mean | 0.1823 | 0.153 | 0.255 | 0.7941 | 0.9609 | 0.9526 |
| R-Squared | 0.379 | 0.029 | 0.561 | 0.084 | 0.091 | 0.064 |
| Observation | 1,476 | 1,345 | 1,663 | 1,345 | 1,449 | 1,345 |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Village Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| F test (Prob > F) | | | | | | |
| Edu = Home | (0.0000) | (0.4134) | (0.0000) | (0.5839) | (0.6578) | (0.2640) |
| Edu = Cash | (0.0000) | (0.8370) | (0.0000) | (0.5278) | (0.6253) | (0.3052) |
| Home = Cash | (0.0760) | (0.3068) | (0.4628) | (0.9369) | (0.3321) | (0.9905) |
| Edu = Home = Cash | (0.0000) | (0.5668) | (0.0000) | (0.7892) | (0.6213) | (0.4447) |
| Panel B. Diff-in-Diff estimation | | | | | | |
| Testing Incentive | 0.569*** | 0.002 | 0.650*** | 0.038 | -0.013 | -0.021 |
| | (0.024) | (0.020) | (0.020) | (0.024) | (0.012) | (0.014) |
| HIV Positive | 0.058 | 0.070 | -0.054* | 0.214*** | -0.051 | 0.025 |
| | (0.091) | (0.126) | (0.028) | (0.044) | (0.072) | (0.022) |
| Incentive*HIV Positive | 0.103 | -0.075 | 0.419*** | -0.090 | 0.007 | 0.063 |
| | (0.101) | (0.173) | (0.060) | (0.068) | (0.120) | (0.042) |
| R-Squared | 0.375 | 0.028 | 0.563 | 0.086 | 0.090 | 0.065 |
| Observation | 1,476 | 1,345 | 1,663 | 1,345 | 1,449 | 1,345 |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Village Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |

Notes: Table 3 reports an effect of interventions on HIV testing take-ups. Controls include age dummy, sex, marital status, religion, education, employment status, area of residence, household asset ownership (indicators for ownership of land, electricity, radio, television, mobile phone, and a measure of scaled livestock units. Panel A represents the results from ITT regression. Panel B represents DID regression results. Reported at the bottom of the table are probability values from F tests of the equality of effect estimates for various pairs of treatment groups. Standard errors are in parentheses. * Significant at 10%, ** Significant at 5%, *** Significant at 1%

Table 4. Home testing vs. Facility-based testing in detecting HIV positive

| | Detection of HIV positive | | | |
|---|---|---|---|---|
| Intervention round | First and second | | First (G2, G3) | Second (G1, G4) |
| | (1) | (2) | (3) | (4) |
| Home Testing | 0.018*** | 0.018*** | 0.021** | 0.019* |
| | (0.007) | (0.007) | (0.009) | (0.010) |
| Constant | 0.005 | 0.006 | 0.021 | -0.021 |
| | (0.021) | (0.021) | (0.026) | (0.031) |
| Control Group Mean | 0.0108 | | 0.0104 | 0.0111 |
| R-Squared | 0.057 | 0.057 | 0.103 | 0.111 |
| Observation | 1484 | 1484 | 672 | 812 |
| Controls | Yes | Yes | Yes | Yes |
| Village Fixed Effects | Yes | Yes | Yes | Yes |
| Round Fixed Effects | No | Yes | No | No |

Table 4 compares the effectiveness of home testing and facility-based testing on detecting HIV positive. Controls include age dummy, sex, marital status, religion, education, employment status, area of residence, household asset ownership (indicators for ownership of land, electricity, radio, television, mobile phone, and a measure of scaled livestock units). The first column includes control and village fixed effect, and the second column additionally include round fixed effect. Standard errors are in parentheses. * Significant at 10%, ** Significant at 5%, *** Significant at 1%.

Table 5. Impact on Infection Expectation

| | Infection expectation is high | |
|---|---|---|
| Follow-up round | First | Second |
| | (1) | (2) |
| Panel A. ITT estimation | | |
| G1 (Edu) | -0.004 | -0.017 |
| | (0.014) | (0.014) |
| G2 (Home) | 0.019 | -0.005 |
| | (0.019) | (0.014) |
| G3 (Cash) | -0.029** | -0.018 |
| | (0.012) | (0.013) |
| Constant | 0.020 | -0.015 |
| | (0.043) | (0.046) |
| Control group mean | 0.0481 | 0.0486 |
| R-Squared | 0.050 | 0.086 |
| Panel B. IV estimation | | |
| Tested | 0.013 | 0.015 |
| | (0.027) | (0.027) |
| HIV/AIDS Knowledge | -0.022 | -0.023 |
| | (0.029) | (0.028) |
| Constant | -0.021 | 0.008 |
| | (0.048) | (0.054) |
| Panel C. Diff-in-Diff estimation | | |
| Testing Incentive | -0.015 | -0.009 |
| | (0.011) | (0.011) |
| HIV Positive | -0.039* | -0.028 |
| | (0.022) | (0.019) |
| Incentive*HIV Positive | 1.021*** | 0.204* |
| | (0.028) | (0.105) |
| R-Squared | 0.147 | 0.086 |
| Observation | 1,441 | 1,227 |
| Controls | Yes | Yes |
| Village Fixed Effects | Yes | Yes |

Notes: Table 5 reports an impact of interventions on infection expectation. Controls include age, sex, marital status, religion, education, employment status, area of residence, household asset ownership (indicators for ownership of land, electricity, radio, television, mobile phone, and a measure of scaled livestock units). Panel A represents ITT estimates, Panel B represents instrumental variable approach which uses three types of interventions as instruments for HIV testing and HIV/AIDS knowledge, and Panel C represents the DID estimates of identical dependent variable. Standard errors are in parentheses. * Significant at 10%, ** Significant at 5%, *** Significant at 1%.

Table 6. Impact on Sexual Behaviors

| | Sexually active | | Multiple sexual partners | | Non-primary sexual partner | |
|---|---|---|---|---|---|---|
| Follow-up round | First | Second | First | Second | First | Second |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Panel A. ITT estimation | | | | | | |
| G1 (Edu) | 0.017 | 0.019 | 0.024** | 0.000 | 0.028** | -0.003 |
| | (0.022) | (0.031) | (0.011) | (0.008) | (0.011) | (0.002) |
| G2 (Home) | -0.021 | 0.049* | 0.040*** | 0.007 | 0.034*** | 0.000 |
| | (0.023) | (0.028) | (0.014) | (0.009) | (0.013) | (0.004) |
| G3 (Cash) | -0.009 | -0.040 | 0.030** | -0.003 | 0.050*** | -0.002 |
| | (0.025) | (0.030) | (0.012) | (0.006) | (0.014) | (0.002) |
| Constant | 0.207** | 0.165 | -0.008 | -0.008 | 0.266** | -0.017 |
| | (0.085) | (0.115) | (0.025) | (0.013) | (0.106) | (0.010) |
| Control group mean | 0.7726 | 0.7668 | 0.0068 | 0.0093 | 0.0023 | 0.0037 |
| R-Squared | 0.440 | 0.177 | 0.139 | 0.061 | 0.172 | 0.033 |
| Panel B. IV estimation | | | | | | |
| Tested | -0.068 | -0.023 | 0.028 | 0.004 | 0.022 | 0.007 |
| | (0.043) | (0.051) | (0.019) | (0.015) | (0.020) | (0.004) |
| HIV/AIDS Knowledge | 0.048 | 0.009 | 0.020 | 0.006 | 0.049** | -0.003 |
| | (0.045) | (0.052) | (0.020) | (0.015) | (0.022) | (0.004) |
| Constant | 0.258*** | 0.164 | -0.004 | -0.026 | 0.293*** | -0.007 |
| | (0.078) | (0.101) | (0.046) | (0.029) | (0.050) | (0.008) |
| Panel C. Diff-in-Diff estimation | | | | | | |
| Testing Incentive | -0.020 | -0.002 | 0.026*** | 0.001 | 0.035*** | -0.000 |
| | (0.018) | (0.022) | (0.010) | (0.006) | (0.010) | (0.002) |
| HIV Positive | -0.078 | 0.133*** | 0.174 | -0.007 | 0.164 | -0.004 |
| | (0.053) | (0.039) | (0.152) | (0.007) | (0.151) | (0.006) |
| Incentive*HIV Positive | -0.004 | 0.012 | 0.060 | -0.000 | -0.187 | 0.006 |
| | (0.120) | (0.093) | (0.269) | (0.016) | (0.151) | (0.007) |
| R-Squared | 0.440 | 0.174 | 0.156 | 0.060 | 0.175 | 0.032 |
| Observation | 1,476 | 1,345 | 1,127 | 1,317 | 1,127 | 1,374 |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Village Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |

Notes: Table 6 reports an impact of interventions on sexual behaviors. Controls include age, sex, marital status, religion, education, employment status, area of residence, household asset ownership (indicators for ownership of land, electricity, radio, television, mobile phone, and a measure of scaled livestock units). Panel A represents ITT estimates, Panel B represents instrumental variable approach which uses three types of interventions as instruments for HIV testing and HIV/AIDS knowledge, and Panel C represents the DID estimates of identical dependent variable. Standard errors are in parentheses. * Significant at 10%, ** Significant at 5%, *** Significant at 1%.

Table 7. Impact on Use of Condom

| | Used condom in last three months | | Prob (Take-up of condom) | | Number of condom taken | |
|---|---|---|---|---|---|---|
| Follow-up round | First | Second | First | Second | First | Second |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Panel A. ITT estimation | | | | | | |
| G1 (Edu) | -0.023 | 0.050* | -0.048 | -0.013 | 0.092 | -0.233 |
| | (0.017) | (0.026) | (0.036) | (0.034) | (0.285) | (0.273) |
| G2 (Home) | -0.003 | -0.021 | 0.007 | 0.057 | 0.185 | 0.244 |
| | (0.019) | (0.021) | (0.034) | (0.036) | (0.266) | (0.293) |
| G3 (Cash) | -0.028 | 0.003 | -0.037 | 0.045 | -0.235 | 0.195 |
| | (0.017) | (0.024) | (0.035) | (0.036) | (0.265) | (0.287) |
| Constant | 0.268** | 0.116* | 0.242** | 0.458*** | 1.323 | 3.836*** |
| | (0.120) | (0.065) | (0.109) | (0.110) | (0.866) | (0.940) |
| Control group mean | 0.0914 | 0.0911 | 0.4479 | 0.3339 | 2.6840 | 2.4404 |
| R-Squared | 0.193 | 0.071 | 0.143 | 0.114 | 0.124 | 0.107 |
| Panel B. IV estimation | | | | | | |
| Tested | 0.014 | -0.107*** | 0.074 | 0.090 | 0.002 | 0.690 |
| | (0.033) | (0.040) | (0.063) | (0.061) | (0.465) | (0.496) |
| HIV/AIDS Knowledge | -0.053 | 0.098** | -0.097 | 0.012 | -0.018 | -0.277 |
| | (0.033) | (0.041) | (0.065) | (0.062) | (0.479) | (0.507) |
| Constant | 0.185** | 0.034 | 0.196* | 0.448*** | 1.351 | 3.540*** |
| | (0.089) | (0.080) | (0.114) | (0.123) | (0.837) | (1.004) |
| Panel C. Diff-in-Diff estimation | | | | | | |
| Testing Incentive | -0.008 | -0.028 | -0.003 | 0.058** | -0.077 | 0.324 |
| | (0.014) | (0.018) | (0.026) | (0.027) | (0.199) | (0.217) |
| HIV Positive | -0.072*** | -0.030 | 0.052 | 0.119 | 1.104 | 1.201 |
| | (0.028) | (0.071) | (0.108) | (0.191) | (1.298) | (1.575) |
| Incentive*HIV Positive | 0.045 | 0.295 | 0.386** | -0.191 | 2.166 | -2.296 |
| | (0.042) | (0.252) | (0.189) | (0.219) | (1.856) | (1.660) |
| R-Squared | 0.191 | 0.069 | 0.145 | 0.115 | 0.127 | 0.107 |
| Observation | 1,397 | 1,345 | 1,476 | 1,336 | 1,476 | 1,336 |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Village Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |

Notes: Table 7 reports an impact of interventions on use of condom. Controls include age, sex, marital status, religion, education, employment status, area of residence, household asset ownership (indicators for ownership of land, electricity, radio, television, mobile phone, and a measure of scaled livestock units. Panel A represents ITT estimates, Panel B represents instrumental variable approach which uses three types of interventions as instruments for HIV testing and HIV/AIDS knowledge, and Panel C represents the DID estimates of identical dependent variable. Standard errors are in parentheses. * Significant at 10%, ** Significant at 5%, *** Significant at 1%.

Table 8. Impact on Fertility Desire

| | Plan to have more child | | Plan to get pregnant (Female) | Want partner get pregnant (Male) | Currently using family planning method | Are you pregnant | |
|---|---|---|---|---|---|---|---|
| Follow-up round | First (1) | Second (2) | First (3) | First (4) | Second (5) | First (6) | Second (7) |
| Panel A. ITT estimation | | | | | | | |
| G1 (Edu) | -0.030 | -0.001 | 0.008 | -0.081* | -0.013 | -0.011 | 0.021 |
| | (0.035) | (0.042) | (0.040) | (0.048) | (0.040) | (0.024) | (0.029) |
| G2 (Home) | -0.008 | -0.005 | 0.060 | 0.025 | 0.043 | -0.009 | -0.016 |
| | (0.035) | (0.043) | (0.043) | (0.051) | (0.040) | (0.027) | (0.028) |
| G3 (Cash) | 0.003 | 0.067 | 0.031 | 0.051 | 0.018 | 0.040 | 0.008 |
| | (0.034) | (0.043) | (0.042) | (0.049) | (0.043) | (0.031) | (0.032) |
| Constant | 0.736*** | 0.208 | 0.016 | 0.520** | 0.200* | 0.172 | 0.112 |
| | (0.102) | (0.212) | (0.124) | (0.262) | (0.119) | (0.111) | (0.248) |
| Control group mean | 0.5930 | 0.5405 | 0.1560 | 0.3113 | 0.4534 | 0.0763 | 0.0759 |
| R-Squared | 0.258 | 0.071 | 0.091 | 0.164 | 0.193 | 0.104 | 0.119 |
| Panel B. IV estimation | | | | | | | |
| Tested | 0.020 | 0.038 | 0.059 | 0.198** | 0.066 | 0.025 | -0.029 |
| | (0.057) | (0.069) | (0.083) | (0.092) | (0.061) | (0.058) | (0.052) |
| HIV/AIDS Knowledge | -0.040 | -0.023 | 0.000 | -0.162 | 0.004 | -0.017 | 0.023 |
| | (0.059) | (0.073) | (0.076) | (0.101) | (0.063) | (0.055) | (0.050) |
| Constant | 0.624*** | 0.182 | -0.047 | 0.492 | 0.298** | 0.163* | -0.058 |
| | (0.110) | (0.240) | (0.143) | (0.312) | (0.124) | (0.099) | (0.160) |
| Panel C. Diff-in-Diff estimation | | | | | | | |
| Testing Incentive | 0.010 | 0.038 | 0.043 | 0.069* | 0.032 | 0.023 | -0.007 |
| | (0.026) | (0.032) | (0.032) | (0.037) | (0.031) | (0.022) | (0.023) |
| HIV Positive | -0.077 | 0.273* | 0.092 | 0.078 | -0.158 | -0.036 | 0.059 |
| | (0.128) | (0.150) | (0.173) | (0.189) | (0.126) | (0.039) | (0.129) |
| Incentive*HIV Positive | -0.247 | -0.286 | -0.039 | -0.454** | 0.322 | -0.149** | -0.242 |
| | (0.192) | (0.283) | (0.295) | (0.214) | (0.255) | (0.073) | (0.150) |
| R-Squared | 0.261 | 0.072 | 0.093 | 0.162 | 0.194 | 0.104 | 0.121 |
| Observation | 1,306 | 1,110 | 658 | 627 | 1,322 | 689 | 621 |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Village Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Notes: Table 8 reports an impact of interventions on fertility. Controls include age, sex, marital status, religion, education, employment status, area of residence, household asset ownership (indicators for ownership of land, electricity, radio, television, mobile phone, and a measure of scaled livestock units. Panel A represents ITT estimates, Panel B represents instrumental variable approach which uses three types of interventions as instruments for HIV testing and HIV/AIDS knowledge, and Panel C represents the DID estimates of identical dependent variable. Standard errors are in parentheses. * Significant at 10%, ** Significant at 5%, *** Significant at 1%.

Figure 1. Study Design

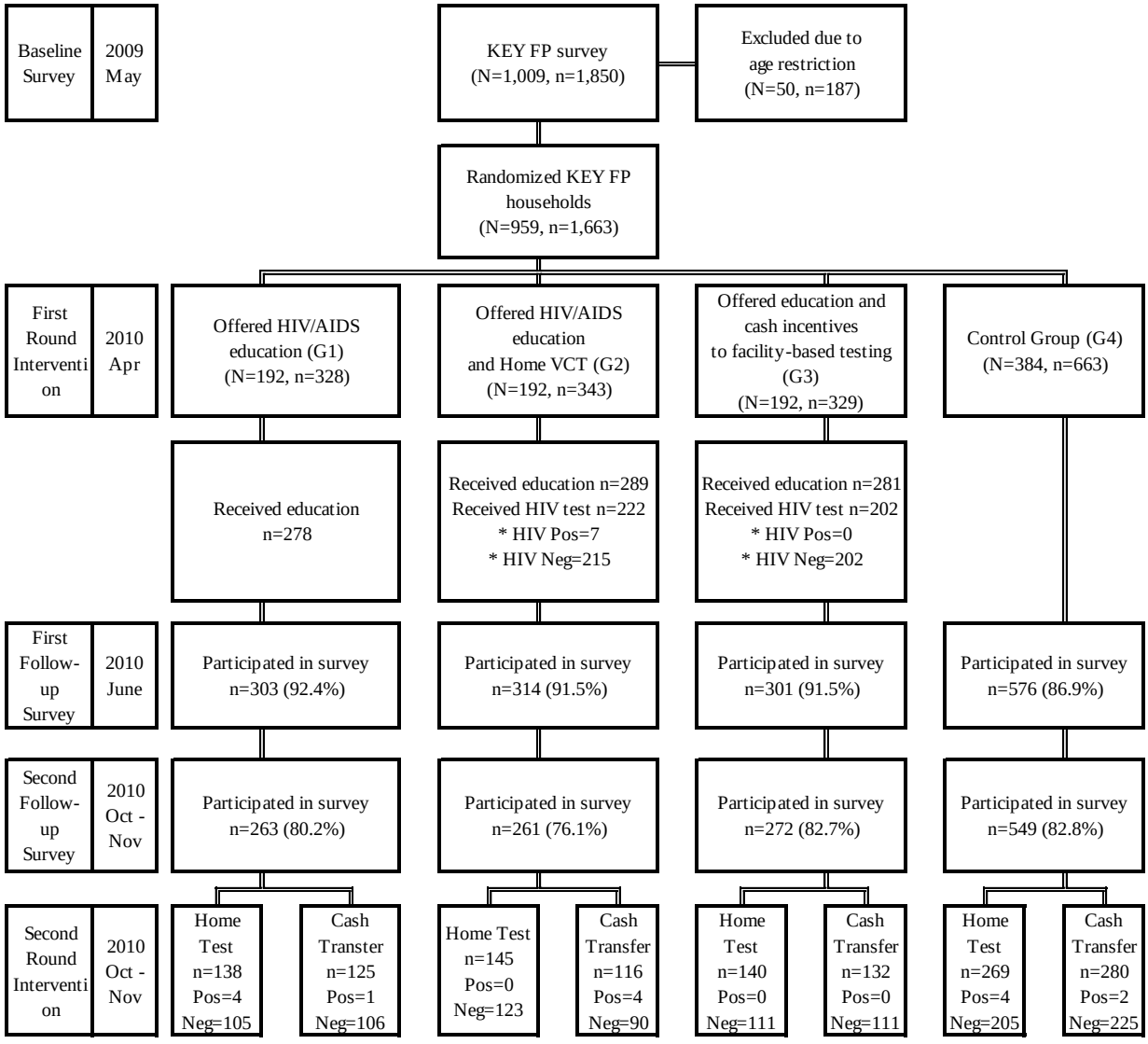
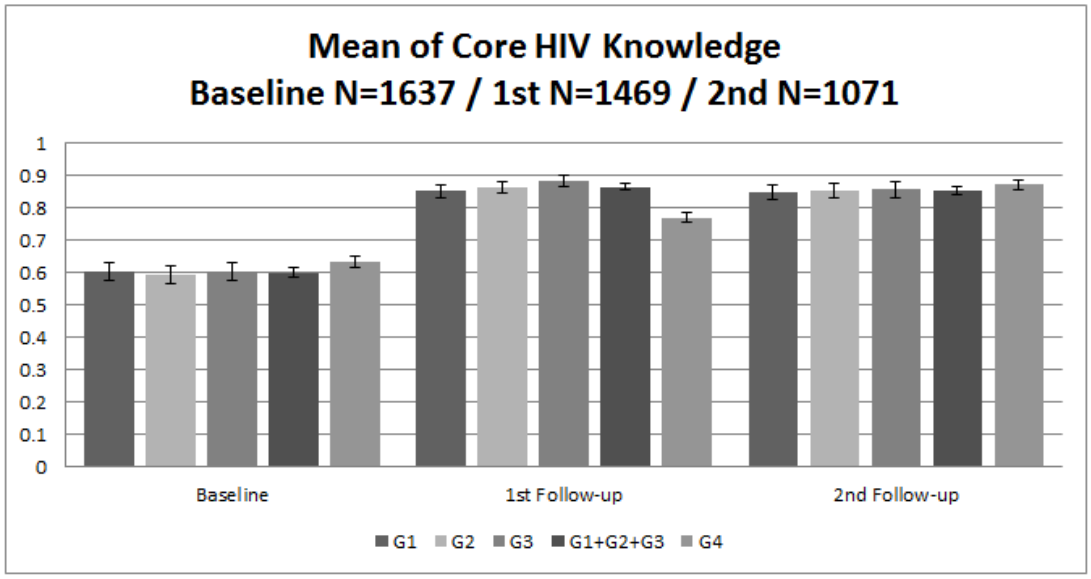
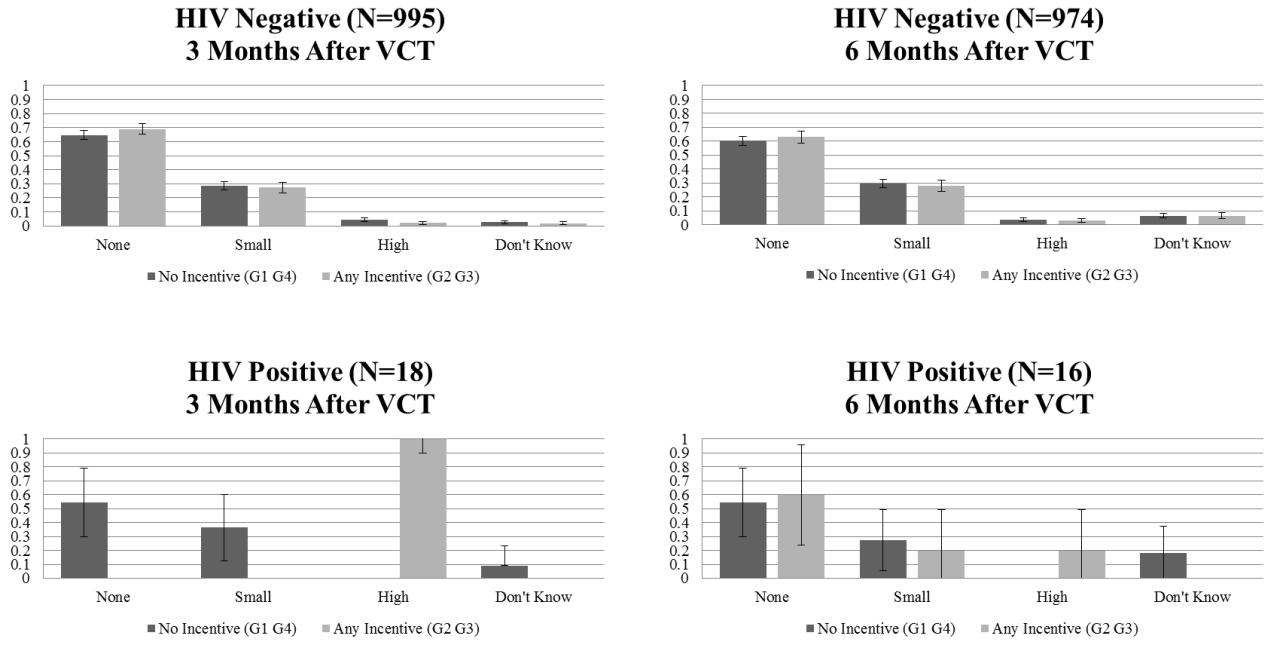


Figure 2. Mean of core HIV/AIDS knowledge




Notes: This figure presents changes in the mean of core HIV/AIDS knowledge score in each study group at baseline, 1st follow-up, and 2nd follow-up survey, respectively. 95% confidence intervals are presented.

Figure 3. Subjective beliefs of HIV infection




Notes: This figure shows subjective beliefs of HIV infection in the first follow-up (left column) and second follow-up (right column) , 3 months after intervention, presented in the left column. On the right column is the subjective. 95% confidence intervals are presented.

## Appendix Tables

Appendix Table 1. Attrition regression

**Table A1. Differential Attrition Analysis**

| | 1st Follow-up | | | 2nd Follow-up | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Edu (G1) | 0.055** | 0.057*** | 0.057*** | -0.019 | -0.021 | -0.023 |
| | (0.022) | (0.021) | (0.021) | (0.028) | (0.026) | (0.026) |
| Home (G2) | 0.052** | 0.054** | 0.050** | -0.072** | -0.069** | -0.070** |
| | (0.021) | (0.021) | (0.021) | (0.030) | (0.030) | (0.029) |
| Cash(G3) | 0.043* | 0.043** | 0.039* | -0.006 | -0.007 | -0.008 |
| | (0.022) | (0.021) | (0.021) | (0.028) | (0.026) | (0.026) |
| Gender (Male=1) | | 0.057*** | 0.062*** | | 0.013 | 0.016 |
| | | (0.022) | (0.021) | | (0.026) | (0.026) |
| Age | | -0.001 | -0.001 | | 0.001 | 0.001 |
| | | (0.001) | (0.001) | | (0.001) | (0.001) |
| HIV positive | | 0.108*** | 0.109*** | | 0.074 | 0.064 |
| | | (0.022) | (0.024) | | (0.090) | (0.089) |
| Engaged in Income Activity | | -0.032 | -0.035* | | -0.039 | -0.039 |
| | | (0.020) | (0.020) | | (0.027) | (0.027) |
| Marriage (Married=1) | | 0.116*** | 0.116*** | | 0.249*** | 0.253*** |
| | | (0.024) | (0.023) | | (0.028) | (0.028) |
| Education Level (Non=0) | | 0.011 | 0.007 | | 0.039* | 0.031 |
| | | (0.019) | (0.020) | | (0.021) | (0.021) |
| R-Squared | 0.007 | 0.040 | 0.050 | 0.005 | 0.089 | 0.100 |
| Observations | | | | 1,663 | | |
| Control | No | Yes | Yes | No | Yes | Yes |
| Village Effect | No | No | Yes | No | No | Yes |

Notes: Appendix T1 reports attrition regression. Columns (1), (2), (3) represent weighted attrition regressions of 1st follow-up participation. Columns (4), (5), (6) represent weighted attrition regressions of 2nd follow-up participation. Significance at 1% *** Significance at 5% ** Significance at 10% *

# Appendix Table 2. Baseline Characteristics by HIV Status

| | Group 2 and Group 3 (First Round Testers) | | | | Group 1 and Control Group (Second Round Testers) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Obs | Refusal | HIV Negative | HIV Positive | Obs | Refusal | HIV Negative | HIV Positive | First Round Refusal vs. Second Round Refusal | First Round Negative vs. Second Round Negative | First Round Positive vs. Second Round Positive |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) |
| Composition | 672 | 248 (36.9%) | 417 (62.1%) | 7 (0.10%) | 812 | 160 (19.7%) | 641 (78.9%) | 11 (0.14%) | | | |
| Panel A. Individual Characteristics | | | | | | | | | | | |
| Age | 672 | 30.230 | 31.765 | 32.857 | 812 | 32.106 | 32.605 | 34.636 | -1.876* | -0.840 | -1.779 |
| Male | 672 | 0.589 | 0.477 | 0.286 | 812 | 0.581 | 0.504 | 0.364 | 0.007 | -0.027 | -0.078 |
| Married | 672 | 1.706 | 1.878 | 2.143 | 812 | 1.813 | 1.900 | 2.364 | -0.107** | -0.022 | -0.221 |
| Engaged in economic activity | 672 | 0.782 | 0.770 | 0.571 | 812 | 0.875 | 0.810 | 0.909 | -0.093** | -0.040 | -0.338 |
| Had formal education | 672 | 0.895 | 0.844 | 1.000 | 812 | 0.888 | 0.869 | 0.818 | 0.008 | -0.025 | 0.182 |
| Illiterate | 672 | 0.230 | 0.417 | 0.429 | 812 | 0.256 | 0.349 | 0.545 | -0.026 | 0.068** | -0.117 |
| Religion | | | | | | | | | | | |
| Orthodox Christian | 672 | 0.625 | 0.532 | 0.857 | 812 | 0.700 | 0.622 | 0.909 | -0.075 | -0.090*** | -0.052 |
| Muslim | 672 | 0.363 | 0.456 | 0.143 | 812 | 0.281 | 0.357 | 0.091 | 0.082* | 0.098*** | 0.052 |
| Health Status | | | | | | | | | | | |
| Perceived health compared to others | 372 | 0.877 | 0.861 | 0.800 | 552 | 0.895 | 0.877 | 0.714 | -0.018 | -0.017 | 0.086 |
| Satisfied with health status | 670 | 0.830 | 0.839 | 0.857 | 811 | 0.888 | 0.863 | 0.636 | -0.058 | -0.024 | 0.221 |
| HIV/AIDS-Related Knowledge Score | 658 | 0.657 | 0.562 | 0.543 | 801 | 0.564 | 0.633 | 0.709 | 0.093*** | -0.071*** | -0.166 |
| Know HIV testing center | 672 | 0.653 | 0.600 | 0.571 | 812 | 0.631 | 0.608 | 0.636 | 0.022 | -0.009 | -0.065 |
| Have a regular sex partner | 566 | 0.879 | 0.914 | 0.714 | 844 | 0.906 | 0.913 | 0.636 | -0.027 | 0.001 | 0.078 |
| Relationship with first sexual partner | | | | | | | | | | | |
| Spouse/Fiance/Cohabiting partner | 289 | 0.454 | 0.482 | 0.500 | 374 | 0.375 | 0.459 | 0.000 | 0.079 | 0.024 | 0.500 |
| Non live-in boyfriend/girlfriend | 289 | 0.361 | 0.292 | 0.500 | 374 | 0.450 | 0.310 | 0.500 | -0.089 | -0.019 | 0.000 |
| Others | 289 | 0.176 | 0.208 | 0.000 | 374 | 0.163 | 0.224 | 0.500 | 0.014 | -0.016 | -0.500 |
| Non primary partner | 477 | 0.007 | 0.009 | 0.000 | 731 | 0.014 | 0.012 | 0.091 | -0.008 | -0.003 | -0.091 |
| Panel B. Household Characteristics | | | | | | | | | | | |
| Area of residence: Rural | 384 | 0.848 | 0.915 | 0.750 | 462 | 0.843 | 0.923 | 0.875 | -0.005 | -0.003 | -0.125 |
| Came from another area | 340 | 0.192 | 0.152 | 0.000 | 421 | 0.143 | 0.143 | 0.250 | 0.040 | 0.018 | -0.250 |
| Own Land | 384 | 0.869 | 0.898 | 0.750 | 462 | 0.892 | 0.918 | 1.000 | -0.026 | -0.014 | -0.250 |
| Own Ox(en) | 331 | 1.630 | 1.505 | 1.000 | 422 | 1.902 | 1.593 | 1.250 | -0.411* | -0.177 | 0.000 |
| Own Electricity | 384 | 0.352 | 0.302 | 0.500 | 462 | 0.294 | 0.253 | 0.250 | 0.058 | 0.045 | 0.250 |
| Own Radio | 384 | 0.779 | 0.711 | 1.000 | 462 | 0.794 | 0.753 | 0.500 | -0.027 | -0.051 | 0.500* |
| Own Television | 384 | 0.097 | 0.043 | 0.000 | 462 | 0.108 | 0.054 | 0.125 | 0.005 | -0.016 | -0.125 |

Notes: Table A2 reports means of selected baseline variables. Columns 1-4 show summaries for the sample of subjects assigned test incentives during first round randomization. Columns 5 – 8 show summaries for the sample of subjects assigned test incentives during second round randomization. Columns 9 – 11 report mean differences (and significance levels for difference of mean tests) between research groups with different round randomization but identical test take-up status.* Significant at 10%, ** Significant at 5%, *** Significant at 1%.

Appendix Table 3. Impact on HIV Testing (2nd round)

| Explanatory Variable | Tested in the 2nd round | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| G1Cash | 0.047 | 0.038 | 0.037 |
| | (0.052) | (0.050) | (0.050) |
| G2Home | 0.045 | 0.050 | 0.051 |
| | (0.051) | (0.053) | (0.053) |
| G2Cash | 0.006 | 0.018 | 0.022 |
| | (0.057) | (0.056) | (0.055) |
| G3Home | 0.002 | 0.007 | 0.012 |
| | (0.053) | (0.052) | (0.051) |
| G3Cash | 0.045 | 0.066 | 0.071 |
| | (0.052) | (0.054) | (0.054) |
| G4Home | -0.014 | -0.020 | -0.016 |
| | (0.050) | (0.049) | (0.049) |
| G4Cash | -0.000 | 0.009 | 0.007 |
| | (0.047) | (0.046) | (0.046) |
| Constant | 0.808*** | 0.677*** | 0.690*** |
| | (0.039) | (0.100) | (0.104) |
| Control group mean | | 0.812 | |
| R-Squared | 0.004 | 0.081 | 0.086 |
| Observations | | 1,345 | |
| Controls | No | Yes | Yes |
| Village Fixed Effects | No | No | Yes |

Notes: Table A3 reports an effect of random assignment on test take-up in the second round intervention. G1Cash is an indicator for being HIV education only group (G1) in the first round and cash incentive group in the second round. G2Home, G2Cash, G3Home, G3Cash, G4Home, G4Cash are created in a similar way. G1Home serves as a reference group. Controls include age, age-squared, sex, marital status, religion, education, employment status, area of residence, household asset ownership (indicators for ownership of land, electricity, radio, television, mobile phone, and a measure of scaled livestock units). Column (1) is a regression without controls and village effects, Columns (2) include controls, and Columns (3) includes both controls and village effects. Standard errors are in parentheses. * Significant at 10%, ** Significant at 5%, *** Significant at 1%.

## Appendix Table 4. ITT Regression on variables related to HIV/AIDS knowledge

| | HIV/AIDS Knowledge | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Explanatory Variable | Abstinence reduces chance of HIV | Being faithful reduces chance of HIV | Using Condom reduces chance of HIV | HIV transmitted during pregnancy | HIV transmitted during delivery | HIV transmitted during breast -feeding | Overall HIV Knowledge | Comprehensive Correct Knowledge |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Panel A. First Follow-up | | | | | | | | |
| G1 (Edu) | 0.083*** | 0.063*** | 0.072*** | 0.071** | 0.109*** | 0.070*** | 0.610*** | 0.596*** |
| | (0.031) | (0.023) | (0.027) | (0.034) | (0.028) | (0.024) | (0.064) | (0.068) |
| G2 (Home) | 0.079*** | 0.042* | 0.097*** | 0.121*** | 0.105*** | 0.073*** | 0.527*** | 0.429*** |
| | (0.030) | (0.023) | (0.024) | (0.031) | (0.027) | (0.025) | (0.067) | (0.066) |
| G3 (Cash) | 0.112*** | 0.022 | 0.133*** | 0.145*** | 0.132*** | 0.075*** | 0.642*** | 0.532*** |
| | (0.029) | (0.025) | (0.023) | (0.028) | (0.027) | (0.024) | (0.060) | (0.062) |
| Constant | 0.530*** | 0.593*** | 0.631*** | 0.755*** | 0.873*** | 0.884*** | -0.344* | -0.736*** |
| | (0.101) | (0.077) | (0.094) | (0.101) | (0.079) | (0.077) | (0.185) | (0.222) |
| Control group mean | 0.807 | 0.891 | 0.847 | 0.759 | 0.842 | 0.883 | 0.717 | 0.684 |
| R-Squared | 0.071 | 0.094 | 0.091 | 0.070 | 0.083 | 0.077 | 0.263 | 0.247 |
| Observation | 1,475 | 1,475 | 1,475 | 1,470 | 1,474 | 1,475 | 1450 | 1471 |
| Control | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Village Effect | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Panel B. Second Follow-up | | | | | | | | |
| G1 (Edu) | -0.118*** | 0.009 | -0.034 | 0.059* | -0.018 | -0.051** | | |
| | (0.036) | (0.033) | (0.025) | (0.031) | (0.023) | (0.021) | | |
| G2 (Home) | -0.048 | -0.028 | -0.022 | -0.006 | -0.013 | -0.016 | | |
| | (0.032) | (0.034) | (0.025) | (0.036) | (0.022) | (0.019) | | |
| G3 (Cash) | -0.029 | 0.049 | -0.015 | -0.006 | -0.014 | -0.047** | | |
| | (0.032) | (0.030) | (0.024) | (0.034) | (0.022) | (0.020) | | |
| Constant | 0.702*** | 0.787*** | 0.974*** | 1.122*** | 1.063*** | 1.090*** | | |
| | (0.126) | (0.091) | (0.083) | (0.082) | (0.056) | (0.048) | | |
| Control group mean | 0.769 | 0.787 | 0.899 | 0.786 | 0.909 | 0.934 | | |
| R-Squared | 0.070 | 0.070 | 0.066 | 0.091 | 0.068 | 0.067 | | |
| Observation | 1,254 | 1,288 | 1,235 | 1,221 | 1,244 | 1,247 | | |
| Control | Yes | Yes | Yes | Yes | Yes | Yes | | |
| Village Effect | Yes | Yes | Yes | Yes | Yes | Yes | | |

Notes: Table A4 reports treatment effect on HIV/AIDS knowledge. Controls include age dummy, sex, marital status, religion, education, employment status, area of residence, household asset ownership (indicators for ownership of land, electricity, radio, television, mobile phone, and a measure of scaled livestock units). Standard errors are in parentheses. * Significant at 10%, ** Significant at 5%, *** Significant at 1%.

## Appendix Table 5. Baseline Characteristics by Testing Status

| | Obs | Home Refusal | Home Test takers | CCT Refusal | CCT Test takers | Home Test takers vs CCT test takers | Home Refusal vs CCT Refusal |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Panel A. Individual Characteristics | | | | | | | |
| Age | 1,484 | 31.481 | 32.585 | 30.419 | 32.017 | 0.568 | 1.062 |
| Male | 1,484 | 0.571 | 0.500 | 0.601 | 0.481 | 0.019 | -0.030 |
| Married | 1,484 | 0.700 | 0.793 | 0.646 | 0.817 | -0.025 | 0.054 |
| Engaged in economic activity | 1,484 | 0.838 | 0.781 | 0.798 | 0.806 | -0.024 | 0.040 |
| Had formal education | 1,484 | 0.890 | 0.844 | 0.894 | 0.875 | -0.031 | -0.003 |
| Illiterate | 1,484 | 0.248 | 0.365 | 0.232 | 0.392 | -0.027 | 0.015 |
| Religion | | | | | | | |
| Orthodox Christian | 1,484 | 0.662 | 0.624 | 0.646 | 0.560 | 0.064** | 0.015 |
| Muslim | 1,484 | 0.324 | 0.356 | 0.338 | 0.427 | -0.072** | -0.015 |
| Health Status | | | | | | | |
| Perceived health compared to others | 806 | 0.874 | 0.856 | 0.895 | 0.880 | -0.024 | -0.021 |
| Satisfied with health status | 1,481 | 0.852 | 0.849 | 0.853 | 0.880 | -0.003 | 0.000 |
| HIV/AIDS-Related Knowledge Score | 1,459 | 0.613 | 0.617 | 0.628 | 0.596 | 0.021 | -0.014 |
| Know HIV testing center | 1,484 | 0.629 | 0.598 | 0.662 | 0.612 | -0.014 | -0.033 |
| Have a regular sex partner | 1,290 | 0.886 | 0.899 | 0.894 | 0.918 | -0.019 | -0.009 |
| Relationship with first sexual partner | | | | | | | |
| Spouse/Fiance/Cohabiting partner | 663 | 0.520 | 0.421 | 0.323 | 0.506 | -0.086* | 0.197*** |
| Non live-in boyfriend/girlfriend | 663 | 0.350 | 0.356 | 0.444 | 0.255 | 0.101** | -0.094 |
| Others | 663 | 0.120 | 0.219 | 0.222 | 0.221 | -0.002 | -0.102* |
| Non primary partner | 1,213 | 0.007 | 0.011 | 0.014 | 0.013 | -0.002 | -0.007 |
| Panel B. Household Characteristics | | | | | | | |
| Area of residence: Rural | 858 | 0.876 | 0.931 | 0.848 | 0.933 | -0.002 | 0.028 |
| Came from another area | 819 | 0.174 | 0.136 | 0.142 | 0.134 | 0.001 | 0.032 |
| Own Land | 858 | 0.900 | 0.931 | 0.889 | 0.936 | -0.005 | 0.011 |
| Own Ox(en) | 819 | 1.713 | 1.560 | 1.760 | 1.613 | -0.052 | -0.047 |
| Own Electricity | 858 | 0.357 | 0.241 | 0.293 | 0.257 | -0.016 | 0.064 |
| Own Radio | 858 | 0.800 | 0.729 | 0.808 | 0.749 | -0.020 | -0.008 |
| Own Television | 858 | 0.076 | 0.041 | 0.111 | 0.051 | -0.010 | -0.035 |

Notes: Table A5 reports means of selected baseline variables. Columns 1-5 show summaries for the sample of subjects assigned home-testing and cash incentives during first and second round randomization. Columns 6 – 7 report mean differences (and significance levels for difference of mean tests) between research groups with different incentives but identical test take-up status.* Significant at 10%, ** Significant at 5%, *** Significant at 1%.

**Appendix 2**

Section A. Experiment Details

A1. Sampling Framework

The Central Statistical Agency of Ethiopia divids all *Kebeles* (villages) in Ethiopia into clusters of households, known as Enumeration Areas (EAs). Each EA contains 150 to 200 households (on average) and sampling for nationwide surveys (such as the Ethiopian Demographic and Health Survey) is based on sampling of EAs. Based on this classification, the 23 rural *Kebeles* in Hetosa are composed of 108 EAs. Since there was no ready-made list of households in the district, the KEYFP team prepared a household list with help from the *Kebele'* leaders. Of the 23 rural *Kebeles*, 6 EAs were selected using probability proportional to size method and one urban *Kebeles* (of the two urban *Kebeles*) was selected using a lottery.

Table A1 shows EAs selected for the KEYFP survey. PPS was used give each EA an equal chance of selection, given the inter-*Kebele* variation in the number of EAs. Using *Kebeles* and an EA map and with help from *Kebeles* leaders and informants, the KEYFP survey team demarcated borders of the 6 EAs in advance and identified all households in the area.

In the urban village, 14% of households (of a total of 2696 households) were randomly selected to make the sample representative of the composition at the district level. We intended to survey all households in six randomly selected EAs in rural villages. Due to budget constraints, we completed the baseline survey for 60% of randomly selected households in two EAs (All households in four of the EAs were surveyed).

Three demographic groups were of interest in each sample KEYFP household: adult females aged 20 to 49 (ever-married or never-married), adult males aged 20 to 59 (ever-married or never-married), and adolescents aged 15 to 19 (male or female). In households with more than one eligible member per group, one was chosen through a lottery. Table 1 below shows the sampling frame for the KEYFP survey**.**

Table A1. Sampling Framework

| Village name | EA serial number | | | | | | | | | | Select every 18th EA starting at the 13th EA |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Anole Salen | 1 | 2 | 3 | | | | | | | | |
| Gurda Busa | 4 | 5 | 6 | 7 | | | | | | | |
| Deyea Debisis | 8 | 9 | 10 | 11 | 12 | | | | | | |
| Hate Andole | **13** | 14 | 15 | 16 | 17 | 18 | | | | | 13 |
| Dawi Titicha | 19 | 20 | 21 | 22 | | | | | | | |
| Wule Argi | 23 | 24 | | | | | | | | | |
| Teru | 25 | 26 | | | | | | | | | |
| Hurtuma Dem | 27 | | | | | | | | | | |
| Denisa | 28 | 29 | | | | | | | | | |
| Jango Klinsa | 30 | **31** | 32 | 33 | | | | | | | 31 |
| Tede Leman | 34 | 35 | 36 | 37 | | | | | | | |
| Gonde Finchan | 38 | 39 | 40 | 41 | 42 | | | | | | |
| Shaki Sherara | 43 | 44 | 45 | 46 | 47 | | | | | | |
| Sero Anseto | 48 | **49** | 50 | 51 | 52 | 53 | | | | | 49 |
| Guche Habe | 54 | 55 | 56 | 57 | 58 | | | | | | |
| Boru Lenche | 59 | 60 | 61 | 62 | 63 | | | | | | |
| Boneya Edo | 64 | 65 | 66 | **67** | 68 | 69 | | | | | 67 |
| Oda Jela | 70 | 71 | 72 | 73 | | | | | | | |
| Boru Chilalo | 74 | 75 | 76 | 77 | 78 | 79 | 80 | | | | |
| Debeya Adere | 81 | 82 | 83 | 84 | **85** | 86 | | | | | 85 |
| Jawi Chilalo | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | | | |
| Harbe Adamoc | 95 | 96 | 97 | 98 | | | | | | | |
| Sibu Abadr | 99 | 100 | 101 | 102 | **103** | 104 | 105 | 106 | 107 | 108 | 103 |

Note: “EA” means Enumeration Area.

A2. Project Details

1) First Round Intervention

Before the field work, eligible KEYFP households were randomly assigned to one of three treatment groups (each with 20% of eligible households) and a control group (40%). The first treatment group (Group 1) was offered HIV education. The second treatment group (Group 2) was offered HIV education and home-based voluntary HIV counseling and testing. The third treatment group (Group 3) was offered HIV education and cash incentives for a facility-based voluntary HIV counseling and testing. The fourth group (control group) was not contacted during the first round intervention and served as a control. Randomization was done at the household level.

A. Door-to-Door HIV Education

The main purpose of the HIV/AIDS information session was to provide subjects with basic scientific facts about HIV transmission mechanisms, ways of reducing the risk of HIV infection, and the benefits and potential risks of getting an HIV test. Subjects were also offered information about where to get HIV counseling and testing service in and around the study area, the availability of HIV treatments for individuals and pregnant women with HIV, what HIV treatments can and cannot do, as well as HIV prevalence in Ethiopia, in the study area, and among different demographic groups. Section A3 in Appendix 2 outlines the contents of the HIV/AIDS information session.

Fourteen trained community-based Health Extension Workers (HEWs) from the Hetosa district recruited and offered eligible subjects HIV education. The information session was conducted through door-to-door visits between March and April of 2010. The information session was conducted in the local language (Oromiffa) and lasted 30 to 45 minutes. Educators had a chance to address HIV-related questions at the end of the information session as they arose. If more than one eligible household member was present during a home visit by an HEW, the information session was conducted for the group inside residence homes (Picture A1 in Appendix 2) or

residence compounds (Picture A2 in Appendix 2), whichever better ensured privacy. HEWs made up to three home visits to recruit and educate as many eligible subjects as possible.

At the end of the information session, HEWs handed out a poster (per household) that promoted voluntary HIV counseling and testing and placed it in a visible place inside the residence homes (Picture A3 in Appendix 2). For subjects assigned to the home-based testing group, HEWs informed them that they were eligible to receive free home-based HIV testing if they wanted to learn their HIV status and made appointments with interested subjects. Appointments were made for any time (between 9am and 5pm) in the following ten days and starting right after the end of the HIV information session. For subjects eligible to receive a cash incentive, HEWs informed them that they would receive cash compensations if they wished to learn their HIV status at an assigned testing clinic. HEWs then handed out coupons to interested subjects and explained the conditions for coupon redemption.

B. Conditional Cash Transfer for a Facility-based HIV Counseling and Testing

Cash incentives were given to compensate for the cost of round-trip transportation and a day of lost farm wages due to a trip to a local testing clinic (Iteya Health Center). This clinic was located in one of the seven study villages (Iteya Village) and there was no testing facility in the other six study villages. To compute the transportation cost, we then gathered information on bus and horse carriage fares from each study village to the assigned testing clinic. We clustered the seven study villages into three groups of villages located at a comparable (odometer) distance away from Iteya Health Center.

The first cluster (Cluster 1) consisted of two villages that were 32 kilometers (kms) and 28 kms away from the assigned testing clinic. The second cluster (Cluster 2) consisted of two villages located 20 kms and 18 kms away from the assigned testing clinic. The third cluster (Cluster 3) consisted of three villages lying 6 kms, 4 kms, and 1km away from the assigned testing clinic. The transportation cost (round trip) for villages in each cluster was then computed by taking the average for the respective cluster. Compensation for the transportation cost was set at 20 Birr

(1.5 U.S. dollars) for eligible subjects in Cluster 1, 15 Birr (1.2 U.S. dollars) for those in Cluster 2, and 4 Birr (0.3 U.S. dollars) for subjects in Cluster 3.

Adding the cost of a day of farm labor in the area, which was estimated at 15 Birr, coupons offered to subjects in Clusters 1, 2, and 3 were worth 2.7 dollars, 2 dollars, and 1.5 dollars, respectively. Coupons were non-transferable and redemption was conditional on subjects learning their HIV status at the assigned testing clinic before coupons expired ten days later. HIV counseling and testing services at the clinic were administered in the usual manner and free of charge.

C. Free and Voluntary Home-based HIV Counseling and Testing

For subjects randomly assigned to home-based testing treatment, Community Counselors (CCs) from nearby districts visited them at the appointment time for voluntary home-based counseling and testing. CCs conducted HIV testing in line with Ethiopia's guidelines for HIV counseling and testing and under the condition of the "Three Cs": informed Consent, Confidentiality, and Counseling. Pre-test counseling, HIV testing, and post-test counseling (and test results) were all done in a single visit and in private (to couples). Testing was done using rapid test kits and finger-prick blood samples and no subject was given a written HIV test result. HIV seropositive subjects were referred to the nearest hospital for follow-up.

2) Follow-up Surveys

We implemented two rounds of follow-up surveys. The first follow-up survey was conducted to gather detailed data on HIV-related knowledge, sexual practices, and HIV testing status around three months after the first round intervention (before the second round intervention). The second follow-up survey was conducted immediately after the second round intervention.

The surveys were conducted using a structured questionnaire adapted from the 2005 EDHS. Trained data collectors who conducted the KEYFP baseline survey, who were familiar with the local culture, and who were not aware of the HIV test status of subjects, conducted follow-up

interviews through door-to-door visits using the local language. Data collectors made up to three visits to interview as many eligible subjects as possible and offered up to ten free male condoms for each subject who completed follow-up interview. Questionnaires were administered by same-sex interviewers in private and appropriate sensitivity to the issues being addressed during the interview session.

3) Second Round Intervention

The second round intervention was conducted immediately after the second follow-up survey. It offered a home-based HIV testing or cash incentives for a facility-based HIV testing. For this purpose, we re-randomized study households in each of the four research groups from first round randomization into two groups of 96 households each (for Group 1, 2, and 3) and 192 households each (for the control group). Second-round home-based testing was conducted using similar procedures described in Section 3.1. Second-round cash incentives were adjusted upwards to account for a 20% devaluation of the local currency that took place in September 2010. Thus, eligible subjects in Clusters 1, 2, and 3 were offered coupons worth 2.9, 2.5, and 1.8 U.S. dollars, respectively, during the second-round intervention.

A3. Outline of Topics Addressed During the HIV/AIDS Information Session

HIV/AIDS-related information was compiled from the Centers for Disease Control and Prevention (USA) (http://www.cdc.gov), Center for Communications Programs (Johns Hopkins University) http://www.jhuccp.org/), and the Ethiopian AIDS Resource Center (http://www.etharc.org/). Information on HIV/AIDS-related issues in the study area was compiled from various unpublished reports of Arsi zone and Hetosa district health bureaus. The following is an outline of issues addressed during the information session.

- What is HIV? What is AIDS?
- How is HIV transmitted? Not transmitted?
- How can one reduce the chance of HIV infection?
- What is the HIV prevalence rate in Ethiopia, in the Hetosa district, and among different demographic groups?
- What are the advantages (and potential problems) of getting an HIV test, especially for pregnant women?
- What are the options for getting an HIV test in and around the Hetosa district?
- What are the benefits of couple HIV counseling and testing?
- What are the recent developments in Ethiopia with regard to access to AIDS and other medications that can reduce the risk of mother-to-child HIV transmission?
- What do these medications do and not do?

Picture A1. A Data Collector (Left) Interviewing a Study Participant Inside

Picture A2. A Data Collector (Right) Interviewing a Study Participant on his Backyard

Picture A3. HIV Educator (Right) Explaining an HIV Testing Promoting Poster