HIV/AIDS sensitization and peer-mentoring: Evidence from a randomized experiment in Senegal*

J.-L. Arcand†, N. Wagner‡, C. Sakho§, P. A. Diallo¶

January 2012

Abstract

Using a simple experimental design, Poisson regression techniques and routinely-collected administrative data from health districts in Senegal, we examine whether funding community based organizations can be an effective manner of increasing voluntary testing and counselling and modifying the subsequent behavior of individuals who test HIV-positive. We distinguish between two treatment groups: in a first set of randomly-chosen health districts, community organizations received funding and carried out HIV/AIDS sensitization using traditional social mobilization techniques, whereas in a second randomly-chosen treatment group, they did so by using a new peer-mentoring mechanism; the remaining health districts were assigned to the control group and received no funding. Our results indicate that: (i)

*This study was funded by the Senegalese government, the Global HIV/AIDS program (GHAP), and the UNAIDS Unified Budget and Workplan (UBW). It is a joint collaboration between the Senegalese Conseil National de Lutte contre le Sida (CNLS), the World Bank, and the Graduate Institute of International and Development Studies, Geneva. The World Bank's Development Impact Evaluation Initiative (DIME) facilitated and coordinated this joint effort. DIME promotes the use of prospective and rigorous impact evaluation to guide policy and operational decisions. DIME's objectives are to improve the quality of the World Bank's operations, build capacity for evidence-based decision-making in client countries, and generate knowledge on strategic development areas. We thank the staff of the CNLS for their help and hospitality in Dakar. In particular we thank Dr. Ibra Ndoye, Dr. Seyni Ndoye, Dr. Papa Amadou Niang Diallo, Gabielle Coll, Kankou Coulibaly, and Elhadj Dram. We also wish to acknowledge the role played by the Hiproject for collecting the administrative data. We further extent our thanks to Dr. Abdoulaye Wade and Dr. Adama Ndir of the Ministère de la Santé, Division de Lutte Contre le Sida as well as Leandre Bassole for organizing this research project. The findings and conclusions in this report are those of the authors and do not necessarily represent the views of any government agency.

†jean-louis.arcand@graduateinstitute.ch, The Graduate Institute, Geneva.
‡natascha.wagner@graduateinstitute.ch, The Graduate Institute, Geneva.
§cheikhousakho5@yahoo.fr, Ministère de la Santé et de la Prèvention Division SIDA/IST, Dakar.
¶aidsdatasenegal@yahoo.fr, Secrétariat Exécutif du Conseil National de Lutte contre le Sida, Dakar.

funded peer mentoring doubles the number of individuals who get tested, who follow pre-test counselling and who pick up their test results, whereas funded traditional social mobilization appears to be ineffective; (ii) both traditional social mobilization and peer mentoring increase the number of partners of HIV-positive individuals who get tested, and (iii) they significantly increase the number of HIV-positive individuals who follow post-test counselling. Thus, instead of confining attention to a single manner of deploying sensitization campaigns, a hybrid approach, in which peer-mentoring and traditional methods are combined, is advisable. Moreover, inexpensive administrative data can be used for rigorous impact evaluations.

Keywords: social mobilization, peer-mentoring, Senegal, RCT, Poisson regression

JEL: I18, C21, C25, C93

1 Introduction

HIV/AIDS prevalence rates are relatively high in most African countries. Current perceived wisdom is that the further spread of the disease can only be curtailed if large parts of the affected societies are made aware of transmission mechanisms, risk reduction techniques and their own serological status. Rigorous impact evaluations of HIV prevention programs in the African context are few and far between, as noted by Pettifor et al. (2007): this is simply because most information campaigns are rolled all at once at the national level. A review by McCoy et al. (2010) of localized information campaigns came to the conclusion that there are very few rigorous studies that use objective biomarkers instead of self-reported outcomes as their response variable. For example, Ross et al. (2007) and Doyle et al. (2010) found some impact of a Tanzanian community-based program, but their study was somewhat underpowered in statistical terms. In the same vein, Dupas (2011) find that risk-reduction messages are more effective in reducing risky sexual behavior (proxied by teenage pregnancy) than risk-avoidance messages. But none of these studies examines the impact of information campaigns on the use of Voluntary Counseling and Testing (VCT) services, despite the quite considerable expenditures by African governments on such services. This is somewhat surprising, and our study seeks to fill this gap.

VCT is an important component of the fight against HIV/AIDS in that it constitutes an entry point for various interventions, from the treatment of other Sexually Transmitted Diseases (STDs) or tuberculosis, to psycho-social assistance. In rural South Africa, for example, the mere expansion of access to VCT has increased the number of HIV tests administered, especially amongst women (Pronyk et al., 2002). Clearly, the availability of VCT services at the local level increases testing rates, even in the absence of sensitization campaigns. Existing evidence also suggests that visibility and ease of access are important factors that improve the take-up of VCT: offering VCT in existing healthcare centers is one approach that has yielded promising results. Once VCT services are made available, specific subgroups of the population, such as pregnant women, can be systematically tested. However, despite improved coverage and the extension of VCT services at the local level, HIV testing rates in most African countries remain low.

An important challenge that must still be addressed in the African context is how to sensitize local communities concerning HIV/AIDS-related issues and how best to encourage individuals to get tested. The efficacy of sensitization campaigns has been well-documented in Tanzania, where the National VCT Campaign raised HIV/AIDS awareness and increased testing in remote Tanzanian regions (Mossdorf et al., 2010). Obstacles to the acceptance and utilization of VCT services also have to be identified and removed, as has been demonstrated by a study in the Ugandan Kasese districts (Bwambale et al., 2008), while a second study of Tanzanian men showed that take-up can be increased

if HIV/AIDS sensitization campaigns address issues of stigmatization and if VCT centers improve both access and confidentiality (Mossdorf et al., 2010). The necessity of integrating VCT services within existing health care units was also highlighted.

An alternative approach involves home-based HIV testing which, for example, was introduced in rural Mali (Obare et al., 2008). The Malian evidence suggests that repeated HIV testing at home by trained healthcare workers from outside the local area was almost universally acceptable: it may be possible to transplant this approach to other contexts, although the main strategy of choice remains VCT in existing healthcare facilities.

Existing studies therefore agree that the visibility of VCT services and sensitization campaigns are important tools that can increase HIV testing rates in the African context. But current research has not addressed the issue of how sensitization campaigns should be carried out or of which particular sensitization technique is the most effective. Another concern is that most existing studies have focused on Anglophone Africa, and that Francophone Africa, where HIV/AIDS issues are often perceived differently, is underrepresented in the literature. In this evaluation, we consider the case of Senegal and examine how different local HIV/AIDS sensitization campaigns affect the take-up of VCT. These services are freely available in Senegal thanks to the support of government authorities and various international partners, and have been substantially reinforced in recent years.

According to the Senegal Demographic and Health Survey 2005, the overall HIV/AIDS prevalence rate in the country is 0.7%. There are no significant differences between urban and rural areas despite some regional differences (DHS, 2005).[1] As would be expected, prevalence rates are highest among sex workers, homosexuals and truck drivers. In order to fight the spread of HIV/AIDS, Senegal decided to deploy a decentralized multisector approach during the 2007-2011 period. The Multi-Country AIDS Program (MAP) has largely contributed to that decentralized approach and to the involvement of civil society in the response to HIV/AIDS. Since 2003, 1,040 Community-Based Organizations (CBOs) have been funded under the "civil society and community support" component of the program, with a particular emphasis on VCT services.

CBOs are an omnipresent aspect of Senegalese civil society and are created by community members to render services to group members and the community at large. Many of the CBOs involved in HIV/AIDS sensitization are women's or youth groups, and they may be secular or religious in nature. Some have a special focus on pregnant women, women of reproductive age or domestic servants; others target specific occupational categories such as truckers, craftspeople, hairdressers and sex workers. The CBOs involved in our study often do not work exclusively with AIDS victims and surviving family members, though all have incorporated the HIV/AIDS sensitization program into their agenda.

[1]For further information see the 2005 Senegal Demographic and Health Survey Fact Sheet on HIV/AIDS

The sensitization program analyzed in this paper was planned by the Conseil National de Lutte contre le SIDA (CNLS) in the context of the Senegal MAP, and implemented by existing CBOs.

In this paper, we provide experimental evidence as to whether funding for HIV/AIDS sensitization programs run by CBOs can be an effective way of (i) increasing voluntary testing rates and (ii) changing the behavior of individuals who test positive. We also examine (iii) whether the manner in which sensitization campaigns are run matters. Specifically, we consider whether traditional social mobilization techniques or a newly-introduced peer-mentoring approach is more effective.

2 The role of CBOs in Civil Society and the Fight against HIV/AIDS

Community-Based Organizations (CBOs) can be defined as non-profit, voluntary and mostly local organizations representing the civil society. They address community needs and are in most cases self-funded. Their organizational form and tasks differ as vastly as the local communities differ. What they have all in common is the "bottom-up" principle in the sense that local needs are addressed by the local community.

CBOs do not merely have a role in developing countries. Developed countries also rely on CBOs when it comes to the delivery of social services such as kindergartens, day care and old-age home facilities. A 10 year study of 120 youth CBOs in 34 cities shows that CBOs can reach out to high risk youths and can help them in their skill development by providing intentional learning environments (McLaughlin, 2000). Marwell (2004) develops a CBO model of the 'machine politics CBO'. In this model CBOs reciprocally distribute services to the community thus creating reliable voting constituencies. According to Marwell (2004) CBOs are political actors in the welfare state due to policies of privatization.

Already in 1994 Stevenson & White identify the important role of CBOs in fighting HIV/AIDS, especially when reaching out to ethnic minorities. CBO collaboration has also shown to be an effective tool for testing high risk populations for Sexually Transmitted Diseases (STDs) (Jones et al., 2000). For the United States Ehrmann (2002) stresses the role of CBOs in reaching out to incarcerated populations, who are at high risk of contracting HIV. In a joint Best Practice document of Sidaction et al. (2005) the existing involvement and possible avenues for future engagements of CBOs in the distribution of anti-retroviral treatment is highlighted. Moreover, Needle et al. (2005) pool 40 studies about injecting drug users (IDUs) and show that HIV risk-reducing behavior can be induced when IDUs are counseled by CBOs

However, it also has to be acknowledged that development assistance administered

through CBOs has been the subject of a good deal of criticism. Mansuri & Rao (2004) argue that elite capture is a major problem when it comes to community-based development initiatives. A related problem is that CBOs often do not have evaluation practices and there is limited material to guide them (Carman, 2007). Our research addresses the need for the evaluation of CBO-based sensitization campaigns. It complements the qualitative work by Chillag et al. (2002) who look at factors that affect the delivery of HIV/AIDS sensitization campaigns by CBOs. *Inter alia*, Chillag et al. identify the importance of sociocultural factors in the delivery of prevention services by CBOs. Taking sociocultural factors into consideration, our randomized experiment introduced a peer-mentoring mechanism into the sensitization campaign.

3 Previous Research on HIV/AIDS Sensitization Campaigns and VCT

When talking about HIV/AIDS sensitization campaigns quite different actions can be meant. Some campaigns solely rely on posters, other have radio and TV ads to increase coverage and visibility. A prominent Tanzanian radio campaign has been shown to reduce risky sexual behavior (Vaughan et al., 2000). The reasoning for HIV campaigns is that knowledge and education increase the take-up of VCT services (Sherr et al., 2007) and decrease risky sexual behavior (Denison et al., 2008).

However, traditional sensitization campaigns have been criticized for various reasons: First, their (written) message is often not understood by the target population (Raj, 2008). Second, HIV/AIDS sensitization often uses idealized characters who are presented as educator and protectors of themselves and their community (Faria, 2008). Such campaigning disregards the reality of the many poor who are trapped in their conditions. Third, the impact of these campaigns is difficult to measure (Snyder et al., 2009), since the evaluation capacity of the CBOs involved in such campaigns is generally very low (Gibbs et al., 2002). There is also a lack of evidence concerning campaign and VCT effectiveness (Sherr et al., 2007)

The sensitization campaign under study here is an education campaign. The message is delivered in training sessions in which the sensitized population participates. A study quite similar to ours is a community HIV/AIDS education program in Uganda (Mitchell et al., 2001). Using structured interviews and focus groups, four channels for HIV/AIDS sensitization where analyzed according to their effectiveness suggesting that multiple channels have to be used to reach out to the population at large. Rakotonanahary et al. (2002) use qualitative methods to analyze prevention activities concerning HIV/AIDS in Madagascar. They advocate increasing participation of the target group. Another interesting study employs a pre/post-analysis to assess how drama can increase the knowl-

edge about HIV/AIDS (Valente & Bharath, 1999). Hughes-d'Aeth (2002) presents a case-study of an HIV/AIDS peer education project in Zambia. His findings indicate that the peer education raises community awareness of HIV/AIDS, increases knowledge and, according to anecdotal evidence, seems to induce behavioral changes. However, Hughes-d'Aeth cannot quantify the effect with his design. Thus, a rigorous impact evaluation of competing sensitization campaigns is missing. This is where our study fills an important gap.

4 Methods

4.1 Study design and data collection

The number of VCT testing sites has been steadily increasing in Senegal, going from 5 locations in 2002 to 281 in 2008. Despite the considerable efforts deployed, voluntary testing in Senegal remains extremely low, with only 1.1% of the total population having been tested. From January to December 2007, for example, it is estimated that 93,065 individuals were tested countrywide. These disappointing results indicate severe lacunae in the strategies deployed up until now in terms of encouraging VCT.

Under the leadership of the CNLS, the CBOs involved in this study sensitized local populations to Sexually Transmitted Diseases (STDs), with a focus on HIV/AIDS. The 190 CBOs that participated in this study operate in 52 Senegalese health districts and each CBO can be unambiguously attributed to a given health district. The number of CBOs per health district varies between 0 and 18 with the mean number being 4.45 CBOs and the median being 3. There is no statistically significant difference in the number of CBOs per health district by treatment group (the $p-$values of the corresponding tests of the difference in means are both above 0.500): the results that we present below are therefore not driven by unaccounted differences in the intensity of treatment by treatment group, at least in terms of the number of CBOs involved.

The experiment took place between January 2009 and March 2009. Prior to January 2009, all CBOs collaborating with the CNLS implemented traditional HIV/AIDS sensitization methods, which rely on social mobilization techniques. Traditional campaigning involves radio and television ads, posters, and flyers, though their key tool is constituted by live information sessions during which CBOs present a series of six pre-determined modules that deal with (i) the disease process, (ii) symptoms, (iii) risk factors, (iv) risk reduction techniques, (v) the transmission of HIV from mother to child and (vi) the functioning of VCT services. This is done through street theatre, role playing and debates. Usually, a total of 450 individuals are involved in various training sessions. The potential weakness of this approach is that some people may be exposed to the disease process module but not to the risk reduction techniques module, whereas others may be

sensitized concerning VCT but will not be exposed to the risk factor module. There is therefore no guarantee that participants will be exposed to all six modules: heuristic evidence gathered in the field suggests that this is indeed the case.

In January 2009 a new peer-mentoring approach to HIV/AIDS sensitization was introduced. Under peer-mentoring, 150 individuals are intensively trained in small groups and are systematically exposed to all six modules. More specifically, three "relays" at the community level engage in social mobilization activities for two groups of 25 individuals, yielding $3 \times 2 \times 25 = 150$ trained "mentors". In the course of the training sessions each of the participants gains a deeper understanding of HIV/AIDS and the necessity of using VCT services. In a second step, the trained individuals promise to mentor at least two other individuals in their community and/or circle of friends. As with the traditional sensitization campaigns, this yields a treated population of approximately 450 individuals per CBO, though the mechanism through which this obtains is fundamentally different. The idea behind the peer-mentoring approach is to split the information transmission process into a two-step procedure and to exploit the dynamics of social networks. The small size of the "mentor" groups allows them to participate in the training sessions in a more active manner and to discuss their own concerns linked to HIV/AIDS. The mentorees, in turn, absorb the material in a more user-friendly way because it is their peers who encourage them to think and talk about HIV/AIDS and to make use of the VCT facilities.

Alongside the CBOs actually carrying out the sensitization campaigns, the Senegalese health administration is the other cornerstone of this impact evaluation. The health district (district de santé) is the smallest administrative entity in the Senegalese health care system. Each district encompasses at least one health center and a network of health posts (postes de santé). HIV/AIDS tests can be carried out in 281 locations countrywide, of which 143 are health posts. Irrespective of the facility in which the HIV test is administered, information about the test, its result and auxiliary data concerning the individual are recorded and can be analyzed at the health district level. Health districts, in turn, are grouped into 14 health regions. The local health posts and testing centers forward the list of their activities and indicators to the regional administrations who report their figures to the CNLS on a monthly or more often a quarterly basis. For the study at hand we constructed quarterly data running from Q1:2008 to Q1:2009. The data for this study were thus culled from standard administrative data and did not involve a costly (and useless) survey: this is a point worth stressing in the cash-strapped West African context.

4.2 Randomization and masking

The implementation of the new peer-mentoring campaign in January 2009 was randomized at the health district level. Depending upon the health district in which a CBO was located, it was assigned to either one of the two treatment groups (which received funding for traditional social mobilization on the one hand, or peer-mentoring, on the other) or to the control group (which received no funding). Prior to the randomized experiment considered in this study, CBOs largely carried out their sensitization activities without focusing on the specific manner in which their message was to be conveyed. The purpose of the experiment was therefore to not only ascertain whether funding of CBO HIV/AIDS sensitization campaigns can (i) significantly affect testing rates and (ii) the subsequent behavior of individuals who test positive, but also, most importantly, (iii) to study whether the manner in which CBOs communicate their message matters.

The objectives of the sensitization activities are twofold. First, CBOs are supposed to reach 450 individuals per treatment session. Second, a minimum of 150 individuals per target group of 450 participants is expected to carry out an HIV/AIDS test. However, prior to January 2009 only 18.9% of the individuals who participated in CBO sensitization campaigns had voluntarily been tested. It is thus of considerable importance to determine how to effectively increase testing rates.

In the experiment, CBOs were randomly assigned to one of three groups according to the health district in which they were operating:

- Group 0, the control group, corresponded to CBOs operating in health districts located in the Kolda, Thies, Matam and Ziguinchor regions. This group received no funding and continued its usual social mobilization activities without interference from the program.

- Group 1, the traditional social mobilization treatment group, which received funding in Q1:2009, corresponds to health districts located in the Dakar, Sedhiou, Kaffrine and Saint Louis regions.[2] The difference between Group 0 and Group 1 is that the social mobilization activities of Group 1 CBOs were funded by the program.

- Group 2, the peer-mentoring treatment group, which also received funding in Q1: 2009, corresponds to health districts located in the Tambacounda, Kedougou, Kaolack, Fatick and Diourbel regions. The difference between Group 1 and Group 2 is therefore the manner in which sensitization was carried out, with CBOs in both groups receiving funding from the program.

[2]Louga was also included in this group, but health district data on this region for Q1:2009 were not available because of labor unrest in the health sector.

4.3 Procedures

Instead of a one time scale up to the entire country, the peer-mentoring mechanism was randomly phased in at the health district level. From April 2009 onwards the peer-mentoring mechanism has been used by all funded CBOs. The initial random variation in treatment status both geographically and over time constitutes the crux of the analysis that follows. Out of the 52 health districts in our sample for the quarter (Q1:2009) during which treatment obtained, 24 correspond to the control group in which no funding to CBOs was provided, 9 correspond to treatment group 1, and the remaining 19 correspond to treatment group 2. In earlier quarters (Q1:2008 to Q4:2008) for which we have data, all health districts fall under the control group heading. Observations are equally distributed amongst the five quarters available in our data, running from Q1:2008 to Q1:2009.

We consider six response variables which are available in the health district administrative data:

- the number of persons tested;
- the number of persons having received pre-test counseling;
- the number of persons having picked up their test results;
- the number of persons having tested positive who picked up their test results;
- the number of persons having tested positive whose partner was also tested;
- the number of persons having tested positive who followed post-test counseling.

Summary statistics for the response variables are presented in table 1 column 1, with the corresponding histograms (for the full samples; not disaggregated by sex) shown in the six panels of figure 1. Our data correspond to a total of 156,178 tests, which span a 15 month period. On the basis of our data, the mean prevalence rate amongst tested individuals by health district is 4.7%, with the median value being 2.5%. On average, 570 tests are carried out in a health district in a given quarter (the median value is 333), though this number varies enormously, from a minimum of 1 to over 12,000 tests. This sizable variation is also reflected in the large standard deviation, which is equal to 932. Means, medians, minima, maxima and standard deviations for the delivery of pre-test counseling and for the number of individuals who have picked up their test results are of the same order of magnitude as for the number of persons tested. Approximately one third of the tested individuals are men, two-thirds women.

The total number of observations drops substantially once we consider the number of people who tested positive. For individuals who tested positive, each health district reports an average of 20 who have picked up their test results. Again, the variation

is substantial. The standard deviation is almost twice the mean. While overall pick-up rates match testing rates reasonably well, especially when taking those who tested negative and those who tested positive together, it is worrisome that, of those having tested positive, only 15% had their partner tested. Post-test counseling rates for those having tested positive are higher on average and reach 60%. Disaggregating results by gender, almost twice as many women who test positive pick up their result as compared to men.

Summary statistics by treatment group are reported in table 1 columns 2–4. These descriptive statistics are already indicative of the regression results that follow as they show that on average regions with funded peer-mentoring or traditional social mobilization display higher testing rates. On average, health districts that fall into treatment groups 1 and 2 report 200 more individuals who follow counseling, get tested and pick up their result. The statistics disaggregated by gender show that this effect is mainly due to an increase amongst females.

4.4 Statistical analysis

The feeling gleaned from the summary statistics presented in table 1 is confirmed visually by the histograms shown in figure 1: the distributions of all response variables are highly skewed. Moreover, all of our response variables correspond to event counts, in the sense that they are given by integers, bounded by zero. As such, standard linear regression techniques, in which a simple comparison of means would be carried out, are not appropriate. The benchmark model for count data is the Poisson model (Cameron & Trivedi, 1998), in which the distribution of the response variable Y_{it} (i will index health districts and t quarters), conditional on a matrix of covariates X_{it}, is assumed to be given by the Poisson distribution:

$$f\left(Y_{it}|\, X_{it}\right) = \frac{e^{-\mu_{it}}\mu_{it}^{Y_{it}}}{Y_{it}!}, Y_{it} = 0, 1, 2, ..., \tag{1}$$

where we assume that the mean parameter μ_{it} is given by:

$$\mu_{it} = E\left[Y_{it}|\, X_{it}\right] = \exp\left\{\alpha_{0it} + D_{1it}\alpha_1 + D_{2it}\alpha_2\right\}, \tag{2}$$

and where the matrix of covariates $X_{it} = [\alpha_{0it}, D_{1it}, D_{2it}]$ is assumed to be given by the two dummy variables corresponding to treatment status:

$$D_{jit} = \begin{cases} 1 & \text{if health district } i \text{ is in treatment group } j \text{ during quarter } t \\ 0 & \text{otherwise} \end{cases}, \tag{3}$$

and α_{0it} is a set of 4 quarter dummies and 10 region dummies. The quarter dummies allow us to control for shocks that affect all regions in a given quarter simultaneously, while the regional dummies control for regional disparities such as different population sizes. Given that randomization –and therefore the determination of treatment status– occurred at the regional level, our inference is based on allowing the stochastic disturbances to be correlated within regions (Bertrand et al., 2004). By clustering our standard errors at the regional level, we allow for regional unobservables to be correlated amongst all health districts that fall within the same region.

As we observe a divergence between the means and variances of the response variables in our data, we do not carry out a Poisson Maximum Likelihood Estimation. Instead, we implement a pseudo-Maximum Likelihood estimation that accommodates the misspecification of the density function. We also carried out the estimation under the assumption that the data follow a negative binomial distribution which, contrary to the Poisson distribution, does not assume equidispersion. Results were virtually identical and are not reported for the sake of brevity. Similarly, to address the robustness of our results we employ a linear model which yields virtually identical results.

Although treatment was randomly phased in, we want to be confident that, in the absence of the sensitization campaigns, the take-up of VCT services would have been identical across health districts. We therefore carry out a comparison of means test for the "placebo-intervention" in quarters Q1:2008 to Q4:2008. In order to do so, we pretend that the health districts that were in fact randomly selected into the three treatment groups in Q1:2009, had already started with the different sensitization campaigns in Q1:2008. Results are presented in table 2. Aggregating over all individuals we do not find significant differences in the utilization of VCT services across the placebo treatment groups. On the other hand, for the number of persons who tested positive and who have followed post-test counseling, we find that in health districts that eventually introduced peer-mentoring initial acceptance of post-test counseling was significantly lower (at the 5% level of confidence). In addition, for health districts that were eventually randomly selected into peer-mentoring, we find that the number of persons who tested positive and who picked up their result is significantly smaller than in the control group (at the 10% level of confidence). It important to note that both of these effects work against us detecting any significant effect from peer-mentoring and/or funded social mobilization in the subsequent analysis.

Splitting up the sample into a subsample for women and another for men paints a similar picture. By and large we cannot reject the hypothesis of equivalence of the means. Whenever we do reject it for peer-mentoring, we find a significantly lower level of utilization of VCT services as compared to the control group. That we do subsequently find a highly significant positive impact of peer-mentoring for the actual treatment period highlights the large impact of this type of intervention. Hence, the analysis of the placebo-

intervention in the pre-treatment periods strengthen our confidence in the validity of our results. For most response variables we found no significant pre-treatment differences across health districts. Whenever we do find pre-treatment effects they work against us finding a significant impact of peer-mentoring and thus lend additional credence to the results reported below.

When implementing randomizations in social settings there is another concern that must be dealt with: population mobility, which would vitiate the treatment status of our health districts. In the context of VCT, the systematic attendance by individuals of health facilities in neighboring districts could bias the results and invalidate the assumptions of our randomized experiment. While we cannot fully rule out such dynamics, we observe that populations in rural communities in Senegal are relatively immobile. If individuals visit a health center, they will usually systematically choose the nearest one given the large transportation costs that they would incur were they to travel further afield. Though there may be some contamination for individuals living near the border of their health district, this effect is likely to be extremely small

A standard manner of quantifying the impact of dummy variables in a Poisson regression framework is to compute the ratio of the conditional expectations of the response variable under the two values taken by the dummy. This yields a particularly simple expression because of the exponential form taken by the mean function given in equation (2). For example the ratio of the conditional mean of the response variable under treatment by the peer-mentoring mechanism to its conditional mean in the control group can be written as:

$$\frac{E\left[Y\left|D_2=1,D_1=0,\alpha_0\right.\right]}{E\left[Y\left|D_2=0,D_1=0,\alpha_0\right.\right]}=\exp\left\{\alpha_2\right\}.$$

Similarly, the ratio of the conditional mean of the response variable under peer-mentoring to its conditional mean under traditional social mobilization is given by:

$$\frac{E\left[Y\left|D_2=1,D_1=0,\alpha_0\right.\right]}{E\left[Y\left|D_1=1,D_2=0,\alpha_0\right.\right]}=\exp\left\{\alpha_2-\alpha_1\right\}.$$

In the results presented in the lower half of the tables 3, 4 and 5, we only present these ratios of conditional means when the corresponding coefficient estimates (α_1, α_2 or $\alpha_2 - \alpha_1$, as the case may be) have associated p-values that are below 0.10.

5 Results

Results of the Poisson specification for each of the response variables are presented in tables 3, 4 and 5. We exploit the full sample period of five quarters. Results are qualitatively similar when we restrict our attention to Q4:2008 and Q1:2009, which correspond to the quarter immediately preceding treatment and that during which CBO treatment

groups 1 and 2 were funded.

Four results stand out in our empirical findings. First, as reported in column 1 of table 3, peer-mentoring significantly increases the number of individuals tested with respect to the control group, while traditional social mobilization, even when funded, does not. Panel B of table 3 shows that in quantitative terms the impact is relatively large with 1.881 times more people being tested under funded peer-mentoring than in the control group. As shown in column 3, this effect appears to be due to a significantly greater number of tested women, with no discernible impact on voluntary testing on the part of men (column 2). The increase in testing due to funded peer-mentoring goes hand-in-hand with an increase, of roughly the same magnitude, in the number of individuals who participate in pre-test counseling. This is shown in column 4 of table 3, and is again due to women (column 6). The increase in testing caused by peer-mentoring is also accompanied by an increase, which is slightly larger in magnitude (the ratio of the conditional expectations is equal to 2.155), in the number of individuals who have picked up their test results, as reported in column 1 of table 4 (panel B). Once more, this effect appears to be entirely due to women (compare column 2 and 3 of table 4). Although the estimated treatment effects for take-up by men and women are similar in size, it is significant only for the subsample of females. Therefore, in terms of testing rates as well as in terms of the number of people who pick up the test results, peer-monitoring outperforms funded social mobilization and un-funded sensitization approaches mainly by reaching women. This result is striking because peer-mentoring was only introduced in January 2009. CBOs in this treatment group were therefore still going through the learning process. That we nevertheless find a statistically significant and quantitatively large effect of peer-mentoring highlights the power of exploiting network and peer dynamics for the transmission of health knowledge. It further implies that, on their own, social mobilization campaigns have to be treated with caution in terms of their effectiveness.

Second, as reported in column 4 of table 4, funded peer-mentoring and funded social mobilization have no statistically significant impact on the number of individuals who have tested positive and who pick up their test results, in comparison with the control group. This is true for the sample as a whole as well as for women. For men, in contrast, there is a statistically significant negative effect of traditional social mobilization on this response variable (column 5 of table 4), perhaps because of unforeseen social stigmatization.

Third, as reported in column 1 of table 5, both peer-mentoring and traditional social mobilization increase the number of HIV-positive individuals whose partners have also been tested. There is no statistically significant difference between the quantitative effects of the two treatments: peer-mentoring increases the conditional mean of this response variable by a factor of 1.644, with the corresponding number for traditional social mobilization being 1.889 (compare table 5 column 1, panel B). The impact of traditional

social mobilization is mainly due to an increase in the number of tested partners of HIV-positive men (column 2 of table 5, panel B, with the ratio of conditional means being equal to 3.743) with relatively little effect on the partners of HIV-positive women (the corresponding ratio of the conditional means, reported in column 3 of table 5, panel B, is equal to 1.255). Perhaps because of the relatively small sample size for this response variable (relatively few health districts systematically collect data on this variable), the positive impact of peer-mentoring only appears when the male and female samples are considered jointly, and does not appear in the results presented in columns 2 and 3.

Fourth, as reported in column 4 of table 5, both peer-mentoring and traditional social mobilization significantly increase (by a factor of roughly 2) the number of HIV-positive individuals who have followed post-test counseling. There is no statistically significant difference between the two sensitization mechanisms in the population taken as a whole, though peer-mentoring, as reported in column 5 of table 5, appears to increase post-test counseling among men (while traditional social mobilization does not). Traditional social mobilization, as reported in column 6, appears to be more effective at increasing post-test counseling among women (the ratio of conditional expectations of the response variables for peer-mentoring versus traditional social mobilization is equal to 0.640, compare table 5 column 6, panel B).

6 Discussion

In terms of the three research questions posed in the introduction, namely whether funding for HIV/AIDS sensitization programs run by CBOs can (i) increase the use of VCT services, (ii) change the subsequent behavior of individuals who test positive and (iii) whether the manner in which sensitization campaigns are run matters, our answers are all "yes". In terms of increasing the use of VCT services, funding peer-mentoring is effective and nearly doubles take-up, while funding traditional social mobilization is not. When it comes to changing the behavior of HIV-positive individuals, both funded social mobilization and peer-mentoring are effective. Traditional campaigns are much more effective in ensuring that partners of infected men are tested and infected women follow post-test counseling, while peer-mentoring is effective at encouraging infected men to follow post-test counseling.

Thus, the manner in which CBOs run sensitization campaigns matters, and the policy of choice depends crucially on the response variable that one focuses on. Instead of confining attention to a single manner of deploying sensitization campaigns, a hybrid approach, in which peer-mentoring and traditional methods are combined, might therefore be advisable, due to the complementarities of the different programs. While peer-mentoring seems to be the most effective means of encouraging individuals to get tested for HIV and pick up their test results, social mobilization campaigns seem to be more effective at

modifying the behavior of infected individuals.

A further question addressed by our study, which is of considerable policy interest in the West African context in which healthcare systems are chronically underfunded, is whether it is possible, through a judicious use of routinely-collected Ministry of Health administrative data and a carefully crafted research design, to rigorously analyze such interventions. Our answer is an unambiguous "yes", thus providing evidence that relatively inexpensive means exist to assess various policy options, without having to resort to onerous and time-consuming survey methods. Established software can be used to collect monthly or quarterly indicators at the level of the smallest administrative unit, such as the health district. These data can then be transferred and consolidated at the highest level of aggregation (the national level). As long as internal validation procedures are correctly implemented, the quality of the data thereby generated can be ensured and nothing hinders a rigorous evaluation. This highlights the importance of strengthening the capacity of West African governments to systematically collect –and use– disaggregated health-related administrative data for the fight against HIV/AIDS.

Finally, our study shows that rigorous impact evaluations of HIV/AIDS sensitization campaigns are possible, can be implemented relatively easily, and can yield results within a reasonable time frame (one quarter in our case). Consider the following hypothetical (though typical) case: An international donor supports local NGOs in their fight against HIV/AIDS. The donor operates on a standard 4 year project cycle. Following the completion of one project cycle, the donor must decide whether or not to renew funding . In most cases donors lack empirical evidence concerning the effectiveness of the sensitization campaigns they support. However, before renewing funding, the donor can stipulate conditions spelling out the way in which future sensitization campaigns have to be carried out. The donor can also request that the NGO collect specific outcome indicators. If the donor funds a least two distinct groups of NGOs, one with and the other without such conditionality, the way is paved for a comparison of outcomes between the two groups of NGOs. If funding is then randomly assigned to NGOs, a simple yet powerful impact evaluation can be carried out. The randomization can be implemented at the NGO-level or at a geographical level, as was the case in our study. In addition, the effectiveness of competing sensitization approaches can be compared by randomly varying conditionality. Of course, the number of differentiated campaigns (and thus the number of treatment arms) has to be limited so as to ensure that the minimum detectable impact of such a research design will remain within reasonable bounds.

References

Bertrand, M., Duflo, E., & Mullainathan, S. (2004). How Much Should We Trust Differences-in-Differences Estimates? *Quarterly Journal of Economics*, *119*, 249–275.

Bwambale, F. M., Ssali, S. N., Byaruhanga, S., Kalyango, J. N., & Karamagi, C. A. (2008). Voluntary HIV Counselling and Testing among Men in Rural Western Uganda: Implications for HIV Prevention. *BMC Public Health*, *8*.

Cameron, A. C., & Trivedi, P. K. (1998). *Regression Analysis of Count Data* volume 30 of *Econometric Society Monographs*. Cambridge, UK: Cambridge University Press.

Carman, J. G. (2007). Evaluation Practice Among Community-Based Organizations. *American Journal of Evaluation*, *28*, 60–75.

Chillag, K., Bartholow, K., Cordeiro, J., Swanson, S., Patterson, J., Stebbins, S., Woodside, C., & Sy, F. (2002). Factors Affecting the Delivery of HIV/AIDS Prevention Programs by Community-Based Organizations. *AIDS Education and Prevention*, *14*, 27–37.

Denison, J., OReilly, K., Schmid, G., Kennedy, C., & Sweat, M. (2008). HIV Voluntary Counseling and Testing and Behavioral Risk Reduction in Developing Countries: A Meta-analysis, 19902005. *AIDS and Behavior*, *12*, 363–373. 10.1007/s10461-007-9349-x.

DHS (2005). *Demographic and Health Survey Senegal – HIV Fact Sheet*. Calverton, MD 20705 USA.

Doyle, A. M., Ross, D. A., Maganja, K., Baisley, K., Masesa, C., Andreasen, A., Plummer, M. L., Obasi, A. I., Weiss, H. A., Kapiga, S., Watson-Jones, D., Changalucha, J., Hayes, R. J., & kwa Vijana Trial Study Group, M. (2010). Long-terms Biological and Behavioural Impact of an Adolescent Sexual Health Intervention in Tanzania: Ffllow-up Survey of the Community-Based MEMA kwa Vijana Trial. *PLoS Medicine*, *7*.

Dupas, P. (2011). Do Teenagers respond to HIV Information? Experimental Evidence from Kenya. *American Economic Journal: Applied Economics Letters*, *3*, 1–36.

Ehrmann, T. (2002). Community-Based Organizations and HIV Prevention for Incarcerated Populations: Three HIV Prevention Program Models. *AIDS Education and Prevention*, *14*, 75–84.

Faria, C. (2008). Privileging Prevention, Gendering Responsibility: An Analysis of the Ghanaian Campaign against HIV/AIDS. *Social & Cultural Geography*, *9*, 41–73.

Gibbs, D., Napp, D., Jolly, D., Westover, B., & Uhl, G. (2002). Increasing Evaluation Capacity within Community-Based HIV Prevention Programs. *Evaluation and Program Planning*, *25*, 261 – 269.

Hughes-d'Aeth, A. (2002). Evaluation of HIV/AIDS Peer Education Projects in Zambia. *Evaluation and Program Planning*, *25*, 397 – 407.

Jones, C. A., Knaup, R. C., Hayes, M., & Stoner, B. P. (2000). Urine Screening for Gonococcal and Chlamydial Infections at Community-Based Organizations in a High-Morbidity Area. *Sexually Transmitted Diseases*, *27*, 146–151.

Mansuri, G., & Rao, V. (2004). Community-Based and -Driven Development. *World Bank Research Observer*, *19*, 1–40.

Marwell, N. P. (2004). Privatizing the Welfare State: Nonprofit Community-Based Organizations as Political Actors. *American Sociological Review*, *69*, 265–291.

McCoy, S. I., Kangwende, A., & Padian, N. S. (2010). Behavior Change Interventions to prevent HIV Infection among Women living in Low and Middle Income Countries: A Systematic Review. *AIDS and Behavior*, *14*, 469–482.

McLaughlin, M. W. (2000). *Community Counts: How Youth Organizations Matter for Youth Development*. Public Education Network, Washington, DC.

Mitchell, K., Nakamanya, S., Kamali, A., & Whitworth, J. A. G. (2001). Community-Based HIV/AIDS Education in Rural Uganda: Which Channel is most Effective? *Health Education Research*, *16*, 411–423.

Mossdorf, E., Stoeckle, M., Vincenz, A., Mwaigomole, E. G., Chiweka, E., Kibatala, P., Urassa, H., Abdulla, S., Elzi, L., Tanner, M., Furrer, H., Hatz, C., & Battegay, M. (2010). Impact of a National HIV Voluntary Counselling and Testing (VCT) Campaign on VCT in a Rural Hospital in Tanzania. *Tropical Medicine and International Health*, *15*, 567–573.

Needle, R. H., Burrows, D., Friedman, S. R., Dorabjee, J., Touzé, G., Badrieva, L., Grund, J.-P. C., Kumar, M. S., Nigro, L., Manning, G., & Latkin, C. (2005). Effectiveness of Community-Based Outreach in Preventing HIV/AIDS among Injecting Drug Users. *International Journal of Drug Policy*, *16, Supplement 1*, 45 – 57.

Obare, F., Fleming, P., Anglewicz, P., Thornton, R., Martinson, F., Kaputaka, A., & Poulin, S., M. Watkins (2008). Acceptance of Repeat Population-Based Voluntary Counseling and Testing for HIV and the Socio-Demographic Variations in HIV Incidence in Rural Malawi. *Sexually Transmitted Infections*, *85*, 139–144.

Pettifor, A. E., Catherine, M., Bertozzi, S., & Rees, H. V. (2007). Challenges of Evaluating a National HIV Prevention Program: The Case of loveLife, South Africa. *Sexually Transmitted Infections*, *83*, 70–74.

Pronyk, P. M., Kim, J. C., Makhubele, M. B., Hargreaves, J. R., Mohlala, R., & Hausler, H. (2002). Introduction of Voluntary Counselling and Rapid Testing for HIV in Rural South Africa: From Theory to Practice. *AIDS Care*, *14*, 859–865.

Raj, S. M. (2008). Public Awareness and Sensitization Campaigns on HIV/AIDS in Nigeria. *The Journal of Pan African Studies*, *2*, 215–224.

Rakotonanahary, A., Rafransoa, Z., & Bensaid, K. (2002). Qualitative Evaluation of HIV/AIDS IEC Activities in Madagascar. *Evaluation and Program Planning*, *25*, 341 – 345.

Ross, D. A., Changaluch, J., I., O. A., Todd, J., L., P. M., Cleophas-Mazige, B., Anemona, A., Everett, D., Weiss, H. A., Mabey, D. C., Grosskurth, H., & Hayes, R. J. (2007). Biological and Behavioural Impact of an Adolescent Sexual Health Intervetion in Tanzania: A Community-Randomized Trial. *AIDS*, *21*, 1943–1955.

Sherr, L., Lopman, B., Kakowa, M., Dube, S., Chawira, G., Nyamukapa, C., Oberzaucher, N., Cremin, I., & Gregson, S. (2007). Voluntary Counselling and Testing: Uptake, Impact on Sexual Behaviour, and HIV Incidence in a Rural Zimbabwean Cohort. *AIDS*, *21*, 851–860.

Sidaction, UNAIDS, & WHO (2005). Expanding Access to HIV Treatment through Community-Based Organizations. UNAIDS Best Practice Collection.

Snyder, L. B., Hamilton, M. A., & Huedo-Medinaa, T. (2009). Does Evaluation Design Impact Communication Campaign Effect Size? A Meta-Analysis. *Communication Methods and Measures – Special Issue*, *3*, 84–104.

Stevenson, H. C., & White, J. J. (1994). AIDS Prevention Struggles in Ethnocultural Neighborhoods: Why Research Partnerships with Community Based Organizations Can't Wait. *AIDS Education and Prevention*, *6*, 126–39.

Valente, T. W., & Bharath, U. (1999). An Evaluation of the Use of Drama to Communicate HIV/AIDS Information. *AIDS Education and Prevention*, *11*, 203–211.

Vaughan, P. W., Rogers, E. M., Singhal, A., & Swalehe, R. M. (2000). Entertainment-Education and HIV/AIDS Prevention: A Field Experiment in Tanzania. *Journal of Health Communication*, *5*, 81–100.

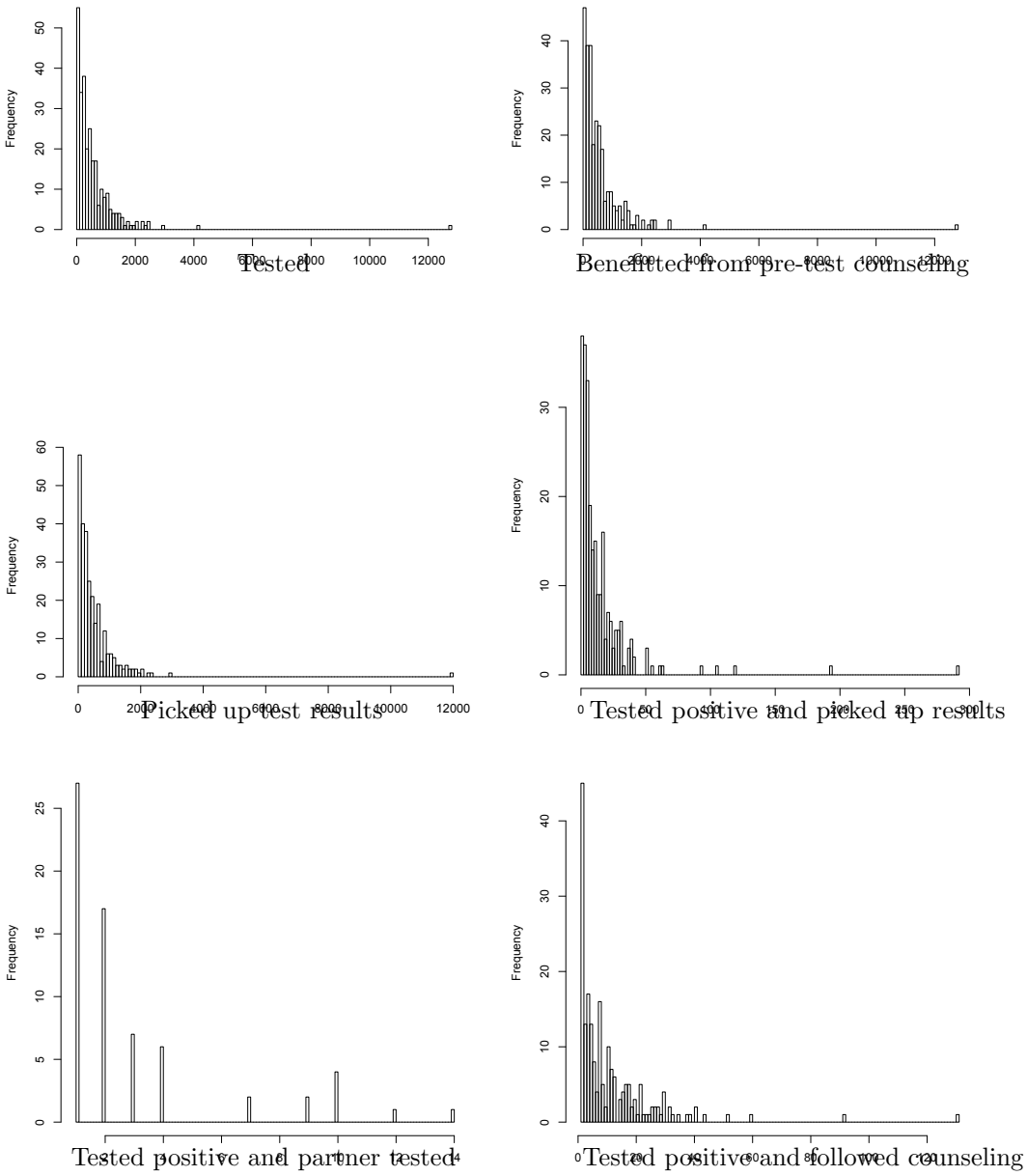

Figure 1: Distributions of the response variables.

	Entire Sample	Group 0	Group 1	Group 2
			All	
Number of persons				
tested	570 (932)	553 (956)	739 (704)	705 (705)
who benefitted from pre-test c.	584 (952)	569 (979)	736 (679)	703 (712)
who picked up their test results	507 (853)	488 (870)	654 (677)	674 (709)
tested positive and				
picked up their test results	20 (38)	15 (27)	21 (33)	15 (14)
whose partner has been tested	3 (3)	3 (3)	3 (3)	2 (1)
who have followed post-test c.	12 (15)	11 (12)	24 (44)	15 (10)
			Men	
Number of persons				
tested	169 (290)	167 (300)	174 (157)	189 (214)
who benefitted from pre-test c.	181 (310)	180 (320)	176 (145)	193 (224)
who picked up their test results	153 (269)	150 (277)	156 (149)	183 (222)
tested positive and				
picked up their test results	6 (9)	6 (10)	5 (4)	6 (5)
whose partner has been tested	2 (2)	2 (2)	2 (1)	1 (0.4)
who have followed post-test c.	5 (5)	5 (5)	6 (5)	6 (4)
			Women	
Number of persons				
tested	402 (660)	392 (679)	456 (371)	515 (516)
who benefitted from pre-test c.	406 (672)	397 (692)	452 (352)	510 (514)
who picked up their test results	357 (602)	343 (616)	447 (352)	491 (513)
tested positive and				
picked up their test results	10 (18)	10 (19)	15 (20)	10 (10)
whose partner has been tested	2 (2)	2 (2)	2 (2)	1 (0·4)
who have followed post-test c.	8 (12)	8 (9)	23 (43)	10 (7)

Table 1: Descriptive statistics: the unit of observation is a health district during one quarter, the letter 'c' abbreviates counseling. Column 1 presents the entire sample. Column 2 shows descriptive statistics for the control group of 24 health districts. In column 3 the descriptives for the 9 health districts that sensitize using social mobilization techniques are presented. Column 4 shows the descriptives for the 19 health districts that sensitize using the peer-mentoring mechanism. Standard errors are in parentheses.

Number of persons ...	tested	who benefitted from pre-test couns.	who picked up their test result	tested positive & who picked up their result	tested positive & whose partner has been tested	tested positive & have followed post-test couns.
			All			
Peer Ment.	25.008 [0.831]	4.981 [0.967]	20.537 [0.845]	-4.670 [0.087]	-1.962 [0.188]	-5.402 [0.014]
Soc. Mobil.	746.097 [0.198]	805.755 [0.175]	691.842 [0.152]	6.669 [0.172]	-0.772 [0.610]	1.715 [0.633]
			Men			
Peer Ment.	-2.997 [0.930]	-5.952 [0.863]	-8.672 [0.768]	-1.558 [0.066]	-0.420 [0.707]	-2.105 [0.028]
Soc. Mobil.	227.122 [0.194]	293.490 [0.085]	225.773 [0.131]	2.047 [0.057]	-0.563 [0.509]	0.682 [0.589]
			Women			
Peer Ment.	32.307 [0.714]	14.725 [0.872]	29.686 [0.713]	-2.808 [0.194]	-1.446 [0.042]	-3.312 [0.038]
Soc. Mobil.	542.083 [0.219]	502.745 [0.243]	468.421 [0.187]	4.080 [0.323]	-0.301 [0.726]	1.215 [0.639]

Table 2: Differences in means test for pretreatment placebo intervention. p-values clustered at the regional level in square brackets.

	Number of persons tested			Number of persons having benefitted from pre-test counseling		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A	all	men	women	all	men	women
Peer-mentoring						
α_2	0.632	0.513	0.624	0.659	0.629	0.603
	[0.056]	[0.222]	[0.037]	[0.051]	[0.186]	[0.038]
Social mobilization						
α_1	0.096	−0.262	−0.014	0.000	−0.390	−0.096
	[0.756]	[0.415]	[0.961]	[0.998]	[0.252]	[0.748]
$\alpha_2 - \alpha_1$	0.535	0.776	0.639	0.659	1.019	0.700
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Panel B	Ratios of conditional means					
Peer-mentoring ÷ Control group						
$\frac{E[Y\|D_2=1,D_1=0]}{E[Y\|D_2=0,D_1=0]}$	1.881	–	1.866	1.933	–	1.828
Social mobilization ÷ Control group						
$\frac{E[Y\|D_1=1,D_2=0]}{E[Y\|D_1=0,D_2=0]}$	–	–	–	–	–	–
Peer-mentoring ÷ Social mobilization						
$\frac{E[Y\|D_2=1,D_1=0]}{E[Y\|D_1=1,D_2=0]}$	1.707	2.173	1.895	1.933	2.770	2.014
Observations	273	265	266	268	261	263
$D_2 = 1$	19	19	19	19	19	19
$D_1 = 1$	9	9	9	9	9	9

Table 3: Poisson regression results for the number of persons tested and benefitting from pre-test counseling. p-values clustered at the regional level in square brackets below coefficients. All regressions include quarterly and regional dummies. Ratios of conditional means are only presented when the underlying parameters are statistically significant at the 10 percent level. $D_1 = 1$ for health district quarters that belong to treatment group 1 and zero otherwise (and similarly for D_2 for treatment group 2).

	Number of persons having picked up their test results			Number of persons who tested positive and who picked up their test results		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A	all	men	women	all	men	women
Peer-mentoring						
α_2	0.768	0.672	0.722	−0.203	−0.354	−0.291
	[0.036]	[0.171]	[0.021]	[0.566]	[0.446]	[0.414]
Social mobilization						
α_1	0.186	−0.236	0.082	−0.240	−0.902	−0.342
	[0.590]	[0.498]	[0.787]	[0.606]	[0.084]	[0.395]
$\alpha_2 - \alpha_1$	0.581	0.909	0.640	0.037	0.547	0.051
	[0.000]	[0.002]	[0.000]	[0.885]	[0.030]	[0.811]
Panel B	Ratios of conditional means					
Peer-mentoring ÷ Control group						
$\frac{E[Y\|D_2=1,D_1=0]}{E[Y\|D_2=0,D_1=0]}$	2.155	–	2.059	–	–	–
Social mobilization ÷ Control group						
$\frac{E[Y\|D_1=1,D_2=0]}{E[Y\|D_1=0,D_2=0]}$	–	–	–	–	0.406	–
Peer-mentoring ÷ Social mobilization						
$\frac{E[Y\|D_2=1,D_1=0]}{E[Y\|D_1=1,D_2=0]}$	1.788	2.482	1.896	–	1.728	–
Observations	271	261	264	246	199	234
$D_2 = 1$	19	19	19	18	16	18
$D_1 = 1$	10	10	9	9	8	8

Table 4: Poisson regression results for the number of persons having picked up their test results and number of persons having tested positive who picked up their test results. p-values clustered at the regional level in square brackets below coefficients. All regressions include quarterly and regional dummies. Ratios of conditional means are only presented when the underlying parameters are statistically significant at the 10 percent level. $D_1 = 1$ for health district quarters that belong to treatment group 1 and zero otherwise (and similarly for D_2 for treatment group 2).

	Number of persons who tested positive and whose partner has been tested			Number of persons who tested positive and who have followed post-test counseling		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A	all	men	women	all	men	women
Peer-mentoring						
α_2	0.497	0.112	0.347	0.721	0.593	0.601
	[0.028]	[0.684]	[0.274]	[0.012]	[0.093]	[0.003]
Social mobilization						
α_1	0.636	1.320	0.227	0.912	0.243	1.047
	[0.000]	[0.000]	[0.053]	[0.000]	[0.219]	[0.000]
$\alpha_2 - \alpha_1$	−0.139	−1.207	0.120	−0.191	0.349	−0.446
	[0.513]	[0.000]	[0.732]	[0.354]	[0.188]	[0.000]
Panel B	Ratios of conditional means					
Peer-mentoring ÷ Control group						
$\frac{E[Y\|D_2=1,D_1=0]}{E[Y\|D_2=0,D_1=0]}$	1.644	–	–	2.056	1.809	1.824
Social mobilization ÷ Control group						
$\frac{E[Y\|D_1=1,D_2=0]}{E[Y\|D_1=0,D_2=0]}$	1.889	3.743	1.255	2.489	–	2.849
Peer-mentoring ÷ Social mobilization						
$\frac{E[Y\|D_2=1,D_1=0]}{E[Y\|D_1=1,D_2=0]}$	–	0.299	–	–	–	0.640
Observations	66	44	47	200	156	188
$D_2 = 1$	8	5	6	12	11	12
$D_1 = 1$	5	3	3	8	5	7

Table 5: Poisson regression results for the number of persons who tested positive and whose partner has been tested and number of persons who tested positive who followed post-test counseling. p-values clustered at the regional level in square brackets below coefficients. All regressions include quarterly and regional dummies. Ratios of conditional means are only presented when the underlying parameters are statistically significant at the 10 percent level. $D_1 = 1$ for health district quarters that belong to treatment group 1 and zero otherwise (and similarly for D_2 for treatment group 2).