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Rewarding Safer Sex

Conditional Cash Transfers for HIV/STI Prevention

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Abstract

Incentive-based policies have been shown to be powerful in many areas of behavior, but have rarely been tested in the sexual domain. The Rewarding Sexually Transmitted Infection Prevention and Control in Tanzania (RESPECT) study is a randomized controlled trial testing the hypothesis that a system of rapid feedback and positive reinforcement that uses cash as the primary incentive can be used to reduce risky sexual activity among young people, male and female, who are at high risk of HIV infection. The study enrolled 2,399 participants in 10 villages in rural southwest Tanzania. The intervention arm received conditional cash transfers that depended on negative results of periodic screenings for sexually transmitted infections, an objectively measured marker for risky sexual behavior. The intervention arm was further divided into two subgroups, one receiving a high value payment of up to $60 over the course of the study ($20 payments every four months) and the other receiving a lower value payment of up to $30 ($10 payments every four months). At the end of the one year of intervention, the results showed a significant reduction in sexually transmitted infections in the group that was eligible for the $20 payments every four months, but no such reduction was found for the group receiving the $10 payments. The effects were stronger among the lower socioeconomic and higher risks groups. The results of a post-intervention follow-up survey conducted one year after discontinuing the intervention indicate a sustained effect among males, but not among females.

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Rewarding Safer Sex: Conditional Cash Transfers for HIV/STI Prevention

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1. Introduction

In 2012, approximately 2.3 million people were newly infected with HIV (UNAIDS 2013). Existing prevention strategies - mainly behavior change interventions promoting safer sexual practices - have had a limited impact on the trajectory of the HIV/AIDS epidemic (Bertrand et al. 2006; Napierela Mavedzenge, Doyle, and Ross 2010). Conditional cash transfers (CCTs) have been used successfully to promote activities that are beneficial to the participants such as school attendance and health check-ups for children (Fiszbein and Schady 2009). We conducted a randomized experiment testing whether CCTs can be used as a strategy for the prevention of HIV and other sexually transmitted infections (STIs) by incentivizing safe sex.

We designed and evaluated a novel intervention that tests for risky sexual behavior repeatedly over short time intervals, reinforcing learning about safer behavior with CCT incentives each time[1]. We have reported some of the short-term impacts of that CCT intervention incentivizing safe sex on STI prevalence earlier (de Walque, Dow, Nathan et al. 2012). Recognizing that such an intervention would be difficult to sustain over the length of individuals' sexual lives, in this paper we evaluate its long-term effects using a post-intervention follow-up survey conducted one year after discontinuing the intervention and we compare those long-term effects with short-term effects measured during the intervention. We also analyze the heterogeneity of the impacts by gender, marital and socio-economic status, urban location and baseline risk of being STI positive and investigate the short and long term impacts of the intervention on sexual behaviors.

[1] In Malawi, cash transfers for young girls attending school were shown to reduce HIV and Herpes (HSV-2) prevalence (Baird, Garfein, McIntosh and Özler 2012). Also in Malawi, small financial incentives have been shown to increase the uptake of HIV testing and counseling (Thornton 2008). A follow-on Malawi intervention promised a single cash reward in one year's time for individuals who remained HIV negative, but this design had no measurable effect on HIV status (Kohler and Thornton 2011). Conditional economic incentives for HIV prevention are also tested among men who have sex with men, including male sex workers in Mexico City (Galárraga, Sosa-Rubí, Infante, Gertler and Bertozzi 2013) and under the form of lottery tickets in Lesotho (Björkman-Nyqvist, Corno, de Walque, and Svensson, 2013).

The study enrolled 2399 participants in 10 villages in rural south-west Tanzania. The intervention arm received conditional cash transfers (CCTs) that depended on negative results of periodic screenings for sexually transmitted infections (STIs) – an objectively measured marker for risky sexual behavior. The intervention arm was further divided into two sub-groups – one receiving a "high value" CCT payment of up to $60 over the course of the study ($20 payments every four months) and the other receiving a lower value payment of up to $30 ($10 payments every four months).

At the end of the one year intervention, the results showed a significant reduction in STIs in the group that was eligible for the $20 payments every four months, but no such reduction was found for the group receiving the $10 payments. Further, at the end of the intervention, the impact of the CCTs did not differ between males and females, but the impact was larger among individuals who were STI positive at baseline. The results of the post-intervention follow-up survey conducted one year after discontinuing the intervention indicate a sustained effect among males suggesting learning effects, but not among females, suggesting that for females the cash component might be important for them in their efforts to negotiate safe sex. While we found impacts of our CCT intervention on STI prevalence, an objective measure of safe sex behaviors, we found very limited impacts on self-reported sexual behaviors, potentially because those self-reports are less reliable. We also did not find any impact on STI treatment seeking behaviors, suggesting that our measured impacts of the CCT intervention are not driven by a higher propensity of the individuals in the intervention group to seek STI treatment.

The next section discusses through which mechanisms economic theory would predict that financial incentives for remaining STI negative might affect sexual behaviors. Section 3 describes the intervention, the randomized trial design and the data collection. Section 4 includes the assessment of balance at baseline and of attrition. Section 5 focuses on the impact of the CCT intervention on the STI outcomes. Section 6 investigates potential mechanisms explaining the results, including sexual behavior change and STI treatment seeking behavior. Section 7 concludes.

2. Theoretical Pathways for Incentive Effects on Risky Sexual Behaviors[2]

There are a variety of theoretical pathways via which incentives could influence risky sexual behaviors. In the STI domain, such behaviors might include sexual behavior (abstinence, fewer partners, less risky partners, condom use, pressure spouse/partner to reduce risky behaviors) as well as testing and treatment behaviors (regular STI testing, STI treatment, and encouraging partner to do the same). In this section we focus on behavioral changes induced particularly by incentives employed in the RESPECT study: cash rewards conditional on testing negative for STIs.

Neoclassical Price Effect

Neoclassical economics predicts that the incentives will influence behavior in part via a price effect. There is a market for transactional sex, with buyers (typically men) and sellers (typically women). This market includes "professional" prostitution but also includes more informal types of sexual transactions. Some sexual encounters involve an explicit price, some do not. As in any market, changes in prices will affect differently the demand and the supply of transactional sex. This theory assumes rational decision-making in the sexual domain (Philipson and Posner, 1995) and is consistent with social exchange theory (Sprecher 1998). The idea that individuals make tradeoffs between price and the riskiness of sex is consistent with Gertler et al. (2005) who find Mexican sex workers charge higher prices for sex without condoms, and Robinson and Yeh (2011) who find that sex workers charge more for anal sex. These examples suggest that the supply of risky transactional sex is responsive to price changes. The price elasticity on the demand side has been less documented. Those results of course do not indicate that individuals are *perfectly* rational in such decisions but lend credence to the idea that people do respond to sex prices. Beyond the explicit or implicit market prices, there is also a shadow price or shadow cost of risky sex which includes the probability to be infected by sexually transmitted infections and the health, psychological and monetary costs associated with such infections. This shadow price does affect the demand and the supply of risky sex in the same

[2] This section draws on material included in de Walque, Dow, Nathan and Medlin (2012).

direction, even if not in the same magnitude: everything else equal, an increase in the health risks associated with risky sex should decrease both its demand and its supply.

Conditioning a monetary reward on STI status, as done in the RESPECT study increases the shadow "price" of risky sex, since there is now a potential loss of cash associated with risky behaviors, such as unprotected sex. However, this price effect may be muted by the fact that not all risky behaviors will result in a positive STI test, so the expected loss may be lower than the reward value. In the RESPECT trial, approximately ten percent of individuals tested positive at each time point, thus a person of average risk who mixes with average risk partners could have an expected loss of only one-tenth of the reward amount. For example, assuming perfect information, the RESPECT study's higher cash reward amount of $20 might yield only a $2 "shadow price" of risky sex during a four month period, which by itself could be a weak spur to behavioral change.

Neoclassical Income Effects

To the extent that health is a normal good, the rewards may change behavior through income effects, particularly with increasing value of cumulative repeated rewards. In the RESPECT study, the rewards over one year can be as high as 25% of mean annual earnings, which is a substantial amount. For some lower-income women this could indeed ameliorate immediate economic pressures to engage in transactional sex, although there is mixed evidence on the size and even sign of the income effect on risky sexual behaviors. For men in particular, it is often hypothesized that higher income will lead to more sexual activity (Kohler and Thornton, 2011) or transactional sex, which over time would mute the incentive effects on male sexual behaviors.

Systematic Cognitive Errors

Some individuals may not be able to accurately perform the expected value calculations discussed above. Limited numeracy, availability heuristics, and bounded rationality may make some people particularly prone to systematic over-estimation of small STI probabilities (see e.g.

Kahneman and Tversky, 1979). Thus they may behave as if the expected financial loss is substantially higher or lower than it truly is. In our baseline survey, individuals tend to overestimate HIV prevalence in their area: perceived HIV prevalence in the community in the same age group is 16% among males and 18.4% among females, while actual prevalence is 2.5% among males and 4.6% among females. It is therefore likely that they also overestimate STI prevalence and therefore the expected financial loss.

High Discounting

In a society with a generalized AIDS epidemic (Tanzania has an estimated 5.7% adult prevalence rate), the expected cost of an AIDS diagnosis might be considered far larger than the modest cash rewards offered. For individuals who are present-focused and heavily discount the future though, the prospect of an AIDS diagnosis many years in the future may not be considered a high cost. But if the price of risky sex would be incurred within months instead (the RESPECT study tested and offered cash rewards every four months), then high discounters may perceive an increased (discounted) price of risky sex, and thus behaviorally respond to this shortening of the time horizon. This of course depends on the extent of high discounting. Results from our survey at round 4 suggest extremely high rates of discounting: when having to hypothetically choose between 2000 Tanzanian Shillings in 2 weeks and 6000 Tanzanian Shillings in 6 weeks, 56.7% of respondents preferred the first option, implying that even a timeframe of months may result in substantial discounting of the potential reward value. And a reward in the timeframe of months may have little impact on those risky sexual behaviors that may be driven by strong hyperbolic discounting (similar to the concept of compulsive immediate gratification used in developmental psychology) as discussed in the behavioral economics literature (O'Donoghue and Rabin, 2001).

Other "Nudges"

A variety of other behavioral economics and psychological hypotheses have been proposed regarding the operation of incentives, now sometimes referred to as "nudges" following the popularization of the term by Thaler and Sunstein (2008). For example, some

argue that introducing explicit monetary incentives into the sexual decision-making process may alter the frame within which people assess costs and benefits, resulting in unpredictable deviations from neoclassical theory. Others suggest that the incentives provide individuals with an excuse for deviating from social norms in order to act on underlying preferences for less risky behavior. Several such theories would predict a discontinuity of the dose-response relationship at zero: the first positive reward amount should have much larger behavioral effects than subsequent amounts. Designing studies with multiple rewards are particularly important for testing such hypotheses and this is why the RESPECT study used $20, $10, $0.

In addition to the above discussed pathways for behavioral change in response to the incentives, it is also useful to consider potential long-term effects of time-limited incentives. Two competing hypotheses are of particular interest:

Learning

For behaviors which individuals may not have tried until encouraged to by the incentives (e.g., use of condoms), it is possible that the incentives will induce learning (and reinforcement) that could result in permanent positive behavior changes even after withdrawal of the incentives. In the context of the market for sex, learning about condom use could have different implications for buyers (men) and sellers (women). Presumably women are not selling sex for pleasure and therefore learning that condoms do not diminish sexual pleasure would have limited impact on their behavior. Bur for men the realization that condom are not reducing their pleasure might have a more substantial impact on their behavior and of the type of sex (e.g. protected or not) they are willing to buy.

Reduced Intrinsic Motivation

Alternatively, psychologists have emphasized the potentially pernicious effects of extrinsic monetary incentives in destroying the intrinsic desire to engage in positive behaviors.

Cameron et al. (2001) reviews the literature on the possible destruction of intrinsic incentives. They conclude that reduced intrinsic motivation might occur for some tasks which are interesting in themselves, for example, drawing pictures among children, but that in general and for tasks which do not present a lot of interest by themselves, such as condom use, incentives do not have pervasive adverse effects.

3. Intervention, Trial Design and Data Collection.

This study is a parallel group randomized trial[3]. It has three separate arms – a control arm and two intervention arms (low-value CCT and high-value CCT) as illustrated in figure 1. We recruited males and females, aged 18-30 (and spouses ages 16 or over, with spousal pairs assigned the same intervention arm) residing in one of 10 selected villages within the Kilombero/Ulanga districts of the Ifakara Health and Demographic Surveillance Survey (Schellenberg et al. 2002) (IHDSS) in south-west Tanzania. We used three exclusion criteria: being pregnant at the time of registration, having the intention to permanently migrate out of the study area within the next year, and unwillingness to participate if assigned to the control arm. HIV-positives were eligible for enrollment.

Interventions

The intervention arm was divided into two sub-arms – a low-value CCT arm eligible for up to $30 over the course of the study (Tsh 10,000 or approximately $10 per testing round), and a high-value CCT arm eligible for up to $60 (Tsh 20,000 or approximately $20 per testing round). Appendix Table A1 details which STIs were tested for and incentivized at each study round. All participants were tested for STIs at baseline and then every 4 months for one year. Participants in the two intervention arms were eligible to receive CCT incentive payments if they tested negative for curable STIs at the 4, 8, and 12-month testing rounds. STIs tested at all of these incentivized rounds were *Chlamydia trachomatis, Neisseria gonorrhea, Trichomonas vaginalis,*

[3] The study protocol was initially approved by the University of California, Berkeley's IRB (Committee for Protection of Human Subjects) effective December 17, 2008; approval has been updated numerous times since to reflect protocol amendments, with the latest approval effective October 11, 2010. The Ifakara Health Institute Institutional Review Board initially approved the study on July 24, 2008. The latest amended approval is from February 11, 2010. Tanzania's National Institute for Medical Research approved the study February 5th 2009. This randomized control trial is registered at ClinicalTrials.gov, study identifier # NCT00922038.

and Mycoplasma genitalium, which are transmitted through unprotected sexual contact and therefore serve as a proxy for risky sexual behavior as well as vulnerability to HIV infection (Fishbein and Pequegnat 2000; Crosby et al. 2003; Niccolai et al. 2005; Napierela Mavedzenge and Weiss 2009). Those converting from negative at baseline to positive at 12-months for syphilis or HSV-2 were also ineligible to receive the 12-month CCT, i.e. the third payment. HIV testing was conducted at baseline and month 12, but payments were not conditioned on those results because of local ethical sensitivities. *Mycoplasma genitalium* results did not affect conditional cash transfer eligibility because the population and the health staff in the area were not familiar with that infection and its test; however, we included it in the combined prevalence measure used as a primary outcome to increase statistical power. Individuals in the intervention arms testing positive for any of the conditioned curable STIs did not receive the CCT payment, but were eligible to continue as study participants in subsequent rounds after having been treated and cured of the infection. Individuals in the control arm were not eligible for CCT payments, but all other study procedures were identical between the control and intervention arms. Anyone testing positive for an STI (regardless of arm) was offered counseling and free STI treatment (for self and partners) through health facilities of the District Ministry of Health facilities serving the research communities. Individual pre-test and post-test counseling was provided to all study enrollees at each testing interval, and monthly group counseling sessions emphasizing relationship-skills training based on the Stepping Stones curriculum (Jewkes et al. 2008), were also made available to all study participants in all villages.

Randomization

Randomization took place at the study station after baseline interview and testing, with participants selecting colored balls from an opaque bag. The randomization took place in two stages with participants first randomly selecting one of four balls to determine their allocation to the intervention or the control arm. In order to study network effects and introduce variation in the intensity of the CCT intervention at the community level, we varied the probability of selection in the intervention group at the sub-village level. In randomly selected sub-villages, the probability of selection in the intervention arm was 75% (3 balls out of 4) and in the other sub-villages, it was 25% (1 ball out of 4). Participants randomized into the intervention arm were further invited to choose one of two balls from a second bag determining in which of the two

intervention arms (low-value CCTs and high-value CCTs) they would be allocated. These transparent procedures were used to enhance acceptability of randomization in a population with limited formal education.

Spousal pairs were assigned the same intervention arm and the protocol prescribed for randomization to occur after both spouses had enrolled.

Outcomes

The biological markers used in the study were selected both due to their likely prevalence levels in the study population and due to their status within the epidemiological literature as reasonable proxies for risky sexual behavior. The primary study endpoint is the round-specific combined point prevalence of the four STIs that were regularly tested – *Chlamydia trachomatis*, *Neisseria gonorrhoeae 3*, *Trichomonas vaginalis*, and *Mycoplasma genitalium* – at months 4, 8, and 12. For logistical reasons related to customs clearance, Mycoplasma genitalium testing was not conducted at baseline. We also tested for HIV, HSV-2, and syphilis at baseline and months 12 and 24 (see appendix table A1 for the details of which tests were conducted and which STIs were incentivized at each round).

All STI testing was conducted by the Ifakara Health Institute (IHI) microbiology laboratory in Ifakara[4]. All test results were available within 7-10 days and were returned to participants the following week. Ten percent of all samples, and all positives, were sent using dry ice packaging to the University of California, San Francisco, Chlamydia Laboratory for confirmation analysis.

At each round, we also interviewed study participants about their sexual partnerships and behaviors. The baseline and months 12 and 24 questionnaires included, in addition, a more

[4] Specimens for Chlamydia, gonorrhea, trichomonas, and Mycoplasma genitalium were collected by a self-administered vaginal swab for females. Males provided a "first-catch urine" (about 20-30 mL) sample. Detection used GenProbe Aptima (GenProbe Inc, San Diego, CA) assays. To test for HIV, HSV-2, and syphilis, a single venous blood sample of approximately 5-10 mL was collected from each participant at baseline and month 12. For HSV-2, we used the Focus HerpeSelect HSV-2 ELISA IgG assay (Focus Technologies, Cypress, CA) to detect serum antibodies. *T. pallidum* was identified using RPR with reactive tests confirmed by TPPA . Active syphilis was defined as RPR+/TPPA+. For HIV, we used a series of three rapid tests for initial results, confirmation of positives, and tie-breaking.

comprehensive socio-economic module. All components of the intervention, including the incentives, but also the counselling activities were stopped after 12 months. One year after discontinuing the CCT intervention, at month 24, we revisited the 10 study villages and retested and re-interviewed study participants to assess the long-term impacts of the intervention.

4. Baseline Summary Statistics and Attrition

Of the 2,409 registered participants, 1,124 (46.7%) were randomly allocated to the control arm. While this is slightly lower than 50%, the distribution of sub-villages into two different intensity levels with 75% vs. 25% probability of selection in the intervention arms was somewhat lumpy and would have predicted that 47.8% of participants should have been randomized in the control arm. The automatic assignment of spouses in the same arm as their first registered and randomized spouse explains further variations from the 50%/25%/25% distribution in the design. Among the participants, 1,285 were randomly selected, in a first stage, to one of the two CCT arms: 615 (25.5%) were randomly assigned in the high value CCT arm and 660 (27.4%) in the low value CCT arm. Ten (0.4%) individuals assigned to the intervention arms were intentionally dropped from the analysis because they were not properly further randomized in one of the two sub-arms.

Table 1 describes the baseline characteristics of the participants by study arm. The prevalence of the six STIs tested at baseline was well balanced across arms, with only syphilis prevalence being slightly higher in the low value CCT arm compared to the control group (significant at the 10% level). Similarly, self-reported sexual behaviors such as condom use at the last sexual intercourse, having more than one sexual partner in the last 4 months or engaging in risky sex (extra-marital sex without a condom) are well balanced across study arms (risky sex was slightly lower in the high value CCT arm, significant at the 10% level). Participants were similar according to gender and education. However, individuals in the low value CCT arm had

slightly lower self-reported socio-economic status[5] but reported a higher income and individuals in both CCT arms were also older at the 10% significance level.

In the control arm, attrition was 14% at round 2 (month 4) and 12.5% at round 3 (month 8). In the high value CCT arm, attrition was 7.3% and 4.8% at round 3. In the low value CCT arm, attrition was 13.9% at round 2 and 4.1% at round 3. An additional study team was included to track down attriters at round 4 (month 12), resulting in a low overall attrition rate of 6.5% (7.2% in the control group, 4.9% in the high value CCT arm and 6.5% in the low value CCT arm). At round 5 (month 24, one year after discontinuing the intervention), attrition from baseline was 9.9% in the control group, 8.3% in the high value CCT arm and 9.2% in the low value CCT arm.

Table 2 investigates in more detail attrition at rounds 4 and 5. Attrition by round 4 at month 12 is slightly lower in the high value cash group and slightly higher in the control group, but attrition does not vary significantly by study arm at round 5 at month 24. Being male, being young or unmarried were predictors of being lost to follow-up both after 12 and 24 months. In addition, attrition increased with education after 24 months. Attrition was not predicted by any of the baseline STI results, except that HIV positive individuals at baseline were more likely to be lost to follow-up despite the fact that they were told that they remained eligible to participate in the study. For sexual behaviors, individuals reporting more than one sexual partner were more likely to be lost to follow-up at both rounds 4 and 5 and reported condom use also predicted attrition at month 24.

5. The Impact of the Conditional Cash Transfers on the STI Outcomes

Table 3 presents impact results on the prevalence of sexually transmitted infections. Relative risks are calculated from logistic regressions[6]. With this specification, a coefficient lower than 1 indicates a risk reduction while a coefficient larger than 1 indicates an increased

[5] We measure an individual's SES standing using the following question: "Think of a ladder in which people in your community are ranked with the highest status people on the top rung and the lowest status on the bottom round. On a ladder with 7 steps, on which step would you place yourself?" Those who reported being on the last two rungs are classified as being in the lowest SES group. We added this measure because income is notoriously poorly measured in rural communities where agriculture is the main activity and where own-consumption is extensive.
[6] Using the *margins* and *nlcom* post-estimation commands in the *Stata 12* statistical software package.

risk. The regressions are controlling for gender, education, age, marital status, income, socio-economic status, sub-village and baseline STI status. We cluster standard errors at the sub-village level, accounting for the variation in selection probability at that level.

Results during the intervention

In columns 1-3 of table 3, the dependent variable is the combined prevalence of the four curable STIs (Chlamydia, Gonorrhea, Trichomonas and Mycoplasma Genitalium) repeatedly tested at months 4, 8, 12 and 24. At months 4 and 8 (columns 1 and 2), the relative risks of the interventions at both cash levels are lower than 1, suggesting a risk reduction, but this is not statistically significant. However, at month 12 (column 3) the high value CCT arm corresponds to a 25% risk reduction compared to the control group (relative risk of 0.749 statistically lower than 1). For the low value CCT arm, the coefficient is essentially one.

When we designed our study, we hypothesized that habit formation would lead to impact after 12 months and that the impact would be stronger after 12 months. The absence of significant impacts at rounds 2 (month 4) and 3 (month 8) suggests that the impact of the CCT may take time to materialize, perhaps because it is not easy to extricate oneself from complicated sexual relationships, perhaps because individual behavior changes need to be reinforced over time by a lower STI prevalence in the pool of sexual partners (network effects), or perhaps because participants needed time to become accustomed to (and trust) the incentive mechanism. The comparison between the impacts of the CCT intervention in the high-value CCT arm to that in the low-value CCT arm permits us to better understand at which threshold CCT can be effective as an HIV/STI prevention tool. While the results showed a significant reduction in STI incidence in the arm that was eligible for the $20 CCTs every 4 months or up to $60 over 12 months, no such reduction was found for the arm receiving the $10 CCTs every 4 months or up to $30 over 12 months. The outcomes between the high CCT and low CCT arms themselves were statistically different as suggested by the p-value rejecting the equality between the high and low value CCT arms in column 3. However, this distinction must be interpreted with caution because assignments to study arms were not masked to participants. Individuals in the low value CCT arm could have behaved differently if they were to receive the same incentive in the absence of a higher CCT arm. In particular, qualitative reports suggest that in the study area, the

arm receiving the $10 CCTs every 4 months was designated in Swahili, the local language, as the "low value" group, which might have affected its perception in the community. Both CCT amounts represent a meaningful proportion of household income in a country where GDP per capita was $440 in 2008, and particularly among our study participants who reported to have had mean individual annual earnings of approximately $250.

Three additional STIs (HIV, HSV-2 and syphilis) were tested at month 12 using a blood test (they were also tested at baseline). Column 4 displays the month 12 impact results for those three other STIs, combining syphilis prevalence with new infections for HIV and HSV-2. In contrast to column 3, no significant reduction is found when the dependent variable is a combined measure for HSV-2 and HIV incidence and syphilis prevalence. The lack of a clear result on the combined measure for the 3 STIs that were tested only at baseline, month 12, (this measure primarily reflects HSV-2 incidence, as HIV and syphilis prevalence were somewhat lower) is puzzling. The contrasting result with the impact of the high value CCTs on the 4 curable STIs that were repeatedly tested could point to the importance of treatment seeking behavior rather than safer sexual practices. However, the interpretation of HSV-2 results is complicated by the fact that most transmission occurs via asymptomatic shedding[7] by partners who may be otherwise low-risk (Koelle and Wald 2000), as well as the fact that it can be transmitted even in the context of appropriate condom use. (Martin, Kantz, Gottlieb et al. 2010). In column 5, the 7 STIs have been pooled together in one measure, combining the prevalence of Chlamydia, Gonorrhea, Trichomonas, Mycoplasma Genitalium, Syphilis and new infections for HIV and HSV-2. The relative risk measured are lower than 1, but not significantly so.

Post-intervention follow-up results

Columns 6-8 of table 3 present results of the one year post-intervention follow-up at month 24, one year after the discontinuation of the intervention using the same 3 sets of STIs as dependent variables as at month 12 (4 STIs tested at each round in column 6, 3 STIs tested only at baseline, month 12 and month 24 in column 7, and all 7 STIs in column 8). Overall, both interventions seemed to have had a sustained impact in reducing the STI prevalence among the

[7] HSV-2 infections are transmitted through contact with lesions, mucosal surfaces, genital secretions, or oral secretions. They can also be shed from skin that looks normal. In persons with asymptomatic HSV-2 infections, genital HSV shedding occurs on 10% of days, and on most of those days the person has no signs or symptoms (Tronstein E, Johnston C, Huang M, et al 2011).

study population: when we combine all 7 STIs, both the high and the low value CCT intervention have relative risks significantly lower than 1 (0.799 and 0.818 respectively in column 8), corresponding to 18 to 20% risk reduction compared to the control group. The relative risks for both groups are not significantly different from each other in column 8, as well as when we separate the 2 groups of STIs. Only the relative risk corresponding to the low value CCT arm is statistically lower than 1 for Chlamydia, Gonorrhea, Trichomonas and Mycoplasma Genitalium (column 6) and only the relative risk corresponding to the high value CCT arm is statistically lower than 1 for HIV, HSV-2 and syphilis (column 7).

Those results from the one-year post intervention follow-up indicate that the CCT interventions might have sustained effect even after the cash payments have been discontinued and suggest a learning effect. They do not suggest that CCTs might destroy the intrinsic motivation to adopt safe sexual practices since no increased risk was reported in the intervention groups. Those are important results when considering the potential feasibility at scale and sustainability of our CCT intervention.

The control variables in table 3 further suggest that women are more likely to be STI positive, while education and being married generally decrease the likelihood of being infected. In tables 4 and 5, we further investigate the heterogeneity of impacts by analyzing how they varied by different categories.

Analysis by gender

Table 4 focuses on differences by gender and includes the same dependent variables and columns as in table 3 with one panel for males and one panel for females. At the bottom of the table, we include p-values testing the equality of the relative risks for males and females. Until month 12, while the CCT intervention was still implemented, we find no differential impacts by gender. The relative risks for the high value CCT group are similar for males and females and similar to the one found overall (compare columns 3 in tables 3 and 4), even if the statistical significance is lower when looking at each gender separately due to the reduced sample sizes. In contrast, at the one year post-intervention follow-up (columns 6-8), we find sustained impacts of the CCT intervention in reducing STI prevalence among males, while with the exception of

the measure combining HIV, HSV_2 and syphilis for the high CCT group (column 7), we do not observe sustained effects among females. Even if we should be careful in interpreting those results because with the exception of column 6 (Chlamydia, Gonorrhea, Trichomonas and Mycoplasma Genitalium) for the high CCT group, the differences by gender are not statistically different from each other (see p-values at the bottom of the tables), this contrast across gender suggests that the long-term impacts were mainly sustained among men, but not among women. One possible interpretation of that finding is that, while the CCT intervention contributed to create safer sex habits among men, the cash component of the intervention might be important for women in their efforts to negotiate safe sex.

Sub-groups analyses

Table 5 includes sub-group analyses by marital status (columns 1 and 2), rural or urban location[8] (columns 3 and 4), socio-economic status (columns 5 and 6) and risk behaviors at baseline as measured by infection for any of the following STIs at baseline: Chlamydia, Gonorrhea, Trichomonas, Syphilis or HIV[9] (columns 7 and 8). We present those sub-group analyses, in addition to the results by gender in table 4, because we hypothesize that the CCT intervention might initiate different dynamics when individuals are in long-term sexual partnership (by marital status), because we expect the cash transfer incentives to be more powerful in low socio-economic status and rural environment and because we anticipate larger effects in higher risk populations, since they have a larger margin to modify their behavior. Panel A displays the results after 12 months, while panel B contains the results of the one year post-intervention follow-up at month 24. At the bottom of each panel, we include p-values testing the equality of the relative risks for the two categories in each sub-group analysis. For most comparisons, we cannot reject the equality of the coefficients across the sub-groups. One sub-group analysis for which the p-values indicate that the coefficients are statistically different from each other is the analysis by risk at baseline: in the high value CCT arm, individuals who were positive for at least one of the STIs at baseline (and could therefore been perceived as of a more

[8] Because rural or urban status is perfectly correlated with village fixed effects, we could not include village fixed effects in the regressions in columns 3 and 4.

[9] For logistical reasons, we were not able to test for Mycoplasma Genitalium for study participants at baseline. We also exclude HSV-2 from this measure of riskiness because it can be transmitted even in the context of appropriate condom use. (Martin, Kantz, Gottlieb et al. 2010).

risky type) have been significantly more responsive to the CCT intervention than those who tested negative for those STIs (column 8). This suggests that this intervention incentivizing safe sex might be particularly effective in high risk environments. Otherwise, the cash transfers seem to have had a stronger and more significant impact for people with low socio-economic status at month 12 (column 6), suggesting possibly a larger effect of the intervention in difficult economic circumstances.

6. Potential Pathways: Sexual Behavior Change and STI Treatment Seeking Behavior

The CCT intervention was aimed at incentivizing safe sex. While the intervention used STI tests as objective bio-markers, it remains interesting to analyze the impact of the CCTs on self-reported sexual behaviors. However, it is important to stress that self-reported sexual behaviors have been shown as not very reliable (Gersovitz 2005, de Walque 2007). Behaviors are by nature self-reported and therefore potentially biased. Risky behaviors such as unsafe sexual behavior are intimate behaviors and they are not perceived as socially desirable. The possibility of bias might therefore be larger than when reporting "regular" behaviors such as education or spending patterns. While acknowledging this limitation, we do not think that the CCT intervention reinforced self-reporting biases. We made it clear to participants that the cash transfers were dependent on STI laboratory test results and not on what they would report about their sexual behaviors in the interviews: the cash payments were given in an envelope containing the STI test results that was received two weeks after the interview took place[10].

Sexual behaviors

Table 6 illustrates with an example the issues of the reliability of self-reported sexual behaviors. It reports the rate of *new* infections at month 12 for each of the curable STIs tested in our study by whether or not the respondent self-reported to have abstained from any sexual intercourse during the reference period. For Chlamydia, Gonorrhea, Trichomonas and Mycoplasma Genitalium which have been tested every four months, the reference period for new

[10] However, at month 4, before the first payment was made and clearly linked to the STI testing results, we could speculate that individuals in the incentive groups might have been more likely to self-report less risky sexual behaviors, in the hope to influence the receipt of the cash transfer. Potentially, this might explain stronger impacts of the cash transfer intervention on self-reported sexual behaviors at month 4 than at later rounds.

infections and for abstinence is the last 4 months, while for Syphilis which was only tested every year, that reference period is the last 12 months, explaining why fewer people reported abstinence. If abstinence was truthfully reported, we would expect no new infections among individuals who reported abstinence. Except for syphilis, this is not the case. For example, 4.15% of individuals who reported having abstained during the last 4 months tested positive for a new Mycoplasma Genitalium infection that can only have been transmitted through sexual contact (compared to 6.99% for sexually active individuals). In the case of Chlamydia and Gonorrhea, the rate of new infections is even larger among individuals who report abstinence than among sexually active individuals. When we combine all 5 five curable STIs, we observe that 7.18% of individuals who reported abstinence ended up testing positive for at least one of the 5 infections. This is a smaller percentage than the 10.09% among those who report having been sexually active, but it is clearly different than zero which should have been the consequence of abstinence.

With strong caveats in mind about the reliability of self-reported sexual behaviors, we include results on the measured impacts of the CCT intervention on those behaviors in table 7. The dependent variables come from a questionnaire module about sexual behavior that was included at each round (month 4, month 8, month 12 and month 24). The reference period is always the last four month, except at month 24 for which we present results over the last 4 months (columns 7 and 8) and over the last 12 months (columns 9 and 10). The analysis is disaggregated by gender. We investigate whether the individual declared more than one sexual partner during the reference period (panel A) and whether he or she reported condom use at the last sexual intercourse (panel B). We also created a variable called "risky sex" that combines extra-marital sex and condom use. "Risky sex" is defined as having sex outside a spousal partnership (both formal and informal marriages included) without using a condom.

Overall, there are few significant impacts of the CCT interventions on those measures of self-reported behaviors, even if the coefficients generally go in the expected direction: reduction of multiple partners and risky sex, increase of condom use. Most of the significant impacts are observed at the earlier rounds. In particular at month 4, women in both CCT arms are less likely to report more than one sexual partner (also at month 8 in the low value CCT arm) and risky sexual encounters in the past 4 months. At month 4, males in the high value CCT arm are also

more likely to report to have used a condom at their last sexual intercourse (a similar impact is also observed at month 24). It is worth emphasizing that the analysis of the behavioral changes must be interpreted with particular caution due to multiple comparisons. Furthermore it is likely that the observed STI effects are driven by smaller behavioral changes in different directions, each of which we do not have the power to detect in analysis of individual behaviors.

STI treatment-seeking behavior

Table 8 investigates the possibility that the measured impacts of the CCT intervention are driven by higher STI treatment-seeking behaviors in the intervention group. Even though free STI treatment was offered to all study participants irrespective of arm, individual assigned in the intervention arms had higher incentives to seek treatment and use the free STI treatment voucher provided by the study than individuals in the control arm. In panel A, we use as dependent variable self-reports about treatment-seeking behaviors. At month 4, the questionnaire did not ask specifically about the free STI treatment voucher distributed by the study to STI positive individuals. For that round, the dependent variable is whether the individual used a medical treatment for any condition. At months 8 and 12, we included a question on whether the individual used the voucher for free STI treatment offered by the study for those who tested positive to any STI. The results in columns 1-3 of table 8 indicate that there was no difference in STI treatment-seeking behavior across study arms and in any case that study participants in the CCT arms were not more likely to seek treatment for STIs (if anything, the only significant coefficient at month 4 for the low value CCT arm suggests the opposite) . Columns 4-6 of table 8 use a potentially more objective measure of STI treatment seeking behavior. The study's free STI treatment vouchers included the participants' anonymous study ID code. At the end of the study, we collected the vouchers from the clinics where those vouchers could be redeemed and in columns 4-6 we are running linear regressions in which the dependent variable is the number of vouchers redeemed. The sample is limited to individuals who tested STI positive at the previous round, so that the analysis is conditional on having received a free STI treatment voucher. We find no significant impacts and conclude that STI positive individuals in the CCT intervention arms are not more likely to redeem their vouchers than in the control group.

7. *Conclusion*

In rural Tanzania, participants in the RESPECT study who were randomly selected to be eligible for a $20 payment every 4 months if they tested negative for a set of curable STIs, experienced a 25% reduction in the incidence of those STIs. The results indicate that conditional cash transfers based on negative results of periodic screenings for incident sexually transmitted infections – an objectively measured marker for risky sexual behavior – are a potentially useful tool for STI and possibly HIV prevention. No such reduction was found for the group receiving $10 payments every four months.

Recognizing that such an intervention would be difficult to sustain over the length of individuals' sexual lives, we evaluated its long-term effects using a post-intervention follow-up survey conducted one year after discontinuing the intervention and we compared those long-term effects with short-term effects measured during the intervention. The results from the one-year post intervention follow-up do not suggest that CCT might destroy the intrinsic motivation to adopt safe sexual practices since no increased risk was reported in the intervention groups. They also indicate that the CCT interventions might have a sustained effect even after the cash payments have been discontinued and suggest a learning effect, but those sustained effect are mainly found among males. This stands in contrast with the results immediately at the end of the intervention (month 12) when there were no differences by gender. One possible interpretation of those findings is that the cash component of the intervention might be important for women in their efforts to negotiate safe sex.

In consideration of possible replications and scaling-up of this cash transfer intervention, it is worth noting that the impacts were very strong among individuals who were STI positive at baseline, who could be categorized as high risk individuals. In a new ongoing project, we are piloting similar incentives among high risk women, including sex workers, in Dar-es-Salaam, Tanzania.

We investigated possible pathways for the impact of CCT in reducing STI prevalence, analyzing both reported sexual behavior changes and STI treatment seeking behavior. With the necessary caveats due to the self-reported nature of that information, we found few significant impacts on sexual behaviors. We did not find any impact of the CCT intervention on STI treatment seeking behavior.

While the study results are important in showing that the idea of using financial incentives can be a useful tool for preventing HIV/STI transmission, it remains a "proof of concept" study. Even though the study site is fairly representative of rural and small town environments in Sub-Saharan Africa, this approach would need to be replicated elsewhere and implemented on a larger scale (in permutations requiring less administrative and laboratory capacity) before it could be concluded that such conditional cash transfer programs offer an efficient, scalable and sustainable HIV prevention strategy.

The extraordinarily high social and economic cost of the current HIV/AIDS crisis suggests that prevention can be far cheaper than treatment, thus motivating continued search for innovative and effective new prevention approaches, such as conditional cash transfers or other financial incentives.

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Figure 1: Trial design

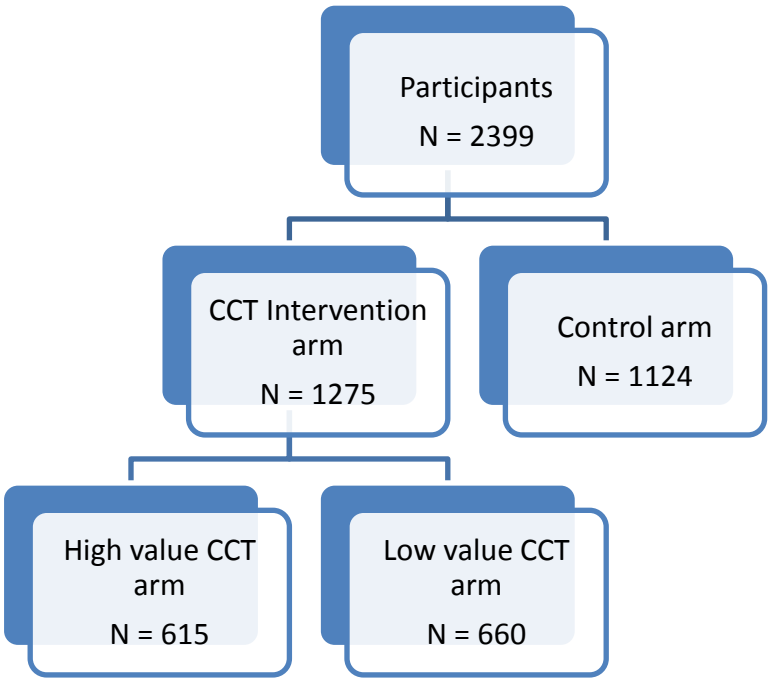

Table 1. Demographic Characteristics					
	Control	High CCT		Low CCT	
Female	0.502	0.511		0.498	
Age	27.1	27.6	*	27.5	*
Married	0.750	0.771		0.722	
Education					
No education	0.120	0.101		0.112	
Primary	0.774	0.790		0.781	
Some secondary	0.106	0.109		0.106	
Socio-Economic Status					
Income	239,311	257,017		283,218	**
Low SES	0.518	0.559		0.572	***
STIs at Baseline					
Chlamydia	0.019	0.024		0.024	
Gonorrhea	0.007	0.013		0.009	
Trichomomas	0.116	0.143		0.120	
Herpes Simplex Virus-2	0.339	0.367		0.342	
Syphilis	0.015	0.013		0.023	*
HIV	0.037	0.028		0.041	
Sexual Behavior at Baseline					
Condom during last sex	0.241	0.230		0.232	
Risky sex	0.102	0.076	*	0.089	
More than one partner	0.108	0.122		0.109	
N	1,124	615		660	

The stars summarize P-values for difference with control group in a logit model with the random assignment as the dependent variable. *, p-value <0.1, ** p-value <0.05, *** p-value<0.01. Yearly income in Tanzanian Shillings (Tsh). At baseline, 1,000 Tsh = approximately 1USD. Low SES corresponds to the lowest two ranks on a self-reported socio-economic status scale from 1to 7. Risky sex takes the value of one if the individual had unprotected sex with a non-marital partner.

Table 2 - Attrition								
	(1)	(2)	(3)		(4)	(5)	(6)	
	Attrition at Month 12				Attrition at Month 24			
	Mean Among Followed	Mean Among Attrited	Share Attrited		Mean Among Followed	Mean Among Attrited	Share Attrited	
Variable								
Treatment Arm								
No CCT (control)	0.465	0.526	0.072		0.466	0.498	0.099	
High Value CCT	0.261	0.195	0.049	**	0.259	0.229	0.083	
Low Value CCT	0.275	0.279	0.065		0.275	0.274	0.092	
Demographic Characteristics								
Female	0.510	0.409	0.052	**	0.510	0.439	0.081	**
Age	27.49	25.49		***	27.46	26.33		**
Married	0.757	0.614	0.052	***	0.760	0.626	0.078	***
Education								
No education	0.114	0.105	0.059		0.115	0.090	0.074	
Primary	0.782	0.758	0.062		0.786	0.721	0.086	**
Some secondary	0.105	0.137	0.082		0.098	0.189	0.164	***
Socio-Economic Status								
Low socioeconomic status	0.546	0.507	0.059		0.541	0.572	0.097	
STIs at Baseline								
Chlamydia	0.022	0.013	0.038		0.022	0.018	0.077	
Gonorrhea	0.009	0.007	0.045		0.009	0.009	0.091	
Trichomomas	0.123	0.144	0.074		0.123	0.136	0.101	
Herpes Simplex Virus-2	0.348	0.327	0.060		0.349	0.326	0.087	
Syphilis	0.017	0.020	0.075		0.017	0.009	0.050	
HIV	0.031	0.098	0.176	***	0.033	0.063	0.165	*
Sexual Behavior at Baseline								
Condom last sex	0.236	0.240	0.061		0.225	0.346	0.131	***
Risky sex	0.089	0.126	0.088		0.091	0.095	0.097	
More than one partner	0.107	0.179	0.102	**	0.105	0.172	0.144	**
Overall Attrition			6.4%				9.3%	
N	2,245	154			2,176	223		

The stars summarize P-values from a t-test for difference in means between attriters and non-attriters: *, p-value<0.1, ** p-value<0.05, *** p-value <0.01. Low SES corresponds to the lowest two ranks on a self-reported socio-economic status scale from 1 to 7. Risky sex takes the value of one if the individual had unprotected sex with a non-marital partner.

Table 3: Impact on STIs at Months 4, 8, 12, and 24 (Relative Risks from Logit Regression)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Month 4 combined prevalence of 4 STIs tested at every round	Month 8 combined prevalence of 4 STIs tested at every round	Month 12 combined prevalence of 4 STIs tested at every round	Month 12 combined measure of 3 STIs tested by blood samples annually	Month 12 combined measure of the 7 STIs	Month 24 combined prevalence of 4 STIs tested at every round	Month 24 combined measure of 3 STIs tested by blood samples annually	Month 24 combined measure of the 7 STIs
High Value CCT	0.907	0.889	0.749**	1.06	0.901	0.798	0.709**	0.799*
	[0.166]	[0.158]	[0.123]	[0.185]	[0.13]	[0.134]	[0.119]	[0.104]
Low Value CCT	0.948	0.848	1.078	0.839	0.972	0.766**	0.822	0.818***
	[0.146]	[0.113]	[0.142]	[0.131]	[0.123]	[0.0913]	[0.116]	[0.066]
Female	1.529**	1.506***	1.365**	1.725***	1.474***	1.29*	1.334**	1.284**
	[0.215]	[0.163]	[0.145]	[0.252]	[0.131]	[0.159]	[0.151]	[0.126]
Primary	0.85	0.67***	0.666***	1.336	0.868	0.762**	0.965	0.902
	[0.16]	[0.114]	[0.11]	[0.291]	[0.121]	[0.104]	[0.153]	[0.0874]
Some secondary	0.59*	0.776	0.476***	1.002	0.649***	0.713*	0.885	0.82
	[0.212]	[0.193]	[0.132]	[0.286]	[0.103]	[0.155]	[0.203]	[0.126]
Married	0.695***	0.964	0.995	0.727***	0.88	0.803	0.703***	0.754***
	[0.116]	[0.156]	[0.155]	[0.102]	[0.0848]	[0.124]	[0.0972]	[0.0723]
Low SES	0.935	1.059	1.021	0.86	0.95	0.99	0.951	0.976
	[0.132]	[0.125]	[0.137]	[0.101]	[0.0856]	[0.0941]	[0.0905]	[0.0608]
Mean	0.116	0.123	0.116	0.102	0.206	0.129	0.113	0.223
N	2075	2090	2210	2210	2210	2146	2141	2141
P-value of Test: High Value CCT = Low Value CCT								
p-value	0.804	0.782	0.017	0.155	0.557	0.819	0.253	0.821

Standard errors in brackets, calculated by the Delta Method, and clustered at the subvillage level. *** p<0.01, ** p<0.05, * p<0.1 denote a Relative Risk significantly different from 1.

High Value CCT = Low Value CCT tests whether the effect of high vouchers was significantly different from the effect of low vouchers. We conducted the tests with village-level fixed effects instead of subvillage level fixed effects due small cell sizes.

In addition to the covariates reported in the table, all regressions control for income, age, and subvillage fixed effects, as well as the six baseline STIs reported in Table 1.

The four STIs tested every four months are: Chlamydia, Gonorrhea, Trichomonas, and Mycoplasma. Mycoplasma however was not ested at baseline.

The three STIs tested annually with blood samples are HIV, Herpes Simplex Virus-2, and Syphilis. The dependent variable measures prevalence of Syphilis and new incidence of HIV and Herpes Simplex Virus-2.

Table 4: Impact on STIs at Months 4, 8, 12, and 24 by Gender (Relative Risks from Logit Regression)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Month 4 combined prevalence of four STIs tested at every round	Month 8 combined prevalence of four STIs tested at every round	Month 12 combined prevalence of four STIs tested at every round	Month 12 combined measure of three STIs tested by blood samples	Month 12 combined measure of the seven STIs	Month 24 combined prevalence of four STIs tested at every round	Month 24 combined measure of three STIs tested by blood samples	Month 24 combined measure of the seven STIs
Panel A: Males								
High Value CCT	1.011	0.763	0.685	1.086	0.903	0.567***	0.644**	0.625***
	[0.303]	[0.168]	[0.218]	[0.389]	[0.22]	[0.138]	[0.181]	[0.132]
Low Value CCT	0.849	0.652**	1.307	0.553**	0.965	0.568***	0.847	0.692***
	[0.233]	[0.142]	[0.288]	[0.182]	[0.212]	[0.143]	[0.248]	[0.109]
Mean	0.087	0.084	0.090	0.084	0.166	0.100	0.085	0.175
N	1032	1043	1088	1088	1088	1055	1052	1052
Panel B: Females								
High Value CCT	0.868	0.971	0.799	1.034	0.891	0.973	0.743*	0.911
	[0.176]	[0.201]	[0.156]	[0.186]	[0.126]	[0.181]	[0.138]	[0.13]
Low Value CCT	1.005	0.952	1.000	0.900	0.960	0.922	0.839	0.896
	[0.188]	[0.175]	[0.169]	[0.174]	[0.149]	[0.165]	[0.116]	[0.0901]
Mean	0.145	0.162	0.142	0.119	0.244	0.157	0.140	0.270
N	1043	1047	1122	1122	1122	1091	1089	1089
P-value of Test: Males = Females								
High Value CCT	0.648	0.551	0.556	0.952	0.961	0.047	0.558	0.220
Low Value CCT	0.448	0.179	0.179	0.461	0.808	0.130	0.221	0.497

Standard errors in brackets, calculated by the Delta Method, and clustered at the subvillage level. *** p<0.01, ** p<0.05, * p<0.1 denote a Relative Risk significantly different from 1.

For definitions of the dependent variables, see notes in Table 3. All regressions include the covariates in the regressions from Table 3.

Males = Females: High Value CCT tests whether the effect of receiving a high value CCT was different for males and females. We conducted the tests with village-level fixed effects instead of subvillage level fixed effects due to small cell sizes. The same applies to Low Value CCT.

Table 5: Impact on the Combined Prevalence of Four STIs Tested Every Round (Relative Risks)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Subgroups	Married		Rural/Urban		SES		STI Positive at Baseline	
	No	Yes	Rural	Urban	High	Low	No	Yes
Panel A: After 12 Months								
High Value CCT	0.919	0.747*	0.663***	1.586	0.962	0.646***	0.935	0.34***
	[0.376]	[0.139]	[0.103]	[1.239]	[0.227]	[0.129]	[0.178]	[0.161]
Low Value CCT	1.319	1.064	1.063	1.296	1.353	0.972	1.213	0.702
	[0.359]	[0.183]	[0.145]	[0.697]	[0.358]	[0.16]	[0.205]	[0.218]
Mean	0.104	0.120	0.127	0.068	0.118	0.115	0.109	0.150
N	537	1673	1808	400	999	1211	1802	408
P-value of Test:	Unmarried=Married		Rural=Urban		High SES = Low SES		No STI = Any STI	
High Value CCT	0.494		0.295		0.046		0.022	
Low Value CCT	0.264		0.588		0.219		0.139	
Panel B: After 24 Months								
High Value CCT	0.893	0.825	0.735*	1.039	0.757	0.833	0.879	0.468***
	[0.24]	[0.149]	[0.151]	[0.27]	[0.154]	[0.211]	[0.152]	[0.149]
Low Value CCT	0.783	0.783*	0.745**	0.769	0.764*	0.768	0.7***	1.115
	[0.188]	[0.131]	[0.11]	[0.144]	[0.135]	[0.165]	[0.103]	[0.32]
Mean	0.159	0.119	0.111	0.207	0.124	0.132	0.121	0.162
N	516	1,630	1,750	396	981	1,165	1,744	402
P-value of Test:	Unmarried=Married		Rural=Urban		High SES = Low SES		No STI = Any STI	
High Value CCT	0.544		0.565		0.754		0.001	
Low Value CCT	0.439		0.859		0.146		0.603	

Standard errors in brackets, calculated by the Delta Method, and clustered at the subvillage level. *** p<0.01, ** p<0.05, * p<0.1 denote a Relative Risk significantly different from 1.

STI positive at baseline (columns 7 and 8) takes the value of one if the respondent tested positive for any of the following: Chlamydia, Gonorrhoea, Trichomonas, Syphilis, and HIV.

The regressions include baseline values of the dependent variables and all the covariates included in the regressions from Table 3.

Unmarried = Married: High Value CCT tests whether the effect of receiving a high value CCT was different between unmarried and married individuals. The same applies for the low value CCT tests, as well as for the other subgroups (Rural/Urban, SES, STI positive at baseline). The p-values are from interaction tests pooling the respective sub-groups, interacting low value CCT and high value CCT with the sub-group categories, but not the other variables. We conducted the tests with village-level fixed effects instead of subvillage level fixed effects due to small cell sizes, however the relative r risks reported are from regressions including sub-village fixed effects.

Table 6 - New Infections by Self-reported Abstinence			
	(1)	(2)	(3)
		Month 12	
Chlamydia	Not Abstained	0.73%	1,780
	Abstained	2.19%	228
Gonorrhoea	Not Abstained	0.50%	1,796
	Abstained	0.87%	229
Mycoplasma Genitalium	Not Abstained	6.99%	1,687
	Abstained	4.15%	217
Trichomonas	Not Abstained	1.73%	1,736
	Abstained	0.90%	221
Syphilis	Not Abstained	0.53%	2,095
	Abstained	0.00%	75
Any of the Above	Not Abstained	10.09%	1,585
	Abstained	7.18%	209
Abstained refers to abstaining from sex between months 8 and 12, except for Syphilis, in which it refers to abstaining for 12 months because there was no Syphilis measurement at months 4 or 8.			

Table 7 - Self-Reported Sexual Behaviors at 4, 8, 12 and 24 Months (Relative Risks from Logit Regression)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	in Last 4 Months								in Last 12 Months	
	Month 4		Month 8		Month 12		Month 24		Month 24	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
Panel A: More than One Partner										
High Value CCT	0.889	0.235***	0.848	0.526	1.290	0.983	1.284	0.882	1.015	0.847
	[0.230]	[0.132]	[0.169]	[0.331]	[0.334]	[0.909]	[0.284]	[0.521]	[0.113]	[0.218]
Low Value CCT	1.092	0.450***	1.027	0.327***	1.253	1.473	1.411	1.024	1.124	0.733
	[0.209]	[0.208]	[0.249]	[0.184]	[0.244]	[0.924]	[0.292]	[0.451]	[0.124]	[0.178]
Mean	0.144	0.022	0.130	0.016	0.126	0.013	0.115	0.023	0.251	0.083
N	986	1,031	993	1,035	1,030	1,102	1,006	1,079	1,006	1,079
Panel B: Used Condom Last Time										
High Value CCT	1.983*	0.715	1.980	0.794	1.486	1.509	1.867*	1.205	1.237	0.815
	[0.564]	[0.410]	[0.618]	[0.517]	[0.436]	[0.919]	[0.519]	[0.661]	[0.198]	[0.154]
Low Value CCT	1.540	0.715	1.852	0.560	1.735	1.734	1.813	1.158	1.197	0.943
	[0.624]	[0.415]	[0.642]	[0.430]	[0.530]	[0.986]	[0.551]	[0.628]	[0.229]	[0.184]
Mean	0.272	0.177	0.275	0.190	0.280	0.189	0.274	0.179	0.230	0.159
N	809	872	732	796	936	1,003	907	986	880	955
Panel C: Risky Sex										
High Value CCT	1.076	0.353***	0.757	0.844	0.892	0.589	0.627	1.799	0.806	1.536
	[0.266]	[0.172]	[0.349]	[0.349]	[0.359]	[0.394]	[0.228]	[0.789]	[0.264]	[0.564]
Low Value CCT	1.313	0.498***	1.453	0.660	1.567	1.261	0.897	1.428	1.216	1.322
	[0.315]	[0.173]	[0.578]	[0.252]	[0.418]	[0.469]	[0.285]	[0.692]	[0.351]	[0.559]
Mean	0.088	0.038	0.064	0.040	0.054	0.019	0.065	0.037	0.093	0.050
N	899	955	817	878	1,030	1,100	945	999	1,004	1,076

Standard errors in brackets, calculated by the Delta Method, and clustered at the subvillage level.*** p<0.01, ** p<0.05, * p<0.1 denote a Relative Risk significantly different from 1.

All regressions control for baseline values of the dependent variable, in addition to all the covariates included in the regressions from Table 3.

Risky sex takes the value of one if the individual had unprotected sex with a non-marital partner.

Table 8: Treatment Seeking Behavior						
	(1)	(2)	(3)	(4)	(5)	(6)
	Relative Risks from Logit Regression			Marginal Effects from OLS Regression		
	Used Medical Treatment, Self-Reported	Used STI voucher, Self-Reported		Number of Vouchers Redeemed For Those Who Tested Positive in the Previous Round, Except HIV		
	Month 4	Month 8	Month 12	Month 4	Month 8	Month 12
High Value CCT	1.031	0.812	0.933	-0.003	-0.036	-0.041
	[0.099]	[0.176]	[0.217]	[0.047]	[0.099]	[0.083]
Low Value CCT	0.881*	1.132	1.013	0.011	0.022	0.122
	[0.070]	[0.221]	[0.190]	[0.048]	[0.083]	[0.086]
Mean	0.222	0.070	0.060	0.137	0.195	0.163
N	1,897	1,938	2,212	439	241	258

Standard errors in brackets, calculated by the Delta Method, and clustered at the subvillage level. *** p<0.01, ** p<0.05, * p<0.1 denote a Relative Risk significantly different from 1 or OLS Marginal Effects significantly different from 0.

All regressions control for all the covariates included in the regressions from Table 3.

Appendix Table A1: STI testing and related incentives, by study rounds

	Round 1 (Month 0)	**Round 2 (Month 4)**	**Round 3 (Month 8)**	**Round 4 (Month 12)**	**Round 5 (Month 24)**
Chlamydia trachomatis	Tested, not incentivized	Tested, incentivized	Tested, incentivized	Tested, incentivized	Tested, not incentivized
Neisseria gonorrhoeae	Tested, not incentivized	Tested, incentivized	Tested, incentivized	Tested, incentivized	Tested, not incentivized
Trichomonas vaginalis	Tested, not incentivized	Tested, incentivized	Tested, incentivized	Tested, incentivized	Tested, not incentivized
Mycoplasma genitalium	Not tested	Tested, not incentivized	Tested, not incentivized	Tested, not incentivized	Tested, not incentivized
HIV	Tested, not incentivized	Not tested	Not tested	Tested, not incentivized	Tested, not incentivized
HSV-2	Tested, not incentivized	Not tested	Not tested	Tested, new infections incentivized	Tested, not incentivized
Syphilis	Tested, not incentivized	Not tested	Not tested	Tested, new infections incentivized	Tested, not incentivized