Effect of non-monetary incentives on uptake of couples' counselling and testing among clients attending mobile HIV services in rural Zimbabwe: a cluster-randomised trial

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Summary

Background Couples' HIV testing and counselling (CHTC) is associated with greater engagement with HIV prevention and care than individual testing and is cost-effective, but uptake remains suboptimal. Initiating discussion of CHTC might result in distrust between partners. Offering incentives for CHTC could change the focus of the pre-test discussion. We aimed to determine the impact of incentives for CHTC on uptake of couples testing and HIV case diagnosis in rural Zimbabwe.

Methods In this cluster-randomised trial, 68 rural communities (the clusters) in four districts receiving mobile HIV testing services were randomly assigned (1:1) to incentives for CHTC or not. Allocation was not masked to participants and researchers. Randomisation was stratified by district and proximity to a health facility. Within each stratum random permutation was done to allocate clusters to the study groups. In intervention communities, residents were informed that couples who tested together could select one of three grocery items worth US$1·50. Standard mobilisation for testing was done in comparison communities. The primary outcome was the proportion of individuals testing with a partner. Analysis was by intention to treat. 3 months after CHTC, couple-testers from four communities per group individually completed a telephone survey to evaluate any social harms resulting from incentives or CHTC. The effect of incentives on CHTC was estimated using logistic regression with random effects adjusting for clustering. The trial was registered with the Pan African Clinical Trial Registry, number PACTR201606001630356.

Findings From May 26, 2015, to Jan 29, 2016, of 24 679 participants counselled with data recorded, 14 099 (57·1%) were in the intervention group and 10 580 (42·9%) in the comparison group. 7852 (55·7%) testers in the intervention group versus 1062 (10·0%) in the comparison group tested with a partner (adjusted odds ratio 13·5 [95% CI 10·5–17·4]). Among 427 (83·7%) of 510 eligible participants who completed the telephone survey, 11 (2·6%) reported that they were pressured or themselves pressured their partner to test together; none regretted couples' testing. Relationship unrest was reported by eight individuals (1·9%), although none attributed this to incentives.

Interpretation Small non-monetary incentives, which are potentially scalable, were associated with significantly increased CHTC and HIV case diagnosis. Incentives did not increase social harms beyond the few typically encountered with CHTC without incentives. The intervention could help achieve UNAIDS 90-90-90 targets.

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Introduction

Couples' HIV testing and counselling (CHTC), whereby an individual tests together with a sexual partner, is associated with numerous benefits including better uptake of HIV prevention and treatment services[1–3] and adoption of safer sexual practices.[4,5] Following evidence of the effectiveness of antiretroviral therapy for HIV prevention among serodiscordant couples,[6] CHTC was incorporated into WHO HIV testing guidance in 2012. The guidance has five recommendations on who should be offered couples' testing.[7] It is cost-effective: in one prevention of mother-to-child transmission programme, although longer counselling sessions made CHTC more costly than individual testing, it was found cost-effective because it averted more disability-adjusted life-years than individual testing.[8] In client-initiated testing programmes in Kenya and Tanzania, it was found to be more cost-effective than individual testing.[9]

Despite the benefits of CHTC, in many countries uptake has been suboptimal. In many settings, fewer than 30% of people who seek HIV testing test together with their partners.[10,11] In Zimbabwe, uptake of CHTC is lowest in rural areas, where only 7% of individuals attending mobile testing facilities run by Population Services International (PSI) tested with partners in 2014.[12] Barriers to CHTC include fear of disclosure of

Research in context

Evidence before this study

We searched PubMed on Feb 7, 2017, for evidence of effectiveness of incentives for HIV testing using the following search terms: HIV AND test* AND incentive* without language or date restrictions. We retrieved 106 articles. Several papers, including a systematic review, reported on effectiveness of incentives for increasing uptake of HIV testing among individuals. There was also evidence that incentives for HIV testing resulted in identification of a higher number of HIV-positive individuals. However, there was very little evidence on incentives for couples' HIV testing. One observational study that was done in Zambia found that non-monetary incentives were associated with higher uptake of retesting among previously tested concordant negative and discordant couples. However, couples who have previously tested together might be different from those who have not because they have overcome the initial barrier to testing together. To our knowledge, our study is the first trial that has investigated the impact of incentives for couples' testing.

Added value of this study

This study used a rigorous design with robust measurement of the primary outcome. A very strong effect of small non-monetary incentives valued at US$1·50 was shown on couples' testing. The nature and size of incentives was determined through formative research in the same communities where this intervention would be implemented, which makes it likely that this scalable intervention will be well received. Importantly, the study adds to the evidence that incentives for HIV testing result in identification of a higher proportion of HIV-positive individuals (an additional 2·2 positives were diagnosed per outreach day). Furthermore, the study showed higher uptake of couples' testing by men (more women tested as individuals than men), a key population to be targeted with HIV-testing efforts.

Implications of all the available evidence

Although testing coverage has been increasing overall, innovative strategies will be required for hard-to-reach populations who have not previously tested. Taken together with other studies, this trial suggests that giving a low-cost intervention will result in testing of hard-to-reach individuals, namely men and those at high risk of testing positive. This finding is important because funding agencies have been asking programmes to find ways of improving HIV case diagnosis so as to make HIV testing more cost-effective. Before implementation of such an intervention, programmes might need to do formative research to determine the nature of incentives that could work in their context.

HIV status, relationship dissolution in the event of HIV diagnosis for one or both partners, mistrust or suspicion of infidelity, lack of understanding of HIV discordancy, and health system barriers such as inadequate training on couples counselling.[13–17] Men appear to be more resistant than women to couples' testing.[15,16] In formative research, we found that broaching the subject of CHTC can be difficult, with individuals worrying that their partner might interpret the request as a sign of distrust or accusation or admission of infidelity.

Small financial and non-financial incentives have been shown to offset the costs of seeking health services as well as providing immediate benefits and have been shown to increase uptake of various health behaviours in high-income and low-income countries.[18] Incentives for CHTC might increase uptake by easing the initial discussion of testing, shifting the focus to incentives and away from difficult subjects of HIV, mistrust, and infidelity. Additionally, incentives might counteract present-biased preferences[19,20] by offering couples immediate benefits to seeking CHTC. However, the effectiveness of incentives for CHTC as well as the optimal nature and size of incentives that might stimulate CHTC is unknown. Also, in some instances, sharing of HIV results between partners has been associated with social harms such as forced or coerced testing, domestic violence, and relationship dissolution,[21–23] and it is unclear whether introducing incentives for CHTC could affect the risk of such harms.

We aimed to determine the impact of incentives for CHTC on uptake of couples' testing and HIV case diagnosis in rural Zimbabwe and to assess the ability of SMS reminders to improve linkage of those referred for HIV prevention, treatment, or care services.

Methods

Study design and participants

We first did formative work to determine the nature and size of incentives that could stimulate CHTC, followed by a cluster-randomised controlled trial to determine the impact of incentives on uptake of CHTC, the effect of incentives for CHTC on the proportion of HIV tests that are positive, and the predictors of CHTC. A telephone survey was done 3 months after CHTC to determine the motivators of CHTC and prevalence of social harms.

From Jan 20, to Jan 30, 2015, we conducted four mixed-gender focus group discussions with individuals from one rural district conveniently located close to Harare. Each focus group discussion had an average of eight participants (n=34): four women and four men. We used participatory methods to elicit views on CHTC and the nature and size of incentives that might stimulate CHTC. Focus group discussions were audio-recorded, transcribed verbatim, and translated into English. Thematic analysis was done using NVIVO 10 (qualitative data management software).

Participants were adamant that cash might cause more harm than good; instead, small household goods were suggested. Based on these results, for the subsequent cluster-randomised controlled trial each person testing as part of a couple in the intervention group was offered a choice of one bar of laundry soap, 750 mL of cooking oil, or 200 g of petroleum jelly (value US$1·50).

The cluster-randomised trial was done in 68 clusters in rural areas of four districts in Zimbabwe (Chegutu, Murehwa, Goromonzi, and Uzumba-Maramba-Pfungwe; figure 1). Clusters were defined by geographical areas that in almost all cases were designated by local government as a ward. Individual participants were those who tested for HIV infection through mobile HIV testing and counselling services in the clusters.

We used a factorial design[24] whereby clusters were randomly allocated in equal numbers to four study groups: incentives for CHTC, SMS reminders for linkage to HIV treatment or prevention services, both, or neither. However, incomplete reporting of linkage outcomes precluded the analysis of the effect of SMS reminders. Because it is extremely unlikely that SMS reminders for linkage to care could have any impact on uptake of CHTC (these were not mentioned during mobilisation in any communities), we examined the impact of incentives by comparing data between clusters allocated to incentives to those without incentives irrespective of whether the cluster was randomised to SMS.

Ethics approval was obtained from the Medical Research Council of Zimbabwe and University College London Ethics Committee.

Randomisation and masking

We stratified clusters by district and whether there was a health facility within the cluster or not (nine strata in total). For each district, two strata were selected by comparable proximity to a health facility, except for Uzumba-Maramba-Pfungwe which formed one stratum due to the small number of clusters. This gave a total of seven initial strata. To ensure that all stratum sizes were a multiple of four, we defined two further strata, which comprised clusters that were randomly removed from strata whose sizes were not a multiple of four. The first stratum consisted of clusters with a facility, three randomly selected from Chegutu and one from Murehwa. The second stratum consisted of clusters without a facility, two selected from Goromonzi and two from Murehwa. Within the nine final strata random permutation was done in Stata software (version 14.2) by the trial statistician to allocate clusters to the four study arms. Allocation was not masked to participants and researchers.

Procedures

PSI Zimbabwe provides mobile HIV testing and counselling services in communities throughout Zimbabwe. They routinely send a team of mobilisers to alert the community 1 week before the impending visit to provide information on dates, times, and specific locations of mobile testing with the message that people who do not know their status should come and test. This messaging was done through meetings, posters, and pamphlets. In CHTC intervention communities, residents were told that if they tested together with their partner, they would be offered a choice of one of the three incentives specified above. In general, the outreach team stayed in one community for 2–3 days, then visited the same community for another round of testing after 3 months. PSI electronically recorded demographic characteristics for each tester, including age, sex, level of education, marital status, history of HIV testing, and sexual behaviour data such as number of sex partners and frequency of condomless sex. PSI also electronically recorded whether individuals had tested together with a partner. The trial did not introduce new data collection systems—trained PSI staff used the same electronic system that is used to collect data in all communities where outreach testing is provided. The electronic system has been programmed to minimise data entry errors. A quality control system was operated by outreach team leaders and research staff.

In eight pragmatically selected clusters (selected on the basis of proximity to Harare, where the research team was based), four in each group, informed consent was obtained from willing individuals who tested together (couple-testers) for post-test telephone interviews. Interviews were done individually about 3 months after testing. This period was selected to allow development of sufficient impression of the effect of couples' testing

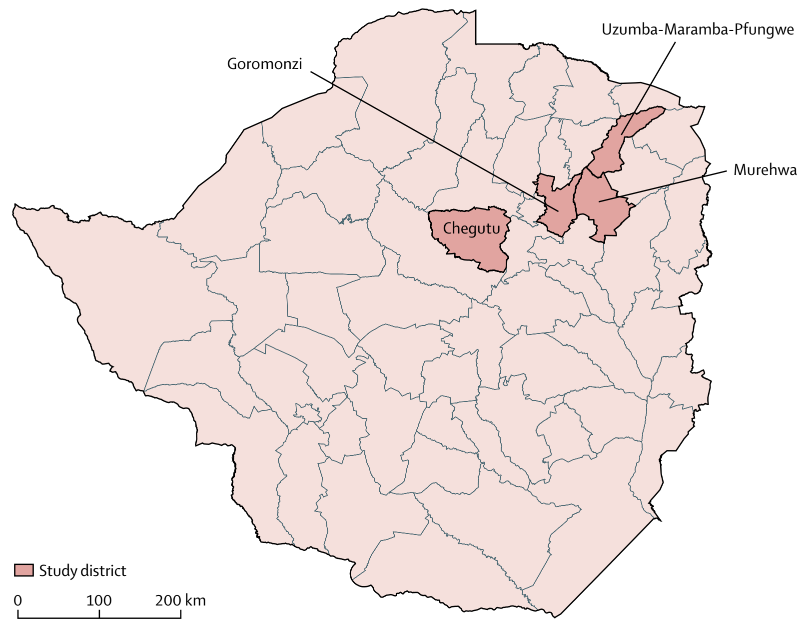

Figure 1: **Map of Zimbabwe showing the study districts**

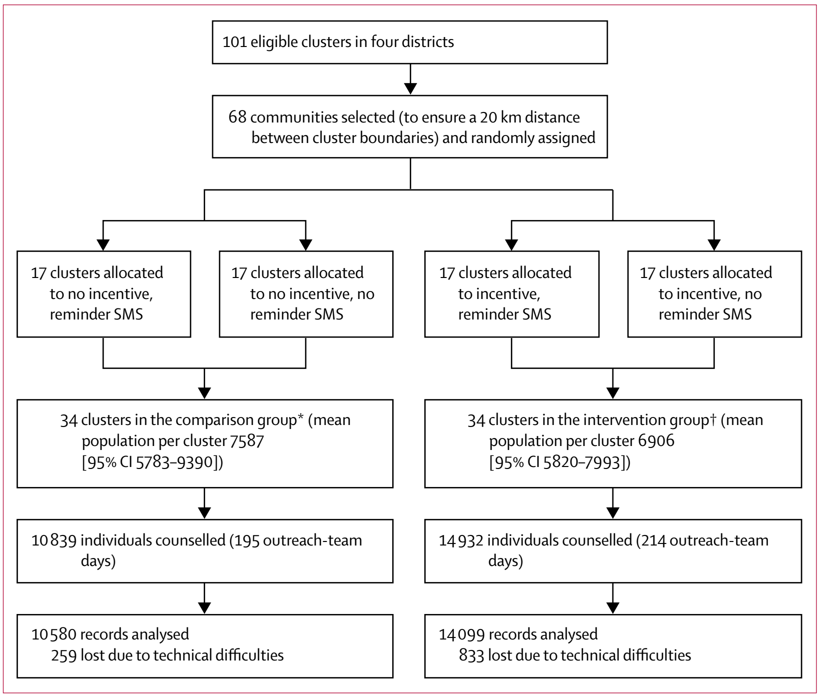

Figure 2: **Trial profile**

*3 outreach team-days in different clusters where incentives were given in error. †2 outreach-team days in different clusters where incentives were not given due to logistical challenges.

while minimising recall bias. Participants were asked if they pressured ("Did you pressure your partner to test with you?") or had been pressured to undergo couples' testing ("Did your partner pressure you to test together at that time?"), whether there was relationship disharmony after testing (and the nature of the disharmony; "Was there harmony between you and your partner after the test? Did the disharmony result from having tested together? Was the disharmony or disagreement related to the incentives/prizes that were given at time of testing? What was the nature of the disharmony—please describe"), and whether they regretted their decision to test with their partner. To ensure that we were talking to the right person, before the telephone interview began, the participant was required to respond to questions that confirmed his or her identity. We also assessed motivators to CHTC and the proportion of individuals reporting the above social harms overall and by group, acknowledging that the survey was not powered for formal testing between groups.

Outcomes

The primary outcome for this study was a binary variable describing whether each individual who tested did so as a part of a couple or not. Secondary outcomes were assessed at the level of the cluster and included the number of individuals tested per day and number testing positive. Additional secondary outcomes were proportion of individuals testing HIV positive, and among couples tested, whether the HIV results were concordant or discordant. In the telephone survey, we also estimated the proportion of individuals who tested with their partner who reported various social harms.

Statistical analysis

The original power calculation to detect the impact of incentives assumed data from 400 people per cluster, that incentives would increase uptake of CHTC from 10% to 30%, and an intracluster correlation coefficient of 0·01. Taking the standard 5% significance level, the trial design of 68 clusters provided (to the nearest percentage point) 100% power to detect the effect of incentives. A trial of this size was required to detect the effect of SMS reminders on linkage to post-test services.

Our analysis was by intention to treat and was done in Stata version 14.2. We estimated the effect of incentives on our primary outcome using logistic regression. We adjusted for the stratification factors (district and proximity to a health facility) using fixed effects, and used random effects to take account of community or cluster effects. We explored adjustment for additional factors that we considered a priori to be important: age, sex, education, marital status, planning to have children, current pregnancy versus current breastfeeding versus neither, current sexually transmitted infection, a composite sexual risk measure (never had sex, one partner last year, two or more partners last year but no further "risks", and two or more partners last year and sex while intoxicated or exchanged for money, or no condom at last sex), ever tested for HIV previously, and HIV status (result of current test). We also prespecified adjustment for additional factors for which a statistically significant imbalance between trial groups was seen. Marital status and number of partners were highly correlated and thus combined into a single factor and likewise, current pregnancy and current breastfeeding status were dropped due to collinearity with other factors. Current sexually transmitted infection was dropped due to very low reporting.

Although all participants testing are included in our primary analysis, as a post-hoc sensitivity analysis, we restricted our analyses to those who were married or cohabiting. Such individuals have a partner with whom they could potentially test, and so interventions to increase couples' testing would be most applicable for them. This decision was made post-hoc after observing that marital status was very strongly linked to the primary outcome. The trial was registered with the Pan African Clinical Trial Registry, number PACTR201606001630356.

Role of the funding source

The funder of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report. The corresponding author had full access to

	Comparison group	Intervention group
Sex	N=10 580	N=14 099
Female	5688 (53·8%)	7722 (54·8%)
Male	4892 (46·2%)	6377 (45·2%)
Age (years)	N=10 580	N=14 099
<25	3538 (33·4%)	3817 (27·1%)
25–34	2976 (28·1%)	4377 (31·0%)
≥35	4066 (38·4%)	5905 (41·9%)
Education	N=10 549	N=13 875
None	257 (2·4%)	436 (3·1%)
Primary	2676 (25·4%)	4462 (32·2%)
Secondary	7174 (68·0%)	8614 (62·1%)
Tertiary	442 (4·2%)	363 (2·6%)
Marital status	N=10 549	N=13 875
Married or cohabiting	6556 (62·2%)	11 062 (79·7%)
Divorced or separated	801 (7·6%)	637 (4·6%)
Widowed	702 (6·7%)	546 (3·9%)
Never married	2490 (23·6%)	1630 (11·8%)
Number of living children	N=10 549	N=13 875
0	3199 (30·3%)	2488 (17·9%)
1–2	3506 (33·2%)	5233 (37·7%)
3–4	2493 (23·6%)	3869 (27·9%)
≥5	1351 (12·8%)	2285 (16·5%)
Current pregnancy (partner or self)	N=10 549	N=13 875
No	10 268 (97·3%)	13 267 (95·6%)
Yes	281 (2·7%)	608 (4·4%)
Current breastfeeding (partner or self)	N=10 539	N=13 875
No	9696 (91·9%)	12 250 (88·3%)
Yes	853 (8·1%)	1625 (11·7%)
Number of sexual partners	N=10 529	N=13 783
Never had sex	1359 (12·9%)	883 (6·4%)
No sex last year	807 (7·7%)	571 (4·1%)
1 partner last year	7691 (73·1%)	11 729 (85·1%)
≥2 partners last year	672 (6·4%)	600 (4·4%)
Sexual risk indicators*	N=10 529	N=13 783
Sex while intoxicated	177 (1·7%)	270 (2·0%)
Transactional sex	80 (0·8%)	75 (0·5%)
No condom at last sex	8208 (78·0%)	11 849 (86·0%)
≥2 current partners	168 (1·6%)	216 (1·6%)
Current sexually transmitted disease	N=10 529	N=13 783
No	10 501 (99·7%)	13 741 (99·7%)
Yes	28 (0·3%)	42 (0·3%)
Previously tested for HIV	N=10 549	N=13 871
No	4122 (39·1%)	5082 (36·6%)
Yes	6427 (60·9%)	8789 (63·4%)
Result of current HIV test	N=10 436	N=13 671
Negative	9760 (93·5%)	12 465 (91·2%)
Positive	676 (6·5%)	1206 (8·8%)

(Table 1 continues in next column)

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Data are n (%). *Multiple responses possible.

Table 1: **Baseline characteristics of participants by study group**

all the data in the study and had final responsibility for the decision to submit for publication.

Results

The trial was done between May 26, 2015, and Jan 29, 2016, in 68 communities as planned with 34 clusters in each study group. According to census records,[25] there was little difference in characteristics of communities by group: mean ward (cluster) population was 6906 (95% CI 5820–7993) in the intervention group and 7587 (5783–9390) in the comparison group, corresponding to an average of 1701 (1439–1962) and 1837 (1408–2265) households, respectively. The mean proportion of males was 49·5% (95% CI 48·7–50·4) in intervention communities and 48·8% (48·1–49·6) in comparison communities.

During the trial there were 214 testing days in the intervention group and 195 in the comparison group. 25 771 participants were seen at the mobile testing facilities and counselled (figure 2). A small number of records were lost due to technical malfunction or server challenges; we analysed 14 099 (94·4%) records from the intervention community and 10 580 (97·6%) from the comparison community.

Of 24 679 participants testing with data available for analysis, 14 099 (57·1%) were in the intervention communities. Almost all (24 527, 99·4%) were aged at least 16 years. 24 107 participants (97·7%) had an HIV test with the result recorded, 196 (0·8%) had counselling only, and data were missing for 372 (1·5%).

Table 1 shows the characteristics of participants testing by group. Individuals testing in intervention communities were older and more likely to be married or cohabiting than individuals testing in comparison communities. Participants testing in intervention communities also had a higher HIV prevalence (1206 [8·8%] *vs* 676 [6·5%]). Among couples testing, 330 (7·7%) had a discordant result, 295 (7·9%) incentive group couples and 35 (6·7%) comparison group couples.

7852 (55·7%) testers in the intervention group and 1062 (10·0%) in the comparison group tested with a partner (table 2). Results were similar for our sensitivity analysis, which was restricted to individuals who were married or cohabiting, where 7540 (68·2%) of 11 062 married or cohabiting individuals in the

	Intervention group (n=14 099)	Comparison group (n=10 580)	Odds ratio or difference (95% CI)	p value	Adjusted odds ratio (95% CI)	p value
Number testing as a couple	7852 (55·7%)	1062 (10·0%)	12·7 (9·7–16·7)	<0·0001	13·5 (10·5–17·4)	<0·0001
Cluster mean (SD) number tested per day	74 (56)	56 (20)	17 (6–29)	0·0035	..	..
Cluster mean (SD) number testing positive per day	5·6 (2·5)	3·4 (2·2)	2·2 (1·1–3·2)	0·0003	..	..

Table 2: Primary and main secondary outcomes

intervention group and 1025 (15·6%) of 6556 married or cohabiting individuals in the comparison group tested with a partner (adjusted odds ratio [aOR] 14·3 [95% CI 11·0–18·6]). The intracluster correlation coefficient for testing with a partner was 0·055 in the comparison group and 0·049 in the intervention group. More people were tested and counselled in intervention communities (table 2). Intervention communities also had a higher yield of positive HIV results (table 2).

More men tested together with a partner than women (ie, women were more likely to test alone; table 3). Other predictors of couples' testing were education and HIV status. In both study groups, those testing with a partner were more likely to be HIV positive than individual testers (table 4), although the association was clearer in the intervention group (p<0·0001) than in the comparison group (p=0·07).

From May 26, to Nov 10, 2015, 39 outreach visits (translating to 991 eligible potential participants) were made to the eight survey clusters. Research staff were available at 26 of the 39 visits, during which 510 participants were enrolled for the telephone survey (432 in the intervention group and 78 in the comparison group). Of the enrolled participants, 427 completed the telephone survey (363 in the intervention group and 64 in the comparison group). The survey response rate was 84·0% (363 of 432) in the intervention group and 82·1% (64 of 78) in the comparison group (83·7% overall). Participants included 176 couples and 75 individuals participating without their partners. Individuals participating in the telephone interview were similar to those who were eligible but did not participate: both groups had almost similar HIV status, 41 of 416 participants (9·9% [95% CI 7·2–13·1]) and 64 of 561 non-participants (11·4% [8·9–14·3]); 149 of 418 participants (35·6% [31·1–40·4]) and 237 of 562 non-participants (42·2% [38·0–46·0]) had primary education or less; and 412 of 418 participants (98·6% [96·9–99·5]) and 550 of 562 non-participants (97·9% [96·3–98·9]) were married. The telephone survey targeted equal clusters in each group, but as it was among couple-testers, most participants (363 [85·0%] of 427) were in the intervention group.

Key motivators to couples' testing seemed broadly similar by group and included desire to know each other's status, planning to have children, and unfaithfulness (table 5). Three participants in the intervention group reported that they had previously tested positive but had not yet disclosed to their partners so took this opportunity to disclose by testing with their partner. Among 227 incentive group participants who were asked whether they would have tested with their partner if there had been no incentive offer, 47 (20·7%) reported that they would not have couple-tested without an incentive.

Harms were rare in both study groups (table 5). Six participants (1·4%) reported that they pressured their partners to test, whereas five participants (1·2%), not partnered to these six, reported that they had been pressured by their partner to test. After CHTC, relationship unrest was reported by eight individuals (1·9%). All eight reported this was due to HIV diagnosis of one or both partners. None of the participants reported that the disharmony was related to incentives. One participant reported that the disharmony had resulted in physical violence. Three separations or divorces were reported. Nine participants (2·1%) reported that they regretted having tested with their partner. None of the participants who pressured their partner to test or were pressured to test regretted having tested with their partner.

Discussion

We found that offering small non-monetary incentives to Zimbabwean adults to test as a couple was associated with a large increase in uptake of CHTC. The association was similar among all testers and similar when analysis was restricted to married or cohabiting couples. Furthermore, providing incentives for CHTC was associated with more people counselled and tested, with those testing more likely to be married or cohabiting, and also more likely to be HIV positive. Consequently, more HIV-positive individuals were identified in the intervention group. Among couple-testers who participated in a telephone survey about 3 months after testing, the main reported motivator to testing was desire to know one another's status, suggesting that incentives did not alter the motivation for testing. In this survey, we found that coercion and relationship unrest was rare: 2·6% of participants reported having been pressured by their partner or having themselves pressured their partner to test. Relationship unrest, including divorce or separations, all due to HIV diagnosis, was reported by 1·9% of those who tested as a couple.

These findings are consistent with previous work on incentives: a 2014 systematic review showed an overall OR of 1·62 (95% CI 1·38–1·91) for adoption of various health behaviours including smoking cessation, physical activity, and uptake of prevention interventions such as vaccination and screening.[18] Incentives have also been found to improve uptake of voluntary medical male circumcision[26] and treatment adherence.[27] Incentives have improved uptake of HIV testing and collection of HIV results in South Africa and Malawi.[28,29] Specific to couples' HIV testing, in Zambia small non-monetary incentives (where couples chose one item from a package that included soap, chlorine, deworming medication, screening, and treatment for urinary schistosomiasis, and blood pressure and diabetes screening) were found to increase repeat testing of both discordant and concordant negative couples.[30]

Importantly, our findings suggest that incentives might work by facilitating the decision to test among couples who have an underlying desire to test together: 93% of couple-testers were motivated by desire to know their joint HIV status. The Zambian study[30] mentioned above also provided evidence to support this: uptake of repeat testing was higher among discordant couples who received incentives than among those who were both HIV negative, indicating that couples retesting was driven by the ongoing need to confirm HIV status in the face of high transmission risk. This finding is contrary to the views of those who worry that incentives pay people to test and might thus attract people who are not interested in their HIV status. However, owing to social desirability bias, participants might have downplayed the importance of incentives during telephone interviews.

Providing incentives resulted in higher numbers of people tested per outreach day, perhaps because the offer of incentives reduced stigma by providing testers with an obvious excuse for being seen at an HIV testing and counselling centre, a phenomenon which was also reported when incentives were offered for collecting HIV results among individual adults in Malawi.[29]

We found that our intervention was associated with higher HIV case diagnosis, similar to when incentives were offered for individual testing in South Africa,[28] which suggests that such interventions might be cost-effective in identifying HIV-positive individuals. Funding agencies are placing increasing demands on testing programmes to identify a higher proportion of HIV-positive individuals. Relatively small incentives might be one cost-effective strategy to achieve this. Furthermore, we found a higher proportion of men testing with partners than women (more women than men were individual-testers), indicating that incentivised couples' testing attracts a larger proportion of men than individual testing. This finding is important as men not only have poorer uptake of testing and other prevention and care interventions in general,[31,32] but have been found to be more resistant to couples' testing.[15,16]

Social harms reported among couple-testers in this study were relatively uncommon in both groups. Specifically, incentives did not appear to cause additional social harms beyond that expected from couples testing in general: the 1·9% of telephone survey participants who reported relationship unrest are similar to reports from other programmes supporting couples' testing.[23] In

	Couples' testing (n/N, %)	Odds ratio (95% CI)	Adjusted odds ratio (95% CI)
Sex		p<0·0001	p<0·0001
Male	4455/11 269 (39·5%)	1	1
Female	4459/13 410 (33·3%)	0·7 (0·64–0·73)	0·48 (0·45–0·52)
Age (years)		p<0·0001	p=0·50
<25	1765/7355 (24·0%)	1	1
25–34	2962/7353 (40·3%)	2·13 (1·96–2·31)	0·99 (0·90–1·09)
≥35	4187/9971 (42·0%)	2·44 (2·26–2·64)	1·04 (0·94–1·15)
Education		p<0·0001	p<0·0001
None or primary	3283/7831 (41·9%)	1	1
Secondary or tertiary	5452/16 593 (32·9%)	0·79 (0·74–0·84)	0·81 (0·75–0·87)
Marital status		p<0·0001	NA*
Married or cohabiting	8565/17 618 (48·6%)	1	..
Divorced or separated	46/1438 (3·2%)	0·033 (0·024–0·044)	..
Widowed	11/1248 (0·9%)	0·008 (0·005–0·015)	..
Never married	113/4120 (2·7%)	0·029 (0·024–0·035)	..
Pregnancy status (self or partner)		p<0·0001	NA*
Pregnant	517/889 (58·2%)	2·75 (2·34–3·24)	..
Breastfeeding and not pregnant	1237/2463 (50·2%)	1·83 (1·66–2·02)	..
Neither	6981/21 072 (33·1%)	1	..
Number of sexual partners		p<0·0001	NA*
Never had sex	67/2242 (3·0%)	0·040 (0·031–0·052)	..
No sex last year	20/1378 (1·5%)	0·019 (0·012–0·030)	..
1 partner last year	8336/19 420 (42·9%)	1	..
≥2 partners last year	234/1272 (18·4%)	0·31 (0·26–0·36)	..
Previous HIV test		p<0·0001	p=0·94
No	2863/9204 (31·1%)	1	1
Yes	5868/15 216 (38·6%)	1·38 (1·29–1·48)	0·99 (0·92–1·08)
HIV status (current test)		p<0·0001	p<0·0001
Negative	7759/22 225 (34·9%)	1	1
Positive	840/1882 (44·6%)	1·38 (1·23–1·54)	1·49 (1·30–1·69)
Partners last year according to marital status		p<0·0001	p<0·0001
No sex	87/3620 (2·4%)	0·024 (0·020–0·030)	0·020 (0·016–0·026)
Married: 1 partner	8223/16 627 (49·5%)	1	1
Married: ≥2 partners	229/642 (35·7%)	0·60 (0·49–0·73)	0·43 (0·35–0·53)
Not married	118/3423 (3·5%)	0·034 (0·028–0·042)	0·029 (0·024–0·035)

NA=not applicable. *Omitted from multiple regression model due to collinearity.

Table 3: **Factors associated with couples' testing**

	Individual testers	Couple testers	Overall	p value (couple *vs* individual)
Comparison group	593/9386 (6·3%)	83/1050 (7·9%)	676/10 436 (6·5%)	0·07
Intervention group	449/6122 (7·3%)	757/7549 (10·0%)	1206/13 671 (8·8%)	<0·0001
Overall	1042/15 508 (6·7%)	840/8599 (9·8%)	1882/24 107 (7·8%)	<0·0001

Data are n/N (%).

Table 4: **Association between couples' testing and HIV-positive test result by study group**

	Comparison group (n=64)	Intervention group (n=363)	Overall (n=427)
Desire to know each other's status	62 (96·9%)	334 (92·0%)	396 (92·7%)
Planning to get married	0	7 (1·9%)	7 (1·6%)
Testing because of pregnancy	5 (7·8%)	18 (5·0%)	23 (5·4%)
Retesting at end of window period	15 (23·4%)	76 (20·9%)	91 (21·3%)
Unfaithfulness (or suspected unfaithfulness) of either or both partners	10 (15·6%)	84 (23·1%)	94 (22·0%)
Planning to have children	19 (29·7%)	108 (29·8%)	127 (29·7%)
Illness of either or both partners	4 (6·3%)	27 (7·4%)	31 (7·3%)
Incentives for couples' HIV testing and counselling (intervention group)	..	149 (41·0%)	..
Pressured partner to test together	0	6 (1·7%)	6 (1·4%)
Was pressured by partner to test together	1 (1·6%)	4 (1·1%)	5 (1·2%)
Relationship unrest after couples' HIV testing and counselling	2 (3·1%)	6 (1·7%)	8 (1·9%)
Regretted having tested with partner	4 (6·3%)	5 (1·4%)	9 (2·1%)

Data are n (%).

***Table 5:* Motivators to couples' HIV testing and counselling and reporting of social harms**

a couples' testing intervention in Malawi (where male partners of HIV-positive women were invited for CHTC), among 181 women, two reported relationship dissolution and one reported emotional distress. Regarding coerced testing, 2·6% of our participants reported having been pressured or themselves applied pressure to test as a couple. As has been found in other research where forced testing was reported,[33] none of these participants regretted having tested together with their partner (the nine participants who regretted the decision to test were not pressured or did not pressure their partner to test).

To our knowledge, this is the first trial that provides strong evidence of the possible effect of small, non-monetary incentives on uptake of couples' testing. Based on the strength of our effect size and plausibility of findings given the literature review above, programmes should consider adopting this intervention. The acceptability of incentive items might be context-specific—formative research similar to what we did could be important in determining what incentives will be feasible and acceptable in each setting.

The strengths of this study include the rigorous design and robustness in measurement of the primary outcome; it was straightforward to document whether one tested as a couple or individual. Programme data were captured electronically, minimising data entry errors. Importantly, we tested small incentives, which are logistically and economically scalable. The nature and size of incentives was suggested during formative research among communities similar to those that would be targeted for scale-up, making it likely that scale-up of this intervention will be acceptable.

Nevertheless, this study had some limitations. Most importantly, it is possible that participants underplayed the importance of incentives during telephone interview. Additionally, although the number and proportion of testers who obtained an HIV-positive result was higher in intervention communities, it is not possible to assess whether these individuals were newly diagnosed. For example, incentives might have promoted testing among HIV-positive individuals who already knew their status. However, as reported in the telephone survey, few individuals reported already knowing their HIV-positive status, and among those who knew, did so specifically to facilitate disclosure to their partner and the offer of incentives helped with this, which is nevertheless a positive outcome. An added benefit of this is acceptance of HIV status that is symbolised by coming forward in public. Although we had a high response rate of 83·7% for the telephone survey, not all eligible participants were offered enrolment as research staff did not attend all outreach visits; however, characteristics of non-responders were comparable to those of responders. Given the high density of mobile phones in Zimbabwe, access to telephones did not limit participation in the telephone survey. Additionally, reporting bias for the social harms outcome is possible, although this is unlikely to be differential by group. Almost 6% of testing records in the intervention group were lost due to technical malfunction, which could have biased the effect estimates. We did not enumerate all members of the randomised communities or collect outcomes or other data from all these individuals. This is a weakness when interpreting findings from our cluster-level outcomes such as a greater number of HIV-positive individuals identified in intervention communities, as we do not know the current size or HIV prevalence in each community. However, because of randomisation, differences are expected to be small and census data support similar cluster sizes between groups.

We originally also aimed to evaluate the effect of SMS reminders on linkage to post-test services. This was not possible because of incomplete reporting of linkage outcomes. We asked people who had tested as couples in either group to give clinic staff a referral from PSI. Clinics were all sensitised that this would happen and a plan was put in place to incentivise public sector staff to maintain these records. Despite this, very few testers handed in referral slips when presenting to clinics (anecdotally because they wanted the public clinic to re-check their result) and clinics were poor at keeping those referral slips that were submitted. These findings show the difficulty in measuring linkage between two different sectors, and calls for research on innovative methods for determining this important outcome.

In conclusion, we found that small, non-monetary incentives, which are potentially scalable, are effective in increasing uptake of CHTC. The intervention also increased uptake of testing among populations who need to be targeted with testing services—men and individuals at risk of infection (high HIV positivity).

Encouragingly, the offer of non-monetary incentives did not introduce additional social harms beyond the small numbers that are usually encountered with ordinary couples' testing.

Contributors

ELS, SG, SNM, SB-A, AC, SIM, HT, NP, KH, and FMC conceived and designed the study. ELS, SG, MT, and JM collected the data. AC analysed the data. ELS wrote the first draft of the Article. FMC, AC, NP, KH, SNM, SIM, HT, SG, MT, and JM made a substantial intellectual contribution to the Article. All authors met the criteria for authorship.

Declaration of interests

We declare no competing interests.

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