

Economic incentives to increase HIV testing among adolescents in Zimbabwe: a randomised controlled trial comparing no incentive vs. fixed incentive and participation in a lottery

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Summary

Background

HIV testing is the critical entry point for HIV care and prevention service, but uptake of HIV testing and thus coverage of antiretroviral therapy, are much lower in older children and adolescents than in adults. We conducted a household randomised controlled trial to investigate the effect of economic incentives provided to caregivers of children aged 8-17 years on uptake of HIV testing and counselling (HTC) in Zimbabwe.

Methods

This randomised controlled trial was nested within a household HIV prevalence survey conducted among children aged 8-17 years in Harare. Households with one or more survey participants whose HIV status was not known were eligible to participate in the trial. Eligible households were randomised to i) no incentive ii) a fixed US\$2 incentive or iii) participation in a lottery, if the participant presented for HTC. Odds ratios were estimated using logistic regression comparing HIV test uptake in the incentivised with the non-incentivised arm adjusted for community and number of children as fixed effect and research assistant as random effect. Primary outcome was proportion of households with at least one child undergoing HIV testing within four weeks of enrolment. The trial was registered (PACTR201605001615280).

Findings

Of 2050 eligible households recruited between 4.08.2015 and 18.12.2015, 649 (32%), 740 (34%) and 661 (32%) were randomised to no incentive, a fixed US\$2 incentive and a lottery. Of these households, 19.7% (93/472), 48.3% (316/654) and 39.7% (223/562) respectively had at least one child tested. Adjusted odds ratios for HIV testing were 3.67 (95%CI 2.77-4.85, $p < 0.001$) for the US\$2 and 2.66 (95%CI 2.00-3.55, $p < 0.001$) for the lottery incentives compared to no incentive.

Interpretation

Fixed and lottery-based incentives increased the uptake of HIV testing among older children and adolescents, a key hard-to-reach population. This strategy would be sustainable in the context of vertical HIV infection as repeated testing would not be required.

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Introduction

Antiretroviral therapy (ART) effectively prevents progression to AIDS and mortality among those living with HIV and decreases the likelihood of onward transmission. The number of HIV-related deaths among adolescents, however, has more than tripled over the last decade. Adolescents are the only age-group in which HIV-associated mortality is rising, despite the global scale-up of ART programmes.¹ Delayed diagnosis of young people living with HIV increases the risk of immunosuppression resulting in increased mortality.² In addition, initiation of ART at advanced stages of disease is associated with much poorer outcomes.^{3,4} The prevalence of undiagnosed HIV is particularly high among older children and adolescents.^{5,6} A recent meta-analysis from South Africa estimated that only 14% of 15-24 years olds living with HIV were accessing ART.⁷

HIV testing is the essential entry point for both treatment and prevention efforts. Conventional HIV testing strategies such as facility-based provider-initiated HIV testing and counselling (PITC), recommended by the World Health Organization since 2007 in high HIV prevalence settings, have not been sufficient to reduce the burden of undiagnosed HIV in this age-group.⁸ Community-based strategies such as mobile testing units and door-to-door testing and one-stop campaigns have been effective in adults, but tend to either exclude adolescents or be less effective in increasing uptake of HIV testing in this age-group.^{9,10} This might partly be due to issues of consent to HIV testing. Novel approaches are therefore required to improve coverage of HIV diagnosis and treatment in this age-group.

Incentivisation is a strategy that has been used with varying success in health programmes to influence behaviours including smoking, illicit substance use and poor diet, as well as for achieving specific targets such as completion of vaccination.^{11,12} The principle underlying use

of incentives is the psychological theory of contingency management, whereby stimulus control and positive reinforcement are used to change behaviour.¹³ Conditional and unconditional incentives have been shown to reduce pregnancy rates and sexual risk behavior for HIV acquisition among adolescents and young adults in Kenya, Malawi and South Africa.¹⁴⁻¹⁷ Economic incentives have also been applied to encourage testing for sexually transmitted infections including HIV.¹⁸ The provision of financial incentives increased uptake of HIV testing among adults in Malawi¹⁹ and unemployed men in South Africa.²⁰

In sub-Saharan Africa, where 90% of the world's children with HIV live, testing of minors requires consent from guardians with the exception of emancipated minors. The age of ability to give independent consent varies across countries, but in the majority of sub-Saharan African countries it is 18 years.²¹ Therefore, for minors to access testing requires the willingness and engagement of guardians. The aim of this study was to evaluate the impact of financial incentives provided to guardians on uptake of HIV testing and counseling in older children and adolescents aged 8-17 years in Harare, Zimbabwe.

Methods

Study design

We conducted a three-arm household-randomised controlled trial comparing provision of no incentives (control arm) with either a fixed incentive of US\$2 or participation in a lottery (intervention arms) and the impact on HIV test uptake at primary health care clinics (PHC) by children aged 8-17 years. The trial was conducted and analysed according to the CONSORT guidelines.

Setting and participants

The trial was nested within a household survey to estimate the prevalence of undiagnosed HIV among children aged 8-17 years in seven communities in Harare. As part of the prevalence survey participants were anonymously tested for HIV by providing oral fluid samples. Participants and caregivers did not receive these results. Each community is served by PHC providing acute and antenatal care services. The survey took place between January and December 2015 and the trial was from August to December 2015.

Results of the prevalence survey have been reported elsewhere.²² In brief, a sample of census enumeration areas (CEAs), defined as the smallest delimited census area in the study communities, was selected from the 2012 National Census sampling frame using simple random sampling. All households in the selected CEAs were enumerated, and any household with one or more residents aged 8-17 years old was eligible to participate in the prevalence survey. Households were eligible for the trial if they included at least one prevalence survey participant whose HIV status was not known.

Randomisation and masking

Following enumeration, eligible households were randomized to one of three trial arms, namely i) no incentive ii) receipt of US\$2 or iii) participation in a lottery to win a cash prize if a survey participant in the household presented to the PHC in the study community for HIV testing. US\$ is the official currency in Zimbabwe since 2009. The growth domestic product in Zimbabwe was US\$1008.6 per capita.²³ US\$2 would pay for a return journey for two individuals from the outskirts of Harare to the city centre. Random allocation was built into the tablet used for data collection. Those randomised to the lottery had a 1 in 8 chance of winning US\$5 or US\$10. There was no separate price draw for US\$5 and US\$10, both prices were drawn from the same box at the clinics. Randomisation was done at household level as it was not feasible to allocate

participants in one household to different trial arms. An independent statistician performed the random allocation of households using STATA v14.0. Randomisation was based on the list of households that were enumerated prior to the prevalence survey. This included households that were subsequently not eligible because they did not have a child in the target age group. However, the reasons for randomizing the enumerated households rather than the households eligible for the survey was to prevent fieldworkers from influencing random allocation. If more than one survey participant from a household randomised to the intervention arms attended for testing, each would be given the incentive.

As the trial was embedded in the prevalence survey, the survey fieldworkers enrolled children into both the survey and the trial, and recruitment into the trial occurred on the same visit as that for enrolment into the prevalence survey. The survey fieldworkers were therefore not blinded.

Procedures

Written informed consent in the local language (Shona) was sought from the guardian and assent from the participants. Consent to participate in the trial was sought separately from consent to participate in the prevalence survey. Hence households with one or more survey participants could decline to participate in the trial.

Fieldworkers visited eligible households and following informed consent collected data on household socio-demographic characteristics. If an eligible child was absent, two further visits were made within two weeks unless the household head reported the child was expected to be absent for more than two weeks (child coded as “unavailable”). For each participant, history of previous HIV testing, including the date and location of the test(s) and whether the participant was taking ART or cotrimoxazole prophylaxis was recorded using a questionnaire administered

to the participant's guardian. Participants were asked to provide documentary evidence of previous HIV testing, and all participants underwent anonymised HIV testing.²² All households participating in the prevalence survey were provided with written information about benefits of HIV testing.

Households with at least one survey participant with i) no documented evidence of a positive HIV test or ii) a negative HIV test result within the past six months were invited to participate in the trial. Trial participants were given vouchers stating their survey study number and the trial arm to which their household had been randomised. Free HIV testing at PHCs was available for all participants and other members of the household at any time but incentives were only provided for those with a trial voucher. A research assistant was available at the clinics to conduct HIV testing and counselling. HIV testing was carried out according to national guidelines, and those who tested HIV-positive were referred for HIV care at the same clinic. As per national guidelines HIV testing required both guardian consent and child assent. Staff at the clinics and the research assistant had undergone repeated training to provide age-appropriate information, testing and counselling to prevent coercion. A research assistant based at the clinics reported any adverse events and ensured appropriate follow-up and linkage to care for any child diagnosed with HIV.

Ethical approval was obtained from the Medical Research Council of Zimbabwe, the London School of Hygiene and Tropical Medicine Ethics Committee and the Institutional Review Board of the Biomedical Research and Training Institute, Harare, Zimbabwe.

Outcome

The primary outcome was proportion of households that underwent HIV testing within four weeks of enrolment. A household was categorised as having tested for HIV if at least one child in the participating household presented for HIV testing at the PHC. An intention to treat analysis was performed.

Statistical analysis

The unit of randomisation and analysis was the household. Participants and field workers were not blinded to intervention or control arm. The statistician was blinded to trial arm for analysis of the trial outcomes.

Assuming 20% of households in the control arm sent a child for testing at the clinic, 392 participating households per arm would provide 90% power to detect a 50% increase in uptake of testing in an intervention arm versus the control arm. With a three arm trial this would require a total of 1176 households, and allowing for 25% refusal 1568 households would need to be surveyed.

Data was collected by the fieldworker on Nexus 7 2013 tablets running Open Data Kit (ODK) software and transferred to STATA (Version 13.1) for data analysis. Descriptive statistics were conducted on the socio-demographic characteristics of the eligible households and the participants. For continuous and non-parametric variables, medians and inter-quartile ranges were calculated, and for categorical variables frequencies and percentages were estimated. Odds ratios were estimated using logistic regression to compare household HIV testing uptake (i.e. at least one child testing for HIV) in the arms receiving the two different intervention strategies with the non-incentivised arm, adjusting for community and number of children in the household as fixed effects and research assistant as a random effect. Adjustment

for community and research assistant were made a priori. Adjustment for number of children was performed to account for imbalance in different arms. Logistic regression was chosen as the method for analysis to account for the effect of clustering within communities and by research assistant. Research assistant was included as a random effect to allow for the possibility that some research assistants were better at explaining the study or convincing caregivers to take children for testing.

A sensitivity analysis was performed investigating individual HIV test uptake by arm adjusting for community and number of children in the household as fixed effects, with household and research assistant as a random effect. Odds ratios investigating factors predicting individual HIV test uptake were estimated using logistic regression among children randomised to the control arm, adjusted for household as a fixed effect and research assistant as a random effect. Children's schooling was recoded into two categories based on the recommended grade for their age; those who were in the appropriate grade for their age, any higher grade, or one grade below, versus children more than one grade below their age or those who had never been to school. Reported general health was recoded into excellent/good and fair/poor.

The trial is registered with the Pan African Clinical Trials Registry (PACTR201605001615280).

Data sharing

The prevalence survey dataset in which the trial was embedded is stored in the DataCompass secure online repository, curated by the London School of Hygiene & Tropical Medicine. The DOI is <http://dx.doi.org/10.17037/DATA.174> <https://doi.org/10.17037/DATA>

Role of the funding source

The funder had no role in the study design, data collection, data analysis, data interpretation, report writing, or decision to submit the report for publication. The corresponding author has full access to all data in the study and had final responsibility for the decision to submit the publication.

Results

A total of 2050 households were eligible to participate in the prevalence survey based on the enumeration of the randomly selected CEAs. Of these, 649 (32%), 740 (34%) and 661 (32%) were randomised to receiving no incentive, US\$2 or participating in a lottery. Household enrolment took place between August and December 2015. The US\$2 arm had more households than the intervention arms partly due to chance imbalance at randomization. In addition the control households were more likely to have an absent child at the time of the survey visit. These households were therefore not eligible to participate. Of the 2050 households, 1703 participated in the prevalence survey. Of the 1703 households, 1688 were enrolled into the trial, 22 households having no undiagnosed child and 1 household refusing consent (Figure 1). Of the participating households 55% had one child, 29% two, 11% three, 3% four and 1% more than four children.

Household characteristics

Socioeconomic characteristics were balanced over the three arms (Table 1). The majority of household heads had at least secondary education and almost half of the households owned their dwelling. Half of the households did not have a regular income or had a monthly income below US\$100. Most guardians felt comfortable with the idea of an HIV-infected child visiting the household or for their child to share food and play with an HIV-infected child.

Impact of the intervention

In the control arm, 19.7% of households (93/472) had at least one child tested for HIV compared with 48.3% (316/654) in the arm with US\$2 incentive and 39.7% (223/562) in the lottery. When comparing each incentive to no incentive the adjusted odds ratios were 3.67 (95%CI 2.77-4.85) for the US\$2 and 2.66 (95%CI 2.00-3.55) for the lottery. The characteristics of individual trial participants by arm are shown in Appendix Table 1. The effect was more pronounced in the sensitivity analysis where individual children in the US\$2 arm and the lottery arm were compared with children in the control arm. The adjusted odds ratios were 4.86 (95%CI 3.84-6.17) and 3.23 (95%CI 2.53-4.13) respectively (Appendix Table 2). **No adverse events were reported.**

Factors associated with HIV testing of participants in the control arm

Factors associated with increased uptake of HIV testing in the control arm included lower household income, smaller household size and older age of the participants (Table 3).

Discussion

Uptake of HIV testing among children and adolescents in households that received a financial incentive was higher than among households that did not receive an incentive. A lottery with a 1 in 8 probability of receiving an incentive had a similar effect to a fixed incentive of US\$2.

Uptake of HIV testing among households randomized to receiving no incentive was low (19%) despite HIV testing being free of charge. This may be because diagnostic HIV testing at the clinic was available only during working hours, and bringing children to the clinic for HIV testing require guardians having to take time off work or looking after other children and possibly children missing school.^{12,24} Diagnostic HIV testing was not performed during the

household visit as it may have affected participation in the prevalence survey, but dedicated research staff were available at the PHCs so that those attending for HIV testing did not have to wait in the routine clinic queue.

The use of incentives to increase HIV testing is grounded in two economic concepts related to decision-making. Firstly, an economic incentive may mitigate against the “indirect” costs of HIV testing incurred by the client, such as loss of income through time taken off work and transport costs. These may be an even larger cost consideration for a child who is likely to be economically dependent. Secondly, some individuals may display what is termed “present-biased” preferences of a behavior. They place disproportionate emphasis on the immediate costs and benefits, such as economic burden or fear of a positive result compared to future costs and benefits.¹³ Incentives may bring forward in time the “benefits” and sway the decision of the child, the guardian or both.

Incentives have been used for the completion of goal-directed activities such as hepatitis B vaccination, tuberculosis screening, and testing for sexually transmitted infections.^{11,25} Several studies have shown improved uptake of HIV testing among young people and first-time testers in sub-Saharan Africa.^{19,20} However, incentivised HIV testing has never been investigated among children and adolescents. A recent study in Tanzania showed that incentivising universal HIV testing in adults with US\$1.30-6.40 was highly cost-effective.²⁶ The costs per quality-adjusted life-year (QALY) gained was US\$70 for prevalent and US\$620 for incident HIV infections. However, HIV prevalence is generally lower in children and adolescents compared to adults and therefore cannot be generalised to this age group. This may be off-set partly by the fact that children and adolescents have more “unlived” life-years and are not at ongoing risk of being HIV-infected until they become sexually active and therefore HIV testing is a “one-off”

activity in childhood. This is particularly important as the sustainability of incentivisation strategies is of concern, particularly for enforcing long-term changes in health behaviours, for example adherence to ART.^{27,28}

In low-income settings, lotteries may be a more affordable strategy than fixed incentives. In our study, the proportion of participants who underwent HIV testing in the lottery arm almost tripled compared to the control arm, and the effect was similar to that of a fixed incentive. These findings are in contrast with studies investigating the effect of fixed financial incentives and/or lottery to enhance uptake of circumcision.^{29,30} Fixed incentives increased uptake of circumcision, but lotteries had no or a non-significant effect.^{29,30} Contextual factors need to be taken into account when designing an incentivisation strategy. Careful consideration is needed to determine the amount, type and frequency of incentives, as well as the probability of receiving an incentive.¹⁷ These factors influence both the likelihood of affecting the desired behavior as well as enabling autonomic decision making by the client.

Ethicists have raised concerns regarding coercion and equity when using incentives to promote healthy behavior.³¹ In particular, when considering incentivisation of guardians for health-related activities targeting their children, the potential of coercion of children from their caregivers should be considered. Lottery systems may be ethically less problematic because receipt of the incentive does not rely exclusively on displaying the desired behavior, but includes an element of chance. The national South African ‘Right to Know’ HIV testing campaign discussed using lottery incentive systems to encourage HIV testing in the general population.³²

The strengths of the study include an incentivisation strategy directed at guardians who are the gatekeepers to minors accessing health care, clear denominators and a large sample size. We acknowledge several limitations. First, the trial was nested in a prevalence survey involving household visits. Whether the interaction between fieldworkers and households and the information provided during these visits had any effect on the uptake of testing is unknown. Second, the number of households randomized to each arm were relatively equally balanced, but the number of households eligible to participate were not, which may have introduced selection bias. However, adjustments were made for number of children per household to account for imbalance. Households randomized to not receiving an incentive were more likely to indicate that they did not have a child in the target age group and therefore were ineligible. These households might have “silently” refused to participate, but felt uncomfortable refusing openly. Thus the incentives might have increased the participation in the trial and uptake of testing. Household characteristics of the participating household were similar across the three groups except for the number of children in each household. This did not affect the effect estimate, as the outcome was measured on household level and adjusted for the number of children in a household. Third, children in the non-incentivised group may have tested without identifying themselves as trial participants resulting in differential outcome misclassification and possibly overestimation of the effect. Fourth, as previously discussed the effect of incentives is context-specific. While the broad principle may be generalisable to other settings, the size of the effect is less likely to be.

The Joint UN Programme on HIV/AIDS (UNAIDS) has set ambitious 90-90-90 targets, whereby 90% of people living with HIV infection should be diagnosed, 90% of HIV-infected individuals should be on ART, and 90% of those on ART should be virologically suppressed by 2020.³³ If achieved, this would lead to a 90% reduction in AIDS-related mortality and HIV

incidence by 2030, and eliminate HIV as a public health threat. Reducing the burden of undiagnosed HIV is the critical first step to realising the UNAIDS targets. Existing strategies are clearly inadequate to address the substantial burden of undiagnosed HIV infection in adolescents, and novel approaches will be required if the targets are to be met in this age-group. Our study demonstrates that incentives targeted at caregivers substantially improves HIV testing rates among adolescents. Looking ahead, studies are needed to investigate the cost-effectiveness of this approach and careful thought given to the social and cultural context if strategies such as this are to be brought to scale.

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Contributors: KK and RAF designed the study. VS and TB were responsible for data management. VS analysed the data with input from KK and HW. ED, SD and GM coordinated the trial. HM and GM provided clinical advice and contributed to patient management. SM, PC and HM contributed to the study design and study logistics. All authors contributed to writing the report and have seen and approved the final draft.

Declaration of interest: We **declare** no competing interest.

Research in context

Evidence before the study

Dramatic improvements in survival have been achieved since the advent of antiretroviral therapy (ART). The critical step to accessing HIV treatment is HIV testing and counselling (HTC). Older children and adolescents have particularly high rates of undiagnosed HIV and therefore much lower coverage of ART than adults. Existing HTC strategies either exclude or are insufficient to meet the needs of this age-group. Novel strategies will be required if we are to meet the ambitious UNAIDS 90-90-90 targets (which stipulate that 90% of HIV-infected individuals should be diagnosed) in this age-group. Incentivisation is a strategy that has been used in a variety of public health programmes to influence health-related behavior or to achieve specific targets.

We identified two recent systematic reviews investigating the impact of incentives on uptake of HIV testing.^{18,27} Additionally we searched the Cochrane Review database, ClinicalTrials.gov, the WHO International Clinical Trial Registry, MEDLINE, Embase and Web of Science with the following terms: “HIV”, “incentives”, “voucher”, “lottery”, “conditional cash transfer” and “prize draw” for papers not included in the review. We identified two randomised controlled trials conducted in the USA³⁴ and Malawi¹⁹ respectively, and two observational studies conducted among high risk groups, unemployed men²⁰ and adolescents³⁵, in South Africa. All the studies demonstrated higher uptake in the incentivised groups, but none used a lottery approach. The only randomised controlled trial investigating the effect of incentives in sub-Saharan Africa was focused on adults and conducted in 2004 before ART became widely available.

Added value of the study

Our study is the first randomised controlled trial using incentives to improve uptake of HIV testing among older children and adolescents in sub-Saharan Africa. Notably, using the household as the unit of randomisation acknowledges the central role of the family and guardian in making the decision about whether the child or adolescent is tested or not. We used two different incentivisation strategies, namely a fixed incentive of US\$2 or a lottery with a 1:8 chance to receive US\$5 or 10. While uptake of testing was higher among households randomised to fixed incentives, participation in the lottery increased uptake 3-fold. This may be a more cost-effective strategy in resource-constrained settings, and potentially less coercive as the client is aware that an incentive may not be forthcoming. The strategy has potential for scalability and sustainability for identifying those with perinatally acquired HIV, as there is no ongoing risk until sexual debut.

Implications of the available evidence

Financial incentives show promise for improving engagement in HIV testing especially among high risk groups. A better understanding of durability, scalability, ease of implementation, sustainability and cost-effectiveness of these different approaches is needed for maximising the impact of incentives in reaching the ambitious 90-90-90 targets.

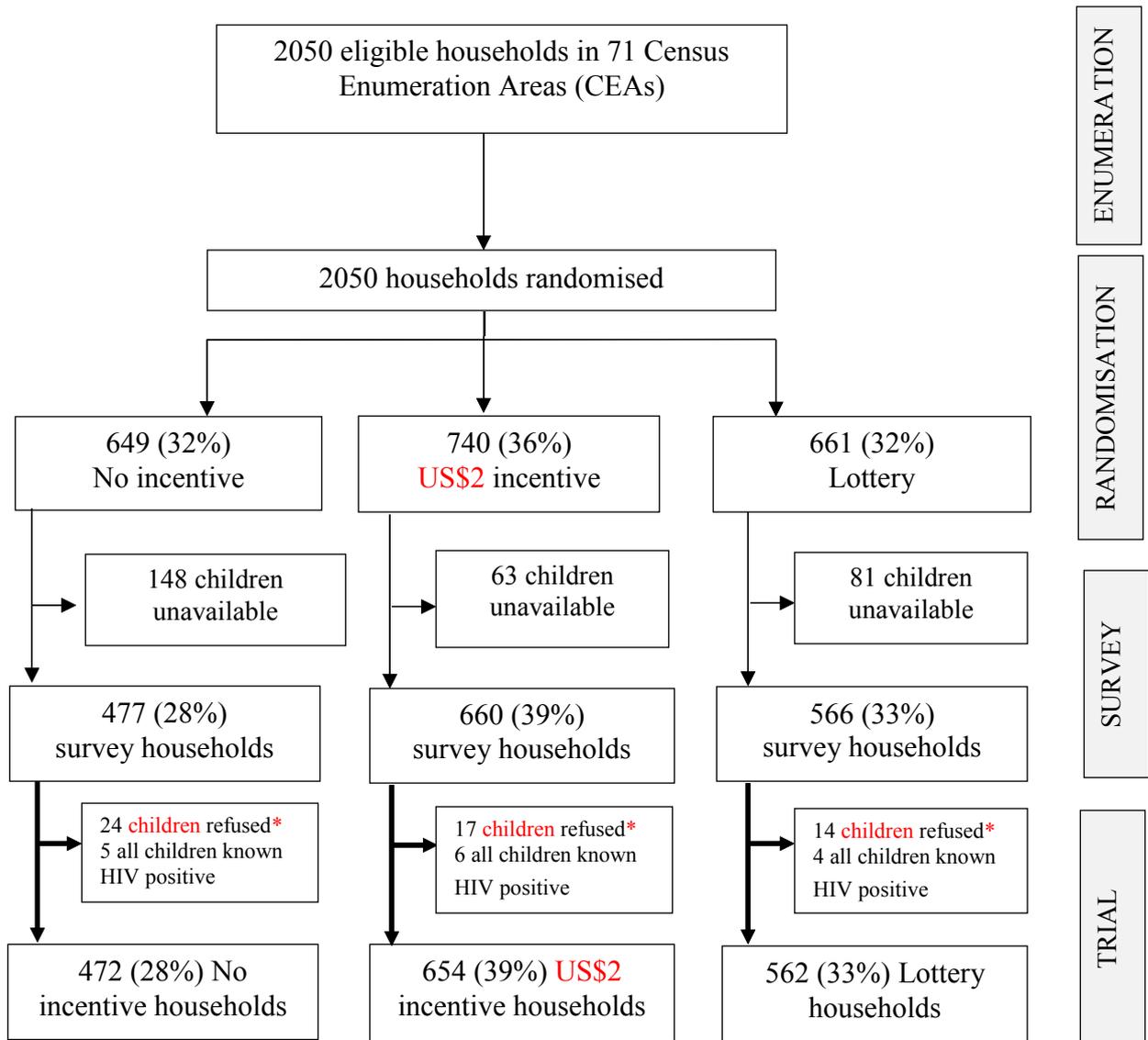
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Figure 1: Study profile



Unavailable = child absent at initial household visits and absent at two further visits or household head reporting that the child was expected to be absent for more than two weeks

*The households remained in the analysis as other children in the household participated

Table 1: Baseline characteristics of households by randomisation arm

	No incentive N=472 N (%) or median (IQR)	US\$2 N=654 N (%) or median (IQR)	Lottery N=562 N (%) or median (IQR)
Median (IQR) household size	5 (4-6)	5 (4-6)	5 (4-6)
Median (IQR) eligible children in household	1 (1-2)	2 (1-2)	2 (1-2)
Median (IQR) Age of household head ¹	41(35-49)	42(36-51)	41(35-49)
Education of HH head ¹			
<i>None/primary</i>	14 (3.0%)	34 (5.2%)	28 (5.0%)
<i>Secondary</i>	397 (84.3%)	521 (79.7%)	468 (83.3%)
<i>Higher</i>	60 (12.7%)	99 (15.1%)	66 (11.7%)
Ownership of dwelling ¹			
<i>Own dwelling</i>	199 (42.3%)	314 (48.0%)	234 (41.6%)
<i>Rent</i>	249 (52.9%)	307 (46.9%)	298 (53.0%)
<i>Use dwelling without rent</i>	23 (4.9%)	33 (5.1%)	30 (5.3%)
HH owns fridge ¹			
<i>Yes</i>	429 (91.1%)	614 (93.9%)	518 (92.2%)
HH owns car or truck ¹			
<i>Yes</i>	71 (15.1%)	112 (17.1%)	85 (15.1%)
HH owns television ¹			
<i>Yes</i>	460 (97.7%)	650 (99.4%)	549 (97.7%)
HH members earning regular salary ¹			
<i>0</i>	188 (39.9%)	265 (40.5%)	255 (45.4%)
<i>1</i>	249 (52.9%)	322 (49.2%)	257 (45.7%)
<i>>1</i>	34 (7.2%)	67 (10.2%)	50 (8.9%)
Regular HH income per month ¹			
<i>No regular income- <US\$200</i>	274 (58.2%)	355 (54.3%)	338 (60.1%)
<i>US\$200-500</i>	128 (27.2%)	161 (24.6%)	140 (24.9%)
<i>>US\$500</i>	69 (14.7%)	138 (21.1%)	84 (15.0%)
Guardian comfort with child playing with HIV+ child ¹			
<i>Very comfortable</i>	447 (94.9%)	627 (95.9%)	544 (96.8%)
Guardian comfort with HIV+ child visiting HH ¹			
<i>Very comfortable</i>	442 (93.8%)	618 (94.5%)	529 (94.1%)
Guardian comfort with child sharing food with HIV+ child ¹			
<i>Very comfortable</i>	430 (91.3%)	606 (92.9%)	523 (93.4%)
Child aged 8-17 in the household diagnosed with HIV	6 (1.3%)	19 (2.9%)	12 (2.1%)
Child aged 8-17 in the household living with HIV	8 (1.7%)	30 (4.6%)	24 (4.3%)

HH=household, IQR=interquartile range ¹ 1 missing value

Table 2: Effect of provision of and type of incentives on uptake of testing at household level

	At least 1 child went to clinic	Crude OR (95% CI)	p-value	Adjusted OR* (95% CI)	p-value
No Incentive	93/472 (19.7%)	1		1	
US\$2	316/654 (48.3%)	3.81 (2.90, 5.01)	<0.0001	3.67 (2.77, 4.85)	<0.0001
Lottery	223/562 (39.7%)	2.68 (2.02, 3.56)	<0.0001	2.66 (2.00, 3.55)	<0.0001

**Adjusted for community and number of children in household, as fixed effects, and research assistant as a random effect*

Table 3: Household and individual level factors associated with HIV testing in the control arm

Variable	Crude OR (95% CI)*	p-value	Adjusted OR (95% CI)*	p-value
Household level				
Does household own dwelling				
<i>No</i>	1			
<i>Yes</i>	0.85 (0.55, 1.230)	0.44		
Household income				
<i>No regular salary - <US\$ 200</i>	1		1	
<i>US\$ 200 – US\$ 500</i>	0.61 (0.35, 1.06)	0.080	0.59 (0.34, 1.05)	0.075
<i>>US\$ 500</i>	0.43 (0.21, 0.91)	0.028	0.51 (0.24, 1.11)	0.089
Number of children aged 8-17 (reference category =1)	0.62 (0.48, 0.79)	<0.0001	0.61 (0.47, 0.79)	<0.0001
Age of household head (years)				
<i><30</i>	1			
<i>30-60</i>	0.46 (0.16, 1.32)	0.15		
<i>>60</i>	0.94 (0.44, 2.01)	0.88		
Individual level				
Gender				
<i>Male</i>	1			
<i>Female</i>	0.79 (0.52, 1.20)	0.26		
Age				
<i>8-12</i>	1		1	
<i>13-17</i>	1.38 (0.91, 2.09)	0.13	1.46 (0.94, 2.25)	0.090
Orphan				
<i>No</i>	1			
<i>Single or double orphan</i>	1.46 (0.80, 2.64)	0.21		
General Health				
<i>Good</i>	1		1	
<i>Fair/poor</i>	1.94 (0.75, 5.05)	0.17	1.59 (0.54, 4.63)	0.41
Ever admitted to hospital				
<i>No</i>	1			
<i>Yes</i>	0.76 (0.22, 2.65)	0.67		
Chronic skin conditions				
<i>No</i>	1		1	

Variable	Crude OR (95% CI)*	p-value	Adjusted OR (95% CI)*	p-value
<i>Yes</i>	1.94 (0.68, 5.50)	0.21	1.61 (0.51, 5.13)	0.42
Schooling (for age)				
<i>≤ 1 grade behind for age</i>	1		1	
<i>>1 grade behind for age</i>	1.31 (0.83, 2.06)	0.24	1.21 (0.76, 1.95)	0.42
Caregiver				
<i>Biological parent</i>	1			
<i>Not biological parent</i>	0.80 (0.47, 1.36)	0.40		

*Adjusted for household as a fixed effect and research assistant as a random effect