Harsha Thirumurthy
Eunice Omanga
Samwel Ogik Rao
Kate Murray
Sam Masters
Kawango Agot

Optimising the use of economic interventions to increase demand for voluntary medical male circumcision in Kenya

October 2016

Impact Evaluation Report 47

HIV and AIDS

3ie International Initiative for Impact Evaluation

About 3ie

The International Initiative for Impact Evaluation (3ie) is an international grant-making NGO promoting evidence-informed development policies and programmes. We are the global leader in funding, producing and synthesising high-quality evidence of what works, how, why and at what cost. We believe that better and policy-relevant evidence will make development more effective and improve people's lives.

3ie impact evaluations

3ie-supported impact evaluations assess the difference a development intervention has made to social and economic outcomes. 3ie is committed to funding rigorous evaluations that include a theory-based design, use the most appropriate mix of methods to capture outcomes and are useful in complex development contexts.

About this report

3ie accepted the final version of this report, *Optimising the use of economic interventions to increase demand for voluntary medical male circumcision in Kenya*, in November 2015 as partial fulfilment of requirements under grant TW3.05 issued under Thematic Window 3. The content has been copyedited and formatted for publication by 3ie. All of the content is the sole responsibility of the authors and does not represent the opinions of 3ie, its donors or its Board of Commissioners. Any errors and omissions are also the sole responsibility of the authors. All affiliations of the authors listed in the title page are those that were in effect at the time the report was accepted. Any comments or queries should be directed to the corresponding author, Harsha Thirumurthy at harsha@unc.edu

Funding for this Thematic Window was provided by the Bill & Melinda Gates Foundation.

Suggested citation: Thirumurthy, H, Omanga, E, Rao, SO, Murray, K, Masters, S and Agot, K, 2016. *Optimising the use of economic interventions to increase demand for voluntary medical male circumcision in Kenya, 3ie Impact Evaluation Report 47.* New Delhi: International Initiative for Impact Evaluation (3ie)

3ie Impact Evaluation Report Series executive editors: Jyotsna Puri and Beryl Leach
Managing editor: Eric W Djimeu
Production manager: Brigid Monaghan
Copy editor: Erin Braun
Proof reader: Yvette Charboneau
Cover design: John F McGill and Akarsh Gupta
Printer: VIA Interactive
Cover photo: Global.finland.fi

Optimising the use of economic interventions to increase demand for voluntary medical male circumcision in Kenya

Harsha Thirumurthy
University of North Carolina at Chapel Hill

Eunice Omanga
Impact Research and Development Organization

Samwel Ogik Rao
Impact Research and Development Organization

Kate Murray
University of North Carolina at Chapel Hill

Sam Masters
University of North Carolina at Chapel Hill

Kawango Agot
Impact Research and Development Organization

3ie Impact Evaluation Report 47

October 2016

Acknowledgements

Funding for this study was provided by the International Initiative for Impact Evaluation (3ie). Harsha Thirumurthy also acknowledges support from the National Institute for Child Health and Human Development (grant no. K01HD061605).

Summary

Background

Low uptake of male circumcision has been a major challenge to scaling-up voluntary medical male circumcision (VMMC) services and maximising its HIV prevention impact in eastern and southern Africa. There is limited evidence on effective demand creation strategies for VMMC that address reported barriers to male circumcision. Building on insights from behavioural economics, we assessed whether providing compensation for opportunity costs of time or lottery-based rewards can increase VMMC uptake among men in Nyanza Province, Kenya.

Methods

Uncircumcised men aged 21–39 years were provided information on VMMC services and randomised in 1:1:1 ratio to two intervention groups or a control group. One intervention group was offered compensation of US$12.50 conditional on VMMC uptake. The amount of compensation was equivalent to clinic transport costs and lost wages during and after the circumcision procedure, and compensation was provided in the form of food vouchers valid at shops in the study region. A second intervention group was offered the opportunity to participate in a lottery with high-value prizes upon undergoing circumcision. The primary outcome was VMMC uptake within three months.

Results

Among 909 participants, those randomised to receive compensation of US$12.50 had the highest VMMC uptake (8.4%, 26/308), followed by those receiving lottery-based rewards (3.3%, 10/302) and those in the control group (1.3%, 4/299). Logistic regression analysis showed that compared to the control group, the US$12.50 group had significantly higher VMMC uptake (Adjusted odds ratio [AOR] 7.1; 95% CI 2.4-20.8). Participants in the lottery-based rewards group were not significantly more likely to become circumcised than participants in the control group (AOR 2.5; 95% CI 0.8-8.1). The effect of providing compensation of US$12.50 was largest among participants who were contemplating circumcision at the time of enrolment.

Conclusions

Providing conditional economic compensation was effective in increasing circumcision uptake among men over a short time period. The results are consistent with studies showing that small incentives can modify health behaviours by addressing barriers such as opportunity costs of time and present-biased decision-making. Unlike the provision of fixed compensation, lottery-based rewards did not significantly increase circumcision uptake. Testing economic interventions in other settings and applying them to other HIV behaviours can be useful for assessing the generalisability of the findings.

Contents

List of figures and tables

Abbreviations and acronyms

3ie	International Initiative for Impact Evaluation
AOR	adjusted odds ratio
CCT	conditional cash transfer
CI	confidence interval
IQR	interquartile range
IRDO	Impact Research and Development Organization
KES	Kenya shillings
RA	research assistant
STI	sexually transmitted infection
VMMC	voluntary male medical circumcision

1. Introduction

Kenya has had remarkable success in scaling up voluntary medical male circumcision (VMMC) services since the procedure was shown to be highly effective in reducing the risk of acquiring HIV (Bailey *et al*. 2007; Gray *et al*. 2007; Auvert *et al*. 2005). Nearly 430,000 men underwent circumcision between October 2008 and March 2012, and two-thirds (66 per cent) of the VMMC target for Nyanza Province has been met (Mwandi *et al*. 2011). However, a number of challenges remain as the country seeks to achieve its target of 94 per cent circumcision prevalence by 2013 (Mwandi *et al*. 2011; Galbraith *et al*. 2014). In particular, uptake among older men has been limited (Herman-Roloff *et al*. 2011a; Mwandi *et al*. 2011) and there remains a need to promote VMMC uptake among men engaged in the highest risk sexual behaviours. Given the higher HIV prevalence for men above 20 years of age (Kimanga *et al*. 2014) and those with riskier sexual behaviours, increasing circumcision prevalence in these groups is likely to have a more immediate impact on population-level HIV incidence. More generally, finding ways to increase uptake of VMMC services among men is a challenge faced by many countries in eastern and southern Africa, where progress in scaling-up VMMC has been more limited than in Kenya (Hankins *et al*. 2011; Sgaier *et al*. 2014).

While male circumcision has been found to be acceptable to men and women in non-circumcising communities in Sub-Saharan Africa (Westercamp & Bailey 2007), a number of barriers to VMMC uptake have also been documented. A commonly reported barrier has been concern about lost wages on the day of the circumcision procedure and days after the procedure when the early stages of wound healing may limit the ability to perform certain types of work – particularly in the informal sector (Herman-Roloff *et al.* 2011b; Westercamp & Bailey 2007). Other barriers include costs of transportation to clinics, fear of pain or adverse surgical events, concerns about a long period of sexual abstinence following the circumcision procedure (recommended by the World Health Organization to be 42 days (World Health Organization & Joint United Nations Programme on HIV/AIDS 2007; Mugavero *et al*. 2009), concerns about sexual potency and female partner's resistance (Westercamp & Bailey 2007; Herman-Roloff *et al.* 2011a, 2011b; Ghaemi *et al*. 2010). Given the scale-up challenges experienced so far, there is a vital need for novel demand creation strategies that can effectively encourage men to seek VMMC services. Yet to date there have only been a few rigorous evaluations of demand creation interventions (Thirumurthy *et al*. 2014; Chinkhumba *et al*. 2014) and recent reviews have identified this as a priority for implementation science research (Gray *et al*. 2013; Hankins *et al*. 2011; Sgaier *et al*. 2014).

This study used a randomised trial design to test the effect of two distinct economic interventions to increase demand for male circumcision in Nyanza Province, Kenya. The primary outcome of interest was VMMC uptake within three months.

2. Intervention, theory of change and research hypotheses

We tested two distinct economic interventions that each have a compelling rationale based on prior economics, psychology and public health studies. Here we briefly describe the two interventions and the rationale for each one.

2.1 Intervention 1: fixed amount of compensation

Participants randomly assigned to intervention 1 were offered a food voucher worth Kenya shillings (KES) 1,000 (about US$12.50) if they underwent circumcision at one of the designated VMMC clinics located in the study area and staffed by Impact Research and Development Organization (IRDO) – the implementing organisation that offers VMMC services in the study region. We refer to this as a *fixed amount of compensation* because the amount of compensation that participants received if getting circumcised was fixed in advance – at the time that they were randomised to the intervention groups or the control group. Participants who came to one of the IRDO's VMMC clinics within three months were given their food voucher at the clinic *after* undergoing the circumcision. Research assistants (RAs) stationed at the IRDO clinics recorded the study identification numbers of participants who come to clinic to seek circumcision and distributed the food vouchers. The food vouchers were usable at a network of shops in the study area and retained their value for up to one month from the time that men received the voucher.

2.1.1 Rationale for compensation provision

Two important barriers to uptake of VMMC that emerged from qualitative work in Nyanza Province, Kenya, are time and transport costs of accessing VMMC services and the hesitation to take time off work on the day of the procedure and during the immediate post-procedure healing period (Herman-Roloff *et al*. 2011b). Men indicated that they are concerned about providing for their families, in particular making sure they can feed their families while they are unable to work during the healing period, which can last for one to three days after the procedure.

Compensating men for out-of-pocket expenses and other financial costs associated with undergoing VMMC may help eliminate some of the barriers to uptake of VMMC. Simple economic intuition suggests that providing compensation to those who come for male circumcision will lower the 'price' of the procedure and thereby result in increased demand. The amounts were also chosen so that they only compensated men for out-of-pocket and opportunity costs associated with getting circumcised – as such the compensation amounts make the circumcision procedure have *zero* financial cost but do not provide an excessive economic *gain* from getting circumcised.

We selected a food voucher amount of KES 1,000 because it was comparable to the combined costs (in the study area) of transportation to the clinic and foregone income over days of work lost. As for the mode of compensation, we chose to provide compensation in the form of food vouchers because feeding one's family was cited as a primary concern among older men. Food vouchers would more directly address this barrier to uptake. We also felt that by providing food vouchers instead of cash, the intervention could be more clearly justified as one that sought to directly address the

stated economic barrier. Acceptability in study communities of compensating with food vouchers was felt to be higher than acceptability of compensating with cash. Nonetheless, we did not seek to test the effects of providing cash instead of food vouchers, so the relative merits of one mode of compensation over the other may need more careful examination.

Providing compensation to address economic barriers to male circumcision builds on the success of other programs that have used monetary or non-monetary compensation to achieve behaviour change in other domains. In the past 20 years, these programmes – sometimes referred to as conditional cash transfer (CCT) programmes when the compensation is in the form of cash – have been widely used to improve various health behaviours (Fernald *et al*. 2009; Lagarde *et al*. 2009; Lagarde *et al*. 2007; Schultz 2004; Baird *et al.* 2012).

2.2 Intervention 2: lottery-based rewards

Participants who received intervention 2 were given an opportunity to participate in a lottery if they underwent male circumcision at one of the VMMC clinics in the study area. The lottery offered a chance to win one of several high-value prizes. This lottery was designed to be *actuarially equivalent* to the fixed compensation amount of KES 1,000. Participants were told that 1 in 20 (5 per cent) would win a bicycle or a smartphone (value KES 9,500 or US$118) and an additional 2 in 20 (10 per cent) would win a standard mobile phone or pair of shoes (value KES 3,600 or US$45). The remaining 17 in 20 (or 85 per cent) were awarded a consolation prize of a food voucher worth KES 200 or US$2.50. We selected the prizes because they were popular with men across all socio-demographic groups and as such are likely to generate interest in the study population.

When participants were randomly assigned to intervention 2, they were told that they could participate in the lottery (and win a prize) only after being circumcised. RAs stationed at the IRDO clinics recorded the study identification numbers of participants who came to clinic to seek circumcision and then provided them a scratch card that instantly revealed the prize. Lottery prizes were then distributed to participants by study staff.

2.2.1 Rationale for lottery-based rewards

The rationale for using lottery-based rewards to promote VMMC uptake is based on a growing body of psychology and behavioural economic research and on several studies conducted to promote desirable health behaviours in other settings.

The first rationale for lottery-based rewards rests on the *theory of present-biased preferences*, whereby individuals' behaviours are driven by immediate costs and benefits as opposed to future costs and benefits (Loewenstein *et al*. 2007; O'Donoghue & Rabin 1999). In the case of male circumcision, many of the benefits lie in the future (with the biggest benefit being that the risk of acquiring HIV in the future is reduced substantially). The costs, however, are largely in the present – they include the above-mentioned transportation and opportunity costs as well as other costs such as the fear of pain and the requirement to abstain from sex during the six weeks following the procedure (Hewett *et al*. 2012). Lottery-based rewards could be an effective strategy for increasing men's

desire to undergo circumcision since they offer the prospect of an immediate benefit from a behaviour otherwise associated with numerous costs that are in the present.

Lottery-based rewards also have several features that make them more desirable than small, fixed incentives – the tendency of individuals to overestimate low probabilities and overemphasise large rewards. As seminal research of Kahneman and Tversky (1979) has shown, people tend to overestimate probabilities near zero. This implies that lotteries with low probabilities of winning large prizes may be more effective than small, fixed incentives or actuarially equivalent lotteries with higher probabilities of winning smaller prizes. Low-probability high-payout lotteries would also be more effective than higher-probability, lower-payout lotteries because of tendencies to pay more attention to the magnitude of rewards. A large body of lab-based experimental research on *Prospect Theory* has confirmed these decision behaviours, particularly by examining willingness to pay for lotteries with different odds of winning large prizes. In addition, it has been shown that *anticipated emotions* often play a major role in individuals' choices when risk or uncertainty is involved (Loewenstein *et al*. 2001). This rationale also makes lotteries a potentially effective intervention for VMMC demand creation, as the anticipated emotion of winning a prize can be influential.

Compared to fixed incentives, lottery-based rewards to uptake VMMC may also be more likely to draw men who engage in higher risk sexual behaviours. Another rationale for lottery-based rewards, particularly in the context of male circumcision uptake, comes from the *expected utility theory* that is commonly used in economics: lotteries tend to be favoured by individuals who are less risk averse (Starmer 2008). In expected utility theory, individuals' risk preferences are an important predictor of interest in gambling and lotteries. While the lottery-based incentive that we offer does not technically constitute a form of gambling, it has some common features – such as incurring a cost (coming for circumcision) in order to potentially win a valuable prize – and as a result, men who will find the lottery-based incentive appealing may have 'risk-loving' preferences (i.e. they are not very risk-averse). Risk preferences are known to influence a variety of economic behaviours, such as investment and portfolio choice. In the field of health economics, attitudes toward risk are likely to affect purchase of health insurance, use of preventive medical care, and propensity to engage in behaviours affecting mortality risk, such as tobacco or seat belt use (Anderson & Mellor 2008; Lahiri & Song 2000; Barsky *et al*. 1997). Therefore, an especially appealing feature of using lottery-based rewards to promote VMMC uptake is the prospect that this intervention may motivate men engaged in higher risk sexual behaviours (such as those with multiple sexual partners or do not use condoms frequently) to come for circumcision.

Finally, lotteries have been shown to be effective as incentives in several domains of health behaviour, including medication adherence (Volpp *et al*. 2008b), weight-loss (Volpp *et al*. 2008a) and cholesterol reduction (Francisco *et al*. 1994). However, many studies of lottery use for promoting desirable health behaviours have been conducted in the United States and not in developing countries. Although their potential for promoting behaviour change has been recognised, whether they can influence important health behaviours such as VMMC uptake has not been studied.

3. Larger context and sample context

3.1 Study setting

The study took place within Greater Nyando District in the Nyanza region of western Kenya. IRDO is currently the primary provider of VMMC services in the region, which consists of 5 divisions, 28 locations and 76 sub-locations and has a population of 170,270 adult men. Since 2008, IRDO has circumcised 30,908 male residents of this specific region. Adult HIV prevalence in the region is 15.1 per cent. We chose Greater Nyando District because circumcision prevalence among adult men is still considerably below the target of 80 per cent and also because the district has occupational diversity, including fishing, plantation work, casual labour and a large informal sector. The district therefore provided a setting for evaluating the appropriateness of the intervention across occupations representative of the populations targeted by VMMC programmes.

3.2 Study population

Out of 30 sub-locations in the study area that were not adjacent to or part of those where our previous demand creation study took place (Thirumurthy *et al*. 2014), we randomly selected seven sub-locations for enrolment of study participants. Trained RAs enumerated the study sub-locations and immediately enrolled eligible males between 28 April 2014 and 10 September 2014. RAs recruited men who met the following eligibility criteria: self-reported age 21–39 years, self-reported to be uncircumcised and no intention to leave the study area in the next four months. Every household in the village was visited by an RA. In households with multiple eligible men, only one eligible man was selected (with each one having an equal chance of being selected).

As the implementing partner providing VMMC services in the District, IRDO's records show that of the 60,835 adult men aged 15-49 years in the District, 30,908 (51.2 per cent) have been circumcised. However, only 26.7 per cent of these circumcised men are between 21-49 years even though men in this age bracket constitute 64.7 per cent of the adult male population. Thus, the majority of those who are coming for VMMC services are aged 20 years or younger even though the risk of acquiring HIV in Kenyan men is highest among men older than 20 years (Kenya National Bureau of Statistics 2010).

4. Linking programme implementation and impact evaluation timelines

The timelines for the implementation of the interventions as well as the impact evaluation are shown in the two tables below.

Figure 1: Programme implementation timeline

	2013			2014											
Activity	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Grant agreement executed	X														
Selection of sublocations		X	X												
Community preparation		X	X												
Recruitment/orientation of shops				X	X										
Procurement of equipment/supplies				X	X										
Staffing preparation			X	X	X	X	X								
Screening & enrollment							X	X	X	X	X	X			
Recording VMMC uptake							X	X	X	X	X	X	X	X	X
Distributing prizes & vouchers								X	X	X	X	X	X	X	X

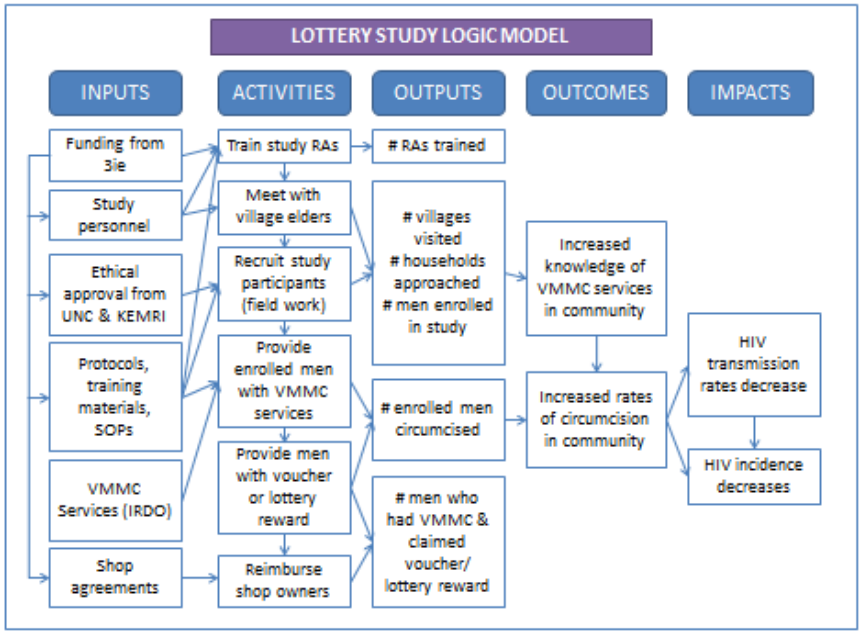
Figure 2: Impact evaluation timeline

	2013			2014											2015		
Activity	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**
Grant agreement executed	X																	
IRB submission, review & approval	X	X	X															
Training of RAs							X											
Household visits:																		
Consent process							X	X	X	X	X	X						
Baseline questionnaire							X	X	X	X	X	X						
Randomization							X	X	X	X	X	X						
Record uptake at VMMC clinics							X	X	X	X	X	X	X	X	X			
In-depth interviews (qualitative component)												X	X	X	X			
Quantitative data analysis																X	X	
Qualitative data analysis																X	X	
Final report																X	X	
Dissemination																X	X	X

5. Process evaluation (implementation assessment)

Key programmatic activities and output indicators are shown below.

Figure 3: Study logic model



At enrolment, men were given referral cards to present at IRDO's VMMC clinics; these referral cards indicated whether they had been randomly selected to receive a fixed or lottery-based incentive if they underwent circumcision. SMS reminders containing information about study clinics and the compensation or lottery intervention were sent at one and two months, post enrolment, to men in all three study groups.

5.1 Recording VMMC uptake at IRDO clinics

Trained RAs were based at the study VMMC clinics and collected the referral cards, confirmed participant identity and confirmed with clinic staff that the men underwent circumcision. VMMC uptake was our primary outcome of interest.

VMMC uptake was monitored at study clinics until 10 December 2014. All participants were asked to present their scratch cards to a study RA at IRDO clinics if they decided to uptake VMMC within three months of enrolment. Participants in the two intervention groups were offered either the food voucher or the scratch card for the lottery by study RAs immediately after the circumcision procedure, which the RAs verified by consulting with surgeons at the clinic. RAs also verified the participants' identity with national identification cards or another form of identification. VMMC uptake was also verified at the end of the study by comparing names of participants with names appearing on official VMMC registers maintained by IRDO. No discrepancies in VMMC uptake were found in this comparison.

5.2 Distribution of prizes and food vouchers

After circumcision, the RAs at the VMMC clinics issued prizes to participants in the lottery-based rewards group whose scratch cards revealed that they had won something and food vouchers to men in the fixed compensation and control groups if they underwent circumcision.

5.3 Participant recruitment and flow

A total of 4,663 households were enumerated, 911 of which were eligible for enrolment and randomised to the three study groups (figure 4). Among the 3,752 households that were not eligible, reasons for exclusion varied; 1,182 had no resident adult male, 1,050 had a resident adult male – but he reported already being circumcised and 894 resident adult males did not meet self-reported age criteria. Other reasons for non-enrolment included difficulty locating men at home (n=250), planning on moving within the study period (n=196), and being busy or declining to participate (n=9).

We encountered some challenges during the implementation of the intervention. We found that in the study communities there were a non-trivial number of households that do not have any men of eligible age (21–39 years) living in the household. The data that we collected indicates that for many households, men in this age range are working for extended periods of time in other locations outside of the study area, such as Nairobi, and only return to Kisumu infrequently. Because of this, enrolment of participants was slower than we had anticipated and RAs visited a large number of households in order to enrol the desired number of participants.

A second challenge that we faced was the reduction in the number of VMMC service providers operating in the study area. Due to unexpected VMMC funding restrictions, IRDO was forced to reduce the number of clinics operating in the study area to four. In spite of this funding restriction, IRDO maintained VMMC provider teams on the ground in locations throughout the study area, but the result is that some study participants may have had to travel farther to a VMMC provider.

6. Methodology: evaluation design and implementation

To identify the impact of each of the two interventions, study participants were randomised to one of three study groups. The two intervention groups were those that offered men a fixed incentive or a lottery-based incentive to go for VMMC (described above). To measure VMMC uptake under the counterfactual scenario of no intervention, a third control group received a very small, fixed amount of compensation for VMMC uptake of KES 50 (US$0.60). Random assignment to the study groups provided an opportunity to learn the causal effect of each intervention and also to compare the two interventions to each other.

The randomised design limits the possibility that confounding factors would bias the estimated effects of the interventions, since assignment to intervention 1 or 2 or the control group was uncorrelated with characteristics of individuals, households or villages. Moreover, we used block randomisation to ensure that characteristics of study participants would be similar across all three study groups.

Following written informed consent, eligible participants were administered a brief baseline questionnaire, provided with general information about the risks and benefits of VMMC, and then randomised in a 1:1:1 ratio to three study groups. Randomisation was performed using ‘referral’ scratch cards that participants were allowed to hand select. The arm to which each participant was assigned was recorded by the RAs and linked to the participant’s study ID number. The unique referral card number for the participant was also recorded. Participants were told to bring their referral cards to VMMC clinics within three months if they chose to get circumcised and wished to receive the incentive corresponding to their study arm.

Selection bias was minimized since study participation was not based entirely on self-selection. We sought to enrol all uncircumcised men of eligible ages living in the study communities. The district we selected is representative of other districts in Nyanza Province because it has comparable circumcision prevalence and has occupational diversity. To ensure minimal bias in the sample, we monitored whether those who refused to participate shared certain characteristics, such as village of residence or occupation.

One reason that we offered the control group a small, fixed amount of compensation (KES 50) to go for VMMC is that this would greatly enhance the feasibility of implementing individual-level randomisation in the community, and it increased the likelihood of correctly measuring VMMC uptake. If men in the control group are not provided any incentive at all, it becomes more difficult to record whether some of them subsequently come for VMMC at the IRDO clinics that are open to all men. Providing them a small incentive motivated men who came for VMMC to present the referral cards they received at the time of enrolment.

Having a control group that received a small amount is helpful also because it makes it more feasible to randomise at the individual level, since every participant received something. At the same time, the amount of the voucher offered to the control group was not so large that it would substantively influence men's decisions to seek VMMC. The amount of KES 50 is even smaller than the amount of compensation that is sometimes provided to participants in research studies; as such it does not represent a significant enough amount to alter VMMC uptake.

One concern in an RCT with a control group receiving no incentive or a very small incentive is that participants assigned to it may be even less willing to undergo VMMC than they might otherwise have been, due to disappointment about not being selected to receive an incentive. Since the uncircumcised men in the control group (and the intervention groups) had a chance to go for VMMC during the past four years and had not done so, we think it is implausible that their willingness to go would *decline* as a result of being randomised to the control group. We also took steps to limit the extent to which such a response happened, such as training the RAs to clearly describe how the randomisation will take place when administering informed consent with study participants. We also made it clear to participants that the study provided compensation or rewards for only a short period and that the control group will receive the standard of care as well as a small fixed amount of compensation.

The purpose of the baseline questionnaire was to obtain basic demographic and socio-economic information, sexual behavioural history, knowledge and beliefs about male circumcision, and self-reported risk preferences using questions about choices the respondent would make when offered hypothetical lotteries. The RAs administered the questionnaires using tablet computers that contain forms developed using Open Data Kit, an open-access data collection platform that we are using in other studies. It was not possible to blind the RAs to the respondents' group, however because randomisation occurred after baseline data collection, we do not believe that biased the interviews in any way.

Power calculations were performed using the *sampsi* command in Stata version 12.1. Power calculations indicated that with a sample size of 300 per study group and 2 per cent VMMC uptake in the control group, there would be 90 per cent power to detect a difference in uptake as small as 7 percentage points and 80 per cent power to detect a difference in uptake as small as 6percentage points. Based on results from the previous study we conducted in the study area, 2 per cent uptake within a short period of time in the control group was considered to be realistic.

6.1 Qualitative interviews

We conducted qualitative in-depth interviews with 19 study participants randomised to lottery-based rewards, eight of whom had been circumcised during the study follow-up period and 11 who had not been circumcised. The main objective of the in-depth interviews was to gain information on the participants' perceptions of the lottery-based incentive and the reasons why they did or did not uptake VMMC. We also sought to assess whether the interventions were perceived to be coercive in any way.

Interviews were audio-recorded in participants preferred language (Dholuo or English). The interviewing RAs translated and transcribed the interviews. NVivo software was used to code and analyse the transcripts. Transcripts were read in their entirety before coding began. The interview guide was used to code each of the transcripts and in vivo codes were also identified during the coding.

7. Impact analysis and results of the key evaluation questions

The primary, pre-specified outcome was VMMC uptake within three months of enrolment. The outcome was coded as a binary variable equal to 1 if the participant underwent circumcision at study clinics within three months of enrolment and 0 if the participant did not. The primary analysis compared VMMC uptake in each intervention group to the control group using logistic regression. We performed a Wald test to compare the coefficients for the fixed compensation and lottery-based rewards groups. We also estimated logistic regression models that adjusted for participants' age, educational attainment, marital status, and wealth. Age was defined as a categorical variable with 5-year age categories (with age of 21–24 years as the reference category); education was defined as a categorical variable indicating different levels of school completion (with less than primary school attainment as the reference category). Marital status was defined as a binary variable to indicate whether the participant was married. Participants' wealth was measured by an asset index defined as the sum of affirmative responses to ownership of 11 household items. No participants were missing information on these covariates and therefore all were included in the analysis.

Figure 4 describes the participant recruitment and randomisation. A total of 4,663 households were enumerated and 3,752 of them were excluded for various reasons: no resident adult male (1,182); resident adult male reported already being circumcised (1,050), did not meet self-reported age criteria (894), or planned to move within four months (196); resident adult male not at home (250) or refused to participate (9). Enrolment and randomisation occurred in 911 households.

7.1 Baseline data

Study participants generally had similar characteristics at baseline across the three study groups (appendix table A-1). Mean age of participants was 29 years (standard deviation 5.9 years). Nearly all participants were from the Luo ethnic group, the largest in the region and one that is traditionally non-circumcising. The majority of participants had completed at least primary education (75 per cent) and participants reported being economically active; median daily earnings was US$3.80 (interquartile range [IQR], US$2.50-$6.30). Sixty per cent of all participants were married.

Participants' self-reported sexual behaviour and male circumcision attitudes were similar in all study groups (appendix table A-2). Overall, 90 per cent of participants reported having a primary sex partner and 24 per cent reported having a sex partner other than their primary partner in the past year. Only 34 per cent of participants reported using a condom the most recent time they had sex. While only 11 per cent of participants reported that they were HIV-positive, the majority of HIV-negative participants felt that they were at high or moderate risk of being infected with HIV (77 per cent). Most participants had knowledge of the benefits of circumcision at baseline (more than 85 per

cent) and reported being likely to become circumcised sometime in the future if a food voucher was given for compensation. Participants reported that the minimum amount needed for a food voucher to make most men get circumcised was US$25 (IQR 15–38). The majority of participants (58 per cent) reported the possibility of being unable to work temporarily as their greatest concern about getting circumcised; 25 per cent reported fear of pain and 17 per cent reported other factors.

7.2 Effect of demand creation interventions on VMMC uptake

Appendix table A-3 shows that VMMC uptake within three months was higher among participants in the lottery-based rewards group (10/302, 3.3%) or fixed compensation group (26/308, 8.4%) than among participants in the control group (4/299, 1.3%). An average of 37 days elapsed between enrolment in the study and VMMC uptake (standard deviation 38 days).

Logistic regression analysis of VMMC uptake (appendix table A-3) indicated that compared to participants in the control group, those in the fixed compensation group were significantly more likely to get circumcised within three months (OR 6.8; 95% CI 2.3-19.7). Those enrolled in the lottery-based rewards group, however, were not significantly more likely to uptake VMMC (OR 2.5; 95% CI 0.8-8.1). The effect sizes for the fixed and lottery-based rewards groups differed significantly (P=0.009). Results from the adjusted logistic regression analysis were similar, with significant increases in the likelihood of VMMC uptake among those in the fixed compensation group, but no significant effect for the lottery-based rewards group (AOR 7.1; 95% CI 2.4-20.8 and AOR 2.5; 95% CI 0.8-8.1, respectively). No adverse events were reported in any of the study groups.

7.3 Qualitative results

The aim of the qualitative analysis was to provide context for why participants in the lottery-based rewards group did and did not become circumcised and to understand how they perceived the lottery intervention. Participants who became circumcised reported mixed expectations of winning a lottery prize, a few feeling that their chances were high and the majority feeling that their chances were low or entirely due to luck and therefore outside of their control.

> *Me … I just thought of … just had high chances of winning because you know that when I went there, because first of all as I was selecting those cards, I found that ombulu [lottery] … So I thought that when I went there, I was just going to select that KES 9,600, that phone … but I was disappointed. (Circumcised man, winner of KES 200)*

> *My chance was low … It was purely luck (Circumcised man, winner of KES 200)*

Of the circumcised participants who were interviewed, one man won a high value prize (bicycle) and 5 interviewees won the consolation prize of 200 shillings (US$2). Almost all of the circumcised participants had considered becoming circumcised previously and reported that health was a major factor in their decision to become circumcised, specifically reducing their risk of HIV and other sexually transmitted infections (STIs).

> *The main reason why I decided to get circumcised was hygiene, and secondly for protection against STIs that I could easily get when I was not circumcised … The prizes to be won … well I thanked them for that, but it did not change my mind because I believe circumcision is a good thing whether there is a prize on offer or not, due to what I had learned about circumcision. (Circumcised man, winner of a bicycle)*

Some men felt that the possibility of winning a prize made it easier for them to go for circumcision, but the participants who felt their chances of winning were low did not report the prize motivated them further.

Participants who did not become circumcised reported several reasons for not going for VMMC. The primary reasons were not finding time to go during the study period, fear of missing work or losing work, and related concern about providing for their families during the post-circumcision healing period. Many men stated that the chance of winning a lottery prize was not sufficient to meet their economic needs if they were unable to work immediately after being circumcised.

> *Yah, I have the desire to get circumcised but the work I do does not allow me to take time off and go for it during that time … Let's say that I went for it … Sometimes you might take time out not engaging in hard duties of which I do know that wound heals after three weeks. You will stay for almost a week without doing hard jobs. Now for this one week and you are required by several different persons for work you see you will lose customers. (Uncircumcised man)*

> *Why I did not go? I did not, because I felt due to the options that were there, I could go and fail to get a bicycle but just only get 200 shillings instead, so if I get 200 shillings upon and I am also not understanding clear side effects of the procedure this would fail me and yet I have school going children and I have those who I provide food for. (Uncircumcised man)*

> *I felt that if I go and get this money, it is little such that it is not going to help me. On the other hand, I could go and miss because it was a matter of luck given that it was being scratched. If you went and got something that cannot help you but you have already gone and at the same time undergoing pain … (Uncircumcised man)*

A few participants expressed disappointment that they had not been randomised to the fixed incentive arm.

> *After scratching, I found the lottery arm. Now with that lottery I was told I will still get to the raffle after circumcision. So it became much more harder to me. I thought I would get that one thousand. (Uncircumcised man)*

The majority of the participants had low expectations of winning a high value prize or perceived that winning the lottery was entirely due to luck/chance, and therefore perceived that the chance of receiving the consolation prize was too high compared to their need to provide for their families.

> *I felt I had some chance [of winning a high-value prize] but my main concern was the fact that you were to be circumcised first, is when you go for the raffle. Now I*

asked myself, in case I go through the raffle and we know with the raffle, it is a matter of chance, now in case I choose on the two hundred shilling voucher, you see I would be in problem … Two hundred shillings surely is too little … Even the one thousand was still less only that it can at least assist. (Uncircumcised man)

Only one participant reported a distrust of the lottery system and was concerned that the clinic staff would not give the high value prizes.

Participants in both groups reported that the lottery prizes, especially the bicycle and the phone, offered in the study were of value to them and many men in the study region, however a cash prize or food item would be preferred. Participants in both the circumcised and uncircumcised groups accurately perceived the intervention, and it appears that the intervention was delivered as intended. Analysis of the qualitative data sheds further light on how men in the lottery arm perceived the intervention and evaluated it against their own real needs.

7.4 Cost-effectiveness

Using the evidence generated in this study on the effectiveness of providing fixed compensation and lottery-based rewards, as well as administrative data we kept on the costs of implementing the intervention, we were able to determine the incremental cost-effectiveness of the demand creation interventions assessed in this study. The cost-effectiveness results, presented in appendix G, show that the fixed compensation intervention in particular was highly cost-effective. In a population of 1,000 uncircumcised men, based on the study results there would be 71 additional circumcisions performed as a result of providing US$12.50 in compensation to clients at a total cost of US$1,599, indicating an incremental cost-effectiveness of US$22.50 per person circumcised. The lottery-based rewards intervention, on the other hand, is less cost-effective, at $47.95 per additional person circumcised. Given the data on the sizable HIV prevention benefits of male circumcision, this suggests demand creation interventions such as the ones implemented in this study warrant strong consideration by programmes and countries seeking to scale-up VMMC. If implemented at scale and over a longer duration of time, it is plausible that compensation interventions would be even more cost-effective, as some of the fixed costs of developing and initiating the intervention could be distributed over a greater number of circumcision clients. The cost-effectiveness will also be enhanced if adjustments are made for the fact that effective demand creation interventions can lead to efficiency gains at clinics, since staff are less likely to be under-utilized.

8. Discussion of results

Among uncircumcised 21- to 39-year-old men in the study region, offering compensation for lost wages and transportation costs in the form of food vouchers – conditional on going for circumcision – was acceptable, feasible, and effective in increasing VMMC uptake within a period of three months. However, participants offered lottery-based rewards for VMMC uptake were not significantly more likely to become circumcised than participants in a control group. This study adds to a small evidence base on effective demand creation strategies for male circumcision in Sub-Saharan Africa. The strengths of this study include a randomised controlled trial design, the development of an intervention based on prior research on barriers to VMMC uptake and extensive consultation with

stakeholders, collaboration with the largest VMMC service delivery organisation in Kenya, careful monitoring of the primary outcome of VMMC uptake and a qualitative analysis that helps interpret the trial results.

The finding that providing a fixed amount of compensation significantly increased VMMC uptake is highly consistent with results from a previous RCT that we conducted in the same region of Kenya (Thirumurthy *et al*. 2014). In that study, providing compensation of about US$8.75 and US$15 led to significantly higher VMMC uptake among 25- to 49-year-old men. Moreover, VMMC uptake in the two study groups that received US$8.75 and US$15 in compensation (6.6 per cent and 9.0 per cent, respectively) was highly comparable to the VMMC uptake among men offered US$12.50 in this study (8.4 per cent). This study therefore provides further evidence that there are economic barriers to VMMC uptake for men above the age of 21 years and that the provision of small amounts of compensation may be an effective strategy for increasing circumcision prevalence in this segment of the population.

The amount of time that participants were offered compensation if they became circumcised was also one month longer in this study compared to the previous one we conducted in the study area (three months instead of two months). The finding that VMMC uptake in the fixed compensation groups was comparable across studies suggests that a longer incentive period is not necessarily likely to yield considerably higher VMMC uptake.

Another important finding from this study is that lottery-based rewards did not lead to a significant increase in VMMC uptake among study participants. Moreover, the effect of providing fixed compensation was also significantly higher than the effect of the lottery-based rewards. This noteworthy result is partially at odds with some of the theoretical rationale for using lottery-based rewards, but it is also consistent with findings from another recent study conducted in the United Kingdom that made a similar comparison of lotteries to vouchers, in this case to promote chlamydia screening among 18- to 24-year-old students (Niza *et al*. 2014). The findings from that study also indicated that fixed vouchers (worth £5) were significantly more effective in increasing screening than lottery-based rewards. Very few studies in Sub-Saharan Africa have rigorously evaluated lottery-based rewards to promote health behaviours. One study conducted in Lesotho has reported preliminary results that such an intervention is effective in encouraging individuals to remain HIV-uninfected (Bjorkman-Nyqvist *et al*. 2013), but further testing of lottery-based rewards as well as additional consideration of the design of such interventions is needed.

There are several candidate explanations for why the lottery-based rewards did not lead to significantly higher VMMC uptake. First and foremost is the possibility that the prospect of lost wages for several days may have been a barrier to VMMC uptake. The lottery-based rewards intervention did not address this economic barrier in a significant way, and this may explain why it did not promote VMMC uptake in the way that the provision of fixed compensation did. Qualitative interviews with participants in the lottery-based rewards group as well as baseline data on barriers to VMMC provide support for this explanation. A second explanation for the study findings stems from the possibility that participants were in fact quite risk averse and as such, in accordance with expected utility

theory, the lottery-based rewards did not appeal to them as much as interventions that provided them compensation with certainty. A third explanation may be that participants felt the lottery prizes were not attractive enough – perhaps due the low probability of winning prizes or due to the prizes being insufficiently high in value. It may have also been the case that study participants did not adequately trust that lottery-based prizes would be awarded. While this was not a strong suggestion from the qualitative interviews, the lack of promotion and public disclosure of the lottery-based rewards intervention may have limited the intervention's effectiveness (such a limitation would be less likely if the intervention were implemented at scale and with greater communication in communities).

Importantly, this study is among the first to assess the efficacy of economic interventions – such as compensation provision and lottery-based rewards, as well as incentives more generally – to promote HIV-related health behaviours in resource-limited settings. Economic interventions have previously been used to promote various health and education behaviours, and recently the use of CCTs for school attendance has also been shown to reduce HIV and STI prevalence (Baird *et al*. 2012). However, while there is growing interest in learning whether interventions such as incentives or compensation can be used to promote HIV-related behaviours such the uptake of HIV testing, linkage to HIV care, and retention in the PMTCT and HIV care cascade, evidence from randomised trials has been relatively limited (Lee *et al*. 2013; Thornton 2008; Bjorkman-Nyqvist *et al*. 2013; Operario *et al*. 2013; de Walque *et al*. 2012). The results from this study illustrate how economic compensation can be used to modify HIV-related health behaviours and promote HIV prevention objectives.

The levels of circumcision uptake observed in this study also underscore that compensation provision alone is insufficient for achieving high circumcision uptake among currently uncircumcised men. Particularly in Kenya, where circumcision prevalence is high, those who are uncircumcised represent the 'hardest to reach' segments of the population. While some study participants may have chosen to undergo circumcision if the intervention remained active for longer than three months or if compensation amounts were slightly higher, it is also likely that other important barriers may explain limited VMMC uptake. Compensation provision can be a low-cost demand creation strategy that is highly cost-effective and addresses barriers for some men, but combining this intervention with other demand creation interventions may hold even greater promise.

9. Actionable findings for policy, implementation and research

From a programmatic standpoint, our results suggest that offering compensation to VMMC clients is a strategy worth consideration in order to achieve greater uptake of VMMC services among men above the age of 21 years in Kenya. There is growing evidence – from Kenya and other countries in Sub-Saharan Africa – that economic factors such as lost wages and opportunity costs of time are among the important barriers to VMMC uptake, particularly for men in age groups that are likely to be employed in the formal or informal sector.

Among the appealing features of the demand creation strategy we implemented and evaluated is that the primary costs of the interventions would only be incurred if and when circumcisions are performed, and that the intervention was very cost-effective. This is

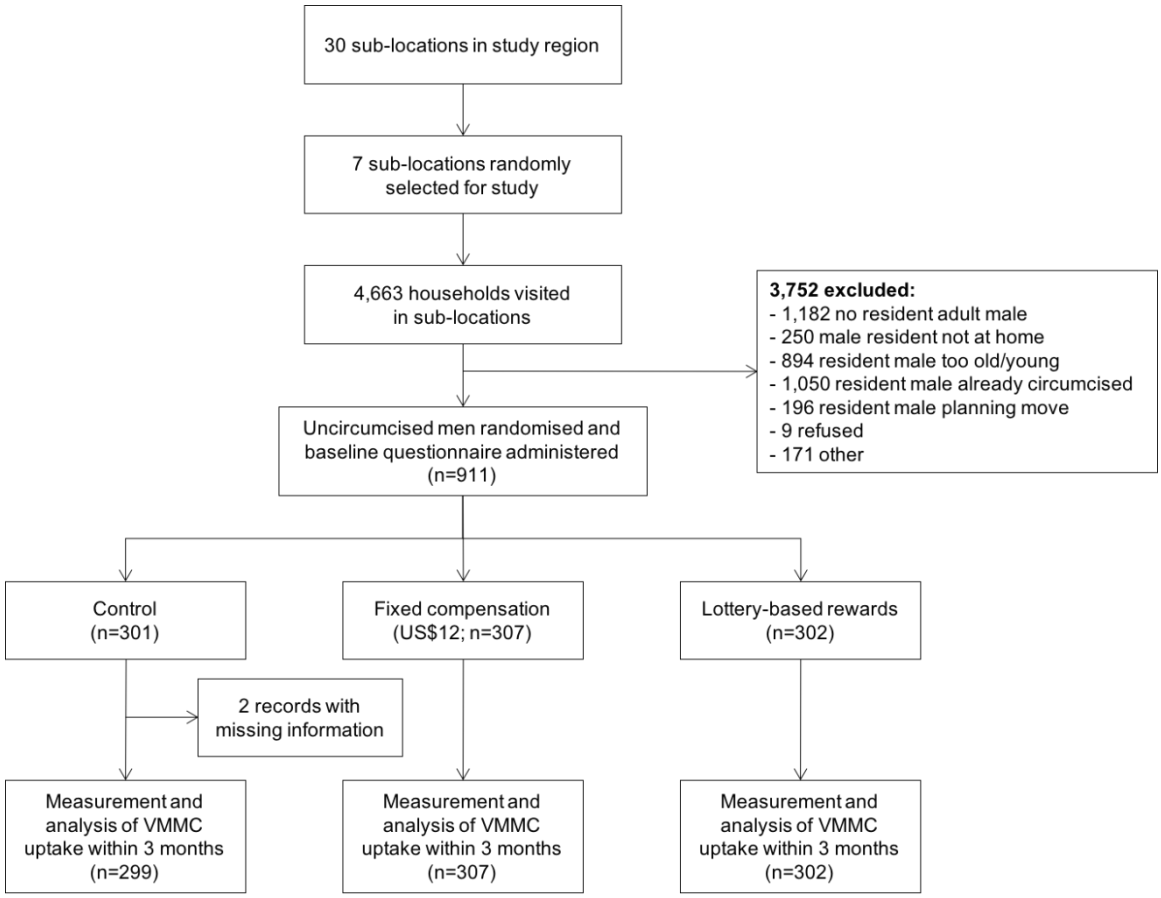
advantageous when considering that the compensation amounts represent the largest portion of the costs associated with the intervention. The costs of the intervention will also be further absorbed by efficiency gains that could be achieved if demand is higher and staff are not under-utilized. Given that the incremental cost-effectiveness of the intervention that provided fixed compensation to clients was US$22.50 per person circumcised, the intervention is likely to be highly cost-effective since every 5–15 circumcisions are projected to avert an HIV infection (Njeuhmeli *et al*. 2011). Moreover, from the standpoint of sustainability, an advantage of this intervention is that it is for a one-time behaviour of VMMC uptake rather than recurring health behaviour.

Several ethical considerations must also be taken into account when using economic interventions to promote a health behaviour such as male circumcision, particularly on a larger scale. Paramount among these is the concern that compensation and lottery-based rewards may be inducements that compromise individual autonomy. There are several reasons why the conditional economic compensation used in this study may not be ethically problematic and may even promote individual autonomy. First, the modest amounts we used compensated participants for costs they would likely incur as a result of becoming circumcised – a finding that was verified by participants' baseline reports of their daily earnings and in-depth interviews. Therefore, the incentives reduced costs to circumcision clients rather than offer disproportionately large benefits. Second, in-depth interviews suggested that the incentives 'nudged' participants towards undertaking a health decision they already favoured. Such an effect of the intervention is consistent with models of decision-making in behavioural economics and other incentive-based studies (O'Donoghue & Rabin 1999; Loewenstein *et al*. 2007; Volpp *et al*. 2009; Volpp *et al*. 2008a). Third, in light of the public health externality benefits of male circumcision, the provision of modest incentives in this case has a more compelling rationale than it would for behaviours with no externality benefits. A favourable overall ethical assessment of our intervention is also consistent with the recent perspective offered by the Ethics Working Group of the HIV Prevention Trials Network (London *et al*. 2012).

Several features of the interventions we tested in this study can be modified when considering their implementation on a larger scale. The interventions we implemented required establishing agreements with a network of shops in the study area where the food vouchers would be valid. This can be feasible for other VMMC programmes with an established presence in their regions as well. However, scaling-up an intervention using food vouchers could be challenging if VMMC programmes are not well-established; even otherwise, establishing agreements with shopkeepers could be costly, time consuming, or subject to mismanagement. Offering alternative forms of conditional economic compensation (whether cash or non-cash, mobile money, etc.) could be solutions to any problems that may arise with food voucher-based compensation. This study also did not compare the effect of providing compensation in form of food vouchers instead of cash; the latter may or may not have had a larger impact on VMMC uptake and as such could be an important question to answer before choosing a mode of compensation. Finally, the inter-personal contact between participants and RAs at the time of study enrolment is not necessary when implementing compensation interventions at scale. Instead, the interventions could be promoted via other forms of communication such as mass media or facility- and community-based events.

Further testing of economic interventions in areas outside Kenya can be important for establishing the generalizability of the results found in this study. To the extent that economic barriers to VMMC uptake exist for at least some men, the results from this study ought to apply in other settings as well. However, it is possible that other barriers to VMMC uptake such as cultural factors are more prominent elsewhere, which would mean that providing compensation alone may not be as effective. Given the results from this study and another related study conducted in Kenya (Thirumurthy *et al*. 2014) – as well as results from other ongoing and recently completed studies of promising demand creation interventions – there is considerable potential for accelerating the scale-up for male circumcision in eastern and southern Africa. Continued dialog between researchers, national governments, donor organisations, as well as community leaders and other stakeholders is essential for realizing this potential.

Figure 4: Study flowchart



Appendix A: Sample design

We randomly selected seven sub-locations in Greater Nyando District. Trained RAs enumerated the study sub-locations and immediately enrolled eligible males between 28 April 2014 and 10 September 2014. RAs recruited men who met the following eligibility criteria: self-reported age between 21–39 years, self-reported to be uncircumcised, and no intention to leave study area in next four months. Every household in villages within the study sub-locations was visited by an RA. In households with multiple eligible men, only one eligible man was selected (with each one having an equal chance of being selected).

A total of 4,663 households were enumerated, 911 of which were eligible for enrolment and randomised to the three study groups (figure 4). Among the 3,752 households that were not eligible, reasons for exclusion varied; 1,182 had no resident adult male, 1,050 had a resident adult male – but he reported already being circumcised – and 894 resident adult males did not meet self-reported age criteria. Other reasons for non-enrolment included difficulty locating men at home (n=250), planning on moving within the study period (n=196) and being busy or declining to participate (n=9).

Appendix B: Survey instruments

Please see separate document.

Appendix C: Pre-analysis plan

The primary aim of this study is to measure the difference in uptake of male circumcision in the two intervention groups, compared to each other and to the control group. If characteristics of the control and two intervention groups are similar, then *t*-tests can be used to compare the proportion of men in each group who uptake VMMC and to test for significant differences. We will also use logistic regression models to estimate the effect of each intervention on VMMC uptake after adjusting for baseline characteristics. The purpose of the regression analyses will be to test whether the interventions have any effect even after controlling for other variables. We will also conduct additional regression analyses to test whether men with high risk behaviours at baseline who are allocated the lottery-based rewards are more likely to uptake VMMC. Since baseline data collection will be conducted using tablet computers and VMMC uptake data will be transmitted regularly, we will be in a position to report preliminary results soon after the end of the data collection period.

Appendix D: Sample size and power calculations

Power calculations were performed using the *sampsi* command in Stata version 12.1. Power calculations indicated that with a sample size of 300 per study group and 2 per cent VMMC uptake in the control group, there would be 90 per cent power to detect a difference in uptake as small as 7 percentage points and 80 per cent power to detect a difference in uptake as small as 6 percentage points. Based on results from the previous study we conducted in the study area, 2 per cent uptake within a short period of time in the control group was considered to be realistic.

Appendix E: Descriptive statistics

Table A-1: Baseline characteristics of study participants

	Study group			Full sample (n=909)	P-value**
	Control (n=299)	Fixed (n=308)	Lottery (n=302)		
Age, mean (SD)	28.9 (5.4)	29.1 (6)	29.2 (6.2)	29 (5.9)	0.79
Wealth based on asset index*, mean (SD)	3 (1.6)	2.8 (1.5)	2.8 (1.5)	2.9 (1.5)	0.17
Daily earnings (US$), median (IQR)	4.4 (2.9-6.3)	3.8 (2.5-6.3)	3.8 (2.5-6.3)	3.8 (2.5-6.3)	0.98
Education					
Some primary education or none, No. (%)	71 (24)	73 (24)	80 (26)	224 (25)	0.66
Completed primary education, No. (%)	88 (29)	118 (38)	102 (34)	308 (34)	0.07
Some secondary education, No. (%)	57 (19)	42 (14)	32 (11)	131 (14)	0.01
Completed secondary or greater, No. (%)	83 (28)	75 (24)	88 (29)	246 (27)	0.39
Married, No. (%)	183 (61)	167 (54)	191 (63)	541 (60)	0.06
Luo ethnicity, No. (%)	299 (100)	306 (99)	301 (100)	906 (100)	0.38

Note: * Wealth was measured using an asset index which was defined as the sum of affirmative responses to questions about ownership of 11 household items. ** Chi^2 test conducted for binary variables and ANOVA for continuous variables.

Table A-2: Attitudes related to demand for VMMC and self-reported sexual behaviour

	Study group			Full Sample	P-value*
	Control	Fixed	Lottery		
Sexual risk behaviour					
Have a primary sex partner, No. (%)	266 (91)	271 (89)	267 (90)	804 (90)	0.65
Had any other sex partner besides primary in past year, No. (%)	63 (22)	85 (28)	67 (22)	215 (24)	0.15
Condom used at last intercourse, No. (%)	96 (33)	109 (36)	100 (34)	305 (34)	0.74
Self-reported chance of having HIV					
High, No. (%)	31 (10)	41 (13)	26 (9)	98 (11)	0.17
Moderate, No. (%)	77 (26)	80 (26)	83 (27)	240 (26)	0.87
Low, No. (%)	98 (33)	104 (34)	111 (37)	313 (34)	0.56
No risk at all, No. (%)	59 (20)	44 (14)	40 (13)	143 (16)	0.06
HIV-infected, No. (%)	8 (3)	8 (3)	9 (3)	25 (3)	0.96
Circumcision knowledge					
Chance of HIV reduced with circumcision, No. (%)	270 (90)	264 (86)	259 (86)	793 (87)	0.15
Circumcised men less likely to get HIV, No. (%)	235 (83)	249 (87)	248 (89)	732 (86)	0.13
Likelihood of getting circumcised sometime in the future					
Definitely yes, No. (%)	121 (41)	114 (39)	100 (35)	335 (38)	0.30
Maybe, No. (%)	155 (53)	162 (55)	160 (56)	477 (54)	0.72
It is unlikely, No. (%)	14 (5)	10 (3)	13 (5)	37 (4)	0.68
Definitely not, No. (%)	5 (2)	9 (3)	14 (5)	28 (3)	0.09
Likelihood of getting circumcised if given a food voucher for compensation					
Very likely, No. (%)	131 (45)	136 (45)	119 (41)	386 (44)	0.57
Somewhat likely, No. (%)	126 (43)	129 (43)	127 (44)	382 (43)	0.95
Not very likely, No. (%)	34 (12)	38 (13)	43 (15)	115 (13)	0.50
Minimum amount needed for a food voucher to make:					
Most men get circumcised (US$), median (IQR)	25(15-38)	25(13-38)	25(18-44)	25(15-38)	0.22

	Study group			Full Sample	P-value*
	Control	Fixed	Lottery		
Greatest concern about getting circumcised					
Cost of missed work, No. (%)	162 (60)	162 (57)	161 (56)	485 (58)	0.70
Pain, No. (%)	67 (25)	59 (21)	80 (28)	206 (25)	0.15
Other concern, No. (%)	41 (15)	60 (21)	44 (15)	145 (17)	0.09

Note: * Chi^2 test conducted for binary and ANOVA for continuous variables

Appendix F: Results

Table A-3: Effects of conditional economic compensation on VMMC uptake within two months

	Study group			P-value for equality test***
	Control	Fixed	Lottery	
N	299	308	302	
Circumcised, No. (%)	4 (1.3)	26 (8.4)	10 (3.3)	
Unadjusted*				
OR	1 (Ref)	6.8	2.5	0.009
95% CI	-	(2.3 - 19.7)	(0.8 - 8.1)	
P-value	-	0.005	0.180	
Adjusted**				
OR	1 (Ref)	7.1	2.5	0.007
95% CI	-	(2.4 - 20.8)	(0.8 - 8.1)	
P-value	-	0.005	0.183	

Note: * Unadjusted model presents the results of a logistic regression of circumcision uptake on study group. ** Adjusted model represents the results of a logistic regression of uptake on study group as well as controls for age, wealth, education and marital status. *** Wald test of equality between fixed compensation group and lottery-based rewards group.

Appendix G: Cost data

Table A-4: Cost data

	Control	Fixed incentives	Lottery-based incentives
Effectiveness			
# of male circumcisions in 3-month period	4	26	10
# of participants in study group	299	308	302
Effectiveness	1.3%	8.4%	3.3%
Projected # of male circumcisions if implemented in community of 1,000 uncircumcised men	13	84	33
Costs			
Cost of setting up and maintaining voucher system for 3 months			
1 month of study coordinator time to visit shops routinely	$0	$500	$500
Personnel time for distributing incentives at facility (5% effort for 3 months)		$45	$45
Voucher costs	$0	$4	$2
Incentive costs	$0	$1,050	$413
Total costs	$0	$1,599	$959
Incremental cost-effectiveness			
Cost per additional male circumcision client		$22.50	$47.95
Unit cost of printing vouchers		0.05	0.05
Unit cost of incentive (expected value for lottery)		$12.50	$12.50

Appendix H: .do files

Please see separate document.

References

Anderson, LR and Mellor, JM. 2008. Predicting health behaviours with an experimental measure of risk preference. *Journal of Health Economics,* 27**,** pp.1,260–74.

Auvert, B, Taljaard, D, Lagarde, E, Sobngwi-Tambekou, J, Sitta, R and Puren, A, 2005. Randomised, controlled intervention trial of male circumcision for reduction of HIV infection risk: the ANRS 1265 Trial. *PLoS Medicine,* 2**,** e298.

Bailey, RC, Moses, S, Parker, CB, Agot, K, Maclean, I, Krieger, JN, Williams, CF, Campbell, RT and Ndinya-Achola, JO, 2007. Male circumcision for HIV prevention in young men in Kisumu, Kenya: a randomised controlled trial. *Lancet,* 369**,** pp.643–56.

Baird, SJ, Garfein, RS, Mcintosh, CT and Ozler, B, 2012. Effect of a cash transfer programme for schooling on prevalence of HIV and herpes simplex type 2 in Malawi: a cluster randomised trial. *Lancet,* 379**,** pp.1,320–29.

Barsky, RB, Miles, K and Shapiro, M, 1997. Preference parameters and behavioural heterogeneity: an experimental approach in the health and retirement study. *Quarterly Journal of Economics,* 112**,** pp.537–579.

Bjorkman-Nyqvist, M, Corno, L, De Walque, D and Svensson, J, 2013. Evaluating the impact of short term financial incentives on HIV and STI incidence among youth in Lesotho: a randomised trial. *7th IAS Conference on HIV Pathogenesis, Treatment and Prevention.* Kuala Lumpur, Malaysia.

Chinkhumba, J, Godlonton, S and Thornton, R, 2014. The demand for medical male circumcision. *American Economic Journal: Applied Economics,* 6, pp.152–177.

De Walque, D, Dow, WH, Nathan, R, Abdul, R, Abilahi, F, Gong, E, Isdahl, Z, Jamison, J, Jullu, B, Krishnan, S, Majura, A, Miguel, E, Moncada, J, Mtenga, S, Mwanyangala, MA, Packel, L, Schachter, J, Shirima, K and Medlin, CA, 2012. Incentivising safe sex: a randomised trial of conditional cash transfers for HIV and sexually transmitted infection prevention in rural Tanzania. *BMJ open,* 2, e000747.

Fernald, LC, Gertler, PJ and Neufeld, LM, 2009. Ten-year effect of Oportunidades, Mexico's conditional cash transfer programme, on child growth, cognition, language, and behaviour: a longitudinal follow-up study. *Lancet,* 374**,** pp.1,997–2,005.

Francisco, VT, Paine, AL, Fawcett, SB, Johnston, J and Banks, D, 1994. An experimental evaluation of an incentive program to reduce serum cholesterol levels among health fair participants. *Archives of Family Medicine,* 3**,** 246–51.

Galbraith, JS, Ochieng, A, Mwalili, S, Emusu, D, Mwandi, Z, Kim, AA, Rutherford, G, Maina, WK, Kimanga, DO, Chesang, K, Cherutich, P, and Group, KS, 2014. Status of voluntary medical male circumcision in Kenya: findings

from 2 nationally representative surveys in Kenya, 2007 and 2012. *J Acquir Immune Defic Syndr,* 66 Suppl 1**,** S37–45.

Ghaemi, SN, Ostacher, MM, El-Mallakh, RS, Borrelli, D, Baldassano, CF, Kelley, ME, Filkowski, MM, Hennen, J, Sachs, GS and Goodwin, FK, 2010. Antidepressant discontinuation in bipolar depression: a Systematic Treatment Enhancement Program for Bipolar Disorder (STEP-BD) randomised clinical trial of long-term effectiveness and safety. *The Journal of Clinical Psychiatry,* 71**,** 372–380.

Gray, RH, Kigozi, G, Serwadda, D, Makumbi, F, Watya, S, Nalugoda, F, Kiwanuka, N, Moulton, LH, Chaudhary, MA, Chen, MZ, Sewankambo, NK, Wabwire-Mangen, F, Bacon, MC, Williams, CF, Opendi, P, Reynolds, SJ, Laeyendecker, O, Quinn, TC and Wawer, MJ, 2007. Male circumcision for HIV prevention in men in Rakai, Uganda: a randomised trial. *Lancet,* 369**,** 657–66.

Gray, RH, Wawer, MJ and Kigozi, G, 2013. Programme science research on medical male circumcision scale-up in Sub-Saharan Africa. *Sex Transm Infect,* 89**,** 345–49.

Hankins, C, Forsythe, S and Njeuhmeli, E, 2011. Voluntary medical male circumcision: an introduction to the cost, impact, and challenges of accelerated scaling up. *PLoS Medicine,* 8**,** e1001127.

Herman-Roloff, A, Llewellyn, E, Obiero, W, Agot, K, Ndinya-Achola, J, Muraguri, N and Bailey, RC, 2011a. Implementing voluntary medical male circumcision for HIV prevention in Nyanza Province, Kenya: lessons learned during the first year. *PLoS One,* 6**,** e18299.

Herman-Roloff, A, Otieno, N, Agot, K, Ndinya-Achola, J and Bailey, RC, 2011b. Acceptability of medical male circumcision among uncircumcised men in Kenya one year after the launch of the national male circumcision program. *PLoS One,* 6**,** e19814.

Hewett, PC, Hallett, TB, Mensch, BS, Dzekedzeke, K, Zimba-Tembo, S, Garnett, GP and Todd, PE, 2012. Sex with stitches: assessing the resumption of sexual activity during the postcircumcision wound-healing period. *AIDS,* 26**,** 749–56.

Kahneman, D and Tversky, A, 1979. Prospect theory: an analysis of decision under risk. *Econometrica,* 47**,** pp.263–291.

Kenya National Bureau of Statistics, 2010. Kenya Demographic and Health Survey 2008–09. *In:* STATISTICS, K. N. B. O. (ed.). Nairobi.

Kimanga, DO, Ogola, S, Umuro, M, Ng'ang'a, A, Kimondo, L, Murithi, P, Muttunga, J, Wariuru, W, Mohammed, I, Sharrif, S, De Cock, KM, Kim, AA and Group, KS, 2014. Prevalence and incidence of HIV infection, trends, and risk factors among persons aged 15–64 years in Kenya: results from a nationally representative study. *J Acquir Immune Defic Syndr,* 66 Suppl 1**,** S13–26.

Lagarde, M, Haines, A and Palmer, N, 2007. Conditional cash transfers for improving uptake of health interventions in low- and middle-income countries: a systematic review. *JAMA: The Journal of the American Medical Association,* 298**,** pp.1,900–10.

Lagarde, M, Haines, A and Palmer, N, 2009. The impact of conditional cash transfers on health outcomes and use of health services in low and middle income countries. *Cochrane database of systematic reviews***,** CD008137.

Lahiri, K and SONG, JG, 2000. The effect of smoking on health using a sequential self-selection model. *Health Economics,* 9**,** pp.491–511.

Lee, R, Cui, RR, Muessig, KE, Thirumurthy, H and Tucker, JD, 2013. Incentivizing HIV/STI Testing: A Systematic Review of the Literature. *AIDS and Behaviour*.

Loewenstein, G, Brennan, T and Volpp, KG, 2007. Asymmetric paternalism to improve health behaviours. *JAMA: The Journal of the American Medical Association,* 298**,** pp.2,415–17.

Loewenstein, G, Weber, EU, Hsee, CK and Welch, N, 2001. Risk as Feelings. *Psychological Bulletin,* 127**,** pp.2,672–86.

London, AJ, Borasky, DA., Jr. and Bhan, A, 2012. Improving ethical review of research involving incentives for health promotion. *PLoS Medicine,* 9**,** e1001193.

Mugavero, MJ, Lin, HY, Willig, JH, Westfall, AO, Ulett, KB, Routman, JS, Abroms, S, Raper, JL, Saag, MS and Allison, JJ, 2009. Missed visits and mortality among patients establishing initial outpatient HIV treatment. *Clinical Infectious Diseases: An Official Publication of the Infectious Diseases Society of America,* 48**,** pp.248–56.

Mwandi, Z, Murphy, A, Reed, J, Chesang, K, Njeuhmeli, E, Agot, K, Lllewellyn, E, Kirui, C, Serrem, K, Abuya, I, Loolpapit, M, Mbayaki, R, Kiriro, N, Cherutich, P, Muraguri, N, Motoku, J, Kioko, J, Knight, N and Bock, N, 2011. Voluntary medical male circumcision: translating research into the rapid expansion of services in Kenya, 2008–2011. *PLoS Medicine,* 8**,** e1001130.

Niza, C, Rudisill, C and Dolan, P, 2014. Vouchers versus lotteries: what works best in promoting Chlamydia screening? A cluster randomised controlled trial. *Applied Economic Perspectives and Policy,* 36**,** 109–124.

Njeuhmeli, E, Forsythe, S, Reed, J, Opuni, M, Bollinger, L, Heard, N, Castor, D, Stover, J, Farley, T, Menon, V and Hankins, C, 2011. Voluntary medical male circumcision: modeling the impact and cost of expanding male circumcision for HIV prevention in eastern and southern Africa. *PLoS Medicine,* 8**,** e1001132.

O'Donoghue, T and Rabin, M, 1999. Doing It Now or Later. *American Economic Review,* 89**,** pp.103–124.

Operario, D, Kuo, C, Sosa-Rubi, SG and Galarraga, O, 2013. Conditional economic incentives for reducing HIV risk behaviours: integration of psychology and behavioural economics. *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association,* 32**,** pp.932–40.

Schultz, TP, 2004. School subsidies for the poor: evaluating the Mexican Progresa Poverty Program. *Journal of Development Economics,* 74**,** pp.199–250.

Sgaier, SK, Reed, JB, Thomas, A and Njeuhmeli, E, 2014. Achieving the HIV prevention impact of voluntary medical male circumcision: lessons and challenges for managing programs. *PLoS Medicine,* 11**,** e1001641.

Starmer, C, 2008. Developments in non-expected utility theory: the hunt for a descriptive theory of choice under risk. *Journal of Economic Literature,* 38**,** pp.332–382.

Thirumurthy, H, Masters, SH, Rao, S, Bronson, MA, Lanham, M, Omanga, E, Evens, E and Agot, K, 2014. Effect of providing conditional economic compensation on uptake of voluntary medical male circumcision in Kenya: a randomised clinical trial. *JAMA,* 312**,** pp.703–11.

Thornton, R, 2008. The demand for, and impact of, learning HIV status. *American Economic Review,* 98**,** pp.1,829–1,863.

Volpp, KG, John, LK, Troxel, AB, Norton, L, Fassbender, J and Loewenstein, G, 2008a. Financial incentive-based approaches for weight loss: a randomised trial. *JAMA : the journal of the American Medical Association,* 300**,** pp.2,631–37.

Volpp, KG, Loewenstein, G, Troxel, AB, Doshi, J, Price, M, Laskin, M and Kimmel, SE, 2008b. A test of financial incentives to improve warfarin adherence. *BMC Health Services Research*, 8, p.272.

Volpp, KG, Troxel, AB, Pauly, MV, Glick, HA, Puig, A, Asch, DA, Galvin, R, Zhu, J, Wan, F, Deguzman, J, Corbett, E, Weiner, J and Audrain-McGovern, J, 2009. A randomized, controlled trial of financial incentives for smoking cessation. *N Engl J Med*, 360, pp.699–709.

Westercamp, N and Bailey, RC, 2007. Acceptability of male circumcision for prevention of HIV/AIDS in Sub-Saharan Africa: a review. *AIDS and behaviour,* 11**,** pp.341–55.

World Health Organization and Joint United Nations Programme on HIV/AIDS 2007. New data on male circumcision and HIV prevention: policy and programme implications. Geneva: World Health Organization.

Publications in the 3ie Impact Evaluation Report Series

The following reports are available from http://www.3ieimpact.org/evidence-hub/impact-evaluation-repository

Estimating the impact and cost-effectiveness of expanding access to secondary education in Ghana 3ie Impact Evaluation Report 42. Dupas, P, Duflo, E and Kremer, M, 2015

The impact of earned and windfall cash transfers on livelihoods and conservation in Sierra Leone, 3ie Impact Evaluation Report 46. Bulte, E, Conteh, B, Kontoleon, A, List, J, Mokuwa, E, Richards, P, Turley, T and Voors, M (2016)

Property tax experiment in Pakistan: Incentivising tax collection and improving performance, 3ie Impact Evaluation Report 45. Khan, A, Khwaja, A and Olken, B (2016)

Impact of mobile message reminders on tuberculosis treatment outcomes in Pakistan, 3ie Impact Evaluation Report 44. Mohammed, S, Glennerster, R and Khan, A (2016)

Making networks work for policy: Evidence from agricultural technology adoption in Malawi, 3ie Impact Evaluation Report 43. Beaman, L, BenYishay, A, Fatch, P, Magruder, J and Mobarak, AM (2016)

Evaluating the effectiveness of computers as tutors in China, 3ie Impact Evaluation Report 41. Mo, D, Bai, Y, Boswell, M and Rozelle, S (2016)

Effectiveness of a rural sanitation programme on diarrhoea, soil-transmitted helminth infection and malnutrition in India, 3ie Impact Evaluation Report 38. Clasen, T, Boisson, S, Routray, P, Torondel, B, Bell, M, Cumming, O, Ensink, J, Freeman, M and Jenkins, M (2016)

Evaluating the impact of vocational education vouchers on out-of-school youth in Kenya, 3ie Impact Evaluation Report 37. Hicks, JH, Kremer, M, Mbiti, I and Miguel, E (2016)

Improving maternal and child health in India: evaluating demand and supply strategies, 3ie Impact Evaluation Report 30. Mohanan, M, Miller, G, Forgia, GL, Shekhar, S and Singh, K (2016)

A triple win? The impact of Tanzania's Joint Forest Management programme on livelihoods, governance and forests, *3ie Impact Evaluation Report 34.* Persha, L and Meshack, C (2016)

Removing barriers to higher education in Chile: evaluation of peer effects and scholarships for test preparation 3ie Impact Evaluation Report 36. Banerjee, A, Duflo E and Gallego, F (2016)

Sustainability of impact: dimensions of decline and persistence in adopting a biofortified crop in Uganda 3ie Impact Evaluation Report 35. McNiven, S, Gilligan, DO and Hotz, C (2016)

Micro entrepreneurship support programme in Chile, 3ie Impact Evaluation Report 40. Martínez, CA, Puentes, EE and Ruiz-Tagle, JV (2016)

Thirty-five years later: evaluating the impacts of a child health and family planning programme in Bangladesh, 3ie Impact Evaluation Report 39. Barham, T, Kuhn, R, Menken, J and Razzaque, A (2016)

Can egovernance reduce capture of public programmes? Experimental evidence from India's employment guarantee, 3ie Impact Evaluation Report 31. Banerjee, A, Duflo, E, Imbert, C, Mathew, S and Pande, R (2015)

Smallholder access to weather securities in India: demand and impact on production decisions, 3ie Impact Evaluation Report 28. Ceballos, F, Manuel, I, Robles, M and Butler, A (2015)

What happens once the intervention ends? The medium-term impacts of a cash transfer programme in Malawi, 3ie Impact Evaluation Report 27. Baird, S, Chirwa, E, McIntosh, C, and Özler, B (2015)

Validation of hearing screening procedures in Ecuadorian schools, 3ie Impact Evaluation Report 26. Muñoz, K, White, K, Callow-Heusser, C and Ortiz, E (2015)

Assessing the impact of farmer field schools on fertilizer use in China, 3ie Impact Evaluation Report 25. Burger, N, Fu, M, Gu, K, Jia, X, Kumar, KB and Mingliang, G (2015)

The SASA! study: a cluster randomised trial to assess the impact of a violence and HIV prevention programme in Kampala, Uganda, 3ie Impact Evaluation Report 24. Watts, C, Devries, K, Kiss, L, Abramsky, T, Kyegombe, N and Michau, L (2014)

Enhancing food production and food security through improved inputs: an evaluation of Tanzania's National Agricultural Input Voucher Scheme with a focus on gender impacts, 3ie Impact Evaluation Report 23. Gine, X, Patel, S, Cuellar-Martinez, C, McCoy, S and Lauren, R (2015)

A wide angle view of learning: evaluation of the CCE and LEP programmes in Haryana, 3ie Impact Evaluation Report 22. Duflo, E, Berry, J, Mukerji, S and Shotland, M (2015)

Shelter from the storm: upgrading housing infrastructure in Latin American slums, *3ie Impact Evaluation Report 21*. Galiani, S, Gertler, P, Cooper, R, Martinez, S, Ross, A and Undurraga, R (2015)

Environmental and socioeconomic impacts of Mexico's payments for ecosystem services programme, *3ie Impact Evaluation Report 20*. Alix-Garcia, J, Aronson, G, Radeloff, V, Ramirez-Reyes, C, Shapiro, E, Sims, K and Yañez-Pagans, P (2015)

A randomised evaluation of the effects of an agricultural insurance programme on rural households' behaviour: evidence from China, 3ie Impact Evaluation Report 19. Cai, J, de Janvry, A and Sadoulet, E (2014)

Impact of malaria control and enhanced literacy instruction on educational outcomes among school children in Kenya: a multi-sectoral, prospective, randomised evaluation, 3ie Impact Evaluation Report 18. Brooker, S and Halliday, K (2015)

Assessing long-term impacts of conditional cash transfers on children and young adults in rural Nicaragua, *3ie Impact Evaluation Report 17*. Barham, T, Macours, K, Maluccio, JA, Regalia, F, Aguilera, V and Moncada, ME (2014)

The impact of mother literacy and participation programmes on child learning: evidence from a randomised evaluation in India, 3ie Impact Evaluation Report 16. Banerji, R, Berry, J and Shortland, M (2014)

A youth wage subsidy experiment for South Africa, 3ie Impact Evaluation Report 15. Levinsohn, J, Rankin, N, Roberts, G and Schöer, V (2014)

Providing collateral and improving product market access for smallholder farmers: a randomised evaluation of inventory credit in Sierra Leone, 3ie Impact Evaluation Report 14. Casaburi, L, Glennerster, R, Suri, T and Kamara, S (2014)

Scaling up male circumcision service provision: results from a randomised evaluation in Malawi, 3ie Impact Evaluation Report 13. Thornton, R, Chinkhumba, J, Godlonton, S and Pierotti, R (2014)

Targeting the poor: evidence from a field experiment in Indonesia, 3ie Impact Evaluation Report 12. Atlas, V, Banerjee, A, Hanna, R, Olken, B, Wai-poi, M and Purnamasari, R (2014)

An impact evaluation of information disclosure on elected representatives' performance: evidence from rural and urban India, 3ie Impact Evaluation Report 11. Banerjee, A, Duflo, E, Imbert, C, Pande, R, Walton, M and Mahapatra, B (2014)

Truth-telling by third-party audits and the response of polluting firms: Experimental evidence from India, 3ie Impact Evaluation Report 10. Duflo, E, Greenstone, M, Pande, R and Ryan, N (2013)

No margin, no mission? Evaluating the role of incentives in the distribution of public goods in Zambia, *3ie Impact Evaluation Report 9*. Ashraf, N, Bandiera, O and Jack, K (2013)

Paying for performance in China's battle against anaemia, *3ie Impact Evaluation Report 8*. Zhang, L, Rozelle, S and Shi, Y (2013)

Social and economic impacts of Tuungane: final report on the effects of a community-driven reconstruction programme in the Democratic Republic of Congo, *3ie Impact Evaluation Report 7*. Humphreys, M, Sanchez de la Sierra, R and van der Windt, P (2013)

The impact of daycare on maternal labour supply and child development in Mexico, *3ie Impact Evaluation Report 6*. Angeles, G, Gadsden, P, Galiani, S, Gertler, P, Herrera, A, Kariger, P and Seira, E (2014)

Impact evaluation of the non-contributory social pension programme 70 y más in Mexico, *3ie Impact Evaluation Report 5.* Rodríguez, A, Espinoza, B, Tamayo, K, Pereda, P, Góngora, V, Tagliaferro, G and Solís, M (2014)

Does marginal cost pricing of electricity affect groundwater pumping behaviour of farmers? Evidence from India, 3ie Impact Evaluation Report 4. Meenakshi, JV, Banerji, A, Mukherji, A and Gupta, A (2013)

The GoBifo project evaluation report: Assessing the impacts of community-driven development in Sierra Leone, *3ie Impact Evaluation Report 3*. Casey, K, Glennerster, R and Miguel, E (2013)

A rapid assessment randomised-controlled trial of improved cookstoves in rural Ghana, *3ie Impact Evaluation Report 2*. Burwen, J and Levine, DI (2012)

The promise of preschool in Africa: A randomised impact evaluation of early childhood development in rural Mozambique, *3ie Impact Evaluation Report 1*. Martinez, S, Naudeau, S and Pereira, V (2012)

Low uptake of male circumcision remains a major challenge to scaling up voluntary medical male circumcision (VMMC) services and maximising its impact on HIV prevention in eastern and southern Africa. Building on insights from behavioural economics, this study evaluates whether providing compensation for opportunity costs of time and clinic transport costs or lottery-based rewards can increase VMMC uptake among men in Nyanza Province, Kenya. Results show that participants randomised to receive compensation had the highest VMMC uptake, followed by those receiving lottery-based rewards and those in the control group. The results are consistent with studies showing that small incentives can modify health behaviours. Testing economic interventions in other settings and applying them to other HIV behaviours can be useful for assessing the generalisability of the findings.

Impact Evaluation Series

International Initiative for Impact Evaluation
202-203, Rectangle One
D-4, Saket District Centre
New Delhi – 110017
India

3ie@3ieimpact.org
Tel: +91 11 4989 4444

www.3ieimpact.org

BILL & MELINDA GATES foundation