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The use of peer referral incentives to increase demand for voluntary medical male circumcision in Zambia

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Summary

Background

Medical male circumcision is a promising HIV prevention tool in countries with generalised HIV epidemics, but demand-creation interventions are needed as circumcision services are scaled up. We piloted an intervention in which circumcision clients were offered incentives for referring their peers for circumcision.

Methods

The intervention was implemented between June 2014 and February 2015 in six randomly selected health facilities in Southern Province, Zambia. For the first five months, circumcision clients at least 18 years of age were given referral vouchers that allowed them to refer up to five peers for circumcision over a three-month period. An incentive of US$2 was offered for each referral. The primary outcome was the number of circumcisions performed per month in each facility. To assess the effect of the intervention, a difference-in-difference analysis was performed using longitudinal data from the six intervention facilities and 22 non-intervention facilities. A questionnaire was also implemented to understand men's perceptions of the intervention.

Results

During the eight-month intervention period, 1,222 men 18 years of age and older were circumcised in intervention facilities. In the first five months, 699 circumcision clients were enrolled and 385 clients brought referral vouchers given to them by an enrolled client. Difference-in-difference analyses did not show a significant increase in circumcisions performed in intervention facilities. However, circumcision clients reported that the referral incentive motivated them to encourage their friends to seek male circumcision. Peer referrals were also reported to be an important factor in men's decisions, as 78 per cent of clients who were referred reported that talking with a circumcised friend had been important for their decision to get circumcised.

Conclusions

The peer referral incentive intervention for male circumcision was feasible and acceptable. However, the intervention did not have a significant effect on demand for male circumcision. Barriers to circumcision as well as features of the intervention may have limited the effect of the intervention. Further efforts to encourage male-to-male communication regarding and evaluations with larger sample sizes are needed.

Keywords

Male circumcision, demand creation, peer referrals, economic incentives

Contents

List of figures and tables

Appendix tables

Abbreviations and acronyms

CHW	Community health worker
CIDRZ	Centre for Infectious Disease Research in Zambia
DID	Difference-in-difference
IQR	Interquartile range
SFH	Society for Family Health
VMMC	Voluntary male medical circumcision

1. Introduction

Medical male circumcision has been shown to reduce men's risk of acquiring HIV by up to 60 per cent (Gray *et al.* 2007; Auvert *et al.* 2005; Bailey *et al.* 2007) and subsequently has been recognised as an essential tool for HIV prevention in high-prevalence countries (World Health Organization and Joint United Nations Programme on HIV/AIDS 2007).

In Zambia, male circumcision has been among the main pillars of the country's HIV prevention strategy, and a major scale-up of voluntary medical male circumcision (VMMC) services has occurred in the past five years. Between 2007 and 2014, more than 800,000 circumcisions were performed, with the vast majority of these occurring in 2013 and 2014. However, the prevalence of male circumcision remains low despite the recent scale-up (Central Statistical Office 2009). As in several other countries in eastern and southern Africa, novel demand-creation interventions are needed in order to achieve sizable increases in circumcision prevalence; several recent reviews have identified this as a priority for implementation science research (Sgaier *et al.* 2014).

Until now, only a few studies have assessed the impact of specific interventions to increase demand for male circumcision. One study in Malawi showed that there were modest increases in demand as the price of circumcision was lowered (Chinkhumba, Godlonton & Thornton 2014), while another in Kenya showed slightly larger effects on demand as a result of providing direct economic compensation to male circumcision clients for transportation costs and lost wages (Thirumurthy *et al.* 2014). Other large-scale demand-creation strategies such as billboards and promotion through mass media, as well as promotion by political and community leaders, have been essential and necessary parts of the rollout of VMMC, but their effects on demand have been much more difficult to evaluate.

Interpersonal communication interventions based on dialogue between community mobilisers or community health workers (CHWs) and potential clients, as well as the use of media, often play an important role in many VMMC demand-creation efforts (Bertrand *et al.* 2011). Such strategies are essential for demand creation and can serve as catalysts to action, but additional interventions are generally necessary to address the various barriers to male circumcision that have been documented in the literature (Hatzold *et al.* 2014; Westercamp & Bailey 2007).

Given the influence that one's peers may have on health behaviours, strategies that specifically encourage circumcision clients to discuss their experiences among their peers have the potential to be effective in increasing male circumcision uptake but have not been piloted and evaluated. Men who have undergone circumcision may be more effective in promoting uptake among individuals in their social networks than CHWs or others who are less strongly connected (Herman-Roloff *et al.* 2011; Muhangi 2010).

In the field of marketing, 'viral marketing' is a term that describes the use of existing social networks to raise awareness of products and services and thereby fulfil marketing objectives such as increased product sales (De Bruyn & Lilien 2008). In

Malawi, peer effects have also been shown to influence decisions to get tested for HIV (Godlonton & Thornton 2012). Understanding ways to promote male circumcision by further leveraging peer effects within social networks can thus be useful for demand-creation efforts in Zambia and other countries seeking to scale-up VMMC.

This study reports results from an intervention in Zambia that provided small financial incentives to circumcision clients who successfully referred their peers to also seek circumcision.

2. Intervention and theory of change

2.1 Intervention overview

We implemented a peer referral incentive program to increase VMMC uptake in Southern Province, Zambia, where the Centre for Infectious Disease Research in Zambia (CIDRZ) has provided VMMC services since June 2013. The intervention allowed men coming for circumcision in randomly selected intervention clinics to refer up to five uncircumcised men in their social networks and receive a monetary reward of 10 kwacha (approximately US$2) for each referred man who underwent circumcision. Men who came for circumcision received five referral vouchers that they could then provide to uncircumcised men who might be interested in undergoing VMMC. The uncircumcised men who came to the CIDRZ VMMC clinics and underwent the procedure could present the referral voucher to clinic staff, who retained the voucher until the referring person came to collect his referral payment.

2.2 Rationale and theory of change

The intervention was design to build upon existing models of demand creation that CIDRZ and other VMMC implementing organisations have used. The peer referral incentive programme had several advantages over some common demand-creation strategies, such as traditional interpersonal communication interventions, which are based on one-to-one dialogue between mobilisers or CHWs and potential clients or on the use of small media (such as brochures).

While interpersonal communication is essential for demand creation for VMMC and can serve as a catalyst to action (Bertrand *et al.* 2011), the peer referral incentive may enable a greater number of *potential* VMMC clients to receive messages about the benefits of circumcision. This could happen because such clients may be difficult for CHWs to reach, particularly if the venues and times when this can be done are inconvenient and unknown to CHWs. The peer referral incentive may also be a more effective catalyst to action than interpersonal communication that is led by CHWs or mobilisers. Men who have undergone circumcision may be more effective at promoting uptake in their social network than CHWs or others who are less well-known.

Thus, the peer referral incentive encourages circumcised men to take on the role of a CHW or mobiliser, who is typically tasked with promoting VMMC. It may incentivise these men to advocate for the VMMC procedure within their social networks to a greater extent than they might otherwise do, and it takes advantage of the fact that the men are likely to have more influence in this network than CHWs or mobilisers. At the

same time, in order for the incentive to be effective, it would need to be the case that other barriers to circumcision – such as transport costs to get to the clinic, sufficient awareness of the existence of male circumcision services and cultural acceptance of male circumcision – are not so large as to limit the effect the of the incentive.

Peer effects have been found to be a significant determinant of men's decisions to get circumcised. Social networks can serve as a resource to programmes that are interested in promoting healthy behaviour. In the field of marketing, 'viral marketing' describes the use of existing social networks to raise awareness of products and services and thereby fulfil marketing objectives such as increased product sales. Such a process of interpersonal diffusion often relies on individuals using word of mouth or technology (such as mobile phones) to influence those in their social networks. Engaging these social networks to encourage preventive health behaviours – such as the uptake of HPV vaccinations, breast cancer screening (Southwell *et al.* 2010a), or VMMC services – offers a supplement to conventional mass media campaigns or outreach by CHWs. Social networks and peer effects are often mentioned as a facilitator for men's decision to seek VMMC (Herman-Roloff *et al.* 2011), particularly among younger men (Muhangi 2010). In Malawi, peer effects have also been shown to influence decisions to get tested for HIV (Godlonton & Thornton 2012). Leveraging peer effects and social networks to promote VMMC uptake is thus a promising way to increase circumcision prevalence.

Economic incentives may strengthen the ability of peer referrals, or viral marketing, to encourage VMMC uptake among otherwise unreached segments of the population. While distinct from the peer referral incentives intervention, recent empirical evidence indicates that positive incentives can bring about changes in various behaviours, including the use of preventive technologies, addictive substances and children's school attendance (Volpp *et al.* 2009; Lussier *et al.* 2006; Banerjee *et al.* 2010). These studies are relevant because they suggest that economic incentives for a specific behaviour can be effective, thereby suggesting that incentives for peer referral can promote greater discussion about VMMC among male circumcision clients. However, to date there have been no studies that have examined whether incentives for peer referrals can result in behaviour changes for increased uptake of health services such as VMMC. One study on uptake of breast cancer screening in the United States found that offering women incentives to nominate other women who could be contacted resulted in an increase in the number of nominees but not in the number of scheduled mammograms (Southwell *et al.* 2012).

2.3 Intervention details

Between June 2014 and January 2015, we recruited all men older than 18 years presenting for the circumcision procedure in the intervention facilities. Men younger than 18 years were excluded because of ethical concerns. After learning about the study and enrolling, the men received vouchers from study staff in an area of the clinic where men normally go to rest immediately after the procedure. Each man received five vouchers and entered his name in the referral log for the study. Tickets were numbered to allow tracking of referrals. Participants received 10 kwacha (around

US$2) for each person from the catchment area they referred to VMMC at the health facility during the intervention period. The maximum that each referring person could earn was 50 kwacha for referring five men.

Each ticket was valid for three months from the day of circumcision to allow participants to fully heal before referring. The study period was divided into an active intervention phase of five months (four months in one facility that started late[1]) and a passive intervention phase of three months. During the active intervention, referral tickets were given to all participants, even if they were referrals, and all referrals were recorded and payments disbursed. During the passive intervention, no new tickets were given out but referrals were still recorded and linked and payment was disbursed.

At each intervention clinic, a register was used to keep track of the numbers from the vouchers that were dispensed or presented. For each man who underwent circumcision at the clinic, the register contained a record of the name of the man, the date of the circumcision and the identification number on the five peer referral vouchers that were given to the man (the number was the same on all five vouchers in order to easily link them to the man, and the man was given a card containing the identification number in order to claim payment later on). Afterwards, each time a man successfully underwent circumcision and presented one of the referral vouchers, the register recorded the date the voucher was presented and the name of the man who presented it. Men who referred others for circumcision were able to claim their incentive payment by presenting the card that contained their unique identification number. The research assistants at each intervention clinic who maintained the register were responsible for disbursing the incentive payments.

2.1.1 Selection of the incentive amount

After consulting with several CIDRZ staff members and community members, the amount per referral of 10 kwacha was established. The amount can also be justified on the basis of the payments that CIDRZ normally makes to mobilisers, which is 500 kwacha (US$100) per month. Mobilisers typically work full time, and in CIDRZ they contribute approximately 50 circumcisions per month,[2] which amounts to approximately 10 kwacha per person referred (500/50). We hypothesise that individual VMMC clients will face fewer barriers and have to make less effort when contacting others in their own social networks. We also consider 10 kwacha as a reasonable reimbursement for transportation costs incurred in visiting friends and possibly in finding the right circumstance to talk with friends (this may imply buying the friend a drink, for example) or communicating with them by phone and text message.

2.1.2 Post-study questionnaire

The main study did not collect any personal information other than what was needed to match referral vouchers with the referring person. However, participants who sought

[1] The active intervention started on 1 August 2014 in Railway Clinic and ended in the end of February 2015.

[2] This figure is from the Community Programme at CIDRZ.

VMMC at least three months before the end of the study period were re-contacted in a telephone questionnaire to better understand the referral process and respondents' general knowledge of VMMC. The questionnaire asked about demographic and socio-economic information, knowledge of VMMC and sexual behaviour, reasons behind the decision to get circumcised, and experience with referrals.

3. Larger context and sample context

3.1 Study setting, intervention design and implementation

The Zambian government has made VMMC promotion one of the main pillars of its HIV prevention strategy and is leading efforts in a major scale-up of VMMC services. VMMC numbers have increased significantly, reaching 854,257 VMMCs from 2007 through September 2014, almost 600,000 of which were in the past two years.

Southern Province is a traditionally non-circumcising region of Zambia, with HIV prevalence of 14.5 per cent (DHS 2007). The study took place in the districts of Choma, Pemba, Kalomo, Sinazongwe and Mazabuka. In 2014, Southern Province accounted for 14 per cent of total VMMCs of Zambia, but the baseline prevalence of VMMC was very low, at 4.4 per cent (DHS 2007), with one of the lowest prevalence rates being in Sinazongwe, where a recent study found a VMMC prevalence of 1 per cent. CIDRZ, the Society for Family Health (SFH) and Jhpiego were the three main partners supporting the governmental VMMC effort in Southern Province in 2013 and 2014. Despite the partners' efforts and the government involvement, knowledge and demand for VMMC have remained lower than targets.

The study took place between June 2014 and January 2015 in six randomly selected, CIDRZ-supported clinics that offered VMMC services in Southern Province. Two of the clinics had been active for a long time, three had started providing VMMC on a regular basis in June 2013, and one had only started in June 2014. The peer referral incentive intervention was integrated into CIDRZ's existing VMMC programme.

After consulting with the provincial medical officer and district medical officers, the peer referral incentive programme was developed and presented to the Male Circumcision Technical Working Group. The discussions with the government stakeholders provided an opportunity to place the intervention into the larger national discussion on VMMC demand creation and obtain feedback on the design of the intervention.

Clinics were assigned to CIDRZ by provincial and district officers based on their assessment of where supply needed to be expanded and on the absence of other VMMC implementing partners working in those clinics.

4. Linking programme implementation and impact evaluation timelines

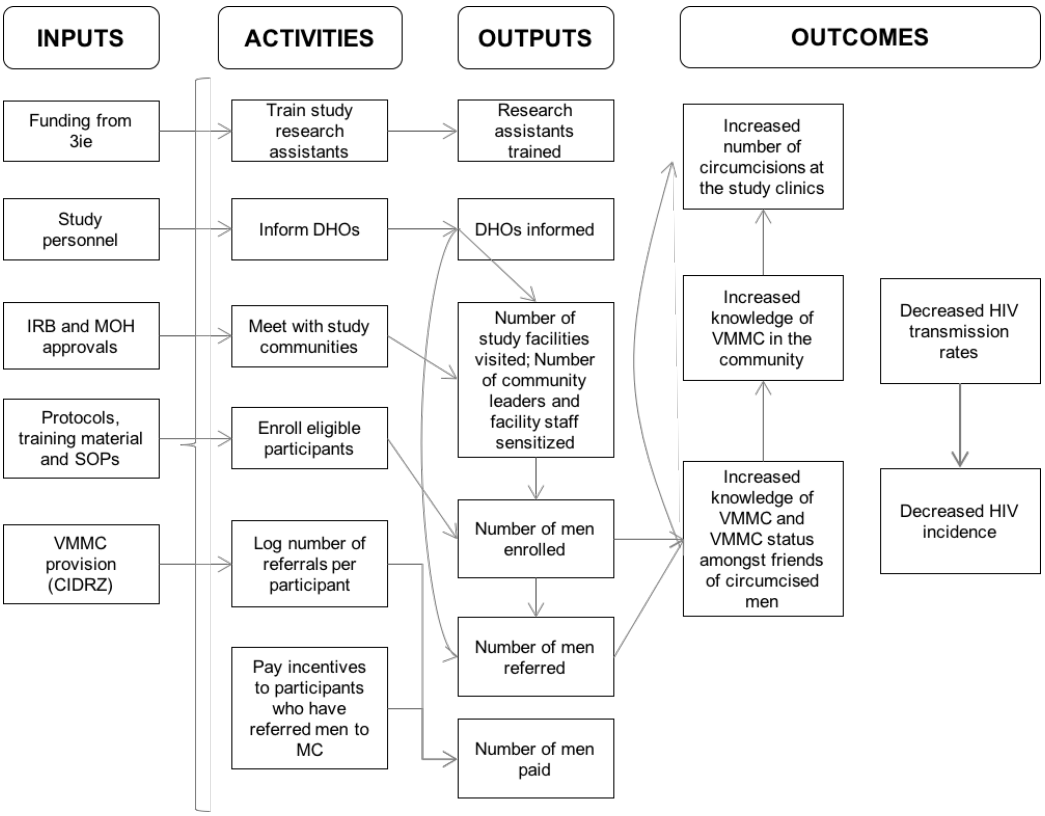
The underlying programme is the provision of male circumcision in the supported clinics, which, for CIDRZ-supported clinics, started about a year before the study and is ongoing. The specific programme being evaluated is the provision of referral tickets and indirect incentives for receiving male circumcision. The first two months were

dedicated to building support for the programme and getting feedback from ministry counterparts and technical working groups and obtaining institutional review board and Ministry of Health approval for the impact evaluation. The programme started in June 2014 and had five months of active intervention, plus three months of passive intervention. Impact evaluation started in parallel with programme implementation; as clients came for circumcision, their referral logs were created and the number of men referred was recorded. Personnel for implementation were also in charge of recording and keeping key data for impact evaluation.

5. Process evaluation (implementation assessment)

Key programmatic activities and output indicators are shown in figure 1.

Figure 1: Study logic model



Five research assistants were trained in the Collaborative Institutional Training Initiative's Responsible Conduct of Research programme in study procedures and methods and in monitoring number of male circumcisions, referrals and keeping the logs. District health officers from Mazabuka, Monze, Choma, Kalomo, Sinazongwe and Pemba were also informed. In May 2014 all of the intervention facilities, as well as all of the control facilities, were visited to sensitise key community leaders in VMMC (in all experimental facilities) and in the study (intervention facilities only). All involved male circumcision providers, both the ones hired by CIDRZ and the ones hired by the Ministry of Health, were aware of the study.

By the end of the study, 699 participants were enrolled. Of these, 379 men seeking VMMC during the intervention were referred by another participant; 347 referrals were paid.

While it was feasible to implement the peer referral incentive intervention and many clients did refer their peers for male circumcision, the number of referrals alone does not imply that the incentive increased the number of circumcisions. It is entirely possible that circumcision clients would have talked to their peers even in the absence of the intervention and that some of those peers would have sought circumcision. As a result, comparing male circumcision uptake in areas without the intervention is vital for determining the impact of the intervention.

6. Methodology: evaluation design and implementation

The design follows a non-randomised control-intervention design that compares the monthly number of circumcisions in each facility both before and during the intervention, using intervention and control facilities.

The intervention was implemented at six CIDRZ-supported facilities in Southern Province where VMMC services were available on at least one day each week. Control facilities include facilities with regular circumcision service, supported either by SFH, the main implementing partner for VMMC in the province, or by CIDRZ. The six intervention facilities were randomly selected from the 12 facilities supported by CIDRZ during the study period.[3] The unit of our data is monthly circumcisions in each facility. We retrieved data as far back in time as possible. For seven of 28 facilities (two in the intervention and five in the control), data could be retrieved from January 2013, but most of the facilities had data from June 2013. Many facilities had just started during 2013, and two facilities had started providing service only in 2014.

The programme was originally set up as a randomised trial with only CIDRZ-supported facilities. However, the minimum enrolment of facilities necessary for our power calculations could not be achieved because two facilities had to be dropped due to disruption of services, and at least two other facilities that were supposed to start support for circumcision were not ready. As a result, we moved away from the experimental design, treated the evaluation as a quasi-experimental design and estimated a difference-in-difference (DID) model. To this end, we expanded the number of control facilities to include all facilities supported by SFH and CIDRZ, for a total of 22 non-intervention facilities and six intervention facilities. Non-time invariant differences between CIDRZ and SFH are eliminated by the DID methodology, which compares trends rather than levels. Time-dependent factors that are common in both treatment and control facilities are also eliminated by the DID methodology. Our outcome is the monthly number of male circumcisions in each facility, expressed as a linear function of facility fixed effects, time dummies and interaction for facilities in the

[3] One facility in the intervention and one in the control had to be dropped shortly after enrolment because of disruption of VMMC service.

treatment group during the intervention period. For each facility *i* in month *t*, the monthly number of circumcision can be expressed as

$$y_{it} = \alpha + \sum_{it} \phi_{it} D_{it} + \sum_{t} \gamma_t D_t + \sum_{j} \beta_j X_{ijt} + \sum_{i} c_i D_i + \epsilon_{it}$$

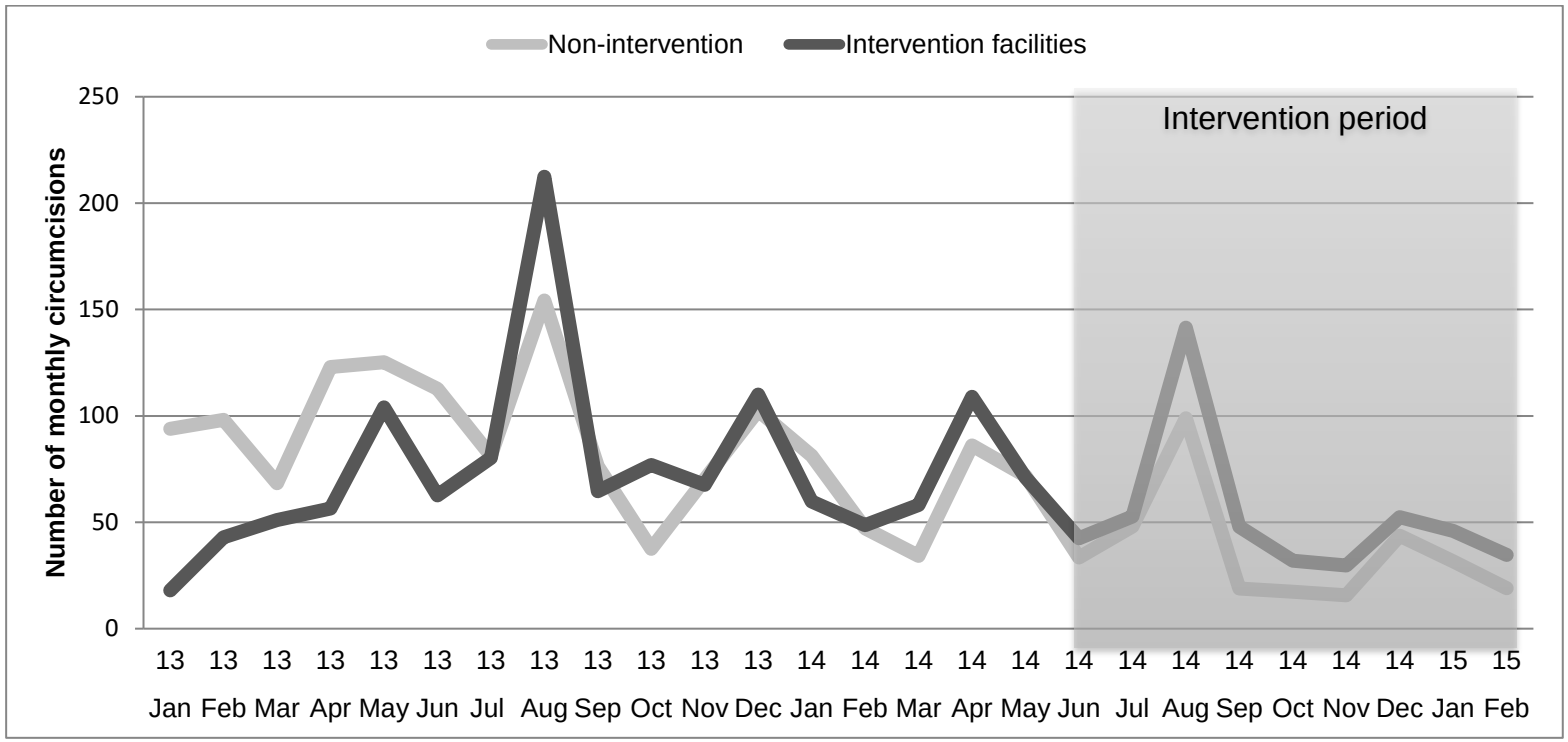
where D_it is the interaction dummy for treatment facilities in the intervention period, $\sum_t \gamma_t D_t$ is a series of time dummies, $\sum_j \beta_j X_{ijt}$ are the *j* time-varying variables for each facility and $\sum_i c_i D_i$ is the facility fixed effects. Hence, treatment is coded 1 for intervention facilities and 0 for non-intervention facilities, even for pre-intervention months (time-invariant). Post is coded as 1 for all months between June 2014 and January 2015 and 0 for all months from January 2013 to May 2014. The interaction variable, which under the DID assumptions identify the impact of the intervention, is a binary variable taking the value of 1 when both the post variable and the treatment variable are switched on. For both CIDRZ and SFH facilities, data were collected from clinical forms and then aggregated into a programmatic dataset.

7. Impact analysis and results of the key evaluation questions

During the intervention (June 2014 to January 2015), the 6 intervention facilities circumcised 2,361 men, of which 997 were at least 18 years old. Forty-seven per cent of men were circumcised during one of the campaign months, which happen three times a year in December, April and August and are characterised by intensified VMMC efforts. There was also a seasonal pattern, with higher demand during dry-season months (April to October) and lower demand in the rainy-season months (November to March). Of the 997 men who were circumcised during the intervention, 746 were circumcised during the active intervention period, when men could be enrolled to receive referral tickets; 699 enrolled and joined the study. During the intervention, 54 per cent of men enrolled (379 men) came with a referral ticket from another study participant.

Figure 2 plots the number of circumcisions in each of the intervention facilities against the average number of circumcisions in the CIDRZ- or SFH-supported facilities in Southern Province from January 2013 to January 2015. Overall, there was an average of 71 circumcisions per month. The peaks represent the campaign months and the seasonal variation is visible. In addition, the graph shows a general slightly negative trend in male circumcision in the past two years. The graph does not seem to suggest any dramatic change in trend during the intervention period. Facilities did not appear to have any systematic difference by treatment group.

Figure 2: Comparison of monthly male circumcisions



Note: The graph represents the average number of circumcisions per month in intervention facilities (darker line) and non-intervention facilities (lighter line) between January 2013 and February 2015. The shaded area represents the intervention period.

Table 1 displays the results of the DID analysis. Model 1 is a basic DID with a binary variable for observations in an intervention facility during an intervention month, which, under DID assumptions, captures the impact of the programme; a binary variable for observations in the intervention period, which controls for common time trends; and a binary variable for the intervention facilities, which controls for time-invariant intervention group characteristics. Model 2 allows for full non-linearities by including facility fixed effects rather than one common intervention variable; it also includes year-month binary variables. Model 3 retains facilities dummies but includes binary variables for observations during campaign months and during the rainy season, rather than complete month-year dummies. In order to account for the problem of within-cluster correlation across multiple time periods present in DID models (Bertrand, Duflo & Mullainathan 2002), we used the bootstrap correction proposed by Cameron, Gelbach and Miller (2008), which is specifically designed for a small number of clusters. The coefficient for the interaction is similar across models: in model 2 it suggests that the intervention was associated with 10 additional monthly male circumcisions (a 14 per cent increase), although the standard errors are large so we cannot establish statistical significance.

Table 1: Impact of peer referral incentive on monthly VMMCs using DID

	Model 1	Model 2	Model 3
Impact of peer referral intervention	**9.11**	**10.27**	**11.14**
	[-18.59; 40.21]	[-13.24; 31.71]	[-16.28; 36.56]
Pre- or post-intervention period			
June 2014-January 2015 (intervention period)	-32.56		-20.59
	[-53.94; -11.38]		[-40.57; 0.65]
January 2013-May 2014 (pre-intervention period)	Reference		Reference
Peer referral programme facility			
Intervention facility	-3.79		
	[-39.80; 37.41]		
Non-intervention facility	Reference		
Campaign months			
Campaign month (August, December, April)			47.69
			[30.47; 63.86]
Not campaign month			Reference
Rainy season months			
Rainy season month (November to March)			-19.60
			[-31.73; -9.22]
Dry season month			Reference
Included monthly binary variables (coefficients omitted)	NO	YES	NO
Included binary variables for facilities (coefficients omitted)	NO	YES	YES
N	474	474	474

Note: Ninety-five per cent confidence intervals using the wild bootstrap procedure for clustered errors described in Cameron, Gelbach & Miller (2008) in brackets.

In appendix A we analyse data from the experimental sample facilities (original intervention and control) and report the results in tables A-1 and A-2. Table A-1 shows the balance across intervention and control facilities for the experimental sample. Since the sample was smaller than planned, we include baseline variables to adjust for baseline imbalance, using the richer data available for that sample. As in the main model, the null hypothesis of no effect cannot be rejected with statistical significance.

7.1 Behind the numbers: results from the questionnaire

We administered a phone questionnaire to all participants whose circumcision happened before the end of the active intervention period. Of a total 699 enrolments, 593 were eligible to be called because they were circumcised before November 2014. Of these, 290 participants had a phone number and were successfully reached.

Table 2 presents baseline characteristics. All respondents had undergone circumcision during the study period and received the five referral tickets. Those who were referred for circumcision appeared similar to those who came without a referral ticket. They had an average age of 24.7 years (median 22, interquartile range [IQR] 20–28) and an education profile higher than average for rural areas, with 14.5 per cent having completed at most primary school, 47 per cent having completed grade 9 and 38.5 per cent having completed upper secondary school or at least some college. In addition, 41.5 per cent of respondents were married. Most of the respondents lived close to the health facility, at an average of 21.7 minutes away [median 20, IQR 10–30 minutes] and did not have to pay to get to the clinic, at an average of 6.8 kwacha [median 0, IQR 0–10 kwacha]. Circumcision status is kept private: only 51 per cent knew the circumcision status of most of their close friends and, of those who did, 30 per cent responded that most of their friends were circumcised.

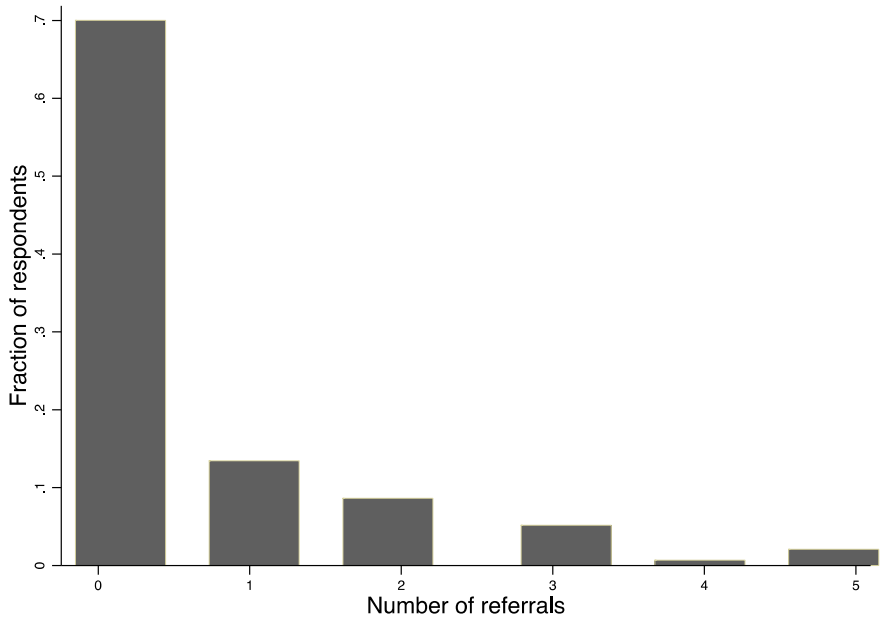
Table 2: Respondents' characteristics

	Came as referral	Did not come as referral	Full sample	P-value
	(N=88)	(N=201)	(N=289)	
Descriptive Characteristics				
Age	24.4 (7.9)	25.2 (7.9)	24.9 (7.9)	*0.38*
Education level				
Primary school or less (%)	12.5	15.4	14.5	
Junior completed (grades 7-9) (%)	46.6	47.3	47	
Secondary or higher (%)	40.9	37.3	38.4	*0.47*
Married, %	39.8	42.3	41.5	*0.69*
Distance to nearest paved road (in minutes)	31.1 (47.5)	24.3 (24.8)	26.4 (33.5)	*0.30*
Distance to nearest health facility (in minutes)	22.7 (13.3)	21.2 (12.9)	21.7 (13)	*0.37*
Cost of travel to health facility (in kwacha)	8.1 (10.7)	6.3 (9.04)	6.8 (9.6)	*0.14*
Sexual behaviours and beliefs				
Self-perceived low or no risk of HIV (vs. high or moderate/average)	79.5%	77.5%	77.8%	*0.63*
Number of HIV tests	2.1 (1.6)	2.4 (2.2)	2.3 (2)	*0.35*
Age at first sex	17.2 (2.7)	17.6 (2.4)	17.5 (2.5)	*0.30*
No. partners in year prior to circumcision	2.1 (1.4)	2.1 (2)	2.1 (1.8)	*0.77*
No. partners since circumcision	1.2 (1)	1.1 (0.6)	1.1 (0.8)	*0.22*
How often used condom since circumcision				
Every time	36.4%	45.2%	42.6%	
Most of the time	27.2%	21.8%	23.5%	
Rarely or never	36.4%	32.9%	33.9%	*0.29*
Reason for circumcision				
Circumcised to reduce chances of getting HIV or other sexually transmitted infection	72.7%	73.6%	73.4%	*0.87*
Referrals				
Number of men that participant has attempted to refer	4.5 (2.2)	5.1 (3.3)	4.9 (3.0)	*0.09*
Number of men that participant has succeeded to refer	0.94 (1.3)	0.8 (1.6)	0.85 (1.6)	*0.24*
Circumcision in group of friends				
I know the circumcision status of most of my friends	58%	45%	51%	*0.08*
Most of my close friends are circumcised	27%	33%	30%	*0.53*
Talking with referring person was important for my decision				
Very important	78.4%	NA	78.4%	
Somewhat important	21.6%	NA	21.6%	
Not important	0.0%	NA	0.0%	*NA*
Referral encouraged me to refer friends?				
Yes, payment motivated a lot	69.8%	64.80%	66.3%	
Payment did not motivate me or only somewhat, the amount was too low	16.3%	19.9%	18.8%	
Payment did not motivate me or only somewhat, reluctant to discuss male circumcision with friends	9.3%	13.3%	12.1%	
Payment did not motivate me or only somewhat, payment on such things is unethical	2.3%	0.5%	1.1%	
Payment did not motivate me or only somewhat; other reasons	2.3%	1.5%	1.7%	*0.49*

Note: Standard deviations in parenthesis. Participants who came as referrals had sought circumcision bringing a referral ticket from another study participant. Wilcoxon rank-sum test was used to test equality of distribution for discrete variables. Chi-square test was used to test equality of binary variables. T-test was used for continuous variables.

As table 2 indicates, 88 questionnaire respondents had been referred by other study participants. On average, each respondent referred 0.85 other participants. Figure 3 shows the distribution of referrals by each questionnaire respondent.

Figure 3: Number of referrals made by respondents



One of the possible explanations for the lack of increase in demand could be that those who were referred were already planning on getting circumcised. However, amongst those who came as referrals through the study, 78 per cent declared that talking with the person who referred them was ‘very important’ for their decision to get circumcised. Another possible explanation is that the referral tickets simply unveiled the existing network of referrals without changing the behaviour. When asked whether the 10 kwacha reward motivated them to refer people for circumcision, 66.3 per cent of participants said that it motivated them a lot, versus only somewhat or not at all. 18 per cent reported that the incentive did not motivate them enough because the amount was too low and another 12 per cent reported that it did not motivate them because they were reluctant to discuss male circumcision with their friends.

To triangulate these results, we tabulated the number of attempted and completed referrals by self-reported motivation. Those who reported that the 10 kwacha motivated them a lot attempted the same number of referrals as those who reported that the referral did not motivate them a lot, but completed on average 0.32 additional referrals and were almost twice as likely to complete at least one referral (table 3).

Table 3: Referral process

	Study Group			
	Referral motivated me a lot	**Referral motivated me somewhat or none**	**Full Sample**	
	(N=188)	(N=102)	(N=290)	P-value
Attempted referrals (median)	4.76	5.23	4.92	0.21
Completed referrals	0.64	0.96	0.85	0.10
Made at least one referral	0.25	0.45	0.38	0.01

Note: P-values are calculated using chi-square tests.

8. Discussion of results

The peer referral incentives system for male circumcision appeared to be feasible. The large majority of referred men declared that talking with the person who referred them had been very important for their decision to get circumcised, and most participants declared that the referral incentive motivated them to refer more men. However, in our setting and with the chosen referral amount, the incentive did not appear to be enough to significantly boost demand for male circumcision. Our setting had high barriers to circumcision because of the rural area, non-traditionally circumcising tribe, low baseline prevalence and relatively new male circumcision provision. Supply problems and small sample size may have contributed to this result: one facility was dropped because it stopped providing male circumcision, one facility had baseline demand close to null and funding interruptions for provision of male circumcision hampered the supply in both intervention and control facilities during the study period.

To our knowledge, this study is one of the first to use peer referral incentives to promote HIV-related health behaviours in Sub-Saharan Africa. In other settings, such interventions have been attempted with some success. For example, an intervention in the United States that encouraged women to refer their peers for breast cancer screening did generate referrals, although the effect of incentivising referrals was not found to be statistically significant (Southwell *et al.* 2012; Southwell *et al.* 2010b). Such interventions have also been commonly used in the private sector as part of viral marketing campaigns (De Bruyn & Lilien 2008). Using peer referral incentives offers several advantages over traditional demand-creation approaches that rely on hiring and motivating mobilisers to generate demand. By encouraging each circumcision client to become an advocate for circumcision in their social networks, uncircumcised men who are contemplating circumcision may become more likely to seek VMMC.

While the results from this pilot study did not suggest that there were large effects on demand, certain features of the intervention, as well as the setting in which it was implemented, may have contributed to the small effect. One reason for the apparent lack of an effect may be that the amount of the incentive was too small to sufficiently

motivate clients to overcome social and cultural barriers to openly discussing male circumcision with their peers and subsequently encouraging friends to seek VMMC.

9. Cost analysis of intervention

The cost and cost-effectiveness of the intervention was assessed over a 12-month period. Since the implementation occurred over an eight-month period in each facility, the monthly intervention cost was used to calculate the 12-month costs. Key cost categories were as follows:

Incentives for referrals (3,850 kwacha): Referred clients brought 385 referral tickets. Each ticket entitled the referring person to 10 kwacha. This led to a total cost of 3,850 kwacha.

Research assistants, implementation officer and administrative assistant time (80,064 kwacha):

- Research assistants' roles were almost exclusively to manage the project: explain the referral system to clients, distribute five vouchers per client, record clients' information in the log book and disburse and keep track of vouchers as clients came in with referral tickets. Each research assistant received a salary of 5,143 kwacha, inclusive of fringe, and dedicated 100 per cent time to the project. We had four research assistants, which for the four months of implementation amounts to 41,144 kwacha.
- An implementation officer spent approximately 50 per cent of his time on implementation-related duties (rather than on study/research). This mainly involved liaising with the research assistants, coordinating procurement and expenses, traveling, monitoring visits and solving day-to-day issues. His salary, inclusive of fringe, was 6,950 kwacha, which for eight months at 50 per cent time amounts to a total cost of 27,800.
- An administrative assistant spent around 20 per cent time on tasks related to implementation. This mainly consisted in double-checking correctness of expenses and receipts and requesting money for expenses and incentives disbursements and sending it to the relevant locations. The administrative assistant salary, inclusive of fringe, was 6,950, which at 20 per cent effort for eight months amounts to 11,120 kwacha.

Monitoring visits cost (24,000 kwacha): The implementation officer visited the research assistants every month to guarantee quality and to check that implementation and recording of the voucher system was done correctly. Each visit included multiple days, typically four days (the implementation officer was based in a central location in Southern Province, but the locations were spread around the province, transportation was limited and night traveling prohibited for safety reasons). Each night out of the office cost 600 kwacha for *per diem* (hotel and food). In addition, we calculated an average of 400 kwacha for transport. For eight months, this cost 24,000 kwacha.

Transport cost between facilities, research assistants (2,400 kwacha): We had six implementation locations and four research assistants. Two research assistants had to

travel to two locations. One location was remote and cost 200 kwacha in taxi fare every week. In addition, the research assistant got 50 kwacha per week for a lunch allowance, since she was more than 30 km away from her base. The second research assistant rode with the providers from the male circumcision provision programme, and so had no transport cost, but still received 50 kwacha for lunch. This amounts to 400 kwacha per month, or 2,400 kwacha for the eight months.

Voucher printing and fliers (1,080 kwacha): This is the cost for printing the vouchers that were given to the clients during the intervention. Vouchers were cardboard and had two parts: one for the referring person and one for the referred person, divided by a perforation in the voucher. Fliers were used to communicate about the project to clients. In total, we spent 1,080 kwacha on voucher printing.

Stationery for research assistants (800 kwacha): This is the cost for binders, referral logs, stationery and photocopying.

Communication (4,400 kwacha): The implementation officer received 150 kwacha per month for phone and the research assistants received 100 kwacha per month – a total of 550 kwacha per month, which for eight months amounts to 4,400 kwacha.

The seven costs above add up to a total of 116,594 kwacha for the eight months. The 2014 exchange rate of 6 kwacha per US$1 was used to convert costs to US dollars. This translates to a total of US$19,432 for eight months, or US$29,148 for 12 months.

Given the non-significant result of our peer referral system, we calculate the cost-effectiveness as the total amount in US dollars for 12 months, divided by the number of additional circumcisions in 12 months, assuming the intervention effects estimated above. Given an estimate of 7.6 additional circumcisions per month per facility due to the intervention, for six facilities we calculate that a total of 547 additional circumcisions would be performed over a 12-month period due to the intervention. As a result, we estimate a cost of US$53.27 per additional circumcision.

Due to the relatively small intervention effect, the fixed costs of implementing the intervention were a much larger portion of total costs than the variable costs associated with each additional circumcision. In addition, a non-trivial portion of intervention costs related to monitoring and supervision of the intervention. Since the intervention's costs are expected to be much lower in settings where facilities are less remote and more easily accessible, cost-effectiveness may be higher in other settings.

10. Actionable findings for policy, implementation and research

This study implemented a peer-to-peer incentive system for VMMC referrals and has implications for public health officials implementing VMMC in lower middle income settings, especially those with low baseline prevalence of male circumcision. While we could not demonstrate a significant increase in VMMC demand, the number of referrals and the results from the questionnaire suggest that the incentive motivated men to try and refer others for male circumcision, and that referrals were reported to be an important component in the decision to seek VMMC. To our knowledge, this is

the only programme establishing and describing a formal male-to-male incentive to refer peers for circumcision. This programme confirmed that the sharing of information on male circumcision by peers 18 years and older is still low, with only half of the men in our questionnaire knowing the circumcision status of their close friends. With referrals being an important component of the decision to get circumcised, programmes encouraging male-to-male communication on circumcision are critical.

The amount of the incentive and how it was delivered may have been behind the lack of boost in demand. The amount was kept low because of scalability concerns: the amount was comparable to the approximate amount a CHW receives when dividing a stipend by the number of clients the CHW typically recruits, and was therefore scalable at the same marginal cost. However, given the high fixed costs necessary to provide VMMC, this amount was conservative. The average cost of VMMC is currently around US$60, so an incentive valued at US$2 was extremely small. New incentive structures could be more effective, and qualitative work may better inform the optimal amount. One improved design may include non-linear incentive structures so that the amount matches the higher marginal cost in reaching one more person. It is also possible that non-monetary incentives may be more effective, as they could reduce the embarrassment factor in recruiting men for VMMC, especially in a low-prevalence setting such as rural Zambia.

In our setting, this was the only active effort to boost VMMC, aside from mobilisers. An integrated approach in which a peer-to-peer referral system is coupled with interventions focused on reducing costs associated with seeking VMMC and with campaigns for encouraging women to support VMMC may be much more effective.

Appendix A: Experimental sample

We present below the results when considering only the experimental sample (six intervention facilities and six control facilities, randomly selected), and only for the intervention period.

Table A-1 shows some baseline characteristics. While the intervention and control facilities are balanced in catchment area, distance to main road and type of facility (new or old), they are not balanced in the number of days of VMMC provision per month. The number of days is a pre-intervention variable, but it strongly predicts whether the facility is high volume or low volume. Railway Clinic appears to be an outlier, because circumcision is typically provided every day of the month. Results from comparing the monthly intervention by treatment status and controlling for possible baseline imbalance indicate no impact of the intervention on male circumcision numbers. The coefficient remains stable even when excluding Railway Clinic. Results remain comparable when considering cumulated male circumcisions over the intervention period and using permutation testing to compare the intervention and the control sample.

Table A-1: Baseline characteristics for intervention and control

Facility	Catchment area	Days of VMMC provision/ month	<5 km from the main road	New facility
Control				
KGH	13,761	4	1	0
Magoye	16,813	4	1	0
Pemba	4,972	4	1	1
Shampande	14,915	8	1	1
Sibanyati	7,457	4	0	1
St Mary	3,046	4	0	1
Average control	**10,161**	**4.67**	**0.67**	**0.67**
Intervention				
Batoka	15,524	8	1	1
Maamba	13,990	8	0	0
Manungu	12,873	8	0	0
Mawaya	11,009	8	1	1
Railway	7,457	24	1	0
Sinazongwe	12,094	4	0	1
Average intervention	**12,158**	**10.00**	**0.50**	**0.50**
P-value comparison intervention-control	0.56	**0.08**	1	1
Test used	Fisher exact on chi-square test	Non-parametric equality of median test with Fisher exact	Fisher exact on chi-square test	Fisher exact on chi-square test

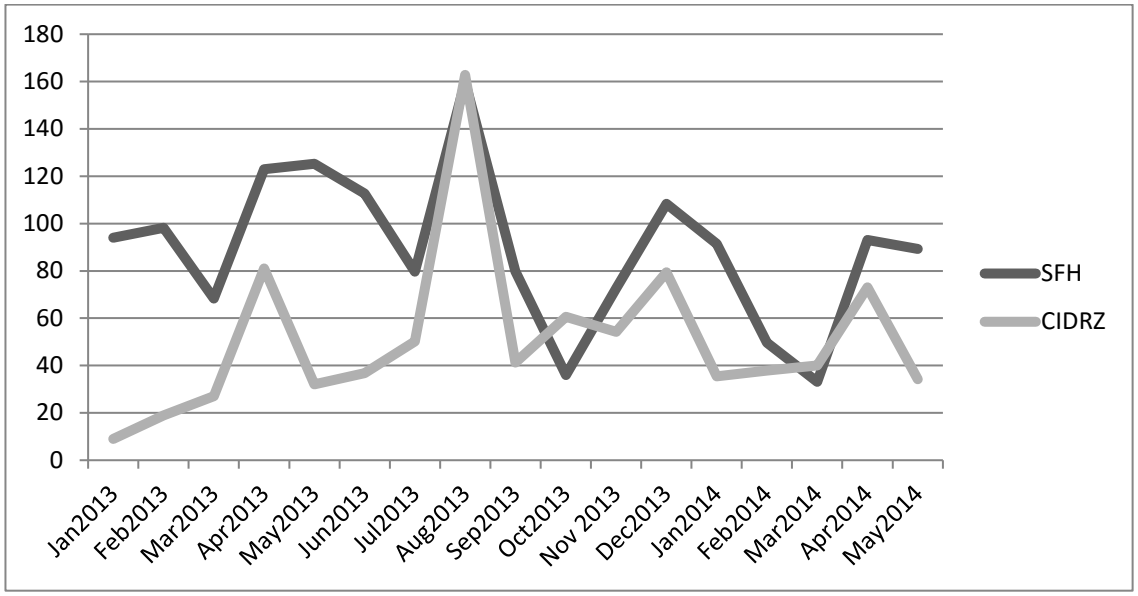
Table A-2: Results from experimental sample, controlling for baseline imbalance in number of provision days

	All sample	Excluding Railway
Treatment facility	**–4.05**	**–5.12**
	[–22.38;14.27]	[–26.29; 16.05]
# days of service provision/month	**5.93**	**6.38**
	[4.58; 7.29]	[3.31; 9.44]
Campaign month	**18.29**	**9.40**
	[–2.31; 38.89]	[–1.54;20.33]
Rainy season month	**–12.61**	**–11.96**
	[–23.51;-1.72]	[–22.12; –1.80]
New facility	**2.94**	**2.02**
	[–12.83; 18.72]	[–12.41;16.46]
Facility is close to main road	**3.28**	**1.95**
	[–12.83;18.72]	[–11.19;15.10]
N	94	88

Note: All standard errors clustered at the facility level. 'New facility' is a binary variable indicating that VMMC provision had started in the facility within three months of the beginning of the study. 'Facility is close to the main road' signifies that the facility is within 5 km of the main paved road.

Appendix B: Comparison of pre-intervention trends

One of the concerns is that CIDRZ and SFH were following differential trends, and that in this case the SFH facilities could drive the results. We present below the trends for average monthly male circumcisions for the facilities. SFH started before CIDRZ, and CIDRZ support was not completely established until June 2013. Once this is taken into account, the trends are largely comparable.



Appendix C: Cost and cost-effectiveness

Unit of operation	12	months	
Additional number of male circumcisions per month, per facility	9.1		
Number of intervention facilities	6		
Total additional male circumcisions per month	54.6		
Baseline number for average monthly circumcisions in control areas	72		
Effectiveness per month	0.126388889		

Data			
Number of months, implementation	8		
Total number of referrals	385		See result section.
Unit cost of referral incentive	10	kwacha	See intervention overview section.
Research assistant monthly salary	5,143	kwacha	This and other salaries include 37% fringe.
Percentage allocation of research assistant to implementation of voucher system	100%		During implementation months, the research assistant's main job was to inform VMMC clients about the study and keep the books with referrals. After the implementation months, the research assistant conducted the questionnaire, but this expense is not included.
Number of research assistants employed	4		
Average cost of monitoring trip	3,000	kwacha	Typical trip lasts 4 days, at 600 kwacha per diem per day plus 400 total for transport.
Implementation officer monthly salary	6,950	kwacha	
Number of monthly monitoring trips	1		Implementation officer did one monitoring trip per month to check that implementation and recording of voucher system were being done correctly.
Percentage of the implementation officer's allocated time devoted to monitoring the voucher system	50%		Implementation officer coordinated aspects of implementation 50% of the time and aspects related to the voucher system another 50% of the time
Percentage of the administrative assistant's allocated time devoted to the check voucher system expenses	20%		
Administrative assistant's monthly salary	6,950	kwacha	Administrative assistant checked that all receipts for incentives and funds were in order
Talk time expense per month/research assistant	100		Communication needs with both clients and monitoring office.

Research assistant travel reimbursement between facilities, per month for all research assistants	300	kwacha	We had 4 research assistants for 6 implementation facilities. For facilities more than 30 km away, we provided a lunch allowance; for one very remote facility, there was a transport cost with taxi (the provider was local). 300 kwacha/ month is the combined amount.
Talk time expense per month/ implementation officer	150	kwacha	
Stationery	800	kwacha	Referral log binder, dividers, pens.
Total cost of printing the vouchers and fliers	1,080	kwacha	

Total cost, entries for total implementation time (8 months)			
Printing the vouchers and fliers	1,080	kwacha	
Stationery for research assistants	800	kwacha	
Incentives	3,850	kwacha	
Transportation for research assistant between facilities	2,400	kwacha	
Research assistant time	41,144	kwacha	
Implementation officer time	27,800	kwacha	
Administrative assistant time	11,120	kwacha	
Communication	4,400	kwacha	
Monitoring visits	24,000	kwacha	

Total cost in kwacha	116,594		
Total cost in US$	19,432.33333		2014 exchange rate of 6 kwacha per US$1

Total cost for 12 months, in US$	29,148.5		

Total additional circumcisions done in 12 months	655.2		

Cost per additional circumcision	44.48794261	US$	

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Voluntary medical male circumcision (VMMC) is a useful HIV prevention tool in countries with generalised HIV epidemics. There is a need for demand-creation interventions as circumcision services are scaled-up. This study evaluates the effectiveness of a pilot intervention conducted in Zambia that provided small financial incentives to circumcision clients who successfully referred their peers also to seek circumcision. Though the peer referral incentive for male circumcision was feasible and acceptable, the intervention did not have a significant effect on demand for male circumcision. However, circumcision clients reported that the referral incentive motivated them to encourage their friends to seek VMMC. Barriers to circumcision as well as features of the intervention may have limited the effect of the intervention. There is need for further efforts to encourage male-to-male communication and evaluations with larger sample sizes.

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