



Factors Beyond Compensation Associated with Uptake of Voluntary Medical Male Circumcision in Zambia

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Abstract

Voluntary medical male circumcision (VMMC) provides partial protection against female-to-male transmission of HIV. The Maximizing the Impact of Voluntary Medical Male Circumcision in Zambia (MAXZAM) project was a phased implementation of a demand generation strategy for VMMC through economic compensation. Previously published findings showed increased uptake of VMMC when compensation was provided. This paper is a follow-up evaluation of the MAXZAM project exploring additional factors associated with uptake of VMMC. Factors found associated include the outreach setting in which men were approached, number of information sources seen, heard, or read about VMMC, their self-reported HIV risk behaviors, their self-reported intention to go through the procedure, and their behavioral-psychographic profile. The findings highlight the importance of considering general (e.g., intensifying mass communications and targeting specific settings) and person-centered demand generation approaches (e.g., considering the client's psychographic profile and HIV risk level) to maximize effect on VMMC uptake.

Keywords Voluntary medical male circumcision · Incentives · Compensation · HIV prevention

Introduction

Since 2007 voluntary medical male circumcision (VMMC) has been recommended by the World Health Organization (WHO) and the Joint United Nations Programme on HIV/AIDS (UNAIDS) as a strategy to reduce the likelihood of HIV acquisition in men during heterosexual sexual encounters [1]. The partial protective effect of male circumcision

against female-to-male transmission of HIV is well established, where seminal studies presented an approximately 60% reduction in the likelihood of acquisition [2–4]. A recent meta-analysis examining studies from multiple settings found reductions in the incidence of HIV for circumcised men, compared to uncircumcised, and particularly among men at high risk for HIV acquisition [5]. As of 2020, over 26.8 million VMMCs had been conducted in 15 countries with high HIV prevalence and low baseline circumcision coverage in eastern and southern Africa [6]. Over 11 million circumcisions occurred in the 4 years between 2016 and 2019, when UNAIDS set VMMC Fast Track targets of 25 million additional VMMCs by 2020 [6].

Zambia is one of 15 UNAIDS and the United States President's Emergency Plan for AIDS Relief's (PEPFAR) priority countries for VMMC scale-up. Findings from Zambia's population-based HIV impact assessment (PHIA) survey in 2016 indicated a medically circumcised prevalence of 21% among men 15–59 years old. Over 3 million men received medical circumcisions in Zambia between 2008 and 2020, of which 1.8 million occurred between 2016 and 2019 [6]. As Zambia continues to scale up VMMC and saturate populations most receptive to

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the service, effective demand generation becomes critical to find hard-to-reach men. In some areas, the remaining uncircumcised men were hesitant to seek VMMC and programs sought novel ways to generate interest in and uptake of VMMC [7]. Strategies VMMC programs have implemented to increase interest in the procedure include financial compensation, monetary and non-monetary incentives, outreach events at school and sporting events, soliciting peer groups to serve as champions for the procedure, and involving influencers like religious leaders and romantic partners to help men decide on the procedure [8].

Demand Creation for VMMC

It is important for demand creation approaches for VMMC to consider barriers against and facilitators to the procedure. In a systematic review that included 23 studies from 10 VMMC prioritized countries in sub-Saharan Africa, the top barriers found included the perception that VMMC is practiced by cultures or religion other than one's own, fear of pain from the procedure, and the belief that the procedure is not helpful or needed [9]. Other barriers included lack of trust in the information about VMMC being provided in campaigns, (for older men) the belief that the procedure is appropriate only for younger age groups, and fear of decreased sexual performance [9]. Wage loss and inability to take time off work were other cited barriers. Individual-, community-, and service-level facilitators were found, including thinking of VMMC as a group norm, the belief in its protective benefit against the transmission of HIV, and the service side benefit of the procedure being free, safe, and available [9]. For demand creation, mobilizers can help clients understand the value of VMMC better and increase its uptake by tailoring health communications to individual-level needs, barriers, and motivators for the procedure. Mindfulness of men's position on a spectrum of behavior change—pre-intention, intention, action—is an example of ways in which efforts can be personalized to men's readiness [10]. A tailored approach requires understanding of and demystifying the factors that prevent men from undergoing the procedure including fear of pain, lack of knowledge about health benefits, belief that the practice is for other cultures or religions rather than one's own, and opportunity cost such as lost wages and abstinence [9, 11]. An effective demand creation strategy addresses these barriers and reinforces facilitators of VMMC, including supportive norms [12]. A person-centered approach, such as motivational interviewing, that considers the individual's circumstances and priorities [13, 14] may help men transition from apathy to, ultimately, interest in undergoing the procedure.

Behavioral-Psychographic Segmentation

One strategy for increasing VMMC uptake is behavioral-psychographic segmentation of VMMC clients, or grouping types of men according to their beliefs towards, barriers against, and social influences on VMMC. Understanding a client's segment group can help mobilizers approach health education in a person-centered manner, where interpersonal communications is tailored to the specific needs of the client. Considering a man's segment or type during interactions with him helps mobilizers address barriers to VMMC based on his knowledge, attitudes, and beliefs [15] toward VMMC [16]. Sgaier and colleagues [10, 16] have extensively studied segments related to VMMC based on defining factors that included: motivation to go for VMMC (including intention to go for and positive attitudes and beliefs about it), control over cognitive dissonance toward male circumcision (i.e., the discomfort from simultaneously being concerned about HIV and doubting the efficacy of VMMC for preventing it), perceived lack of ability (defined by perceived lack of knowledge about VMMC, the desire to know more about it, and hesitancy with undergoing the procedure due to lack of knowledge), perceived efficacy against social pressure (self-efficacy to go for the procedure even with social pressure against it), and personal constraints (e.g., fear of pain, feeling shame, concerns about recovery process). In a study of over 2000 men in Zambia, seven segments were identified, including *traditional believers*, *self-reliant believers*, *socially-supported believers*, *knowledgeable hesitants*, *friends-driven hesitants*, *scared rejecters*, and *indifferent rejecters*. The segments found represented a spectrum of psychographic profiles that varied on the key segment-defining factors, level of commitment to getting circumcised, and risk behaviors for HIV. There were also varying proportions of men who were circumcised in each segment (Table 1 contains a summary of each segment). The authors [16] proposed that segments could be used to prioritize service delivery to those that have the highest likelihood of undergoing the procedure; for example, in resource-limited settings, programs could prioritize segments with high proportion of uncircumcised men but highly (mentally) committed to going through with circumcision. Because segmentation enables mobilizers to deliver personalized communications about VMMC to clients according to their needs, it can be an effective strategy for increasing uptake.

Economic Compensation for Men at High Risk for HIV Infection

Another strategy for increasing uptake of VMMC is economic compensation [17, 18]. Because clients must miss work for the procedure, the cost of going through VMMC is loss of wages. Thus, a demand creation strategy to increase

Table 1 Characteristics of each segment on the factors from which the segments were derived, the proportion of uncircumcised, and the proportion of men committed to VMMC in each segment

	Motivation to go for MC	Control over cognitive dissonance	Perceived ability	Perceived self-efficacy against social pressure	Personal constraints	% Uncircumcised in the segment out of all men in the segment	% Committed to VMMC among the uncircumcised in the segment
Self-reliant believers	Strong	Average confidence	Strong ability	Somewhat socially driven	Strong fears	29	86
Traditional believers	Neutral	Strong confidence	Lack of ability	Very socially driven	Some fears	29	84
Friends driven hesitant	Neutral	Lack of confidence	Lack of ability	Somewhat socially driven	No fears	86	71
Indifferent rejecters	Weak	Strong confidence	Strong ability	Somewhat socially driven	Some fears	95	21
Knowledgeable hesitant	Neutral	Strong confidence	Lack of ability	Somewhat socially driven	No fears	50	58
Scared rejecters	Weak	Average confidence	Lack of ability	Fully independent	Strong fears	90	37
Socially supported believers	Strong	Strong confidence	Average ability	Fully independent	Strong fears	44	80

This table was reproduced and adapted from Tables 1B and 2 in Sgaeir et al. [16]

uptake of VMMC is to make up for this loss through economic compensation or incentives. The WHO differentiates between compensation and incentives, whereas compensation recognizes the cost of the behavioral change and makes up for the loss, an incentive provides gain or profit and may not be necessary to make up for the opportunity cost of the choice (e.g., prizes not deemed essential) [18]. In general, review studies indicate that fixed compensation or incentives tend to increase uptake of VMMC but not variable ones obtained by chance, such as lottery. Food or transportation vouchers and cash transfers increase the likelihood of undergoing VMMC, lottery incentives and non-monetary gifts do not [17]. Financial compensation for lost wages and transportation expenses do increase uptake [17, 19]. However, regardless of the type or amount of incentive or compensation, it is important to take safeguards to avoid coercion (i.e., persuading the client to do something he would not otherwise do were it not for an incentive so great that he disregards his initial preference). Coercion can be avoided with careful program planning to determine a fair but not coercive value, through thorough client health education, and by providing informed consent.

Regarding the effect of compensation or an incentive for men at high risk for HIV acquisition, none of the review studies included approaches particularly for them [17]. Finding men who are at high risk for acquiring HIV and have not yet been reached by services is important for its potential for averting infection [5]. Characteristics of men previously found at higher risk of acquiring HIV include those with a history of sexually transmitted infection like herpes simplex

virus type 2 and syphilis [20], have participated in transactional sex [21], alcohol use [22, 23], and illicit drug use [24].

Study Purpose

The current analysis is from a VMMC initiative titled, Maximizing the Impact of Voluntary Medical Male Circumcision in Zambia or MAXZAM. The impetus for MAXZAM was to find an effective approach at increasing VMMC uptake among men who were at elevated risk for HIV exposure based on self-reports of risky behaviors. The project sought to understand the effect of enhanced demand creation and economic compensation on uptake of VMMC. Demand creation in this initiative was “enhanced” in that the mobilizers used a special tool to identify each client’s segment and adjusted health messaging about VMMC according to their segment [20]. Segmentation is not usual practice for VMMC services. Initial findings indicated significant increase in VMMC uptake when compensation was provided [25–27] as compared to enhanced demand creation alone without compensation. Here, we present follow-up analyses, exploring predictors beyond financial compensation associated with increased of VMMC uptake, including segmentation, the outreach setting in which men were approached, number of risk behaviors for HIV, the number of sources from which the client heard messages about VMMC, and reported intention to undergo the procedure. Behavioral intention was examined because behavioral theories have well-established the positive association between intentionality and behavior

[12]. Other factors including age, financial assets, and educational level were accounted for.

Methods

Study Design

The project was a phased implementation of a demand creation initiative testing the effect of compensation on uptake of VMMC. The project took place in Lusaka and Mazabuka in Zambia, involving seven VMMC service delivery sites (out of 53 VMMC sites in the Lusaka and Mazabuka Districts that provided VMMCs in 2018). The sites were chosen to allow for purposeful sampling of men from a variety of settings (i.e., urban and urban-adjacent setting) and so that different types of men could be included (e.g., seasonal workers, daily, plantation-based workers). Phase 1 was conducted between June and December of 2018 and Phase 2 between February and June of 2019. Men were approached by mobilizers at various venues and were provided consent for participation. Mobilizers were community members hired to book and refer clients to facilities for circumcision. Men who provided consent were administered a risk questionnaire. Enrolled participants were given additional questionnaires and provided one-on-one counseling. Flip charts designed through a human-centered approach were used for the one-on-one sessions to assess segment category. Men were provided personalized health education about VMMC that were tailored according to their segment. The segments were identified and defined prior to the project and referenced above [16, 27]. One-on-one interactions between participants and mobilizers lasted about 30–45 min. Men then completed a questionnaire that was administered by the mobilizer and were given referral vouchers for circumcisions within 3 months of enrollment. Methods for both phases were the same but participants in Phase 2 who underwent VMMC at one of the designated sites within 3 months of enrollment received ZMW 200 (about 17 USD at the time of the study), which was equivalent to three days of missed work and transportation costs. In both phases, men who had no contraindications, such as current sexually transmitted infection (STI), were circumcised. Although HIV testing is offered as part of the package of services for VMMC, testing was not required for circumcision. Those who were diagnosed with an STI or HIV were deferred for circumcision until they received clearance from an antiretroviral therapy clinic, and if returned for circumcision within the 3 months, were counted as circumcised and, in Phase II, given an incentive. Excluded men were: those younger than 18 years, answered “no” to all risk behavior questions (see below), were already circumcised, did not consent, and lived

outside of the catchment areas of interest. Study methods are described in greater detail elsewhere [27].

Sampling Strategy

Mobilizers used a convenience sampling approach to target men for health education on VMMC. They sought men in settings determined by study staff through pre-study procedures to be popular gathering places for men (e.g., late-night adult venues and health facilities). Outreach settings were within the service area of a VMMC site. For eligibility, men had to be uncircumcised, 18 years or older, and living within the catchment area of a VMMC site and planned to stay in the area for the next 3 months. Men who met eligibility criteria, provided consent, and reported an HIV risk behavior, as defined below, were enrolled in the program.

Data Collection

Age

Participant age was collected and aggregated into 5 categories: 18–29, 30–34, 35–39, 40–49, 50+. Fifteen- to twenty-nine-year-olds are priority ages for PEPFAR VMMC and thus the 18–29 group was aggregated into one age group as a comparison group.

Recruitment Setting

The venues at which the mobilizers engaged with and recruited the men for VMMC varied. Venues were high-traffic locations in the catchment areas of participating clinics. Locations were chosen to include men in urban and peri-urban settings and to be inclusive of seasonal and plantation-based workers, particularly in Mazabuka. Recruitment settings were barbershops, bars, brothels, bus stops, a cane cutter compound, churches, fishing camps, health facilities, residences, commercial markets, music shops, schools, sports grounds, and other locations. For the purposes of this exploratory analysis and statistical parsimony, some recruitment venues were recategorized into four broader categories: retail, adult entertainment, common public space, and work. Barbershop, market, and music shop were coded into *retail*. Bar and brothel were coded into *adult entertainment*. Bus stop, church, school, and sportsground were coded as *common public space*, and cane cutter compound and fish camp were coded as *work*. Health facility, home outreach, and other settings were not recoded. Thus, there were seven categories of recruitment venues: retail, adult entertainment, common public space, work, health facility, home, and other. Additionally, there was an unspecified category, *unknown*.

HIV Risk Behaviors

To determine HIV risk behaviors, participants answered the bulleted questions below related to activities over the 6 preceding months. An affirmative response to one or more questions was considered a high-risk behavior for HIV exposure and qualified men to enroll in the study.

- Have you received treatment for an STI (or symptoms of an STI) within the last 6 months?
- In the last 6 months, did you pay or receive payment with money, a favor, food, or things in exchange for having sexual intercourse?
- In the last 6 months, have you had sex with a partner that you knew was HIV-positive?
- In the last 6 months, have you had more than 2 overlapping sexual partners?
- In the last 6 months, have you had sex when you or your partner were drunk?
- In the last 6 months, have you used drugs (e.g., smoked dagga, taken ecstasy, used cocaine)?

Number of Information Sources

The number of times in which a VMMC candidate saw, heard, or read a message about male circumcision from various sources was assessed by the question, *In the past 3 months, how often have you seen, heard, or read from each of the following sources: television, radio, newspaper, pamphlets, internet message, billboards, community meetings (events), health facilities, public transportation?* For each information source, the participant responded 1 = *never*, 2 = *on one occasion*, 3 = *on a few occasions*, or 4 = *on many occasions*. For analytical purposes, these response options were recoded to 0 = *never*, 1 = *on one occasion*, 2 = *on a few occasions*, or 3 = *on many occasions*. The total number of sources from which the participant had heard about circumcision was counted such that if a participant had heard from a source at least *on one occasion* the source was counted toward the sum. Thus, the count of information sources on VMMC sum score for each participant was between 0 and 9 sources.

Number of Financial Assets

Number of tangible financial assets or wealth indicators was assessed based on ownership of agricultural land, livestock, and bank account. The men were asked, *Do you or a member of your household own any of the following: agricultural land, livestock, a bank account?* (Response options were *yes*, *no*). Number of assets owned were summed for each participant for the three assets queried. Thus, each participant could own between none of the three to all three.

Education Level

Participants reported their education background by responding to, “What is the highest level of education that you attained?” (primary, secondary, post-secondary).

Intention for VMMC

Intention to undergo VMMC was measured by the response to, *How likely are you to go for male circumcision in the next 3 months?* (1 = very unlikely, 2 = unlikely, 3 = neutral, 4 = likely, 5 = very likely).

Segmentation

As mentioned, seven segments were identified in previous research for Zambia [10, 16]. A flipchart tool was developed prior to this initiative that contained a series of questions that mobilizers used to identify segmentation group of men during mobilization and tailor health messaging according to their group [16]. The flipchart tool used for segmentation contained a flowchart with pre-written questions that led men to one segment or another. These questions included, “Can you imagine yourself getting circumcised?” “Would you encourage a brother (if you have or had one) to go for male circumcision?” “What do you believe about the benefits that male circumcision might give you?”.

Analyses

R [28] was used for the multivariable logistic regression (MLR) model and SPSS [29] was used for all other analyses. Predictors included in the MLR model were data collection phase, age group, recruitment setting, number of HIV risk behaviors, number of information sources, number of wealth indicators, educational level, intention to undergo VMMC, and segmentation.

Results

Overall, 9874 men were recruited, eligible, and provided consent, of whom 9827 reported at least one HIV risk behavior and were enrolled in the intervention. Table 2 contains a descriptive summary for all factors assessed. There were 6,096 men enrolled in Phase 1, of whom 206 (3%) underwent circumcision as part of the demand creation program. In Phase 2, 3731 men were enrolled, of whom 1428 (38%) were circumcised. The mean client age was 26.0 (SD = 7.8). In Phase 1, the mean age was 25.9 (SD = 7.7) and Phase 2 it was 26.3 (SD = 7.7). The most frequent recruitment setting was a retail space (n = 2437, 25%). The average number of HIV risk behaviors reported across both phases

Table 2 Overall descriptive summary and frequency and proportion of participants undergoing and not undergoing VMMC by phase

Characteristic	Phase 1			Phase 2			Both phases		
	Overall (n = 6096 ¹) n(%)	No (n = 5890 ¹) n(%)	Yes (n = 206 ¹) n(%)	Overall (n = 3731 ¹) n(%)	No (n = 2303 ¹) n(%)	Yes (n = 1428 ¹) n(%)	Overall (n = 9827 ¹) n(%)	No (n = 8193 ¹) n(%)	Yes (n = 1634 ¹) n(%)
Age group									
18–29	4618 (76%)	4451 (76%)	167 (81%)	2720 (73%)	1701 (74%)	1019 (71%)	7338 (75%)	6152 (75%)	1186 (73%)
30–34	680 (11%)	656 (11%)	24 (12%)	458 (12%)	272 (12%)	186 (13%)	1138 (11%)	928 (11%)	210 (13%)
35–39	360 (6%)	352 (6%)	8 (4%)	275 (7%)	165 (7%)	110 (8%)	635 (7%)	517 (6%)	118 (7%)
40–49	355 (6%)	350 (6%)	5 (2%)	229 (6%)	133 (5%)	96 (7%)	584 (6%)	483 (6%)	101 (6%)
50+	83 (1%)	81 (1%)	2 (1%)	49 (1%)	32 (1%)	17 (1%)	132 (1%)	113 (1%)	19 (1%)
Recruitment setting									
Common public space	882 (15%)	874 (16%)	8 (3.9%)	717 (20%)	504 (23%)	213 (15%)	1599 (16%)	1378 (17%)	221 (14%)
Retail	1,607 (28%)	1,555 (28%)	52 (25%)	830 (23%)	570 (26%)	260 (18%)	2437 (25%)	2125 (26%)	312 (19%)
Adult venue	1,173 (20%)	1,151 (21%)	22 (11%)	799 (22%)	515 (23%)	284 (20%)	1972 (20%)	1666 (20%)	306 (19%)
Work	180 (3%)	178 (3%)	2 (1%)	39 (1%)	24 (1%)	15 (1%)	219 (2%)	202 (2%)	17 (1%)
Health facility	304 (5%)	252 (4%)	52 (25%)	261 (7%)	104 (5%)	157 (11%)	565 (6%)	356 (4%)	209 (13%)
Home	777 (13%)	736 (13%)	41 (20%)	493 (13%)	249 (11%)	244 (17%)	1270 (13%)	985 (12%)	285 (17%)
Other	853 (15%)	824 (15%)	29 (14%)	524 (14%)	269 (12%)	255 (18%)	1377 (14%)	1093 (13%)	284 (17%)
Unknown	320 (5%)	320 (5%)	0 (0%)	68 (2%)	68 (3%)	0 (0%)	388 (4%)	388(5%)	-
HIV risk behaviors									
≤ 2	3552 (58%)	3399 (58%)	153 (74%)	1667 (45%)	985 (43%)	682 (48%)	5219 (53%)	4384 (54%)	835 (51%)
> 2	2,544 (42%)	2491 (42%)	53 (26%)	2064 (55%)	1318 (57%)	746 (52%)	4608 (47%)	3809 (47%)	799 (49%)
No. of financial assets									
0	1394 (23%)	1354 (23%)	40 (19%)	377 (10%)	254 (11%)	123 (8.6%)	1771 (18%)	1608 (20%)	163 (10%)
1	2191 (36%)	2110 (36%)	81 (39%)	1925 (52%)	1192 (52%)	733 (51%)	4116 (42%)	3302 (40%)	814 (50%)
2	1066 (17%)	1036 (18%)	30 (15%)	300 (8%)	219 (10%)	81 (6%)	1366 (14%)	1255 (15%)	111 (7%)
3	1443 (24%)	1388 (24%)	55 (27%)	1129 (30%)	638 (28%)	491 (34%)	2572 (26%)	2026 (25%)	546 (33%)
Unknown	2 (0%)	2 (0%)	-	-	-	-	2 (0%)	2 (0%)	-
No. of information sources grouped									
0 to 3	1,855 (30%)	1,794 (30%)	61 (30%)	1,193 (32%)	775 (34%)	418 (29%)	3048 (31%)	2569 (31%)	479 (29%)
4 to 6	2965 (49%)	2860 (49%)	105 (51%)	1632 (44%)	1072 (47%)	560 (39%)	4597 (47%)	3932 (48%)	665 (41%)
7 to 9	1276 (21%)	1236 (21%)	40 (19%)	906 (24%)	456 (20%)	450 (32%)	2182 (22%)	1692 (21%)	490 (30%)
Education level									
Primary	1964 (32%)	1915 (33%)	49 (24%)	1221 (33%)	842 (37%)	379 (27%)	3185 (32%)	2757 (34%)	428 (26%)
Secondary	3532 (58%)	3402 (58%)	130 (63%)	1983 (53%)	1200 (52%)	783 (55%)	5515 (56%)	4602 (56%)	913 (56%)
Post-secondary	598 (10%)	571 (10%)	27 (13%)	527 (14%)	261 (11%)	266 (19%)	1125 (11%)	832 (10%)	293 (18%)
Unknown	2 (0%)	2 (0%)	-	-	-	-	2 (0%)	2 (0%)	-
Intention to undergo MC									
neutral Or unsure	803 (13%)	799 (14%)	4 (1.9%)	154 (4.1%)	122 (5.3%)	32 (2.2%)	957 (10%)	921 (11%)	36 (2%)
Very unlikely or unlikely	289 (5%)	288 (5%)	1 (1%)	19 (1%)	16 (1%)	3 (0%)	308 (3%)	304 (4%)	4 (0%)
Likely or very likely	5002 (82%)	4801 (82%)	201 (98%)	3558 (95%)	2165 (94%)	1393 (98%)	8560 (87%)	6966 (85%)	1594 (98%)
Unknown	2 (0%)	2 (0%)	-	-	-	-	2 (0%)	2 (0%)	-
Segmentation									
Self reliant believer	740 (13%)	716 (13%)	24 (12%)	664 (18%)	376 (17%)	288 (20%)	1404 (14%)	1092 (14%)	312 (19%)
Traditional believer	639 (11%)	595 (11%)	44 (21%)	527 (14%)	309 (14%)	218 (15%)	1166 (12%)	904 (12%)	262 (16%)
Friends driven hesitant	808 (14%)	785 (14%)	23 (11%)	522 (14%)	345 (15%)	177 (12%)	1330 (14%)	1130 (15%)	200 (12%)

Table 2 (continued)

Characteristic	Phase 1			Phase 2			Both phases		
	Overall (n = 6096 ¹)	No (n = 5890 ¹)	Yes (n = 206 ¹)	Overall (n = 3731 ¹)	No (n = 2303 ¹)	Yes (n = 1428 ¹)	Overall (n = 9827 ¹)	No (n = 8193 ¹)	Yes (n = 1634 ¹)
	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)
Indifferent rejecter	1364 (24%)	1303 (23%)	61 (30%)	609 (17%)	351 (16%)	258 (18%)	1973 (20%)	1654 (21%)	319 (20%)
Knowledgeable hesitant	678 (12%)	663 (12%)	15 (7%)	447 (12%)	286 (13%)	161 (11%)	1125 (11%)	949 (12%)	176 (11%)
Scared rejecter	862 (15%)	841 (15%)	21 (10%)	449 (12%)	292 (13%)	157 (11%)	1311 (13%)	1133 (15%)	178 (11%)
Socially supported believer	685 (12%)	667 (12%)	18 (9%)	445 (12%)	276 (12%)	169 (12%)	1130 (12%)	943 (12%)	187 (11%)
Unknown	320 (5%)	320 (5%)	0 (0%)	68 (2%)	68 (3%)	0 (0%)	388 (4%)	388 (5%)	–

¹n (%)

²For *No* and *Yes* columns, *No* = did not undergo VMMC as part of the initiative and *Yes* = had undergone VMMC as part of the initiative

was 2.7 (SD = 1.4, median = 2). Men in Phase 2 reported a greater number of risk behaviors than men in Phase 1 (Mean (M) = 3.0, SD = 1.5 vs M = 2.74, SD = 1.3, $t(6937) = -19.3$, $p < 0.001$). For the three financial assets assessed, the median number owned was one asset.

Regarding sources of information about VMMC, overall, the mean number of sources was 4.7 (SD = 2.3). For Phase 1, the mean number of sources was 4.7 (SD = 2.2) and 4.8 (SD = 2.4) for Phase 2. The median number of different sources overall and for each phase was 5. Table 3 contains frequency and proportion of men that saw, heard, or read a message about the health effects of male circumcision by information source. The most frequently reported information source was health facility, which also had the highest degree of exposure at 2.0 median (or *on a few occasions*), relative to a median of 0 or 1.0 (i.e., *never* or *on one occasion*) for the other information sources.

Overall, most men indicated that they were *very likely* (n = 5,498, 56%) to undergo VMMC, followed by *likely*

(n = 3,062, 31%), *neutral* (n = 957, 10%), *unlikely* (n = 199, 2%), and *very unlikely* (n = 109, 1%). The average likelihood rating was 4.4 (SD = 0.8) overall, 4.25 (SD = 0.9) for Phase 1, and 4.6 (SD = 0.6) for Phase 2. Table 1 contains descriptive data for intentionality, regrouped into three categories (*very unlikely* to *unlikely*, *neutral*, *likely* to *very likely*). *Indifferent rejecters* were the most represented, although distribution was relatively even across segments.

VMMC Uptake

The odds of a client coming for circumcision were 17.2 times higher in Phase 2 than Phase 1 (95% CI 14.6–20.3, $p < 0.001$). The likelihood of VMMC did not differ between 18 and 29 and other age groups. Table 4 details findings from the MLR analysis on likelihood of VMMC based on other characteristics.

MLR findings indicated that men mobilized from all recruitment settings, except for work setting, had

Table 3 Frequency and proportion of men that saw, heard, or read a message about the health effects of male circumcision at least once

VMMC information source	Phase		
	Phase 1 (n = 6096) ¹	Phase 2 (n = 3731) ¹	Overall (n = 9827) ¹
Billboards	4349 (71%)	2652 (71%)	7001 (71%)
Community meetings	3887 (64%)	2512 (67%)	6399 (65%)
Television	3044 (50%)	1582 (42%)	4626 (47%)
Radio	3337 (55%)	1917 (51%)	5254 (53%)
Newspaper	1878 (31%)	1136 (30%)	3014 (31%)
Pamphlets	2494 (41%)	1856 (50%)	4350 (44%)
Internet Message	1990 (33%)	1372 (37%)	3362 (34%)
Health Facilities	5323 (87%)	3135 (84%)	8458 (86%)
Public Transportation	2130 (35%)	1561 (42%)	3691 (38%)

¹Participants indicated how often they saw/heard/read about VMMC from each source of information (0 = never, 1 = on one occasion, 2 = on a few occasions, or 3 = on many occasions). Above is the number of participants who said *on one occasion* or more often

Table 4 Multivariable logistic regression analysis of factors associated with uptake of VMMC

Characteristic	AOR	95% CI	p-value
Phase			
Phase 1	–	–	
Phase 2	17.2	14.6, 20.3	< 0.001
Age group			
18–29	–	–	
30–34	1.10	0.90, 1.33	0.339
35–39	1.01	0.79, 1.30	0.927
40–49	0.93	0.71, 1.21	0.603
50+	0.67	0.37, 1.17	0.172
Recruitment setting			
Common public space	–	–	
Retail	1.44	1.17, 1.78	< 0.001
Adult venue	1.42	1.15, 1.76	0.001
Work	1.36	0.73, 2.40	0.305
Health facility	5.95	4.53, 7.84	< 0.001
Home	2.39	1.91, 3.01	< 0.001
Other	2.39	1.91, 3.00	< 0.001
HIV risk factors			
≤ 2	–	–	
> 2	0.66	0.58, 0.76	< 0.001
No. of information sources grouped			
0 to 3	–	–	
4 to 6	0.96	0.83, 1.12	0.637
7 to 9	1.55	1.29, 1.86	< 0.001
No. of financial assets			
0	–	–	
1	1.15	0.94, 1.43	0.183
2	0.66	0.49, 0.88	0.006
3	1.27	1.01, 1.59	0.042
Education level			
Primary	–	–	
Secondary	1.23	1.06, 1.43	0.006
Post-secondary	1.91	1.53, 2.38	< 0.001
Intention to undergo MC			
Neutral	–	–	
Very unlikely or unlikely	0.88	0.25, 2.40	0.825
Likely or very likely	3.40	2.38, 4.98	< 0.001
Segmentation			
Self-reliant believer	–	–	
Traditional believer	1.25	1.00, 1.57	0.049
Friends driven hesitant	0.76	0.60, 0.96	0.022
Indifferent rejecter	1.08	0.88, 1.34	0.455
Knowledgeable hesitant	0.76	0.60, 0.97	0.025
Scared rejecter	0.81	0.63, 1.02	0.076
Socially supported believer	0.86	0.68, 1.09	0.214

Odds ratios have been adjusted to account for other predictor variables in the multivariable logistic regression model

AOR Adjusted odds ratio, CI Confidence Interval

significantly greater likelihood of undergoing VMMC compared to men approached at a common public space (Table 4). This model showed that men mobilized from a health facility had the highest odds of undergoing VMMC at almost six times greater likelihood than those approached at a common public space (adjusted odds ratio (AOR) = 5.95, 95% CI 4.53–7.84, $p < 0.001$). Figure 1 highlights that clients who were approached at a health facility and at home had the greatest proportion of VMMC uptake.

Men who reported two or fewer risk behaviors were about 1.5 times more likely to undergo VMMC than men who reported more (AOR = 0.66, 95% CI 0.58–0.76, $p < 0.001$; see Table 4). Additionally, those who had *two assets* were less likely to undergo VMMC than those who had *no asset* (AOR = 0.66, 95% CI 0.49–0.88, $p = 0.006$), whereas those who owned *three assets* had 1.27 times the odds of undergoing VMMC than those who had *no asset* (95% CI 1.01, 1.59, $p = 0.042$; see Table 4).

Clients reporting four to six information sources did not have a different likelihood of undergoing the procedure from those reporting zero to three sources of information. However, those reporting seven to nine sources did have 1.55 times increased odds of undergoing the procedure than those who reported 0–3 sources (95% CI 1.29–1.86, $p < 0.001$; see Table 4).

MLR indicated that men with secondary education had 1.23 times greater odds of undergoing VMMC than those with primary education. Men with post-secondary education had 1.91 times greater odds than those with primary level of education (Table 4).

The overall model indicated 3.4 times greater likelihood of undergoing VMMC for men who said *likely or very likely* to go for MC than men who indicated *neutral* (AOR = 3.4, 95% CI 2.38, 4.98, $p < 0.001$). Likelihood by those who indicated that they were *unlikely or very unlikely* to go through VMMC did not significantly differ from *neutral*.

Regarding segmentation, *traditional believers* had slightly greater odds of undergoing VMMC than *self-reliant believers*. On the other hand, *friends-driven hesitant* and *knowledgeable hesitant* had lower odds of VMMC than *self-reliant believers* (Table 4 and Fig. 2).

Discussion

For the MAXZAM project, of more than 9,827 enrolled men, 1636 (17%) underwent circumcision. The odds of VMMC uptake for men offered compensation (Phase 2) was 17 times higher than for men who were not compensated (Phase 1). Findings are consistent with studies suggesting that monetary incentives are an effective demand generation strategy for VMMC [17]. The added objective in the present study was to understand the significance of other factors

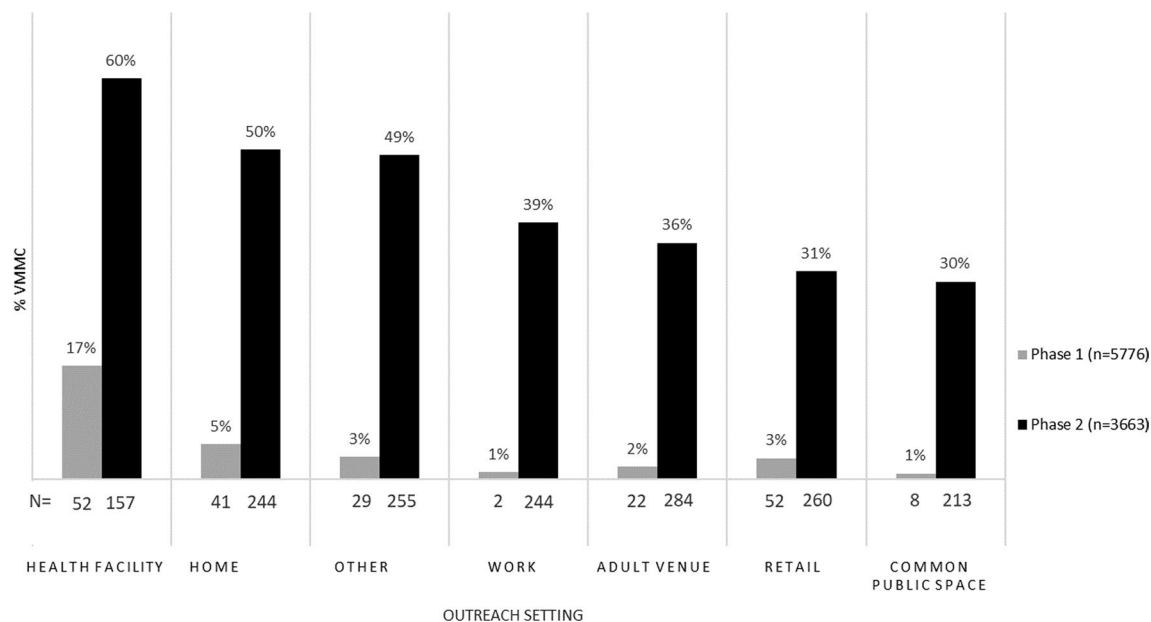


Fig. 1 Participants approached at a health facility or home underwent VMMC to a greater extent. *Note.* The denominator for each column is the total approached at each venue for each phase

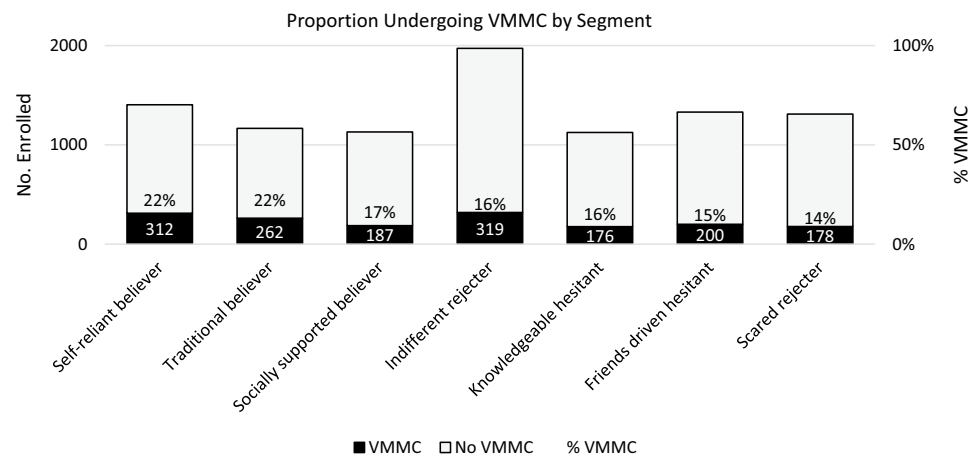
in mobilizing high-risk men for circumcision. It was found that not only does compensation influence the likelihood of VMMC [27], but so does the setting in which men are approached, the self-reported number of HIV risk behaviors, number of information sources from which he was informed about VMMC, their reported intention to go through the procedure, and segment group.

Education level and financial assets were both also significant predictors of VMMC uptake. However, the number of assets is only a crude indicator of wealth and the direction of effect is not clear because compared to men with no assets, those with one or three assets had higher odds of VMMC but men with two assets had lower odds. Further investigation is needed using a more accurate indicator of wealth. Men at higher education levels had greater odds of undergoing the procedure than those with primary level education. This finding is not surprising as education has long been linked with health outcomes [30]. This finding suggests that mobilizers may need to be more vigilant about understanding particular barriers that men of lower education levels face. Because financial assets and education level are non-modifiable for demand creation planning purposes, the discussion that follows focuses on the other significant factors on VMMC uptake.

Recruitment Setting

We wanted to determine whether there would be an advantage to mobilizing from other settings than common public spaces, which are the usual venues that mobilizers visit to approach men about VMMC. Findings reiterate that setting is a critical factor in demand generation. Overall, the likelihood of VMMC was significantly greater for men reached at a health facility or home compared to men recruited at a common public space, specifically, six- and two-times greater likelihood of going through the procedure. A possible explanation for the greater VMMC uptake at health facilities is that the men recruited from there had pre-existing connections to the health system and were already engaged in some care, and, therefore, more easily referred for VMMC than men who were not linked. For these men, the activation energy or motivation required to go through the process of undergoing the procedure may be less than those who were not connected with, and possibly less knowledgeable about, navigating the health system. Additionally, clients recruited from health facilities may capture men who are more disposed to seek help, perform health promoting and disease preventing behaviors, and have the means to go to the clinic [31] and, therefore, for whom VMMC would require less effort to undergo. Future research might evaluate other characteristics of men that are associated with health behaviors, characteristics such as beliefs about masculinity, which are thought to be negatively associated with help seeking behaviors [32, 33]. Another possible reason is that outreach at health facilities for or during this initiative may

Fig. 2 Self-reliant believers and traditional believers had the highest VMMC conversion rate



have been more frequent than other settings. A large majority of the men enrolled in this evaluation (86%) indicated that they had seen, heard, or read a message about VMMC at a health facility. Program evaluation findings suggests that STI and ANC clinics may be suitable settings for reaching men who are willing to and interested in undergoing VMMC [34]. Targeting specific venues to reach men at high risk for HIV is important and because having an STI is a risk factor for HIV infection, STI clinics are favorable entry points for VMMC programs to find men at high risk for HIV infection.

Home outreach was another setting in which mobilizers were successful in recruiting men for VMMC. A possible reason is that there may have been existing relationships between local mobilizers and men approached for VMMC and therefore, greater trust. One-on-one interactions in the privacy of a client's home may have facilitated personalized counseling, giving mobilizers greater opportunity to develop rapport with a client, educate them on the benefits of the procedure, and allay their concerns about the procedure. Although home outreach may take up greater time and resources compared to public recruitment, the personalized attention given to men is likely more effective at bringing them into the clinic for VMMC. The degree to which results can be applied in other settings is unclear and may depend on contextual factors such as the extent to which individuals in a setting (i.e., district, city, neighborhood) know one another, distance of recruitment venue from VMMC clinic, and population migration (e.g., refugee migration and seasonality of work). All in all, findings suggest that for demand creation, it is important to consider that certain outreach settings are associated with men having greater likelihood of undergoing VMMC.

HIV Risk Behaviors

Findings indicate that those with fewer reported risk behaviors for HIV were more likely to go through the procedure. Phase 2 clients reported a greater number of risk behaviors than Phase 1 clients. A limitation of the study is that HIV risk behaviors were self-reported. The degree to which participants inflated their risk level in Phase 2 to secure enrollment in the incentivized VMMC program cannot be determined. The accuracy of clients' risk level may be greater in Phase 1 as self-reports of risk in this phase are less likely to be obscured by potential exaggeration from increased motivation to enroll generated by potential financial compensation. It is also possible that the compensation offered in Phase 2 may have encouraged more high-risk men who had already been thinking about the procedure go through it. However, the finding that men with fewer risk behaviors (at or below median of 2 behaviors) had greater odds of undergoing circumcision is consistent with other health studies indicating that individuals with fewer health risk behaviors may be more conscientious about their health in general [35], and, therefore, more likely to take disease prevention precautions like VMMC. One challenge for programs, particularly those with limited resources, is accurately targeting and reaching uncircumcised men who are at high risk for HIV acquisition in order to achieve the greatest impact on prevention.

Number of Information Sources

The finding that those who saw, heard, or read about VMMC from the greatest number of sources (7 to 9 sources) had over 1.5 times greater odds of undergoing the procedure (Table 4) than those who heard from fewer sources highlights the importance of repetitive messaging through

multiple channels for sensitization to health promotion campaigns. The wide-reaching health campaigns may normalize VMMC and shift attitudes toward it, change risk perceptions and alter efficacy beliefs [36], ultimately helping men decide to go through the procedure.

Intention to Undergo VMMC

Although very few men indicated that they were unlikely to go for VMMC, noteworthy is that 72% of those who had undergone VMMC through this program had reported that they were *very likely* to go through it. They were over 3 times more likely to undergo the procedure than those who indicated being *neutral*. This finding may have implications for demand creation efforts, specifically, that it may be important to assess men's readiness for change to prevent HIV (one of which may be undergoing VMMC). Simply understanding a client's intentions for VMMC may be useful for strategizing communications with him. For example, for clients who express strong intentions to go through the procedure, mobilizers may want to focus interactions on identifying and eliminating final barriers to VMMC. The transtheoretical model of behavioral change suggests that individuals go through a process for change. They move through stages of motivation and commitment, from precontemplation to contemplation, preparation, action, and maintenance [14]. Communication strategies should be tailored based on the individual's stage of change at the time in which he is approached by the mobilizer. An individual in the precontemplation stage is not ready to act, whereas someone in the maintenance stage has acted on and committed to behavior change for better health. A personalized approach to demand generation such as motivational interviewing, where health providers empathetically discuss the client's motivation and hesitation for change, may help guide men towards healthier decisions for HIV prevention (e.g., VMMC, condom use, avoiding multiple sexual partners) [13, 37].

Additionally, with limited resources, programs could focus on the men who do verbally report high intention to go for VMMC and implement alternative strategies for men who say they are unlikely to go through with it. Men who have low intentions to go through the procedure may be at a different (precontemplation) stage of change for HIV/STI prevention [38], may have more roadblocks, and require greater effort to mobilize [14, 39]. Men who at high risk for HIV infection but are not ready for and have low likelihood of ever seeking VMMC could be referred to alternative HIV prevention services such as preexposure prophylaxes and self-testing.

Segmentation

The mobilizer's role in demand creation was to customize communications based on segment categories by addressing the various roadblocks to VMMC that individuals in each segment believes. Although certain segments have greater baseline motivation and more positive beliefs about the benefits of VMMC [16], any preexisting differences in likelihood of VMMC should be attenuated by the human-centered design of health education. Enhanced communications were tailored to each client's perceived barriers to VMMC. To the degree that health messaging was equally effective across segments, group differences in VMMC outcome is attenuated. However, the odds of VMMC did differ for some segments indicating that the enhanced communication methods did not function equally across segments. Without a baseline comparison group, it is difficult to ascertain the degree to which human-centered methods resulted in greater uptake for each segment. The proportion of men enrolled who underwent VMMC in Phase 1 was low, though traditional believers had the highest VMMC conversion rate. Because prior research had indicated that *self-reliant believers* and *traditional believers* have the highest baseline commitment to VMMC among all segments [16], it was not surprising to find these groups with the highest overall uptake at 22% each. Enhanced communication strategies may work relatively well on indifferent rejecters, a group which Sgaier and colleagues (2017) had found to have the lowest commitment to VMMC. Without the influence of compensation in Phase 1, this group had the second highest proportion of men undergoing VMMC to *traditional believers* (over 4%). Although not significant, the *indifferent rejecters* group had the only other odds at above 1, compared to *self-reliant believers*, of undergoing the procedure.

In Phase 2, *self-reliant believers*, *indifferent rejecters*, and *traditional believers* had the highest proportions of VMMC, all at above 40% undergoing the procedure. *Scared rejecters* were documented to have the highest risk level in previous research [16] and *socially supported believers* and *self-reliant believers* have been described in previous research as having the strongest motivation for VMMC [16]. Even more specialized and tailored messaging may be necessary for certain segments, such as *friends-driven hesitant* and *knowledgeable hesitant*, for whom there are other and unknown factors beyond the roadblocks addressed during enhanced communications.

Conclusions

The present findings suggest that there are factors in addition to financial compensation that influence uptake of VMMC for men reporting high-risk behaviors. VMMC programs need to be strategic about outreach locations for best VMMC yield. Recruitment through or at health clinics may provide better results and prove efficient, although they could miss certain segments of the high-risk population. Additionally, an intensified mass communications plan is likely to help uptake. For men not reached through a generalized approach, a personalized strategy through segmentation or by other means of understanding a client's intention and commitment to change is optimal for guiding the decision to undergo VMMC.

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Data Availability Contact the first author for data and data collection materials, which may be made available upon request.

Code Availability Contact the first author for analytical codes, which may be available upon request.

Declarations

Conflict of interest The authors have no relevant financial or non-financial interests to disclose.

Ethical Approval Approval was obtained from ERES Converge IRB in Zambia (Ref# 2017-May-054) and The Johns Hopkins University School of Public Health (IRB# 00008078). The project was reviewed for research determination and approved by the Associate Director for Science for the Center for Global Health, U.S. Centers for Disease Control and Prevention as activity involving human subjects without CDC involvement and requiring no additional IRB Review (CGH HSR Tracking #2018-102a).

Consent to Participate Informed consent was obtained from all individual participants included in the study.

Consent for Publication Not applicable. Only aggregate data are presented.

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