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Voluntary medical male circumcision uptake and perceptions among men aged 30–49 years in Ntungamo district, Uganda

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Abstract

Background Voluntary medical male circumcision (VMMC) is a proven HIV prevention strategy, yet uptake among older men remains suboptimal in many settings. Understanding the level of uptake and perceptions among men aged 30–49 years is essential for improving targeted VMMC programs in Uganda. This study investigated the uptake and perceptions of VMMC among men aged 30–49 years in Ntungamo district, southwestern Uganda.

Methods We conducted a cross-sectional study using quantitative and qualitative methods. Quantitatively, we randomly reviewed selected medical records (Safe Male Circumcision client form - HMIS ACP 029) of all men (10–49 years) who had undergone VMMC in the district between October 2021 and September 2023. Data entered in Microsoft Excel and descriptive analysis was performed. We also conducted 8 focus group discussions, each consisting of 8–12 men aged 30–49 years, which were audio-recorded, transcribed verbatim, and analyzed manually using thematic analysis.

Results Out of 368 records of all men (10–49 years) who had undergone VMMC, only 16.1% (59/368) were aged 30–49, of which, the majority, 71.2% (42/59), were married. Qualitatively, two main themes emerged: (1) awareness of VMMC and its benefits, which included men's understanding of VMMC and the sources of information through which knowledge was acquired; (2) perceptions of the VMMC services, encompassing perceived barriers such as fear of pain, economic and time constraints, and socio-cultural beliefs, as well as perceived facilitators of VMMC uptake, including peer influence, spousal support, and perceived health and sexual benefits.

Conclusion The uptake of VMMC among men aged 30–49 years is suboptimal. While awareness of VMMC and its benefits exists, decisions to undergo circumcision are strongly shaped by perceptions of the procedure and post-circumcision care. There is a need for targeted, age-appropriate VMMC strategies that address specific barriers faced by older men while leveraging social support systems to improve uptake in this population.

Keywords Voluntary, Medical, Male, Circumcision, Perceptions, Uganda



1 Introduction

It is estimated that achieving 80% Voluntary Medical Male Circumcision (VMMC) coverage among males aged 15 to 49 could avert an estimated 3.36 million new HIV infections [1]. In recognition of this prevention potential, the World Health Organization (WHO) and the Joint United Nations Programme on HIV/AIDS (UNAIDS) recommended VMMC as an additional HIV prevention strategy for regions with high HIV prevalence and low male circumcision rates [1, 2]. This recommendation was prioritized for 15 countries in Sub-Saharan Africa, including Uganda [1]. By 2019, over 27 million VMMCs had been performed across these countries [3–5]. VMMC programs have largely prioritized adolescents and young men aged 10–29 years to achieve rapid population-level impact, resulting in substantially higher circumcision coverage in these younger age groups compared to older men [5, 6]. Consequently, uptake remains disproportionately low among men aged 30–49 years, with the highest uptake being among boys aged 10–14 years [5–7].

In Uganda, although VMMC prevalence improved from 43% in 2016 to 54% in 2020 [8], coverage remains well below the national target of 80% among men aged 15–49 years, set by the Ministry of Health in 2010 for achievement by 2020 [9]. Persistently low uptake among older men, in particular, continues to limit the full public health impact of VMMC [10]. Despite more than a decade of VMMC scale-up, a substantial proportion of men aged 30–49 years remain uncircumcised, partly due to socio-cultural norms, economic responsibilities, and health system barriers that disproportionately affect this age group. This gap is especially concerning given that older men bear the highest burden of HIV infection in the country, with prevalence reaching up to 11.1%, making them a critical priority group for HIV prevention interventions such as VMMC [11]. Furthermore, although sexual debut among males occurs at younger ages, HIV acquisition risk accumulates over time, making older men a critical population for prevention interventions [12]. Failure to adequately reach this age group represents a missed opportunity to maximize the preventive benefits of VMMC and reduce ongoing HIV transmission at the population level.

Studies have found associations between men's perceptions about VMMC and their willingness to get circumcised. Men's perceptions of VMMC are shaped by fears of pain and delayed healing, concerns about economic productivity, and social norms around masculinity, alongside positive beliefs about improved hygiene, sexual performance, and protection against HIV [10, 13–15]. Importantly, these perceptions may differ by age group, with older men more likely to weigh perceived economic and social costs against anticipated health benefits [16]. In other African settings, uncircumcised men were more likely to be willing to get circumcised if they thought that their friends or partners encouraged male circumcision [13, 17]. Consequently, a mix of perceptions about VMMC has been documented, and efforts have been made to create awareness and dispel myths and misconceptions about VMMC through social behavioural change programs [9, 18, 19].

Ntungamo district has an HIV prevalence of 5.9%, higher than the national average of 5.1% [20], underscoring the need to strengthen prevention interventions such as VMMC. While evidence from Uganda and other Sub-Saharan African settings consistently shows that VMMC uptake is disproportionately low among men aged 30–49 years, the magnitude of this gap and the perceptions driving it remain undocumented

in high-burden districts like Ntungamo, limiting the design of targeted interventions for this high-risk group. Moreover, the existing literature on perceptions toward VMMC is largely drawn from younger age groups or broader national surveys, leaving a gap in context-specific evidence for older men in rural southwestern Uganda. Focusing on this age group is therefore essential to address an underserved but high-risk population and to inform age-tailored interventions that complement existing youth-focused VMMC strategies. This study, therefore, investigated the uptake and perceptions of men aged 30–49 years toward VMMC services in Ntungamo district.

2 Methods

2.1 Study design and setting

We conducted a descriptive cross-sectional study employing both quantitative and qualitative data collection methods between August 2024 and January 2025. The study was conducted in Ntungamo district, located in the Ankole sub-region of Southwestern Uganda, bordered to the north by Mitooma, Sheema, and Rwampara Districts, to the east by Isingiro District, to the south by the Republic of Rwanda, to the southwest by Rukiga District, and to the northwest by Rukungiri District. The district has an estimated total population of 552,786 people [21] and, comprises 42 public health facilities, of which 8 (one general hospital, four HC IVs, and three HC IIIs) are accredited to offer VMMC services across designated catchment areas. Ntungamo district was selected from the southwestern region of Uganda, where HIV prevalence is estimated at 5.9% [20]. VMMC has been conducted in Ntungamo for 13 years through community outreaches and facility-based approaches with support from USAID/PEPFAR [22].

All 8 VMMC-accredited facilities were included in the sampling frame for this study. However, one facility had not reported any VMMC cases during the review period (October 2021 – September 2023) and was therefore excluded, resulting in a final study sample of 7 facilities: Ntungamo HC IV, Itojo Hospital, Kitwe HC IV, Bwongyera HC III, Rubaare HC IV, Rwashamaire HC IV, and Ngoma HC III. Data collection for the qualitative component, however, was conducted across the catchment areas of all the 8 accredited facilities.

2.2 Study population, sample size and sampling procedure

The quantitative component involved a review of medical records from public health facilities in Ntungamo District that offered VMMC services between October 2021 and September 2023. Although routine HMIS records captured all male VMMC clients aged 10–49 years during this period, this study specifically targeted and analyzed records for men aged 30–49 years, who represent the primary population of interest. Records between 2021 and 2023 were selected because this period had the most complete and verified HMIS dataset with regard to VMMC uptake. Records with incomplete key variables were excluded from the analysis. For the qualitative component, the study targeted community-dwelling men aged 30–49 years residing within the catchment areas of the selected health facilities. Circumcision status was not used as an inclusion or exclusion criterion, to allow exploration of diverse perspectives from both circumcised and uncircumcised men. Participants were eligible if they were aged 30–49 years, resident in the selected communities, and willing to provide informed consent. Men who were unable

to participate in group discussions due to illness or communication difficulties were excluded.

The sample size for the quantitative arm was determined using a survey sample size formula the Kish–Leslie formula (1965). We assumed a prevalence of 31.4% based on a previous Ugandan study [7], a 5% margin of error, a 95% confidence level, and an additional 10% adjustment to account for potential missing data. This resulted in a final required sample size of 368 records. We included all eight Ministry of Health–accredited facilities in Ntungamo District that offered VMMC services in the sampling frame. However, only seven had reported VMMC cases during the review period and were therefore selected. The number of records reviewed at each facility was allocated using probability proportionate to size sampling based on the volume of VMMC clients per facility (Supplementary file 1). Consecutive sampling was applied to determine each record to be reviewed.

Additionally, eight Focus Group Discussions (FGDs) were conducted, one within the catchment area of each of the eight VMMC-accredited health facilities, until data saturation was achieved. Saturation was assessed iteratively during data collection by monitoring for the emergence of new themes [23], once interviews no longer yielded novel information, data collection was concluded. Participants were community-dwelling men aged 30–49 years, and circumcision status was not considered as an inclusion or exclusion criterion, in order to capture a broad range of perspectives on VMMC. A multi-stage purposive sampling approach was used to identify and recruit participants. First, one village was purposively selected from each health facility catchment area to ensure geographical representation across the district. Within each selected village, a Village Health Team (VHT) member assisted in community mobilization by informing eligible men about the study and inviting them to participate. Men who met the age criteria (30–49 years), were residents of the selected village, and were willing to provide informed consent were included in the FGDs. Participants were recruited on a voluntary basis, and efforts were made to include men of varying marital status, occupations, and educational backgrounds to ensure diversity of views. Each FGD comprised 8–12 participants.

2.3 Data collection tools and procedure

The quantitative data were collected through document review of the Safe Male Circumcision (SMC) client form (HMIS ACP 029), which is the standard data collection tool used by the Ministry of Health of Uganda. The tool captures primary data of each man and consent/assent is documented before circumcision. We reviewed medical records of all men (10–49 years) who undertook VMMC between October 2021 and September 2023 at public health facilities. These safely stored hard copies were accessed after obtaining consent from the health facility In-charge. We captured information on background and other characteristics of men who had undergone VMMC including occupation, education level, tribe, religion, marital status, site type, source of information about VMMC, sexual activity status, and recent HIV testing history. Review of records was done by four research assistants with a bachelor's degree in nursing, training in Good Clinical Practice and Responsible Conduct of Research. The research assistants were fluent in English and the local language. The research assistants were trained on the study protocol prior to data collection to ensure consistency in the data collected.

Qualitative data were collected through eight focus group discussions using a standardized FGD interview guide. The FGD interview guide collected data on awareness about VMMC uptake and perceptions about VMMC procedure, including benefits, motivations and barriers to VMMC uptake. The FGD interview guide was developed based on a review of existing literature on VMMC uptake and men's health-seeking behaviours in sub-Saharan Africa [24, 25]. Key domains including awareness and knowledge of VMMC, perceived benefits, fears of pain and complications, economic constraints, and social influences such as peer and partner support, were adapted from these studies to ensure relevance to the study objectives. Some of the questions asked included; "Describe what you know about VMMC and the benefits you know it provides," "Discuss how you usually get information about VMMC and how they would influence your decision in seeking the services," "Share any challenges or concerns that discourage men from seeking VMMC services," "Elaborate on the factors that would motivate or encourage men to consider undergoing VMMC." The questions in the guide were reviewed by an experienced qualitative researcher (EM) to ensure the relevance and appropriateness of the study objectives. The FDG guide was translated into local language (Runyankole) by language expert to ensure that the research assistants asked the correct questions. In total, 8 FGDs were conducted with each group comprising 8–12 participants and each FGD lasted approximately 70–90 min. The interviews were conducted in local Language, audio-recorded with consent, and transcribed verbatim and later translated to English. To minimize discomfort and encourage open discussion, FGDs were conducted in familiar community settings, facilitated by trained moderators of the same sex and fluent in the local language. Participants were assured of confidentiality, and ground rules emphasizing respect and non-judgment were established at the beginning of each discussion. Importantly, circumcision status was not disclosed or required for participation, which helped reduce stigma and encourage participation.

2.4 Data management and analysis

All data were backed up on an external hard drive and a Google drive. For quantitative arm, data on records was reviewed at a time by the research assistant. Manual summaries were made followed by entry of the data into Microsoft excel. Descriptive statistics was done to determine the proportion of men aged 30–49 years who underwent VMMC between October 2021 and September 2023 and their characteristics.

The audio-recorded interviews in local languages were transcribed verbatim and translated into English by bilingual expert (PM) to ensure accuracy and minimize bias. The transcripts were subsequently proofread by two members of the research team, each of whom was proficient in both languages. This was performed by listening to the original audio recordings while reviewing the transcripts to ensure the accuracy of the original content and correcting any grammatical errors identified. Four team members independently read the transcripts to familiarize themselves with the data.

An inductive thematic analysis approach [26] was employed to analyze the data. The themes generated included awareness about VMMC and its benefits, and perceptions about VMMC procedure, process and post-surgical care. Three research team members independently conducted the manual coding. Manual coding involved identifying recurring patterns and themes and assigning descriptive codes to segments of the data. The codes were iteratively reviewed and refined to ensure that they accurately represented

participants' perspectives. The findings were discussed by the research team, and any discrepancies in interpretation were resolved through consensus. Illustrative quotes were extracted from individual interviews to elaborate on codes.

3 Results

3.1 Quantitative participant characteristics

Table 1 presents the socio-demographic and service-related characteristics of 368 men who underwent VMMC between October 2021 and September 2023, disaggregated by age group (10–29 years and 30–49 years) to contextualize the uptake gap that is the focus of this study. Among men aged 30–49 years who did undergo VMMC, the majority (88.1%) were not formally employed, though employment was notably higher in this group (11.9%) compared to younger men (1.0%). Educational attainment was also higher among older men, with 91.5% having attained primary or post-primary education compared to 58.3% among younger men. The study population was predominantly of the Banyankole tribe (94.8%) and almost entirely Christian (99.5%) across both age groups.

Marital status differed markedly between age groups, with the majority of men aged 30–49 years being ever married (71.2%), whereas most younger men (87.4%) had never married. This difference is particularly relevant as marital status and spousal dynamics emerged as important contextual factors influencing VMMC decision-making among older men, as further explored in the qualitative findings. Most VMMC services were

Table 1 Background and other characteristics of men that had undergone VMMC

Characteristic	All (n = 368) n (%)	Age category	
		10–29yrs(n = 309) n (%)	30–49 yrs. (n = 59) n (%)
Occupation			
Employed	10(2.7%)	3 (1.0%)	7 (11.9%)
Not employed	358(97.3%)	306 (99.0%)	52 (88.1%)
Highest Level of Education			
Pre-primary and none	27(7.3%)	22 (7.1%)	5 (8.5%)
Primary and post-primary	234(63.6%)	180 (58.3%)	54 (91.5%)
Tribe			
Munyankole	349(94.8%)	291 (94.2%)	58 (98.3%)
Other tribes	19(5.2%)	18 (5.8%)	1 (1.7%)
Religion			
Christians	366(99.5%)	307 (99.4%)	59 (100.0%)
Moslem	2(0.5%)	2 (0.6%)	0 (0.0%)
Marital Status			
Ever married	81(22.0%)	39 (12.6%)	42 (71.2%)
Never married	287(78.0%)	270 (87.4%)	17 (28.8%)
Site Type			
Outreach	338 (91.0%)	287 (92.9%)	51(86.4)
Static	30 (8.2%)	22(7.1%)	8(13.6%)
Source of Information About SMC			
Friend	12 (3.3%)	11(3.6%)	1(1.7%)
VHT	356 (96.7%)	298(96.4%)	58(98.3%)
Sexual Activity Status			
Yes	314 (85.3%)	255 (82.5%)	59(100.0%)
No	54 (14.7%)	54 (17.5%)	0 (0.0%)
Tested for HIV in the Past 4 Weeks			
No	51 (13.9%)	0 (0.0%)	51(86.4%)
Yes	317 (86.1%)	309 (100.0%)	8(13.6%)

SMC: Safe Male Circumcision, VHT: Village Health Team

Table 2 Summary of key themes and subthemes

Theme	Subtheme	Category
Awareness about VMMC and its benefits	• Understanding of VMMC and Its Purpose • Source of information about VMMC	
Perceptions of VMMC Procedures, the process and post-VMMC care	- Perceived barriers to VMMC uptake - Perceived facilitators for VMMC uptake	• Perceived risks and concerns about the VMMC process. • Economic barriers • Socio-cultural barriers to VMMC uptake • Peer influence to undertake VMMC • Spousal support and pressure to undertake VMMC. • Perceived health and sexual benefits

accessed through outreach sites (86.4% among older men), and Village Health Teams (VHTs) were the predominant source of information about VMMC (98.3%) among men aged 30–49 years. All men aged 30–49 years who underwent VMMC were sexually active (100%), compared to 82.5% among younger men. Notably, the vast majority of older men (86.4%) had not tested for HIV in the four weeks preceding their VMMC, in sharp contrast to younger men, all of whom (100%) had tested recently.

3.2 Uptake of voluntary medical male circumcision among men aged 30–49 years in Ntungamo district, Southwestern Uganda

Quantitative data were collected from 368 records of men who underwent VMMC over a 2-year period, from October 2021 to September 2023. Less than a quarter, 16.1% (59/368) of all the men (10–49 years) who had undergone VMMC in the review period were aged 30–49 years. Among them, the majority, 88.1% (52/59), were unemployed. Additionally, close to three-quarters, 71.2% (42/59), were married, and most, 86.4% (51/59) of men aged 30–49 years had not tested for HIV in the past 4 weeks before VMMC. The low uptake documented quantitatively is contextualized and explained by the factors identified qualitatively, below, together providing a comprehensive picture of why older men remain underserved.

3.3 Qualitative participant characteristics and the summary of key themes

The focus group discussions (FGDs) comprised men aged 30–49 years drawn from the communities of Bwongyera, Kakiika, Ngoma, Itojo, Kahunga, Rubaare, Kitwe, and Rwashamaire. Most of the participants were married and did not have formal employment. The education status ranged from no formal education to tertiary education, and almost all were Christians.

The study identified two main themes: (1) awareness of VMMC and its benefits, including understanding of VMMC and sources of information; (2) perceptions of the VMMC procedure and post-circumcision care, characterized by perceived barriers to VMMC as well as perceived facilitators of VMMC uptake among men aged 30–49 years (Table 2).

3.4 Theme 1: awareness about VMMC and its benefits

Awareness about VMMC and its benefits emerged as a key theme in the study. Participants demonstrated varying levels of understanding of VMMC and its intended purpose, with many recognizing it as a medical procedure aimed at reducing the risk of HIV

and improving personal hygiene. Sources of information about VMMC included health workers and media programs, which played an important role in shaping men's knowledge and perceptions of VMMC.

3.4.1 Understanding of VMMC and its purpose

Many participants demonstrated a clear understanding of VMMC and its perceived health benefits, particularly in relation to hygiene and disease prevention.

"Circumcision improves hygiene by removing the dirt that hides under the prepuce and helps prevent diseases like gonorrhea and HIV" (Itojo-Kahunga FGD).

3.4.2 Sources of information about VMMC

Most participants reported that they accessed information about Voluntary Medical Male Circumcision (VMMC) from diverse sources, including radio broadcasts, community mobilizers, and health facility announcements.

"...radios and TV stations always advertise these services of male circumcision, even health workers appear there and talk about it. So we hear them." (Rubare FGD).

3.5 Theme 2: perceptions on VMMC procedures and post-VMMC care

Perceptions of the VMMC procedure and post-circumcision care strongly influenced uptake. Key barriers included fears related to pain, complications, and healing time, as well as practical and economic constraints such as loss of income and time away from work, and socio-cultural beliefs that discouraged circumcision. Conversely, facilitators of VMMC uptake included peer influence, spousal support or encouragement, and perceived health and sexual benefits, which motivated some men aged 30–49 years to undergo the procedure.

3.5.1 Perceived barriers to VMMC Uptake

Barriers to VMMC uptake among men aged 30–49 years were multifaceted. Participants expressed perceived risks and concerns related to the VMMC process, including fear of pain and other complications. Economic barriers, such as loss of income during recovery and work commitments, also hindered uptake. Additionally, cultural and social factors, including stigma and misconceptions about circumcision, contributed to low VMMC uptake among men in this age group.

3.6 Perceived risks and concerns about the VMMC process

Fear of pain during and after the VMMC procedure was commonly mentioned during the discussion. Many respondents expressed anxiety about the discomfort associated with the procedure, fear of extended recovery times, and the potential for complications during the healing process.

"...those injections into the penis at the beginning of the procedure are very painful, also after circumcision, there is a lot of pain, especially when you get an erection, and after that it takes months for the penis to heal properly..." (Rubaare FGD).

Some men expressed concerns about potential infections, delayed healing, and other complications that could arise if they did not receive proper follow-up care after the procedure.

“...my friend almost lost his manhood, he got a big wound after 4 days and couldn't walk, but the health workers said they would only help him if he found the means to the health facility, yet he was unable even to sit on a bicycle to take him there...” (Rubaare FGD).

Men expressed concerns about the procedure itself and the aftercare. Many men were hesitant about undergoing circumcision due to the perceived risks of complications and the lack of adequate post-procedure follow-up care.

“...We worry about complications because health workers don't always follow up consistently after the procedure until one heals...” (Kakiika cell FGD).

3.7 Economic barriers to VMMC uptake

A common concern was the economic impact of taking time off work to recover following VMMC. Many men expressed fears about how the procedure would affect their ability to support themselves and their families financially. One participant in Bwongyera cell-FGD explained,

“...some of us have to work every day, our jobs need energy, and therefore one has to be very healthy, having a wound on the penis is not easy, and therefore we fear losing income during recovery...” (Bwongyera cell FGD).

Many men also cited indirect costs associated with recovery, such as transportation to health facilities for follow-up visits.

3.8 Socio-cultural barriers to VMMC uptake

Cultural and social dynamics, such as concerns about marital relationships and potential social stigma, were prominent barriers to seeking VMMC. For many men, the fear that circumcision might lead to negative outcomes within their marriage was another barrier.

“...the common message is that it prevents HIV, and my wife knows it is done for those men who have risky sexual behaviour. If I get circumcised, she will ask what has changed in our sexual life that necessitated getting circumcised, and if I stop having intercourse after circumcision, my wife might think I have other women.” (Kakiika cell FGD).

“...Circumcision is for young boys who are not busy, I see them being taken from schools and communities, me as a grown man, I cannot mingle with those young boys.” (Rwashamaire FGD).

3.8.1 Perceived facilitators for VMMC uptake

Under the facilitators for VMMC uptake, most participants reported peer influence, spousal support and pressure to get circumcised as well as other health and sexual reasons that motivated them to undertake VMMC.

3.9 Peer influence to undertake VMMC

Most participants agreed that influence from peers on their colleagues was a big motivator for VMMC uptake. Men learned about the benefits of circumcision from friends and peers who had already undergone the procedure.

“...friends who have already been circumcised encourage us, they share their experience, and we can even see how they are faring after VMMC. The majority have no complaints, and that encourages us to go too...” (Kitwe FGD).

3.10 Spousal support and pressure to undertake VMMC

The majority of the group participants agreed that pressure from intimate partners influenced decision-making towards undertaking VMMC.

“...many times, when you meet a new girlfriend, you get the impression that they would prefer sex with a circumcised man, the bold ones will tell you to get circumcised before the next encounter...” (Itojo-Kahunga FGD).

However, there were a few contradictory opinions suggesting that some women did not approve of the practice, and this demotivated men to undertake VMMC.

“.....if I stop having intercourse after circumcision, my wife might think I have other women.....” Kakiika village FGD).

3.11 Perceived health and sexual benefits

Health-related reasons were the most commonly mentioned motivators for men considering VMMC. The majority acknowledged that the procedure provided significant health benefits, particularly in terms of STI prevention.

“We men do it to avoid diseases like HIV and STDs.....” (Bwongyera FGD).

Furthermore, participants highlighted that VMMC was good at helping them maintain hygiene, which motivated them to seek the services.

“... circumcision helps keep a man clean and free from infections...” (Itojo-Kahunga FGD).

Sexual benefits were also commonly raised with the majority of men suggesting that VMMC improves their sexual prowess.

“...when you are circumcised, you last longer during sexual intercourse, so I would encourage men, and I am sure many men have been circumcised for that reason...” (Rubaare FGD).

Taken together, these qualitative findings explain and contextualise the low VMMC uptake documented quantitatively, revealing that for men aged 30–49 years, the decision to undergo VMMC is not merely a matter of awareness but is shaped by a complex interplay of fear, economic vulnerability, socio-cultural identity, and social influence, all of which must be addressed simultaneously if VMMC programs are to meaningfully reach this high-risk age group in Ntungamo district.

4 Discussion

The study found that men aged 30–49 years constituted 16.1% (59/368) of all clients who underwent VMMC between October 2021 and September 2023 in Ntungamo District. This indicates that a relatively smaller proportion of VMMC clients were from this age group compared to younger men within the same service data. The observed distribution may be explained by men's perceptions of the procedure, including fears of pain, concerns about healing time, and economic constraints, which appeared to outweigh perceived benefits and influence their decision to utilize VMMC services.

In our study, only 16.1% of men who underwent VMMC were aged 30–49 years, revealing persistently low uptake among the age group at highest risk of HIV infection and highlighting a critical gap in VMMC programming in Ntungamo District and similar rural settings. This low uptake is in line with findings from studies in rural Uganda and other priority countries, which reported substantially lower uptake among older

men compared to adolescents and young adults [2, 27, 28]. The low uptake among older men may be explained by competing economic responsibilities, marital obligations, and entrenched social norms that frame circumcision as an intervention for boys and young men [16, 29]. Unlike younger men, older men may also perceive fewer personal benefits relative to perceived costs [27]. These findings imply a need for age-differentiated VMMC strategies that prioritize men aged 30–49 years as a distinct target group. Furthermore, VMMC coverage can improve if these services are integrated into other health care services as well as in the communities and workplaces [9, 30].

The demographic profile indicates that the majority of men accessing VMMC services were aged 30–49 years, married, and engaged in informal economic activities. This is an important finding because older men, particularly those in stable unions, are often considered a priority population for HIV prevention due to their relatively higher risk of HIV acquisition and transmission within long-term partnerships. This finding that men aged 30–49 years and married men are accessing VMMC services contrasts with several studies in Uganda and sub-Saharan Africa, which consistently show higher uptake among younger and unmarried men. For example, a recent Ugandan study found that most VMMC clients were younger (≤ 27 years) and unmarried, and married men were less likely to undergo circumcision [7]. Similarly, programmatic data from Central Uganda showed that the majority of VMMC clients were aged 20–29 years [28], even where services were adapted. Across Sub-Saharan Africa, demand-generation strategies particularly school- and youth-based interventions have historically skewed uptake toward adolescents and young adults rather than older men [31]. The difference may be explained by targeted community outreach and VHT engagement, which appear to be more effective in reaching older, married men who are typically missed by youth-focused strategies. Additionally, married men may be motivated by perceived responsibility to protect partners or increased HIV risk awareness within stable unions [10]. However, persistent structural and cultural barriers such as fear of pain, healing time, and opportunity costs have previously limited uptake among this group in Uganda. This suggests a positive shift in program reach, indicating that community-based models can successfully engage older men, a key priority population for HIV prevention. However, it also highlights the need to maintain a balance so that younger men are not neglected.

Furthermore, the predominance of men engaged in informal economic activities in this study is consistent with evidence from Uganda indicating that a substantial proportion of VMMC clients are either informally employed or low-income earners [7, 32]. However, despite this similarity, previous studies highlight that economic constraints remain a significant barrier to VMMC uptake, particularly among older working men who face competing livelihood demands and cannot easily afford time away from income-generating activities [33]. Even in settings where VMMC services are provided free of charge, overall uptake remains suboptimal, largely due to indirect costs such as lost wages, transportation expenses, and time required for recovery [34]. These findings suggest that financial and opportunity costs continue to undermine the effectiveness of existing service delivery models. Therefore, there is a critical need for operational and economic research to better quantify the burden of these indirect costs and their influence on service utilization among men in the informal sector.

We found that despite low uptake, men aged 30–49 years demonstrated high awareness of VMMC. The predominance of men engaged in informal economic activities in your

study aligns with evidence from Uganda showing that a large proportion of VMMC clients are informally employed or low-income earners and its health benefits, including HIV and STI prevention and improved hygiene. This indicates that knowledge alone is insufficient to drive uptake in this age group. This finding aligns with previous studies in Uganda and Eswatini, which reported good knowledge of VMMC but continued reluctance to undergo the procedure among older men [13, 35]. The disconnect between awareness and uptake may be attributed to risk-benefit appraisal, where older men weigh immediate economic and social costs more heavily than long-term health benefits [36]. These findings suggest that VMMC programs must move beyond awareness campaigns towards addressing practical and psychosocial constraints. Future research should examine which message framings and delivery channels resonate most with older men, particularly those emphasizing economic protection and family well-being.

Most participants pointed out fear of pain, prolonged healing, and inadequate post-procedure care as dominant deterrents to VMMC uptake. Conversely, men expressed anxiety about injections, erections during healing, infections, and lack of responsive follow-up care from health providers. These concerns are consistent with findings from western and central Uganda, where fear of pain and perceived poor management of post-circumcision complications discouraged VMMC uptake [10, 13]. The lack of adequate follow up and post procedure care from the healthcare providers reflects poor quality VMMC services. Nevertheless,, clinical evidence shows that VMMC is generally safe when appropriate follow-up is provided, suggesting a gap between perceived and actual service quality [37]. Existing literature has consistently shown that the quality of VMMC services including provider competence, pain management, counselling, and post-operative follow-up plays a critical role in influencing uptake [38, 39]. Studies in Uganda and other sub-Saharan African settings report that fears of poor wound care, complications, and negative client experiences can deter men from seeking VMMC services, even when awareness is high [24, 32]. Our findings are consistent with this evidence and highlight the need to strengthen not only technical service delivery but also client-centered care, particularly follow-up mechanisms and communication, to improve confidence in VMMC services among older men [40]. Programmatically, this underscores the role of strengthening post-VMMC follow-up, pain management counselling, and emergency referral systems. Future studies should evaluate client satisfaction with post-circumcision care and test enhanced follow-up models, including community-based and phone-based follow-up.

Our findings also showed that economic constraints, particularly loss of income during recovery and transport costs for follow-up visits, were major barriers to VMMC uptake among men aged 30–49 years. These challenges were especially salient given the predominance of informal employment among participants. Similar findings have been reported among rural men in Uganda and Tanzania, where indirect costs were stronger deterrents than the procedure itself [13, 41]. Additionally, failure to get time off at the work place following circumcision has been cited as one of the major barriers [16, 42]. It is important to note that older men's roles as household providers likely amplify sensitivity to income disruption, making even short recovery periods economically untenable. These findings imply that VMMC programs must incorporate economic considerations, such as flexible service hours, workplace-based circumcision, or short-term livelihood support and fixed compensation for those that go for VMMC [43]. Future research

should quantify the indirect costs of VMMC and assess cost-mitigation interventions tailored to older men.

Peer influence and spousal support emerged as strong motivators for VMMC uptake, alongside perceived health and sexual benefits. Men reported greater willingness to undergo VMMC after observing positive experiences among peers or receiving encouragement from intimate partners. These findings align with previous African studies demonstrating that women and peers play a pivotal role in shaping men's health behaviours [14, 17, 44]. On the contrary, some participants indicated that spousal influence can also be negative when VMMC is associated with mistrust or infidelity, as highlighted by previous studies [42, 45]. This dynamic highlights how intimate relationship norms and gendered expectations can function as barriers to VMMC uptake. Hence, these findings suggest that couple-centered and peer-led approaches may be particularly effective for increasing VMMC uptake among older men. Future studies should assess the effectiveness of involving women and circumcised peers as VMMC champions.

Our findings further showed that perceived health-related benefits of VMMC motivated service uptake, particularly the desire to improve personal hygiene and enhance sexual performance. Participants viewed circumcision as a means of maintaining genital cleanliness, preventing infections, and increasing sexual confidence, which reinforced their willingness to seek VMMC services. These perceptions align with evidence from previous studies, which consistently cite the desire to maintain genital hygiene and prevent infections as major reasons men opt for VMMC [15, 44, 46]. Additionally, the belief that VMMC improves sexual performance is strongly held in many African societies and has been cited as one of the motivators for VMMC uptake [14, 44, 47]. Collectively, these findings suggest that emphasizing both the hygienic and sexual health benefits of VMMC, while ensuring accurate, balanced messaging, may be an effective strategy for increasing demand and sustaining uptake among men.

4.1 Strengths and limitations

One of the key strengths of this study was use of both quantitative and qualitative data collection methods which provided both the magnitude and contextual understanding of VMMC uptake among men aged 30–49 years, linking service utilization patterns with men's lived experiences, perceptions, and social influences. The use of routinely collected Ministry of Health data from the standard Safe Male Circumcision client form (HMIS ACP 029) enhanced data consistency, comparability, and programmatic relevance. In addition, inclusion of all Ministry of Health–accredited VMMC facilities in the district, with probability proportionate to size allocation, improved the representativeness of facility-based VMMC services in Ntungamo District.

Several limitations should be considered when interpreting these findings. The cross-sectional design precludes causal inference, as temporal relationships between perceptions, motivations, and VMMC uptake could not be established. The use of FGDs for sensitive topics like VMMC may have introduced social desirability bias and limited disclosure of personal experiences. Quantitative analyses were limited to men who accessed VMMC services at public health facilities, excluding those circumcised in private facilities or those who never accessed services, which may have led to underestimation or misrepresentation of overall uptake. Additionally, the qualitative findings reflect general community perceptions rather than the specific experiences of men who accepted or

declined VMMC services. Reliance on retrospective HMIS record review further constrained the analysis to routinely documented variables, omitting potentially important factors such as income, cultural beliefs, pain experiences, and post-procedure outcomes, and some records may have been incomplete or inaccurately documented. Nonetheless, these limitations were partially mitigated by using standardized Ministry of Health data collection tools, including all accredited VMMC facilities in the district, and complementing quantitative findings with qualitative data to provide contextual depth.

5 Conclusion

In this study, men aged 30–49 years accounted for 16.1% of all clients who underwent VMMC, indicating that a smaller proportion of VMMC service users were from this age group compared to younger men. VMMC uptake was shaped by several barriers, including fear of pain, concerns about prolonged healing time, and financial constraints related to the inability to work during recovery. Conversely, uptake was encouraged by peer influence, perceived health and sexual benefits, and spousal support. Tailored strategies such as workplace and community-based VMMC delivery, strengthened follow-up care, and peer- and partner-supported interventions should be implemented to address economic, informational, and service-related barriers and improve uptake among men aged 30–49 years. Future studies are recommended to adopt a more targeted qualitative approach involving distinct groups of men (those who accepted, declined, and those in the general community) to provide more nuanced insights.

Abbreviations

ACP	AIDS control program
AIDS	Acquired immune deficiency syndrome
FGD	Focus group discussion
HC III	Health center level 3
HC IV	Health center level 4
HIV	Human immuno-deficiency virus
HMIS	Health management information system
OPD	Out-patient department
PEPFAR	The U.S. president's emergency plan for AIDS relief
RCT	Randomized controlled trial
SMC	Safe male circumcision
STI	Sexually transmitted infection
UDHS	Uganda demographic and health survey
UNAIDS	Joint United Nations Programme on HIV/AIDS
USAID	United States agency for international development
VMMC	Voluntary medical male circumcision
VHT	Village Health Team
WHO	World Health Organization

Supplementary Information

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Supplementary Material 1.

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Author contributions

AK TM, EM, AB, and BC conceived and designed the study. Formal data analysis was undertaken by AK and AM. The initial manuscript draft was prepared by OH, AK, AM and TM, while EM oversaw study implementation and data collection. EM provided critical revisions to the manuscript. TM, AK, AM and EM compiled the final version. All authors reviewed and approved the final manuscript.

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Data availability

The de-identified datasets generated and analyzed during the current study can be obtained from the corresponding author on reasonable request.

Declarations**Ethics approval and consent to participate**

All procedures complied with the 2013 Declaration of Helsinki and relevant national guidelines. The study protocol received ethical clearance from the Faculty of Medicine Research Committee and the Mbarara University of Science and Technology Research Ethics Committee (MUST-2024-1537). Administrative clearance and authorization to access facility data were obtained from Ntungamo district administration. Written informed consent was obtained from each participant for the FGDs at enrollment and separate consent for audio recording was also obtained. Before the start of interviews, the moderator emphasized to participants their voluntary participation and right to withdraw and leave at any time. A waiver of consent was obtained to gain access to the VMMC records. Confidentiality was safeguarded by replacing personal identifiers with unique study codes, storing the linkage file separately on password-protected computers with restricted access, and keeping paper records in locked cabinets. For record review, only the researcher and research assistants had access to the records of men who underwent VMMC.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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