

Voluntary Medical Male Circumcision and Sexual Practices among Sexually Active Circumcised Men in Mzuzu, Malawi: A Cross-Sectional Study

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Abstract

Background: Voluntary Medical Male Circumcision (VMMC) is one of the strategies being promoted to prevent sexual heterosexual transmission of HIV. It has been adopted by 14 countries with high HIV prevalence and low circumcision rates. The 60% protective efficacy of VMMC has come with misconceptions in some societies in Malawi, hence VMMC clients may opt for risky sexual practices owing to its perceived protective effect. The study estimated proportion of circumcised men engaging in risky sexual behaviors post-VMMC, assessed knowledge on VMMC protective effect and identified socio-demographic factors associated with risky sexual practices. **Method:** A cross sectional study was conducted at two sites of Mzuzu city. Systematic random sampling was used to select 322 participants aged 18-49 who had undergone VMMC. The independent variables included age, location, occupation, religion, marital status and education. Outcome variables were non condom use, having multiple sexual partners and engaging in transactional sex. Data from questionnaires was analyzed using Pearson's chi square test and logistic regression. **Results:** Out of 322 respondents, 84.8% (273) understood the partial protection offered by VMMC in HIV prevention. Ninety-six percent of the participants self-reported continued use of condoms post VMMC. Overall 23.7% - 38.3% participants self-reported engaging in risky sexual practices post VMMC, 23.7% (76) had more than one sexual partner; 29.2% (94) paid for sex while 39.9% (n=187) did not use a condom. Residing in high density areas was associated with non-condom use, ($p = 0.043$). Being single ($p < 0.001$), and residing in low density areas ($p = 0.004$) was associated with engaging in transactional sex. **Conclusion:** Risky sexual practices are evident among participants that have undergone VMMC. Messages on safer sexual practices and limitations of VMMC need to be emphasized to clients, especially unmarried or single and those residing in low density areas.

Background

HIV and AIDS pose a major threat to health and livelihood world-wide. Of the 37 million people living with HIV worldwide, 70% of these live in sub-Saharan Africa and Malawi accounts for 4% [1–3]. Malawi has an HIV prevalence of 8.8% among men and women aged 15 – 49 [2]. Approximately 5,600 people worldwide contract HIV daily [1,4] and 790,000 adults and children died of AIDS related illnesses, accounting for 66% of AIDS related deaths worldwide [1,4]. An estimated 1 million people in the Sub Saharan region contract HIV annually as of 2017 [1,4,5]. In 2017, Malawi registered 39,000 new HIV infections and 17,000 deaths due to AIDS related illnesses in all ages [1,4, 6]. Heterosexual contact is the major mode of HIV transmission and accounts for 88% of the infections [2]. Access to prevention and treatment from this incurable disease is limited in sub-Saharan Africa and the disease affects mostly the productive age group [7]. In this regard, efforts tailored at reducing HIV transmission and averting deaths is a welcome development. However, there are several types of prevention strategies to reduce the risk of acquiring or transmitting HIV such as behavioral, biomedical and structural that are complementary [8,9].

Voluntary medical male circumcision (VMMC) is one of the biological interventions and is an effective strategy in reducing sexual transmission of HIV from women to men [10–12]. In 2007, the Joint United Nations Programme on HIV/AIDS (UNAIDS) and the World Health Organization (WHO) recommended scale up of male circumcision (MC) and has been adopted as one of the HIV preventive strategies in countries with low levels of MC[13]. Globally, the estimated prevalence rate of male circumcision is around 38.7% with half of the circumcisions conducted for religious and cultural reasons [14,15]. Only 28% of the men aged 15-49 in Malawi are circumcised [3]. This figure includes 18% circumcised by traditional practitioners and 9% by medical professionals[3]. Hence the percentage for those that underwent VMMC is significantly low. Male circumcision is effective when done between the ages of 15 to 20 years and its effect declines with increase in age as the risk of contracting HIV decreases [16].

Evidence of male circumcision on HIV prevention came from meta-analysis of three randomized controlled trials involving 11,050 men that were conducted in South Africa, Kenya, and Uganda which showed a relative risk reduction for contracting HIV infection in circumcised men to be around 60 % (95% CI 40 – 67%) [17, 18]. Consequently, recommendations were made by WHO and UNAIDS to countries with low rates of male circumcision and high HIV prevalence rate to adopt VMMC as a measure to prevent HIV transmission alongside other preventive strategies such as condom use. Following this development, Malawi as one of 14 prioritized countries according to WHO and UNAIDS, adopted and rolled out VMMC in 2011 as one of its HIV preventive strategies [19,20]. A total of 266,176 VMMCs have so far been performed as of 2015 representing 13% of the target that was set in 2011 [21]. Circumcising more than 80% of males aged 15 to 49 in a high HIV prevalent region could avoid 3.36 million infections and 386,000 deaths by 2025 [22].

VMMC clients undergo counselling and HIV testing prior to the circumcision procedure where they are informed about the advantages of VMMC and the need to use other HIV prevention strategies including being faithful to one partner, abstaining from sex for a period of six weeks following VMMC, and also consistent and correct condom use [23,24].

During counselling, the protective effect of VMMC which is at 60% (as a scientific explanation) is interpreted as a lowered risk of contracting HIV if circumcised [23,24]. This explanation creates and leaves room for misconceptions and poses a considerable threat to the main preventive effort [24]. It was also noted that the media utilizes this '60%' protection in promoting VMMC messages against HIV infection, which was observed in a trial by Auvert et al[10].

A study conducted in Kenya involving 1,344 men showed that 30.7% were involved in early resumption of sex [25]. This is one of the risky sexual practices following VMMC, which may be as a result of the misunderstanding of the protective effect of VMMC [25]. Furthermore, the desire to be circumcised was associated with knowledge of the perceived protective effect of VMMC among the uncircumcised individuals who were practicing risky sexual behaviours as well as high incidence of STIs in circumcised clients [22, 26]. In this case, the motivation to get circumcised could be associated with the desire to freely engage in risky sexual practices due to the perceived protective effect of VMMC. This may point to the lack of understanding as regards the protective effect of VMMC which may contribute to further risky sexual practice among circumcised men hence putting them at risk of contracting HIV.

It is worth noting that women's desire for circumcised men, enhanced sexual pleasure, religion, proven safety, affordability, confidentiality and being hygienic prompted participants to go for circumcision [20,27]. In Malawi, the desire to have more women was the motivating factor for the adolescent boys to get circumcised [22].

There are limited studies on risky sexual practices associated with “60% protective effect” of VMMC in Malawi [28]. This study was conducted to determine if circumcised men were likely to engage in risky sexual practices in Mzuzu City owing to the perceived protective effect that VMMC offers.

Methods

Study design and study setting

A cross section study was conducted in two health facilities of Mzuzu city located in the northern region of Malawi between 12 February, 2017 and 11 May, 2017. Mzuzu city was chosen since it has two public health facilities that provide free VMMC services to the community with support from partners Jhpiego Malawi and Project Concern International (PCI) Malawi.

Study Population

All men aged 18 to 49 years who underwent voluntary medical male circumcision were eligible for the study.

Inclusion criteria and exclusion criteria

The study included men aged 18 to 49 years that had undergone VMMC at any of the two sites and six months had elapsed following procedure were eligible for the study. On the contrary, those who were very sick were not included in the study.

Variables

The explanatory variables included socio demographic characteristics; age, occupation, marital status, education, religion and place of residence. Outcome variables were risky sexual practices. Risky sexual practice constituted three indicators namely: transactional sex in all men who reported to have ever engaged in paid sex, multiple sexual partners in those that had more than one sexual partner and non-condom use in those that did not use a condom during last sex to a non-marital or cohabiting partner.

Sampling and sample size determination

The two government owned facilities that provide free VMMC services were both used to sample participants for the study. Sample size was determined using STATA version 12 with 31% proportion [25], level of statistical significance at 5%, 95% confidence interval and margin of error; 0.05. The calculated overall sample size was 322 participants.

Systematic random sampling was used to select study participants. Those waiting to collect medication at the pharmacy following consultation were approached. Every 5th male client was selected until the sample size was reached.

Data Collection

An interviewer administered structured questionnaire [29] was used to collect data. Data was collected by two Research Assistants (RAs) and the Principle Investigator (PI). Research assistants were trained in data collection methods and management for three days, followed by one day of fieldwork pre-testing. The questionnaire had three components: the socio demographic factors, sexual practice assessment and the interpretation of VMMC messaging to prevent HIV. The English questionnaire was translated into Tumbuka and Chichewa languages. The translated questionnaires were then back-translated to English to maintain meaning and consistency. The tool was piloted with 10 participants and was amended to capture all the relevant information.

The PI and the RAs approached potential research participants and sought their informed consent prior to data collection. At the end of each day, the principle investigator checked the questionnaires for completeness and consistency and provided feedback to data collectors where necessary. Data was double entered into a secure password protected Microsoft Excel (2007) database and was cleaned before analysis. Statistical analysis was done using STATA version 12 (Stata corp., college station, Texas: Statacorp LP, USA).

Data Analysis

Proportions and frequencies for categorical variables were calculated. Pearson's Chi-square test was used to analyze categorical data for associations and relationships between the variables. Odds ratio was used as a measure of effect. Logistic regression was also used to control for confounding. Statistical tests were assessed at significance level of 0.05 and confidence level of 95%.

Ethical approval and consent to participate

Ethical approval was obtained from the College of Medicine Research Ethics Committee in Malawi (reference number P.10/16/2035). Written permission to conduct the study was obtained from Mzuzu and Moyale health facilities. Informed written consent were obtained from study participants. Willingness to participate in the study was confirmed by signing or thumb printing on the informed consent sheet.

Results

Socio-demographic characteristics of the study participants

Out of the 322 participants, 154 (47.8%) were recruited from Mzuzu Health Centre and 168 (52.2%) were from Moyale Health Facility. The participants' mean age was 27.6 years SD± 6.8 (range: 18 to 48). Two-thirds of the sample was comprised of men aged 18 to 29, representing 66.8% of total sample; 51.2% of

the participants were married, 66.8% came from high density locations, 72.4% attained secondary education, 83.6% were Christians and 34.8% were students. (Table 1)

Proportion of participants engaging in risky sexual practices

Sexual practices of study participants post VMMC showed that the proportion of participants that self-reported engaging in risky sexual practice post VMMC was 38.2% (n=322). About 23.7% (n=322) reported having multiple sexual partners; 29.2% (n=322) reported being involved in transactional sex while 36.9% (n=187) reported non-condom use in the past six months. On the other hand, 32.3% (104) had sex prior to the recommended six weeks abstinence period (VMMC healing period). (Table 2)

Perceived protective effect of VMMC

The results showed that 50% (n=322) of the participants self-reported undergoing VMMC for HIV prevention, 30.4% for hygiene purposes and 19.6% for other reasons (tradition 2.2%, religion 5.9%, medical reasons 5.3%, and peer pressure 6.2%). The results also show that 84.8% of the respondents reported understanding the partial protection offered by VMMC and that one can still acquire the virus even after circumcision. Only 12.7% of the participants reported that VMMC provides total protection to HIV infection and 2.5% were unsure. On the benefits offered by VMMC, 58.1% stated VMMC helps in the prevention of HIV and STIs, while 37.3% cited hygienic reasons and 4.7% felt it was for sexual pleasure. When participants were asked about the fear of contracting HIV following VMMC, 45.7% of participants stated that they have no fear of contracting HIV following VMMC while 54.4% are still afraid of contracting HIV despite having undergone VMMC. On condom use post VMMC, 94.4% agreed to continued condom use following circumcision. In addition, participants understand that a circumcised man can contract HIV (96.5%) and that an infected circumcised man can still transmit HIV (98.4%) (Table 3).

Sexual practices

On the type of sexual partner, it was observed that 43.5% had sex with a marital partner, 29.2% paid for sex and 27.3% had a non-cohabiting partner. Results of the participants' sexual practices post VMMC showed that 76.4% (n=322) of the participants reported having only one sexual partner. Aside those that did not use a condom because they are married, 22% (n=70) of the participants did not use a condom during their last sexual encounter with a non-cohabiting partner. Several reasons were cited for the non-condom use (condoms not available 6.2%, feeling safe due to VMMC 7.1% and 8.7% forgot to use a condom). Of those that had a risky sexual act despite being single or married, 36.9% (n=187) did not use a condom. In addition, 32.3% were involved in sex prior to the recommended 6 weeks abstinence period post VMMC and 11.8% had a sexually transmitted infection. (Table 4)

Socio-demographic factors associated with risky sexual practices

As explained in the data analysis section, non-condom use, multiple sexual partners and being involved in transactional sex are the proxy indicators for risky sexual practices. While several demographic factors were tested for association with the risky sexual practices, the results showed that VMMC participants living in high density areas were less likely to use condoms when having sex with non-cohabiting partners (p-value=0.030). Furthermore, the study showed that those aged 18-29 years, residing in low density locations, being unmarried / single, having secondary and tertiary education, being student and unemployed were significantly associated with being involved in transactional sex. (Table 5 - 7).

Univariate and multivariate analysis on sexual practices

The odds of not using a condom during the last sexual encounter among those from high density residential areas was twice as higher compared to those from low density residential areas (OR=2.0, 95%CI=1.05-3.81). Age, marital status, occupation, religion and education were not statistically significant with non-condom use. (Table 5)

On multiple sexual partners, aged group 25-29 was significantly associated with having multiple sex partners. The odds of having multiple sexual partners among those aged 25-29 was 2.22 times higher compared to those aged 18-24 (OR=2.22, 95% CI=1.18-4.20). The other age groups were not significant. (Table 6)

On transactional sex, the odds of being involved in transactional sex among those aged 30-49 was 81% less compared to those aged 18-29 (OR=0.19, 95%CI=0.09-0.37). The odds of being involved in transaction sex among the married ones was 88% less compared to those that were single (OR=0.12, 95% CI=0.07-0.22). The odds of being involved in transaction sex among those that reside in high density areas was 55% less compared to those that reside in low density areas (OR=0.45, 95% CI=0.27-0.74). On occupation; students and those that were unemployed were significantly associated with being involved in transaction sex. The odds of being involved in transaction sex was four times higher among the students compared to those with formal employment (OR=4.02, 95% CI=1.80-8.97) and the odds of being involved in transaction sex among those unemployed was six times higher compared to those with formal employment (OR=5.88, 95% CI=2.23-15.5). (Table 7)

Multivariate analysis

The final multivariate model included location, age, marital status, occupation and education. Of these, location was significantly associated with non-condom use (aOR=1.98, 95% CI=1.02-3.84) while marital status (aOR=0.19, 95% CI=0.08-0.47), and residing in low density location (aOR=0.41, 95% CI=0.22-0.76) was significantly associated with being involved in transaction sex (Table 5-7)

Discussion

Overall, the study found that a good proportion of participants; 38.2% (123) that have undergone VMMC engaged in risky sexual practices. The study shows several factors that play a role in the adoption of risky sexual practices among participants that have undergone VMMC namely: age, education, religion, residential area, occupation and marital status.

While anecdotal observations show that there is a better perceived understanding that VMMC protects against contracting HIV, the results in this study show a variation in VMMC client's views. The study shows that a higher proportion of participants reported understanding that VMMC offers partial protection and that one can still acquire HIV if engages in unsafe sexual practices. In addition, almost all of the participants reported the need to continue using condoms post VMMC and that one can still transmit the virus despite having undergone VMMC. Further to this, more than half of the participants reported being afraid of acquiring HIV if they subject themselves to risky sexual practices despite having undergone VMMC.

A study done in South Africa showed that 75.5% of participants understood the partial protection offered by VMMC a percentage slightly lower as compared to this study [30]. A similar study conducted in Botswana, Namibia and Swaziland showed that 9-15% of the participants believe that circumcised men are fully protected against HIV compared to 2.5% from this current study [31]. In addition, 14–26% of the participants from a study conducted in Botswana, Namibia and Swaziland believed that an HIV-positive circumcised man cannot transmit the virus compared to 1.6% from this study [31]. The participants' better understanding of VMMC messages as seen from this study could be attributed to enhanced IEC from the Ministry of Health (MoH) through the use of mass media as a measure to combat rising pressure of possible risk compensation that is being imagined with the rolling out of VMMC in Malawi. This is further influenced by the availability of wide range of mass media and residing in an urban location where access to information is high among the literate population who have undergone counselling prior to undergoing VMMC.

On the other hand, 12.7% of the study participants had a perception that VMMC provides total protection against HIV acquisition and 2.5% of the study participants were not certain as to what VMMC offers in HIV prevention. These contrasting views could be attributed to message dissemination in relation to HIV and the protection that VMMC offers. VMMC being a new strategy in HIV prevention, most of the messages are focused on the HIV protection with little emphasis on the limitation of VMMC. Furthermore, to increase the uptake of VMMC in Malawi, campaigns are on the increase and message dissemination does not mostly emphasize on the limitation of VMMC. In addition, participants' understanding and level of education could also have an impact on the uptake and interpretation of the messages that are packaged for VMMC awareness. In this regard, VMMC is being taken as a preventive measure against contracting HIV with little emphasis on its limitation putting at risk clients who may opt for VMMC and engage in risky sexual practices post VMMC owing to its protective effect.

Despite having high level of understanding as regards HIV transmission and the protection offered by VMMC, this may also be a driving factor for participants to go for VMMC. Perceived benefits of VMMC such as protection against contracting HIV and sexually transmitted infections and penile hygiene have been found to encourage men to undergo VMMC and this was also observed in a study done in Uganda [32]. Close to half (45.7%, n=322) of the participants in this study agreed to have less fear of contracting HIV following VMMC, which may try to explain the discrepancy between knowledge and practice of participants that have undergone VMMC where 38.2% still engaged in risky sexual practice despite knowing the level of protection that VMMC offers. Contextually, VMMC seems to have opened an opportunity for participants that were previously afraid of engaging in risky sexual acts. A study by Kibira *et al* demonstrated that willingness to be circumcised was associated with risky sexual practice [33] putting forward an idea that being circumcised is likely to encourage clients to engage in risky sexual practices.

Socio demographic factors may influence the sexual practices of participants that have undergone VMMC. Residing in high density locations was significantly associated with non-condom use while those residing in low density residential areas were significantly associated with being involved in paid sex. High density locations of Mzuzu are mostly associated with low socioeconomic status hence access and affordability of condoms may be affected. Low education levels may as well affect condom uptake and usage while those residing in low density areas are associated with wealth and higher education hence the likelihood of affording to pay for sex[3]. This result is similar with findings that were observed in the MDHS where those residing in high density locations were less likely to use condoms [3]. In this regard, knowledge of the perceived protective effect of VMMC in such circumstances could overshadow the need to use other preventive measures like condom use hence an increase in risky sexual practices.

Though not statistically significant, the odds of having multiple sexual partners was almost twice among those that attained secondary and tertiary education and those aged 25 -29 were twice likely to have multiple sexual partners compared to those aged 18 - 24. This finding may be attributed to social factors that this age group is exposed to mostly during college time. A similar study demonstrated that circumcised younger men, residing in urban areas, with secondary or higher education, higher social class and with knowledge of protective effect of VMMC were more engaged in risky sexual practices [33].

Being a student and unemployed was significantly associated with being involved in paid sex. Students usually are provided with a source of income through up keep allowances from institutions of higher learning which are located within reach of social activities within the urban setting (bars and night clubs) where the unemployed counterparts may attend and be involved in the risky sexual acts. Furthermore, those unmarried or single were involved more in paid sex within the age bracket of 18 – 29. Education level could have had an influence on the young ones who understand better the benefits that VMMC carries and this could have been the driving force to their risky sexual practice. Similarly, a study done in Uganda observed that risky sexual behaviors were associated with willingness to be circumcised and this was evident among the youth aged 15 -34, educated and residing in the urban region [33]. This finding supports the idea that undergoing VMMC is likely to encourage participants to engage in risky sexual acts. Furthermore, in a comparative study, risky sexual practices were observed less in the uncircumcised participants who showed interest to be circumcised than in the circumcised ones [34]. Results from a study done in Zimbabwe showed a strong association between willingness to be circumcised in participants that had risky sexual practices (multiple partners, being involved in paid sex and non-condom use) [26]. This observation may explain the continued risky sexual practices in circumcised participants as being carried forward following circumcision and likely due to the perceived protective effect.

Furthermore, the results have shown that marital status, location and occupation were associated with being involved in paid sex. Those that were unmarried, young, unemployed and coming from low density areas were more likely to engage in paid sex while those with formal employment were less likely to engage in paid sex. These findings contradict with those from a similar study that was conducted by Mapoma and Bwalya where those aged 25-59 and married were associated with risky sexual practices [35]. These findings may be attributed to the place of study; being urban location, most of those aged 18 – 29 are either students or dependents who are being cared for and the income they generate is mostly spent on social life that may expose them to paid sex. A study across the VMMC prioritized countries in the Sub Saharan region showed that age, religion, education, job and marital status were significant with risky sexual practices [36].

The study found that 38.2% of the participants were involved in paid sex post VMMC. Having multiple sexual partners constituted 23.7%, being involved in paid sex 29.2% and non-condom use at 36.9% (n=187). A study by Kibira *et al*, also demonstrated higher proportions of circumcised participants that were involved in risky sexual practices (non-condom use 38.4%, 65.8%, multiple sex partners, and 3.7% paid for sex) [37]. Mapoma and Bwalya in the study conducted in Zambia showed slightly lower proportions of risky sexual practices (23.9% paid for sex, 20.8% had >2 sexual partners and 18.2% did not use a condom) [35]. These studies demonstrated proportions higher compared to the uncircumcised counterparts. These findings show that there is an increase in risky sexual practices among circumcised participants.

Risky sexual practices such as having multiple sexual partners and engaging in paid sex influenced men to go for VMMC owing to the perceived protective effect of VMMC as observed from studies that were conducted in Zimbabwe and Botswana [33]. Further to this, a study done in Uganda showed that the HIV prevalence among the circumcised was low even with risky sexual practices [37]. These findings may negatively affect the promotion of safer sex practices among the circumcised and could be a driving factor for clients to opt for VMMC and consequently engage in risky sexual practices. Studies done in Zimbabwe, Zambia, two from Uganda and from the 14 prioritized VMMC countries showed that VMMC participants are engaging in risky sexual practices despite the proportions not being significant. [37], 47].

In addition, abstinence post VMMC also impacts on HIV transmission. In this study 32.3% (104) resumed sexual activity before six weeks. Of these, higher percentage was observed among the married ones, 63.5% versus 36.5% in singles. Those that are married are unlikely to observe the six week abstinence period as they mostly engage in sex with their marital partner hence diffusing the fear of contracting HIV. The risk of contracting HIV is higher in those that resume sexual activity in less than 6 weeks as was observed from studies done in Uganda and Cape Town in South Africa [38],[39].

Risky sexual practices are evident in the circumcised participants. Varied estimates have been observed from different studies on the risky sexual practices specifically on non-condom use, having multiple sexual partners and being involved in paid sex. Proportions of those that self-reported engaging in risky sexual practices from this study (38.2%), support the possibility of risky sexual practices arising from being circumcised. It has also been observed that the driving force for men to undergo VMMC was their risky sexual practice prior to getting circumcised. In addition, almost close to half of the participants self-reported less fear of contracting HIV post VMMC. The findings of this study have shown that VMMC participants are likely to engage in risky sexual practices owing to the perceived protective effect that VMMC offers.

Nevertheless, there are some limitations to this study. This study is cross-sectional and causal inferences cannot be drawn. It is also worth noting that the findings could also be limited by social desirability bias in participants' self-reporting of sexual risk practices during face to face interviews and also recall bias when reporting on their sexual practices.

On the other hand, a study that incorporates both circumcised and uncircumcised participants need to be conducted to compare the findings.

Conclusions

HIV still poses a great threat to the livelihood worldwide and Sub Saharan African bearing the highest burden of the pandemic. The study found that circumcised men are likely to engage in risky sexual practices owing to the perceived protective effect that VMMC offers. A higher proportion of men that underwent VMMC understand the protection that VMMC offers in preventing HIV transmission and the need to use condoms to avoid contracting the virus. Nevertheless, risky sexual practices were observed among circumcised men. There is need to strengthen the information, education and communication (IEC) component before, during and after circumcision with emphasis on the unmarried / single, younger men (18 - 29 years), the students and those unemployed as they are at risk of engaging in risky sexual practices post VMMC. However, misunderstandings and inaccurate perceptions about protection from HIV through VMMC could lead clients to opt for risky sexual practices and reduce the ability for adopting options available for safer sex. Further studies need to be done to ascertain if male circumcision has an impact on condom use.

List Of Abbreviations

AIDS: Acquired Immune Deficiency Syndrome; ART: Antiretroviral therapy; COMREC: College of Medicine Research and Ethics Committee; CO: Commanding officer; DHO: District Health Office; HIV: Human Immunodeficiency Virus; IEC: Information, Education and Communication; JHPIEGO: John Hopkins Program for International Education in Gynecology and Obstetrics; MC: Male circumcision; MDHS: Malawi Demographic and Health Survey; MoH: Ministry of Health; PCI: Project Concern International; PI: Principal Investigator; RA: Research Assistant; STI: Sexually Transmitted Infections; UN: United Nations; UNAIDS: United Nations Programme on HIV and AIDS; VMMC: Voluntary Medical Male Circumcision; WHO: World Health Organization.

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from the College of Medicine Research Ethics Committee in Malawi (issued January 6, 2017, reference number P:10/16/2035). Written permission to conduct the study in the health facilities namely Mzuzu and Moyale were obtained from the health facilities involved in the study.

Participants were informed of their freedom not to participate in the study or to withdraw from the study at any point during the interview. Completing the questionnaire was done in a private place to ensure privacy and to reduce external distractions as well as to maintain confidentiality by using unique identifiers instead of personal data. All participants gave their informed consent voluntarily through written signature or thumbprint. Study participants were informed about the purpose of study, risks and benefits as well as the right to withdraw from the study at any time and without adverse consequences.

Consent for publication

Not applicable

Availability of data and material

The data of this study are available without restriction from the corresponding author.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

Study design, analysis and manuscript drafting was by ZJC. VJ assisted with study design and manuscript editing. VS, AK, SCA assisted with interpretation of findings, review and editing of the manuscript. All authors read and approved the final manuscript.

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Tables

Table 1: Socio-demographic characteristics of participants (n=322)

Characteristic	Frequency	Percent
Age		
<i>18-24</i>	131	40.68%
<i>25-29</i>	84	26.09%
<i>30-34</i>	55	17.08%
<i>35-39</i>	30	9.32%
<i>40-49</i>	22	6.83%
Marital status		
<i>Single</i>	153	47.52%
<i>Married</i>	165	51.24%
<i>Widowed</i>	1	0.31%
<i>Divorced/Separated</i>	3	0.93%
Area of residence		
<i>Low density</i>	107	33.23%
<i>High density</i>	215	66.77%
Education level		
<i>Primary</i>	48	14.91%
<i>Secondary</i>	233	72.36%
<i>Tertiary</i>	41	12.73%
Religion		
<i>Christian</i>	269	83.54%
<i>Islam</i>	38	11.80%
<i>Other</i>	15	4.66%
Employment status		
<i>Not employed</i>	35	10.87%
<i>Student</i>	112	34.78%
<i>Business</i>	90	27.95%
<i>Farmer</i>	26	8.07%
<i>Formal employment</i>	59	18.32%

Table 2: Proportions of participants that engaged in risky sexual practice

Variable Number (%) 95% CI

<i>No condom use</i>	69 (n=187)	36.90	(29.91, 43.87)
<i>Paid sex</i>	94 (n=322)	29.19	(23.90, 33.85)
<i>Multiple sex partners</i>	76 (n=322)	23.60	(18.94, 28.27)
<i>Overall proportion</i>	123 (n=322)	38.20	(32.86, 43.53)

Table 3: Perception of the protective effect offered by VMMC (n=322)

Reasons for undergoing VMMC	Frequency	Percentage
<i>HIV prevention</i>	161	50.00
<i>Hygiene</i>	98	30.43
<i>Others</i>	73	19.57

Perceived understanding of VMMC protection against HIV transmission (n=322)

Item	Frequency	Percent
<i>Provides total protection</i>	41	12.73
<i>Provides partial protection</i>	273	84.78
<i>Does not understand</i>	8	2.48

Benefits of VMMC (n=322)	Frequency	Percentage
<i>Prevention of HIV, STI & cancer</i>	187	58.08
<i>Hygiene</i>	120	37.27
<i>Sexual pleasure</i>	15	4.65

VMMC and fears of HIV (n=322)	Frequency	Percentage
<i>Fear reduced</i>	147	45.65
<i>Fear not reduced</i>	175	54.35

Condom use following VMMC	Frequency	Percentage
<i>Continued use</i>	304	94.41
<i>No condom use</i>	18	5.59

Transmission of HIV in	Frequency	Percentage	the infected circumcised
<i>Can still transmit HIV</i>	317	98.45	
<i>Cannot transmit HIV</i>	5	1.55	

Contracting HIV following VMMC	Frequency	Percentage
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<i>Can contract HIV</i>	311	96.58
<i>Cannot contract HIV</i>	11	3.42

Table 4: Characteristics of sexual practices among circumcised participants.

Number of sexual partners (n=322)	Frequency	Percentage
<i>One partner</i>	246	76.40
<i>More than one partner</i>	76	23.60
Condom use last encounter (n=322)	Frequency	Percentage
<i>Used condom</i>	118	36.65
<i>Did not use condom</i>	204	63.35
Reason condom not used (n=204)	Frequency	Percentage
<i>Marital partner</i>	134	65.69
<i>Condoms not available</i>	20	9.80
<i>Perceived VMMC protection</i>	22	10.78
<i>Forgot</i>	28	13.73
Type of sexual partner (n=322)	Frequency	Percentage
<i>Marital partner</i>	140	43.38
<i>Paid sex partner</i>	94	29.19
<i>Non cohabiting partner</i>	88	27.33
Abstinence post VMMC (n=322)	Frequency	Percentage
<i>Less than six weeks</i>	104	32.30
<i>More than six weeks</i>	218	67.70
STI (n=322)	Frequency	Percentage
<i>Had STI</i>	38	11.80
<i>No STI</i>	284	88.20

Table 5: Univariate and multivariate analysis on non-condom

<i>Univariate and multivariate logistic regression on non-condom use</i>							
<i>Variable</i>		<i>OR[†]</i>	<i>p - value</i>	<i>95% CI</i>	<i>aOR^{†a}</i>	<i>p -value</i>	<i>95% CI</i>
<i>Age</i>	18 -29	1					
	30 - 49	0.53	0.132	0.23 - 1.21	0.48	0.244	0.14 - 1.65
<i>Marital status</i>	Single	1					
	Married	0.71	0.357	0.35 - 1.46	0.61	0.397	0.19 - 1.92
<i>Education level</i>	Primary	1					
	Secondary	1.12	0.843	0.36 - 3.46	1.59	0.473	0.44 - 5.59
	Tertiary	1.53	0.520	0.42 - 5.58	3.41	0.112	0.75 - 15.50
<i>Religion</i>	Christianity	1					
	Islam	1.39	0.563	0.46 - 4.18	1.87	0.337	0.51 - 6.75
	Others	7.49	0.077	0.81 - 67.63	6.81	0.100	0.69 - 66.87
<i>Area of residence</i>	Low density	1					
	High density	2.00	0.034	1.05 - 3.81	1.93	0.043	1.02 - 3.84
<i>Occupation</i>	Formal employment	1					
	Student	1.81	0.279	0.62 - 5.34	1.18	0.798	0.32 - 4.48
	Farmer	2.40	0.341	0.40 - 40.55	1.76	0.599	0.21 - 14.30
	Business	3.20	0.064	0.92 - 10.98	3.6	0.083	0.84 - 15.35
	Unemployed	1.60	0.484	0.43 - 5.95	1.21	0.808	0.26 - 5.63

†adjusted Odds Ratio, ‡Odds Ratio

Table 6: Univariate and multivariate analysis on multiple sex partners

<i>Univariate and multivariate logistic regression on multiple sexual partners</i>							
<i>variable</i>		<i>OR[†]</i>	<i>p - value</i>	<i>95% CI</i>	<i>aOR^{†a}</i>	<i>p -value</i>	<i>95% CI</i>
<i>Age</i>	18 - 24	1					
	25 - 29	2.22	0.013	1.18 - 4.20	2.28	0.037	1.05 - 4.95
	30 - 34	1.11	0.79	0.41 - 2.46	1.10	0.859	0.39 - 3.11
	35- 49	0.99	0.988	0.31 - 3.19	0.95	0.942	0.23 - 3.85
	40 - 49	1.91	1.570	0.78 - 4.67	1.60	0.440	0.48 - 5.29
<i>Marital status</i>	Single	1					
	Married	1.33	2.81	0.79 - 2.24	1.04	0.922	0.44 - 2.49
<i>Education level</i>	Primary	1					
	Secondary	1.62	0.247	0.72 - 3.66	2.19	0.093	0.88 - 5.48
	Tertiary	1.83	0.247	0.66 - 5.11	2.40	0.143	0.74 - 7.73
<i>Religion</i>	Christianity	1					
	Islam	2.03	0.053	0.99 - 4.17	2.10	0.066	0.95 - 4.64
	Others	0.54	0.420	0.12 - 2.44	0.47	0.343	0.10 - 2.26
<i>Area of residence</i>	Low density	1					
	High density	1.19	0.530	0.69 - 2.03	1.06	0.855	0.57 - 1.10
<i>Occupation</i>	Formal employment	1					
	Student	0.80	0.554	0.38 - 1.68	0.92	0.883	0.34 - 2.50
	Farmer	0.88	0.817	0.30 - 2.60	1.05	0.879	0.33 - 3.72
	Business	1.13	0.751	0.54 - 2.37	1.11	0.820	0.46 - 2.66
	Unemployed	0.61	0.354	0.21 - 1.75	0.61	0.416	0.43 - 2.49

†adjusted Odds Ratio, ‡Odds Ratio

Table 7: Univariate and multivariate analysis on transaction sex

<i>Univariate and multivariate logistic regression on transaction sex</i>							
<i>variable</i>		<i>OR[‡]</i>	<i>p - value</i>	<i>95% CI</i>	<i>aOR^{†a}</i>	<i>p - value</i>	<i>95% CI</i>
<i>Age</i>	18 -29	1					
	30 - 49	0.19	<0.001	0.09 - 0.37	0.46	0.118	0.17 - 1.22
<i>Marital status</i>	Single	1					
	Married	0.12	<0.001	0.07 - 0.22	0.19	<0.001	0.08 - 0.47
<i>Education level</i>	Primary	1					
	Secondary	4.00	0.005	1.52 - 10.52	2.3	0.136	0.77 - 6.91
	Tertiary	4.46	0.009	1.44 - 13.79	2.67	0.148	0.71 - 10.02
<i>Religion</i>	Christianity	1					
	Islam	0.7	0.368	0.32 - 1.53	1.37	0.516	0.53 - 3.59
	Others	0.16	0.079	0.02 - 1.24	0.18	0.127	0.02 - 1.63
<i>Area of residence</i>	Low density	1					
	High density	0.45	0.002	0.27 - 0.74	0.41	0.004	0.22 - 0.76
<i>Occupation</i>	Formal employment	1					
	Student	4.02	0.001	1.80 - 8.97	0.98	0.977	0.33 - 2.90
	Farmer	1.01	0.988	0.28 - 3.63	2.04	0.342	0.47 - 8.90
	Business	1.11	0.819	0.45 - 2.73	1.24	0.692	0.42 - 3.76
	Unemployed	5.88	<0.001	2.23 - 15.53	2.97	0.083	0.86 - 10.15

[†]adjusted Odds Ratio, [‡]Odds Ratio