KNOWLEDGE, ATTITUDE AND PRACTICES ON SHANGRING METHOD OF MALE CIRCUMCISION IN PREVENTING NEW HIV INFECTIONS AMONG COMMUNITY MEMBERS IN HOMA BAY COUNTY, KENYA

BY

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SCHOOL OF PUBLIC HEALTH AND COMMUNITY DEVELOPMENT

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DECLARATION

By Student:

I, Jacob Ochieng' Yahuma, confirm that this thesis is my own original work, crafted with care, and has not been submitted to any other university or institution for a degree or similar qualification

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DEDICATION

To my loving wife Rose Ndunda, I dedicate this work for being part and parcel of this walk. She believed and kept encouraging me to continue. I also wish to dedicate this research to my mentors, Dr. Edna Nyangechi and Professor Collins Ouma, whose expertise and mentorship have significantly shaped both my academic growth and research capabilities. In addition, I extend this dedication to all those who played a role in bringing this study to fruition especially the research assistants and study participants. Your contributions were essential in making this work a reality. It is my hope that this research will offer meaningful insights and contribute positively to ongoing discussions in the field. I deeply appreciate everyone who offered encouragement and support throughout this scholarly journey.

ABSTRACT

Despite robust evidence that voluntary medical male circumcision reduces heterosexual HIV transmission risk by approximately 60%, uptake of the ShangRing device a bloodless, faster, and highly acceptable alternative to conventional surgical circumcision remains persistently low (2-5% of VMMC procedures) in Homa Bay County, Kenya. This county continues to bear a high HIV burden, with an adult prevalence of approximately 11.41% and 1,180 new infections reported in 2024. The main objective of this study was to determine the knowledge, attitudes, and practices regarding the ShangRing method of male circumcision in preventing new HIV infections among community members in Homa Bay County. Specifically, the study sought to establish the level of knowledge about ShangRing as a method of voluntary medical male circumcision, describe attitudes towards the ShangRing method, and establish practices related to its use. A cross-sectional mixed-methods design was employed. Quantitative data were collected using a structured questionnaire administered to 422 men aged 15-49 years selected through simple random sampling from attendees at four purposively selected health facilities offering ShangRing services. Qualitative data were collected through key informant interviews and focus group discussions. Quantitative data were analyzed using descriptive statistics, chi-square tests, Pearson correlation, and multiple linear regression in SPSS version 29.0, while qualitative data underwent thematic analysis. Results showed moderate knowledge (mean composite score 15.76/25; 58.3% sufficient), moderately positive attitudes (mean score 17.21/30), and moderately good practices (mean score 16.94/25), with 86.5% of respondents willing to undergo or recommend the ShangRing method. Knowledge ($\beta = 0.290$, $p < 0.001$) and attitudes ($\beta = 0.128$, $p = 0.022$) were significant predictors of favourable practices ($R^2 = 0.073$, $p < 0.001$). Important knowledge gaps and misconceptions, particularly regarding partner protection and risk compensation, persisted. The study concludes that while community members demonstrate positive attitudes and high individual acceptability of ShangRing, knowledge gaps and cultural barriers hinder optimal uptake. Strengthening community awareness, addressing misconceptions, and implementing targeted demand-creation strategies may enhance adoption of ShangRing and contribute to HIV prevention in high-burden settings. These findings provide evidence to inform policy and programmatic interventions aimed at increasing ShangRing uptake as part of Kenya's comprehensive HIV prevention strategy.

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LIST OF ABBREVIATIONS AND ACRONYMS

CDC	:	Centers for Disease Control and Prevention.
EIMC	:	Early Infant Male Circumcision.
KAP	:	Knowledge, Attitude and Practice
KHIS	:	Kenya Health Information System
MC	:	Male circumcision
MMC	:	Medical male circumcision
NACC	:	National AIDS Control Council
NGO	:	Non-Governmental Organizations.
NSDCC	:	National Syndemic Disease Control Council
SDG	:	Sustainable Development Goals.
SMC	:	Safe male circumcision
STIs	:	Sexually Transmitted Infections
UNAIDS	:	Joint United Nations Program on HIV and AIDS
VMMC	:	Voluntary Medical Male Circumcision
WHO	:	World Health Organization

DEFINITION OF OPERATIONAL TERMS

ShangRing Device: Is a sterile, single-use, disposable male circumcision device that consists of two concentric plastic rings, the inner of which is lined by a silicone pad, which provides a smooth and non-bioreactive surface against the surgical wound

Male Circumcision (MC): The surgical or device-assisted removal of the foreskin covering the penis.

Medical Male Circumcision: Male circumcision performed by trained health-care personnel using approved medical procedures.

Knowledge: Refers to the awareness, understanding, or information a person has about ShangRing.

Attitude: Is a person's feelings, beliefs, or mindset toward ShangRing.

Practices: The actual behaviors or actions related to ShangRing.

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CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

Worldwide efforts to reduce the HIV/AIDS epidemic have adopted multiple preventive measures, among which Voluntary Medical Male Circumcision (VMMC) stands out as a vital strategy. Supported by recommendations from the World Health Organization (WHO) and UNAIDS (2021), VMMC is implemented as part of a holistic prevention approach, incorporating condom provision, testing and treatment for sexually transmitted infections (STIs), HIV counseling and testing, and access to antiretroviral therapy for individuals living with HIV. These combined interventions form a cornerstone of global public health strategies aimed at reducing HIV transmission.

Research has consistently shown that VMMC can significantly lower the risk of heterosexual HIV transmission by approximately 60%, as evidenced by three large-scale randomized controlled trials. The inner foreskin is particularly vulnerable to HIV, providing an easy entry point for the virus to infect and multiply. Circumcision reduces this vulnerability and serves as a powerful biomedical barrier against infection (WHO & UNAIDS, 2021).

A major breakthrough in male circumcision technology has been the development and global adoption of the ShangRing, a medical device designed to simplify the circumcision procedure, minimize complications, and improve client satisfaction. The ShangRing method is bloodless, relatively painless (requiring no injectable anesthesia), and quicker than the conventional surgical (dorsal slit) method. These features have made it particularly suitable for resource-limited settings, high-volume campaigns, and clients wary of surgical procedures. Several countries across Eastern and Southern Africa have already adopted ShangRing into their national VMMC frameworks, recognizing its efficiency and safety. Notably, studies conducted in Kenya, Uganda, and Zambia showed that ShangRing offers high safety, effectiveness, faster healing time, andbetter practices and greater likelihood of ShangRing uptake. A significant proportion of clients preferred it over traditional surgical methods, citing comfort, faster recovery, and reduced pain (Barone et al., 2014). Client-based evaluations in Kenya further confirmed excellent cosmetic outcomes, rapid healing (mean ~30 days), and near-universal recommendation rates

(Awori et al., 2017). In routine program rollout, high satisfaction and uptake were documented with active adverse event surveillance (Odoyo-June et al., 2019).

In 2019, the WHO officially endorsed ShangRing as a safe and effective alternative to surgical circumcision. The organization also updated its operational guidance to: Include topical anesthesia (eliminating the need for injectable anesthesia), introduce the "no-flip" technique, which simplifies the procedure, and expand the cadre of healthcare providers authorized to perform it, increasing accessibility (WHO, 2019). This global innovation not only increases the efficiency and safety of VMMC services but also addresses key barriers to uptake, such as fear of pain, lengthy recovery, and limited access to skilled providers, thereby supporting broader efforts to curb HIV transmission in high-burden regions.

In Kenya, VMMC has gained wide acceptance, even among traditionally non-circumcising communities. The Ministry of Health has implemented the program in phases since 2008, achieving over 2 million circumcisions for males aged 10 and above. National estimates indicate that 91.2% of males are circumcised either traditionally or through VMMC (Grund et al., 2023). Counties that were initially resistant like Homa Bay, Kisumu, Migori, Siaya, Turkana, and Busia have made substantial progress, with Homa Bay alone recording over 200,000 circumcisions in the last seven years. Despite these successes, HIV remains a major public health concern. Recent 2024–2025 data from NSDCC/NASCOP reports indicate national prevalence at ~3.0%, with Homa Bay remaining among the highest-burden counties (e.g., ~14.7–15.2% in some estimates, contributing significantly to new infections).

The integration of innovative tools like ShangRing into Kenya's national program has been instrumental in expanding coverage and addressing challenges associated with traditional VMMC methods. Globally, in 2021, approximately 35 million people were living with HIV, with 2.3 million new infections recorded that year. Sub-Saharan Africa remains at the epicenter, accounting for nearly 70% of all new HIV cases, making scalable, efficient prevention methods like VMMC critical. Additionally, in 2018, there were an estimated 499 million new cases of treatable STIs including chlamydia, gonorrhea, syphilis, and trichomoniasis among adults aged 15 to 49 years. These infections further compound the burden on healthcare systems and underscore the importance of comprehensive sexual health strategies.

These persistent gaps in accurate understanding of VMMC benefits and ShangRing-specific features directly inform the first objective of this study: assessing community knowledge regarding the ShangRing method of male circumcision for HIV prevention in Homa Bay County. A systematic review by Westercamp and Bailey (2007) found that while awareness of male circumcision was generally high in Sub-Saharan Africa, understanding of its partial protective effect against HIV was limited, with many respondents incorrectly believing it offered complete protection. Similarly, Herman-Roloff et al. (2011) reported in Western Kenya that fear of pain, misconceptions about complications, and concerns about sexual performance were major barriers to VMMC uptake despite high awareness levels. In Uganda, Kigozi et al. (2008) observed that cultural norms, partner influence, and perceived healing time significantly shaped men's willingness to undergo circumcision. Likewise, Mavhu et al. (2011) in Zimbabwe found that negative attitudes, fear of adverse events, and misinformation reduced uptake among eligible men. In Tanzania, Layer et al. (2013) reported that myths surrounding infertility, reduced masculinity, and prolonged abstinence after circumcision affected decision-making at community level. These patterns persist in more recent research. Studies in traditionally circumcising communities (Ntshiqa et al., 2023) and among adolescents in high-prevalence settings (Shezi et al., 2023) continue to show moderate knowledge scores (e.g., median 62.5% on VMMC benefits), positive but incomplete attitudes, and better practices and greater likelihood of ShangRing uptake are strongly predicted by accurate knowledge, awareness, and favorable beliefs. In Homa Bay County itself, community discussions around VMMC remain relatively open (78.9% of respondents), with high satisfaction reported when services are accessible, though stigma, provider gender preferences, and misconceptions still influence uptake decisions. Building on these insights into attitudinal and social barriers, the second and third objectives of this study examine community attitudes toward ShangRing and actual practices/uptake patterns in Homa Bay, where device-specific KAP data remains particularly limited compared with general VMMC research.

Collectively, these findings suggest that knowledge alone does not guarantee uptake; attitudes, beliefs, and social influences strongly determine practice behavior. Device-specific community KAP data on innovations like the ShangRing remain particularly limited compared with general VMMC research, highlighting the need for targeted studies in high-burden counties like Homa Bay to close these gaps and accelerate HIV prevention.

1.2 Statement of the Problem

Despite evidence that voluntary medical male circumcision reduces heterosexual HIV transmission by approximately 60%, the uptake of the ShangRing device in Homa Bay County remains persistently low. While over 7,000 men access VMMC services annually, only 2-5% of these procedures utilize the ShangRing device, with most men still opting for conventional surgical methods. This low uptake persists even though Homa Bay County continues to record a high HIV burden.

The ShangRing offers clear advantages including a bloodless procedure, topical anaesthesia, shorter operation time, faster healing, better cosmetic outcomes, and higher client satisfaction. However, these benefits have not translated into wider community acceptance and utilization.

This gap highlights insufficient understanding of community-level knowledge, attitudes, and practices influencing adoption of the ShangRing method. Without context-specific evidence on these factors, efforts to increase uptake remain unfocused.

This study therefore sought to determine the knowledge, attitudes, and practices regarding the ShangRing method of male circumcision for HIV prevention among community members in Homa Bay County.

1.3 Objectives of the Study

1.3.1 Broad Objective

To determine knowledge, attitude and practices on ShangRing as a method of male circumcision in preventing new HIV infections among community members in Homa Bay County, Kenya.

1.3.2 Specific Objectives

The specific objectives were:

i. To establish the knowledge about ShangRing as a method of voluntary medical male circumcision in preventing new HIV infections among community members in Homa Bay County, Kenya.
ii. To describe the attitudes around the ShangRing as a method of voluntary medical male circumcision in preventing new HIV infections among community members in Homa Bay County, Kenya.

iii. To establish the practices of the use of the ShangRing as a method of voluntary medical male circumcision in preventing new HIV infections among community members in Homa Bay County, Kenya.

1.4 Research Questions

i. What is the knowledge about ShangRing as a method of voluntary medical male circumcision in preventing new HIV infections among community members in Homa Bay County, Kenya?
ii. What are the attitudes around ShangRing as a method of voluntary medical male circumcision in preventing new HIV infections among community members in Homa Bay County, Kenya?
iii. What are the practices of ShangRing as a method of voluntary medical male circumcision in preventing new HIV infections among community members in Homa Bay County, Kenya?

1.5 Significance of the Study

The findings of this study offer actionable insights and recommendations to the National Syndemic Diseases Control Council (NSDCC), the Ministry of Health, NGOs, and other development partners engaged in scaling up Voluntary Medical Male Circumcision (VMMC) services particularly the ShangRing method in Kenya, Homa Bay County, and similar high-burden settings. By identifying community-level knowledge, attitudes, and practices (KAP) barriers and enablers specific to ShangRing, the results emphasize the importance of context-specific, evidence-based approaches to enhance service delivery, improve practices and greater likelihood of better ShangRing uptakeamong target populations, and increase accessibility in traditionally non-circumcising communities.

Despite substantial investments and evidence demonstrating the cost-effectiveness and superior features of the ShangRing (e.g., reduced pain, faster healing, and higher client preference in facility settings), the persistently low uptake (only 2–5% of VMMC procedures) documented in routine program data signals that national coverage goals and anticipated public health gains may not be fully achieved without targeted, community-informed interventions. This is particularly critical in high-prevalence counties like Homa Bay, where sustained progress is essential to curb

new infections and reduce the overall HIV burden. The study highlights priority areas for further research and programmatic action, including strategies to bridge gaps in community awareness of ShangRing-specific advantages, address misconceptions and attitudinal barriers, and overcome practical implementation challenges such as information dissemination and service access.

Ultimately, these findings provide evidence to guide future programmatic and policy strategies, enabling Kenya to strengthen its national HIV prevention efforts and advance toward global commitments under Sustainable Development Goal (SDG) 3 (Target 3.3: end the AIDS epidemic as a public health threat by 2030). This aligns with UNAIDS-recommended 2030 targets (e.g., 90% reduction in new HIV infections and AIDS-related deaths from 2010 levels), Kenya's AIDS Integration Strategic Framework (2025–2030), and national plans for a resilient, country-owned HIV response beyond 2030. Through targeted enhancements informed by this research, the study contributes to broader efforts to maximize the impact of biomedical HIV prevention tools, promote health equity, and support Kenya's path to an AIDS-free generation.

1.6 Limitations of the Study

This study used a cross-sectional design, which provides a snapshot of the situation at one point in time and therefore cannot establish causality between variables. The sample was drawn from men attending health facilities offering ShangRing services. This may have introduced some selection bias, as participants may have had greater exposure to information about the device than non-attendees. Data were collected through self-reported responses, which are subject to social desirability bias. To mitigate these limitations, anonymity and confidentiality were strictly maintained, research assistants were trained to administer the questionnaire in a neutral manner, and the tools were pre-tested for clarity and cultural appropriateness.

1.7 Delimitations of the Study

The study was limited to men aged 15-49 years in Homa Bay County who attended the selected facilities offering ShangRing services. It focused only on four purposively selected facilities in Mbita, Ndhiwa, Rachuonyo, and Kabondo sub-counties. These boundaries were set to allow an in-depth examination of ShangRing-specific knowledge, attitudes, and practices within the study’s time and resource constraints.

CHAPTER TWO

LITERATURE REVIEW

2.1 Knowledge of ShangRing Method of Male Circumcision in Preventing HIV

Knowledge of VMMC's partial protective effect against heterosexual HIV transmission (approximately 60%) is foundational to uptake, yet community understanding often remains incomplete or inaccurate. Early studies in sub-Saharan Africa showed high general awareness of male circumcision but limited grasp of its benefits, with misconceptions (e.g., complete protection) common (Westercamp & Bailey, 2007). In Western Kenya, including areas like Homa Bay, fear of pain and misconceptions about complications persisted despite awareness (Herman-Roloff et al., 2011). ShangRing-specific knowledge is even more limited. The device, endorsed by WHO in 2019 for its bloodless procedure, topical anesthesia, no-flip technique, and faster healing (WHO, 2019), has been rolled out in Kenya with active surveillance showing high safety and uptake monitoring (Odoyo-June et al., 2019). Clinical trials and program data in Kenya (including Homa Bay) reported excellent client satisfaction, rapid healing (~30 days), and preference over conventional methods among those circumcised (Barone et al., 2014; Awori et al., 2017; Peck et al., 2023). However, community-level knowledge of ShangRing features (e.g., reduced pain, no injectable anesthesia, quicker recovery) remains understudied beyond facility clients.

While facility-based evaluations confirm ShangRing's advantages, no comprehensive community-based study in Homa Bay or similar high-prevalence, non-circumcising settings has fully assessed baseline knowledge of ShangRing specific features versus general VMMC, or sources of information/misinformation. This gap directly relates to the first specific objective and the study sought to address this gap.

2.2 Attitudes on ShangRing Method of Male Circumcision in Preventing HIV

Attitudes significantly shape VMMC uptake, influenced by cultural beliefs, fear of pain, concerns about sexual performance/masculinity, and partner/family views (Kigozi et al., 2008; Mavhu et al., 2011; Layer et al., 2013). In traditionally non-circumcising communities, positive attitudes emerge when benefits (e.g., hygiene, STI/HIV protection) are clear, but myths (e.g., infertility, reduced pleasure) persist (Lukobo & Bailey, 2007).

For ShangRing, attitudes among circumcised clients are highly favorable: high satisfaction, preference over surgical methods, and willingness to recommend due to reduced pain, faster recovery, and cosmetic outcomes (Barone et al., 2014; Odoyo-June et al., 2019). Rollout data in Kenya showed better practices and greater likelihood of ShangRing uptake with peer education (Odoyo-June et al., 2019). However, community attitudes remain largely unexplored. Device-specific attitudinal data on ShangRing (e.g., cultural fit, innovation concerns, masculinity perceptions) is scarce at community level in high-burden Kenyan counties like Homa Bay, limiting understanding of barriers beyond clinical settings.

Previous studies have explored attitudes toward male circumcision; however, limited research has examined community attitudes toward the ShangRing circumcision method specifically in Homa Bay County. Understanding these attitudes was important since they directly influence uptake of circumcision services.

2.3 Practices on ShangRing Method of Male Circumcision in Preventing HIV

In communities where medical male circumcision (MMC) is not a common tradition, such as traditionally non-circumcising areas in western Kenya including Homa Bay County, questions arise about how innovative methods like the ShangRing are introduced, decided upon, and practiced as part of HIV prevention efforts. Researchers have explored this through program evaluations, surveys, and community perspectives to understand real-world uptake patterns, decision-making processes, information-seeking behaviors, and social influences across sub-Saharan Africa.

Voluntary medical male circumcision (VMMC) practices in Kenya have expanded significantly since 2008, with over 2 million procedures performed nationally and substantial coverage achieved in non-traditional counties like Homa Bay. However, ShangRing-specific adoption in routine programs remains low, often comprising only a small fraction of procedures despite its advantages (e.g., bloodless, topical anesthesia, faster healing, and suitability for high-volume settings) (Odoyo-June et al., 2019; Calderon et al., 2025).

Community practices frequently rely on informal channels for information and decision-making, with peer influence and family discussions playing prominent roles. In rollout evaluations across Kenyan counties (including Homa Bay), uptake varied widely when ShangRing was offered in

routine services (e.g., 29.2% choice rate among eligible men, with high completion 97.4% and low adverse events 0.3%), but overall program utilization stayed limited due to factors like variable facility availability, stock issues, and preference for conventional methods (Odoyo-June et al., 2019). Among those circumcised with ShangRing, most adhered to post-procedure counseling (e.g., 99% recalled 6-week abstinence recommendations), though early resumption of sex occurred in a minority (13%), often driven by strong sexual desire or partner pressure (Barone et al., 2016).

Women and partners significantly influence male practices and uptake. Multi-country community research across Kenya, Namibia, South Africa, Eswatini (formerly Swaziland), and Uganda showed high awareness of MMC (~87% among women) and strong support for its community introduction as an HIV prevention tool, with women emphasizing benefits for family health and advocating for involvement in demand generation and decisions (AVAC/ATHENA Network, WHiPT, 2010 note: foundational multi-country insights; recent studies build on similar patterns).

In parental decision-making for early infant circumcision (EIMC) using ShangRing (relevant for long-term uptake scaling), motivations included disease prevention (e.g., HIV/STIs), hygiene, and social/religious reasons, with near-universal parental satisfaction (>99%) and recommendation rates when the device was used safely by midlevel providers (Calderon et al., 2025; Basourakos et al., 2022). These findings highlight the need for men and their partners to embrace ShangRing in non-traditional communities to maximize public health impact, including faster HIV incidence reductions through earlier (e.g., infant) circumcision timing.

Despite favorable facility-level practices (e.g., high satisfaction, recommendation, and adherence among users), scaled community uptake of ShangRing lags, signaling persistent barriers like limited awareness, cultural considerations, and service access in high-burden areas.

While previous studies have examined general male circumcision practices, limited evidence exists on the actual uptake of ShangRing circumcision method and factors influencing its utilization in Homa Bay County. It is upon this background that the current study determined knowledge, attitude and practices on ShangRing as a method of male circumcision in preventing new HIV infections among community members in Homa Bay County, Kenya.

2.4 Operational Conceptual Framework

This study was guided by a conceptual framework adopted from literature on knowledge, attitudes, and practices (KAP) in voluntary medical male circumcision (Westercamp & Bailey, 2007; Herman-Roloff et al., 2011; Layer et al., 2013). The framework illustrates the relationships among the study variables as shown in Figure 2.1.

Knowledge of the ShangRing method and its role in HIV prevention was positioned as the main independent variable that influences attitudes. Attitudes toward the ShangRing method subsequently influence practices, including willingness to undergo the procedure, recommendation to others, and adherence to post-procedure care. These variables (knowledge, attitudes, and practices) collectively determine the uptake of the ShangRing method of male circumcision for HIV prevention in Homa Bay County.

Community mobilization (including health education programmes, peer influence, and service accessibility) acts as an intervening variable that may strengthen or weaken the relationships between knowledge, attitudes, practices, and uptake. The framework posits that individuals with higher levels of accurate knowledge are more likely to develop positive attitudes, which in turn lead to better practices and increased uptake of the ShangRing method.

This conceptual framework (Figure 2.1) guided the development of data collection tools, analysis of data, and interpretation of findings. It provided a logical structure for understanding the persistent gap between the availability of the ShangRing device and its low uptake in the study setting.

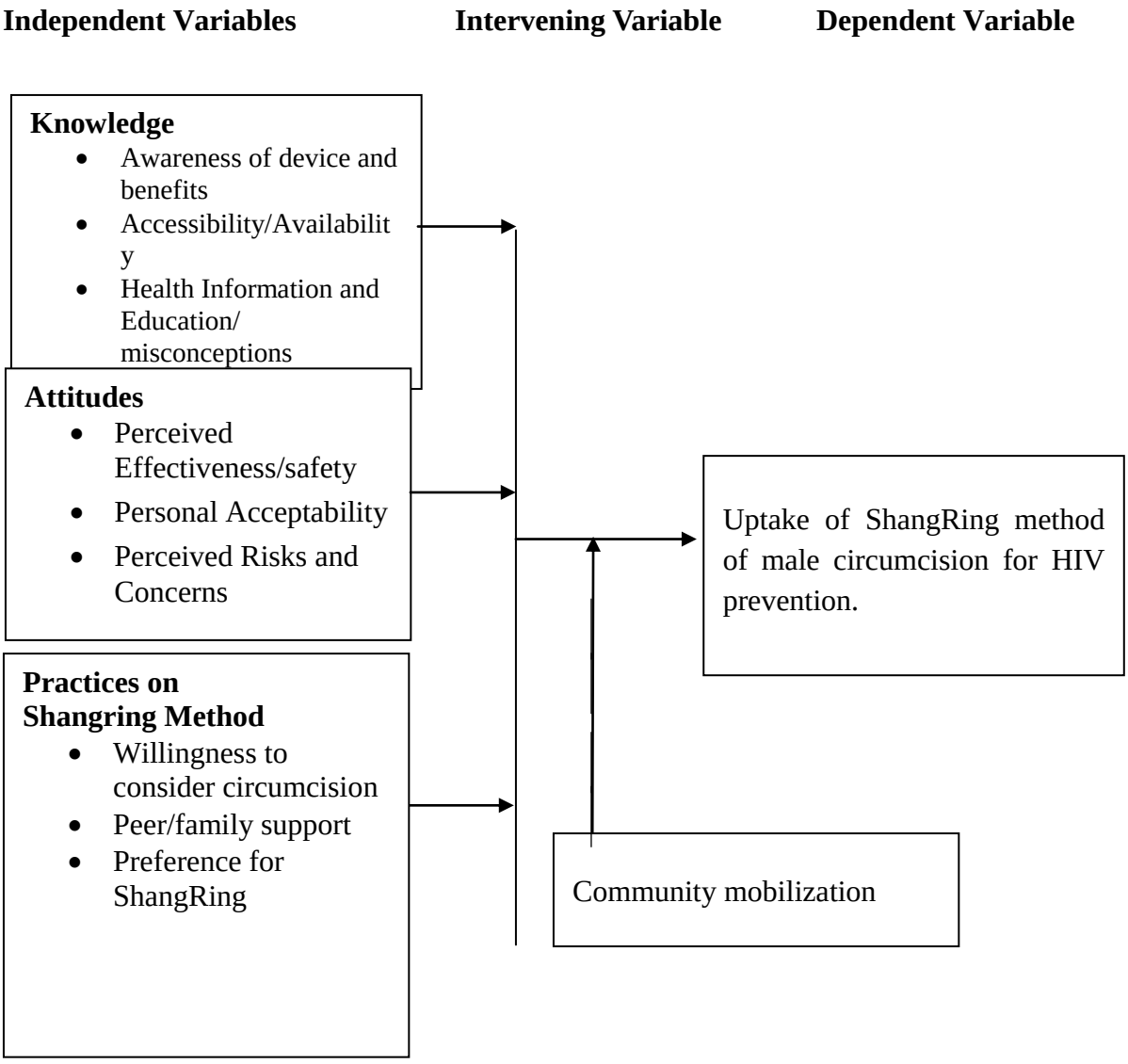


Figure 2.1: Conceptual framework (Adopted from Literature Review, 2024)

CHAPTER THREE
METHODOLOGY

3.1 Study setting

The study was conducted in Homa Bay County, located in western Kenya along the shores of Lake Victoria. The county covers an area of approximately 3,154.7 square kilometres and had a population of 1,131,950 according to the 2019 Kenya National Bureau of Statistics census (KNBS, 2019). It is one of the counties with persistently high HIV prevalence (estimated at 11.41% in 2024, with ranges of 10.6–15.2% in recent years) and ranks among the top five counties nationally for new HIV infections (NSDCC Kenya AIDS Response Progress Report 2025; NSDCC HIV Estimates 2025).

Data collection took place in four purposively selected health facilities actively offering ShangRing voluntary medical male circumcision (VMMC) services during the study period: Suba North Sub County Hospital (Mbita constituency), Ndhiwa Sub County Hospital, Adiedo Health Centre (Rachuonyo North), and Ober Level IV Hospital (Kabondo). These facilities were chosen because they were the only ones providing ShangRing VMMC in the county at the time, aligning with the need to study device-specific uptake in routine service delivery settings.

3.2 Study Design

This study adopted a cross-sectional mixed-methods design. The cross-sectional approach enabled the collection of data at a single point in time to determine the knowledge, attitudes, and practices regarding the ShangRing method of male circumcision among community members in Homa Bay County. This design was appropriate as it allowed for the assessment of prevalence and associations between variables without inferring causality.

3.3 Study Population

The study population consisted of 422 males aged 15–49 years who attended ShangRing circumcision services at the selected four health facilities during the study period.
This group represented the accessible population from which the sample was drawn.

3.3.1 Inclusion criteria

The inclusion criteria targeted men aged between 15 and 49 years who had been residents of Homa Bay County for at least six months and were willing to take part in the study.

3.3.2 Exclusion Criteria

i. The study excluded individuals who had a professional or personal conflict of interest, such as employees of organizations promoting the ShangRing method, which might bias their responses.

ii. It also excluded all who may have benefited from the service but have fallen ill or in pain that may influence their responses. Finally, the study excluded anyone who declined to provide informed consent.

3.4 Sample Size Determination and Sampling Procedure

3.4.1 Sample Size determination

The sample size for this study was determined using Yamane's (1967) formula for finite populations, which is suitable for studies with a known population size. The formula is:

$$n = \frac{N}{1 + N(e)^2}$$

Where:

- (n) = required sample size
- (N) = total population size (12,255 eligible men).
- (e) = margin of error (0.05 or 5%)

Calculation:

Using eligible men population size of 12,255 and a 5% margin of error at 95% confidence level, the initial sample size was calculated as 384 respondents. To cater for a possible 10% non-response rate, the sample size was adjusted using the formula: Adjusted sample size = Initial sample size / (1 – non-response rate) This adjustment increased the sample size to a final size of 422 respondents.

This sample was proportionally allocated across the four purposively selected health facilities based on their previous ShangRing performance (2020–2022).

3.4.2 Sampling Procedures

The sampling unit was the selected health facilities from where individual males aged 15–49 years were receiving VMMC services. A multi-stage sampling approach was employed. First, purposive sampling was used to select Homa Bay County (due to its high HIV prevalence and low ShangRing uptake), the four facilities (as the only active ShangRing providers), key informants (based on their programmatic expertise), and community groups for FGDs (e.g.,

youth, fishing, or men's groups in facility catchments). For the quantitative sample, simple random sampling was applied at each facility: eligible attendees were listed daily, and participants were selected using a random number generator to ensure equal probability and minimize bias. The sample was proportionally distributed (Table 3.1) across facilities based on their historical ShangRing performance (2020–2022).

Table 3.1: Distribution of the Sample Population

Health Facility	Population	Facility performance (2020-2022)
Suba North Sub County Hospital	110	216 (26%)
Ndhiwa county hospital	114	223 (27%)
Adiedo Health center	101	199 (24%)
Ober level IV Hospital	97	191 (23%)_
Total	**422**	**829 (100%) of ShangRing cases**

For qualitative sampling, purposive techniques targeted knowledgeable individuals (key informants) and diverse groups (FGDs) to capture varied perspectives.

3.5 Data Collection Tools

Data were collected using three tools: a structured questionnaire for quantitative data, a semi-structured key informant interview (KII) guide for in-depth interviews, and an FGD guide for group discussions.

3.5.1 Questionnaires

A structured, questionnaire (Appendix V) collected quantitative data on knowledge, attitudes, and practices from 422 participants. It included Likert-scale items (1 = strongly disagree to 5 = strongly agree), multiple-choice, and binary questions aligned with study objectives.

Administered face to face by trained research assistants, the questionnaire collected information on: Socio-demographic characteristics, Knowledge about ShangRing, Attitudes toward ShangRing and Uptake practices related to ShangRing.

3.5.2 Key Informant Guide

A semi-structured interview guide (Appendix VI) was used for in-depth interviews with 12 key informants (County Director of Health, VMMC Focal Person, County Community Focal Strategist, 4 Facility in-charges Community Health Assistants-5). The guide explored service delivery experiences, community perceptions, barriers, and recommendations.

3.5.3 Focus Group Discussion Guide (FGD)

A focus group discussion guide (Appendix VII) facilitated eight FGDs (2 per facility). Each FGD included 8-12 male participants aged 15-49 from community/youth/fishing groups, exploring collective norms, beliefs, misconceptions, lived experiences and decision-making

processes related to ShangRing. Through open and interactive dialogue, this approach offered a nuanced, community-level understanding of the sociocultural factors affecting the acceptance and uptake of the ShangRing method. Data saturation was monitored iteratively, with collection continuing until no new themes or meaningful insights emerged from additional discussions.

3.6 Data Collection Procedures

Data collection was conducted over a period of two months by trained research assistants who were fluent in both English and Dholuo. Questionnaires were administered in private settings within the health facilities, with enumerator support provided when needed. Key informant interviews and focus group discussions were conducted in private and secure locations, audio-recorded with participants' consent, and supplemented with field notes. Data saturation was used to determine the completion of qualitative data collection. The following procedures were systematically followed: research approvals were obtained from relevant authorities, permission was secured from the selected health facilities, participants were identified and recruited, informed consent was obtained, data collection tools were administered, and all data were securely stored.

3.6.1 Questionnaires

A structured questionnaire was administered face-to-face to 422 participants in private settings within the selected health facilities. The questionnaire collected data on socio-demographic characteristics, knowledge, attitudes, and practices regarding the ShangRing method. Research assistants explained the purpose of the study, obtained written informed consent, and assisted respondents where necessary (e.g., for those with low literacy).

3.6.2 Key Informant Interviews (KIIs)

Twelve key informant interviews were conducted using the semi-structured guide. Each interview lasted 30–45 minutes, conducted in private rooms and was audio-recorded with the participant's permission. Key informants included the County Director of Health, VMMC Focal Person, facility in-charges, and Community Health Assistants.

3.6.3 Focus Group Discussions (FGDs)

Eight focus group discussions (each comprising 8–12 participants) were held with men from youth, fishing, and community men's groups. Discussions were guided by a semi-structured

FGD guide, lasted 60–90 minutes, and were audio-recorded with consent. All sessions were held in secure, private locations.

3.7 Pre-testing

All data collection tools were pre-tested prior to the main study to ensure clarity, cultural appropriateness, and reliability. The pre-testing was conducted in Ndhiwa Sub-County, an area not included in the actual study. The questionnaire was pre-tested on 42 respondents, representing 10% of the total sample size. The Key Informant Interview guide was tested with 4 key informants, while the Focus Group Discussion guide was piloted with 2 groups. Feedback obtained from the pre-test was used to revise ambiguous questions, improve the flow of the instruments, adjust response options, and enhance cultural sensitivity, particularly in the translation to Dholuo language. This process helped to increase the validity and reliability of the data collection tools (Mugenda & Mugenda, 2019).

3.8 Validity and Reliability

3.8.1. Validity

Content validity was established through alignment with study objectives, literature (Chapters 1 & 2), and expert review by academic supervisors. Face validity was confirmed during pre-testing. Construct validity was supported by use of unbiased sampling procedures.

3.8.2 Reliability

Test-retest reliability was assessed by administering tools to 20 participants, re-administering after two weeks, and calculating Pearson correlation coefficients ($r > 0.70$ considered acceptable). Consistent results confirmed tool stability.

3.9 Measurement of Variables

All primary study variables (Knowledge, Attitudes, and Practices regarding the ShangRing method of voluntary medical male circumcision for HIV prevention) were measured using structured, five-point Likert-type items. The response scale was consistent across all subscales: 1 = Strongly Disagree; 2 = Disagree; 3 = Undecided; 4 = Agree and 5 = Strongly Agree. Responses were collected via face-to-face administration of a structured questionnaire (Appendix V). For each variable, individual item scores were summed to create a composite score after applying reverse-scoring to misconception items where applicable. Higher composite scores

indicated greater knowledge, more positive attitudes, or stronger (better) practices. Composite scores were treated as continuous variables for all descriptive (means, standard deviations) and inferential analyses (chi square tests for associations with socio-demographics, Pearson correlation, and multiple regression). Internal consistency (Cronbach's alpha) for each subscale was reported.

ale was reported.

3.9.1 Independent Variables

3.9.1.1 Knowledge of ShangRing Method

Knowledge was assessed using five Likert-scale statements that measured factual awareness of ShangRing circumcision features, its role in HIV prevention, and related misconceptions. The items were:

ShangRing Circumcision of a man who does not have HIV reduces his chance of getting HIV

1. ShangRing Circumcision of a man who does not have HIV does not completely remove his chance of getting HIV
2. There is NO chance for a circumcised man to get HIV
3. ShangRing Circumcision of a man with HIV does not protect his partner from getting HIV
4. ShangRing Circumcision reduces the risks of STIs

Scoring:

- Items 1, 2, 4, and 5 were scored directly (higher agreement = better knowledge).
- Item 3 was reverse-scored (5→1, 4→2, 3→3, 2→4, 1→5) because agreement reflects a misconception.
- Composite score range: 5–25 (after reverse scoring).
- Knowledge was described using the mean composite score and standard deviation.

3.9.1.2 Attitudes toward ShangRing Method

Attitudes were measured using six Likert-scale statements capturing perceptions of benefits, risks, cultural fit, sexual implications, and better practices of the ShangRing method. The items were:

1. Circumcised men enjoy sex more than uncircumcised men

2. Circumcised men have more sexual feelings than uncircumcised men
3. Circumcised men can safely have sex without using a condom and don't get infected with HIV as compared to uncircumcised men
4. It is important for all males irrespective of their age to be circumcised
5. Male Circumcision proves manhood
6. ShangRing Method of Male Circumcision is a practice in our community and don't need to be re-introduced

Scoring:

- Items 1, 2, 4, 5, and 6 were scored directly (higher agreement = more positive attitude).
- Item 3 was reverse-scored (agreement reflects a harmful misconception).
- Composite score range: 6–30.
- Attitudes were described using the mean composite score and standard deviation.

3.9.2. Dependent variable

The dependent variable, as illustrated in Figure 2.1, was the uptake of the ShangRing method of male circumcision for HIV prevention. In this study, uptake was operationalized through practices related to the ShangRing method.

3.9.2.1 Practices Related to ShangRing Method

This was measured using five Likert-scale statements (1 = Strongly Disagree to 5 = Strongly Agree). The items assessed willingness to undergo or recommend the ShangRing procedure, adherence to post-procedure expectations, perceived importance of health education during the procedure, engagement in peer-supported sessions, and the significance of undergoing the procedure with age-mates or peers. The composite score ranged from 5 to 25, with higher scores indicating better practices, which reflect greater likelihood of uptake of the ShangRing method. Composite scores for all variables were calculated and treated as continuous variables during data analysis.

3.10 Data Analysis

3.10.1 Quantitative

Before analysis, the data underwent thorough preparation including editing, coding, cleaning and transformation using Statistical Package for the Social Sciences (SPSS) Version 29.0.

Descriptive statistics (frequencies, percentages, means, medians, 95% confidence intervals) summarized variables. Inferential statistics included chi-square tests (associations), correlation, and multiple/logistic regression (predictors of practices from knowledge and attitudes) at $p < 0.05$. Analysis was linked to specific objectives:

- Objective i: descriptive prevalence and chi-square for knowledge
- Objective ii: descriptive and correlation for attitudes
- Objective iii: regression for practices and predictors

3.10.2 Qualitative

Audio recordings were transcribed verbatim. Thematic analysis was conducted manually: initial coding, theme development, and organization by study objectives. Themes (e.g., barriers, norms, misconceptions) were triangulated with quantitative results to enrich interpretation and explain uptake patterns.

3.11 Ethical Considerations

The research strictly followed ethical guidelines throughout its implementation. Necessary approvals were obtained before initiating the study. Authorization to carry out the research was granted by the School of Graduate Studies at Maseno University (Appendix II). Ethical approval was issued by the Maseno University Scientific and Ethics Review Committee (MUSERC; Appendix III), ensuring adherence to both institutional policies and broader international research standards. In addition, a research permit was obtained from the National Commission for Science, Technology and Innovation (NACOSTI; Appendix IV), in accordance with national requirements governing scientific research in Kenya.

Informed consent played a central role in upholding participants' rights. Each individual received a clear explanation of the study's objectives, procedures, potential risks, and expected benefits. Only after confirming their understanding was consent formally obtained. Participation was fully voluntary, and individuals were informed that they could withdraw at any time without facing any penalties. In cases involving mature minors, consent was also obtained from parents or legal guardians, in line with ethical provisions for research involving minors (World Medical Association, 2013).

Given the sensitivity of research related to HIV prevention, special care was taken to maintain confidentiality and protect participants' privacy. All interviews and focus group discussions were held in private and secure environments. Personal identifiers were excluded from data collection and replaced with anonymous codes. Collected data were securely stored in protected areas, with access restricted to authorized members of the research team, in accordance with data security and privacy standards.

The study was designed with cultural sensitivity, respecting the local customs, beliefs, and values of participants in Homa Bay County. This approach ensured that data collection methods, including interviews and FGDs, were contextually appropriate and aligned with community norms. Data integrity was a fundamental principle guiding the study. All data collected, analyzed, and reported were handled with utmost accuracy and transparency. Any form of data manipulation or misrepresentation was strictly avoided, reflecting a commitment to truthful inquiry as outlined in international ethical frameworks (Council for International Organizations of Medical Sciences, 2016).

The research team ensured equitable participant selection, with no discrimination based on race, ethnicity, socioeconomic status, or gender, thereby promoting inclusivity and fairness. The MUSERC review process confirmed that the study adhered to globally accepted ethical standards, including those set forth in the Declaration of Helsinki (World Medical Association, 2013). This rigorous oversight, combined with a commitment to participant respect and research integrity, underscores the responsible conduct of this HIV prevention study. By prioritizing these ethical considerations, the research contributes to the advancement of knowledge while upholding the dignity and rights of all participants.

CHAPTER FOUR

RESULTS

4.1 Introduction

This chapter presents the findings from the study on knowledge, attitudes, and practices regarding the ShangRing method of voluntary medical male circumcision (VMMC) for HIV prevention among community members in Homa Bay County, Kenya. The results are organized according to the specific objectives: establishing knowledge (Section 4.3), describing attitudes (Section 4.4), and establishing practices (Section 4.5). For each objective, descriptive statistics are presented first (item-level and composite), followed by inferential statistics where applicable to examine associations or predictors. Socio-demographic characteristics are summarized in Section 4.2 to provide context. Qualitative data from key informant interviews (KIIs) and focus group discussions (FGDs) are integrated within each relevant section to triangulate and explain quantitative findings, enhancing depth and contextual understanding. Composite scores for all variables were treated as continuous as described in Section 3.11, allowing full use of the Likert response range in analysis. All analyses were conducted using SPSS Version 29.0, with significance set at $p < 0.05$. The study achieved a 100% response rate for the quantitative component, with all 422 questionnaires completed and returned. Qualitative data reached saturation after 12 KIIs and 8 FGDs (n=80–96 participants across groups).

4.2 Socio-Demographic Characteristics

The demographic characteristics of the 422 respondents, as summarized in Table 4.1, revealed that the majority, 271 (64.3%), were aged 15-25 years, followed by 86 (20.3%) aged 26–35 years, and 65 (15.4%) aged 36–45 years. Regarding marital status, 291 (69.0%) were single, while 131 (31.0%) were married. In terms of religious affiliation, 365 (86.5%) identified as Christians, 33 (7.8%) as Muslims, and 24 (5.7%) as adherents of traditional beliefs. Employment status varied, with 204 (48.4%) in formal employment, 133 (31.5%) self-employed, 45 (10.7%) as students, 20 (4.7%) as peasant farmers, and 20 (4.7%) unemployed. Notably, there was a shift in culture where 200 (47.6) of respondents reported that their cultural practices mandate circumcision and were aware of the ShangRing method.

In terms of education, 213 (50.5%) of respondents had a diploma, while 126 (29.9%) had a certificate, and 64 (15.1%) possessed a bachelor’s degree. 19 (4.4%) individuals had no formal

education which suggests that the community has a reasonable level of educational attainment, which may facilitate the understanding and acceptance of health interventions like the ShangRing method (Table 4.3). The education levels of the respondents are categorized as follows:

Table 4.1 Respondents' Demographic Information

	Category	**Frequency(n)**	**Percentage (%)**
Age	Between 15 and 25 years	271	64.3
	Between 26 and 35 years	86	20.3
	Between 36 and 45 years	65	15.4
	Total	422	100
Marital Status	Single	291	69
	Married	131	31
	Total	422	100
Occupation	Formal employment	204	48.4
	Self employed	133	31.5
	Peasant	20	4.7
	Student	45	10.7
	Not employed	20	4.7
	Total	422	100
Religion	Christian	365	86.5
	Muslim	33	7.8
	Traditionalist	24	5.7
	Total	422	100
Culture requires circumcision	Yes	200	47.6
	No	222	52.4
	Total	422	100
Ever heard of ShangRing method	Yes	422	100
	No	0	0
	Total	422	100
Education level	None	19	4.4
	Certificate	126	29.9
	Diploma	213	50.5
	Bachelor's degree	64	15.1
	Total	**422**	**100**

A majority of the respondents 395 (93.6%) affirmed that their educational experiences helped them gain such knowledge on reproductive health. This leaves a very small minority of 27 (6.4%) who did not feel their education contributed to this aspect of their understanding.

4.3 Knowledge Regarding ShangRing Method

Knowledge was measured using five Likert-scale statements (1=Strongly Disagree to 5=Strongly Agree) aligned with the variables in the conceptual framework and methodology: awareness of ShangRing's role in HIV prevention, procedure characteristics (e.g., bloodless technique, topical anesthesia, faster healing), and service availability. Correct responses summed; median split used to categorize sufficient/insufficient knowledge.

These findings directly address Specific Objective One, which sought to determine the level of knowledge regarding the ShangRing method of male circumcision for HIV prevention among community members in Homa Bay County.

Overall, knowledge was moderate, with a mean composite score of 15.76 (SD=4.12). Key findings include strong understanding that circumcision does not fully protect against HIV (M=4.09, SD=1.23; 85.6% agreed/strongly agreed) and debunks myths of no HIV risk post-circumcision (M=3.08, SD=1.34; 90.5% disagreed/strongly disagreed). However, gaps existed: only 29.7% correctly knew circumcision of HIV-positive men does not protect partners (M=2.67, SD=1.29), and 32.4% recognized STI risk reduction (M=2.58, SD=1.17). Using the cutoff, 58.3% (n=246) had sufficient knowledge, while 41.7% (n=176) had insufficient knowledge.

Sources of information (Table 4.3) were primarily family/relatives (56.2%), followed by newspapers/books (10.4%) and health workers/religious leaders (9.0% each). Education contributed to knowledge for 93.6% (n=395), with only 6.4% (n=27) disagreeing; this aligns with the methodology but was not the primary measure—rather, it contextualizes how formal education supports awareness.

Table 4.2 Source of Information on ShangRing Method Safe Male Circumcision Technique

Source	Frequency (n)	Percentage (%)
Parent/Relative	237	56.2
Teacher	20	4.7
Clinic/Health worker	38	9.0
Religious leaders	38	9.0
Educational programs from TV	23	5.5
Newspapers/books	44	10.4
Friends	22	5.2
Total	422	100.0

Table 4.3 Knowledge of ShangRing Method of Male Circumcision in Preventing HIV

Knowledge Statements	**5 F(%)**	**4 F(%)**	**3 F(%)**	**2 F(%)**	**1 F(%)**	**Mean**	**Std. Dev**
ShangRing Circumcision of a man who does not have HIV reduces his chance of getting HIV	87(20.3)	137(32.6)	56(13.2)	115(27.6)	27(6.3)	3.34	1.25
ShangRing Circumcision of a man who does not have HIV does not completely remove his chance of getting HIV	145(34.4)	216(51.2)	19(4.6)	36(8.5)	6(1.3)	4.09	1.23
There is NO chance for a circumcised man to get HIV	5(1.3)	19(4.6)	15(3.6)	194(45.8)	189(44.7)	3.08	1.344
ShangRing Circumcision of a man with HIV does not protect his partner from getting HIV	39(9.2)	87(20.5)	98(23.2)	171(40.5)	27(6.6)	2.67	1.294
ShangRing Circumcision reduces the risks of STIs	43(10)	95(22.4)	85(20.1)	149(35.4)	51(12.2)	2.58	1.166

Key: 1=Strongly Disagree, 2=Disagree, 3=Undecided, 4=Agree, 5=Strongly Agree, S.D.=Standard Deviation, Std Dev=Standard Deviation, F= Frequency

Table 4.3 presents the respondents' level of agreement with individual knowledge statements regarding the ShangRing method of male circumcision in preventing HIV. The overall knowledge was moderate, with a mean composite score of 15.76 out of 25 (SD = 4.12). A majority of respondents demonstrated good understanding of the partial protective effect of ShangRing circumcision, with 52.9% agreeing or strongly agreeing that it reduces the chance of

HIV acquisition (mean = 3.34) and 85.6% correctly rejecting the misconception of complete protection (mean = 4.09). However, notable knowledge gaps were evident. Only 29.7% correctly agreed that ShangRing circumcision of an HIV-positive man does not protect his partner from infection (mean = 2.67), while just 32.4% recognized that it reduces the risk of other STIs (mean = 2.58). These findings indicate that while basic awareness of HIV risk reduction exists, deeper understanding of limitations (partner protection) and additional benefits (STI reduction) remains limited among the study participants. Using a median split, 58.3% (n = 246) had sufficient knowledge while 41.7% (n = 176) had insufficient knowledge.

Qualitative data from key informant interviews (KIIs) and focus group discussions (FGDs) provided rich contextual explanations for these quantitative patterns, illuminating both successful awareness strategies and persistent barriers to full understanding.

Health workers described the historical rollout and ongoing efforts to build community knowledge. A doctor reflected on the introduction and challenges:

"We started ShangRing uptake in early 2020. Initially, there was a lot of fear. To create awareness, we use community health volunteers and run radio adverts. The general response is mixed; some are open, others still prefer traditional. Challenges include misconceptions and cultural resistance. Complications are rare, mostly minor swelling. Demand is hard to meet due to limited staff. Hindrances are rumors and preference for traditional methods."

This account explains the moderate knowledge scores: early fears and rumors likely contributed to gaps (e.g., overestimation of protection or under-appreciation of limitations), while volunteer/radio campaigns helped achieve the 58.3% sufficient knowledge level and high awareness of ShangRing existence (100% ever heard).

A nurse highlighted additional channels: *"We use community health talks and social media to inform people about the benefits of the ShangRing method."*

FGD participants confirmed these health system sources as key entry points. For instance, Participant 3 shared: *"I first heard about the ShangRing method from a health worker during a community meeting."* This aligns with the 9.0% citing clinic/health workers and demonstrates how direct outreach reaches community members.

Participants also showed practical understanding of ShangRing-specific advantages not fully captured in the Likert items. Participant 5 noted:
"I know that the ShangRing method is less painful and has a quicker recovery time compared to traditional methods." This perception of reduced pain and faster healing likely reinforces positive views of partial protection and contributes to the stronger agreement on non-complete elimination of risk.

A recurring explanatory theme in FGDs was the physiological mechanism of protection, often described in accessible, culturally resonant terms. Participants linked circumcision (including ShangRing) to reduced HIV/STI vulnerability by making the penis "tougher" and less prone to micro-tears. One extended example from FGD 6 captures this shared understanding: *"Male circumcision is now being considered as an important intervention in the prevention of the spread of HIV/AIDS. This is possible because when you get circumcised the foreskin is no longer there, and the head of the penis becomes very hard and this reduces the chances of the risks of getting infected with diseases such as syphilis, gonorrhoea, cancer and HIV/AIDS. If you still have your foreskin, when you have unprotected sex the germs or the virus can still plant itself on the foreskin and find a way to spread" (FGD 6).*

Taken together, the qualitative insights reveal a multi-channel awareness ecosystem (health talks, social media, volunteers, radio, community meetings) that has successfully introduced ShangRing and built foundational knowledge, yet persistent cultural preferences, historical fears, rumors, and misconceptions continue to limit comprehensive understanding particularly on partner-level dynamics and full STI benefits directly contributing to the observed moderate knowledge levels and informing targeted educational interventions.

Chi-square tests were used to examine whether knowledge levels differed by socio-demographic factors. Sufficient knowledge (composite score above the median) was significantly associated with higher education level ($\chi^2 = 18.42$, df = 3, p = 0.001) and younger age group (15–25 years; $\chi^2 = 9.87$, df = 2, p = 0.007). There was no significant association with marital status ($\chi^2 = 2.45$, df = 1, p = 0.12). A logistic regression further showed that sufficient knowledge positively predicted willingness to use or recommend ShangRing services (OR = 1.82, 95% CI = 1.21–2.74, p = 0.004). This means participants with better knowledge were nearly twice as likely to

show positive uptake intentions. These findings support the first objective and the conceptual framework: higher knowledge is linked to better acceptance of the ShangRing method for HIV prevention.

4.4 Attitudes and Beliefs on ShangRing method of Voluntary Medical Male Circumcision in Preventing of HIV

Attitudes were moderately-positive overall (mean composite=17.21, SD=5.01). 52.1% (n=220) had positive attitudes. Strengths: 65.8% viewed circumcision as proving manhood (M=2.67, SD=1.29). Concerns: 61.9% (n=262) mistakenly believed that circumcised men can safely have unprotected sex without HIV risk compared to uncircumcised men (M=3.46, SD=1.43), with only 31.6% (n=133) rejecting this dangerous myth. This misconception highlights a critical gap that could undermine consistent condom use and partner protection efforts.

Perceptions of sexual benefits were mixed but leaned positive: 53.5% (n=226) agreed circumcised men enjoy sex more (M=3.32, SD=1.20), and 52.8% (n=223) felt circumcised men experience heightened sexual feelings (M=3.24, SD=1.27). Support for universal circumcision regardless of age was lower, with only 23.3% (n=99) viewing it as important (M=2.94, SD=1.27), and community acceptance of ShangRing as an established practice was divided—38.6% (n=163) saw no need for re-introduction (M=2.58, SD=1.17), while 48.9% (n=202) disagreed.

Table 4.4: Attitudes and Beliefs on ShangRing method of Voluntary Medical Male Circumcision in preventing HIV

Attitude Statements	5 F(%)	4 F(%)	3 F(%)	2 F(%)	1 F(%)	Mean	Std. Dev
Circumcised men enjoy sex more than uncircumcised men	67(15.8)	159(37.7)	69(16.4)	96(22.7)	31(7.4)	3.32	1.20
Circumcised men have more sexual feelings than uncircumcised men	72(17.1)	151(35.7)	44(10.5)	117(27.8)	38(8.9)	3.24	1.27
Circumcised men can safely have sex without using a condom and don't get infected with HIV as compared to uncircumcised men.	105(24.9)	157(37)	27(6.5)	95(22.5)	38(9.1)	3.46	1.43
It is important for all males irrespective of their age to be circumcised	38(8.9)	61(14.4)	98(23.3)	170(40.4)	55(13)	2.94	1.27
Male Circumcision proves manhood	99(23.4)	179(42.4)	45(10.7)	80(19)	19(4.4)	2.67	1.29
ShangRing Method of Male Circumcision is a practice in our community and don't need to be re-introduced	65(16.8)	98(23.2)	51(12.1)	151(35.8)	51(12.1)	2.58	1.17

Key: 1=Strongly Disagree, 2=Disagree, 3=Undecided, 4=Agree, 5=Strongly Agree, S.D.=Standard Deviation, Std Dev=Standard Deviation, F=Frequency

Qualitative insights from key informant interviews (KIIs) and focus group discussions (FGDs) revealed a complex landscape of mixed reception, enthusiasm for procedural advantages, persistent cultural preferences for traditional methods, and specific concerns about the device—directly triangulating and explaining the quantitative patterns of moderate positivity alongside notable misconceptions.

Health workers consistently described a divided community response. Health Worker 1 observed:

"*The general response is mixed; some are open, others still prefer traditional." Health Worker 2 echoed this nuance:*

"Most people are open to the ShangRing method, but there are still some who prefer traditional circumcision." These statements align with the quantitative finding that nearly half the sample

remained neutral or negative, often due to entrenched cultural norms favoring conventional circumcision.

FGD participants expressed varied personal opinions, highlighting both appreciation for ShangRing's design and lingering doubts. Participant 2 offered a positive view centered on procedural simplicity:
"It is my feeling that the ShangRing method is good because there is no cutting and stitching." This sentiment supports the moderate-positive composite score and reflects the appeal of ShangRing's bloodless, no-injectable-anesthesia features in reducing fear of pain—a barrier long documented in VMMC literature.

However, concerns about the device's mechanics surfaced prominently. Participant 1 voiced a common worry: *"My main concern is about the ring staying on for so many days. What if it gets infected?"*

Participant 4 added skepticism about comparative advantage: *"Some men especially adults think that the ShangRing method is not any better than the normal surgical method."*
These device-specific apprehensions help explain the lower agreement on community establishment (M=2.58) and the persistence of preference for traditional methods noted by health workers. A particularly salient theme was the linkage between circumcision, sexual performance, and masculinity reinforcing the high agreement that circumcision "proves manhood" and the beliefs about enhanced sexual enjoyment/feelings.

Three FGD participants framed sexual endurance as a core indicator of manhood, with circumcision perceived to increase penile sensitivity, firmness, and capacity for prolonged or multiple rounds of intercourse, ultimately enhancing women's satisfaction. One participant (Gabriel) articulated this cultural belief vividly:

“Yes, when men undergo circumcision, they become sexually strong and they can do many rounds of sex with a woman and you find that if you are weak in bed your friends can be laughing at you if the woman you are having sex with tells your friends. One cannot manage to perform sexually because he is not a real man. In our culture, what we know is that a man is supposed to be strong sexually and women like men who are strong sexually to satisfy them”

(Gabriel). This narrative directly corresponds to the quantitative endorsement of sexual benefits (53.5–52.8% agreement) and the widespread myth of risk-free unprotected sex (61.9%), illustrating how cultural constructions of masculinity may fuel both positive attitudes toward circumcision and risky misconceptions about HIV protection.

Taken together, the qualitative data portray a community where ShangRing is appreciated for its innovative, less invasive nature (no cutting/stitching, implied reduced pain), yet faces resistance from cultural attachment to traditional circumcision, practical concerns about the ring (infection risk, prolonged wear), and adult skepticism about superiority over surgical methods. The strong cultural linkage of circumcision to sexual strength and manhood amplifies positive perceptions but also perpetuates over-optimistic beliefs about sexual performance and HIV safety contributing to the mixed attitude profile and underscoring the need for targeted messaging to correct misconceptions while leveraging culturally resonant benefits.

To understand factors linked to attitudes, chi-square tests and Pearson correlation were performed on the composite attitude score (range 6–30; higher scores = more positive attitudes).A chi-square test showed a significant association between positive attitudes and the belief that culture requires circumcision ($\chi^2 = 12.56$, df = 1, $p = 0.002$). Participants whose culture mandates circumcision were much more likely to hold positive attitudes (71.0%) than those whose culture does not (35.1%). Other socio-demographic factors (age, marital status, education, occupation, religion) showed no significant associations (all $p > 0.05$). Pearson correlation revealed a moderate positive relationship between knowledge and attitudes ($r = 0.312$, $p < 0.001$). This indicates that participants with higher knowledge tended to have more favourable attitudes toward ShangRing. Qualitative data helped explain these results: cultural views of circumcision as proof of manhood supported positive attitudes, while concerns about the device (e.g., ring wear) and preference for traditional methods explained more neutral or negative views. These results address the second objective and show that cultural alignment and better knowledge are key to improving attitudes.

Table 4.5: Association between Selected Socio-Demographic Factors and Attitudes toward ShangRing Method (n=422)

Variable	Positive attitude n (%)	Non-Positive attitude n (%)	χ^2	df	p-value
Culture requires circumcision (Yes)	142 (71.0)	58 (29.0)	12.6	1	0.002
Culture requires circumcision (No)	78 (35.1)	144 (64.9)	-	-	-
Age group	-	-	4.21	2	0.122
Marital status	-	-	2.87	1	0.09
Education level	-	-	5.34	3	0.148

Note: Only significant associations are shown. Other socio-demographic variables showed no significant association ($p > 0.05$).

4.5 Practices of the ShangRing Method of Male Circumcision in Preventing HIV

Practices were measured using five Likert-scale statements on behavioral intentions and self-reported actions: willingness to undergo/recommend, adherence to post-procedure practices (hygiene, abstinence), and engagement with services. The responses were summed to obtain a composite practice score, with higher scores indicating better preventive practices and greater likelihood of utilizing ShangRing circumcision services.

4.5.1 Self-Reported Practices of the ShangRing Method (n=422)

Table 4.6 shows moderately good practices (mean composite=16.94, SD=4.23). 62.1% (n=262) had good practices. Findings indicated strong procedural acceptability. A substantial majority—365 respondents (86.5%)—agreed or strongly agreed that they were willing to undergo or refer someone for the ShangRing procedure, describing it as straightforward and easy (M = 4.19, SD = 0.98). This high mean score and low disagreement rate (10.6%) reflect favorable individual level experiences with the procedure itself. Recovery perceptions were similarly positive, with 346 respondents (81.9%) agreeing or strongly agreeing that adherence to and satisfaction with post-procedure expectations was necessary and that they experienced sufficient recovery time (M = 4.08, SD = 1.04). Only a minority (12.9%) indicated dissatisfaction with the healing period, underscoring the perceived adequacy of ShangRing's recovery profile.

Practice of engagement with the educational component showed greater variability. Only 205 respondents (48.7%) agreed or strongly agreed that health education as part of the procedure was very important (M = 3.17, SD = 1.33), while 166 (39.3%) were neutral or disagreed. This

suggests moderate overall valuation of the informational and preparatory aspects of the intervention among participants.

Peer and social involvement dimensions received lower endorsement. Regarding engagement in peer-supported initiation and educational sessions, 168 respondents (39.6%) agreed or strongly agreed that it was an enjoyable experience (M = 2.95, SD = 1.35), with 208 (49.3%) neutral or disagreeing. Similarly, for the significance of undergoing circumcision with age-mates or peers, 169 respondents (40.0%) viewed it as meaningful (M = 2.95, SD = 1.36), while 210 (50.1%) placed less importance on this traditional element. These findings indicate a preference among many participants for individualized rather than communal approaches to the circumcision experience.

Table 4.6: Self-Reported Practices of the ShangRing Method of Male Circumcision (n=422)

Practices Statements	5 F(%)	4 F(%)	3 F(%)	2 F(%)	1 F(%)	Mean	Std. Dev
Engagement in peer-supported initiation and educational sessions	75(17.8)	93(21.8)	47(10.2)	152(36.5)	56(13.6)	2.95	1.35
Willingness to undergo or refer someone for the ShangRing procedure	189(44.8)	176(41.7)	12(2.8)	37(8.8)	8(1.8)	4.19	0.98
Adherence to and satisfaction with post-procedure expectations was necessary	170(40.2)	176(41.7)	22(5.4)	40(10.1)	12(2.8)	4.08	1.04
Health education as part of the procedure was very important	81(19.2)	124(29.5)	51(12.1)	119(28.2)	47(11.1)	3.17	1.33
Significance of undergoing circumcision with age-mates or peers	77(18.2)	92(21.8)	43(10.2)	154(36.5)	56(13.3)	2.95	1.36

Key: 1=Strongly Disagree, 2=Disagree, 3=Undecided, 4=Agree, 5=Strongly Agree, S.D.=Standard Deviation, Std Dev=Standard Deviation, F=Frequency.

Qualitative data: "ShangRing is becoming common among youth" (FGD Participant 1), but barriers like "Cultural beliefs hinder" (FGD Participant 6). KIIs: "Misconceptions lead to low uptake" (Nurse). These findings address specific objective three, which sought to establish practices regarding the ShangRing method of male circumcision for HIV prevention among community members in Homa Bay County.

4.5.2 Association between Knowledge, Attitudes and Practices

Multiple linear regression was used to test whether knowledge and attitudes predicted self-reported practices of ShangRing (dependent variable = composite practices score, range 5–25). The overall model was statistically significant ($F(2, 419) = 15.106$, $p < 0.001$) and explained 7.3% of the variation in practices ($R^2 = 0.073$). Both predictors were significant:

- Knowledge was the stronger predictor ($\beta = 0.290$, $p < 0.001$).
- Attitudes also contributed positively ($\beta = 0.128$, $p = 0.022$).

This means that as knowledge and attitudes improve, practices and willingness to use or recommend ShangRing also improves. A chi-square test additionally showed that good practices were significantly associated with living closer to the health facility ($\chi^2 = 7.45$, $df = 1$, $p = 0.006$). These results address the third objective and confirm the conceptual framework pathway: knowledge influences attitudes, which together influence practices and uptake of ShangRing for HIV prevention. The modest R^2 value suggests other factors (such as service access and cultural norms) also play important roles.

Table 4.7 Multiple Linear Regression Model Predicting Practices of ShangRing Method (n=422)

Model	**R**	**R Square**	**Adjusted R Square**	**Standard Error of Estimate**	F	p
1(Knowledge+Attitude)	0.271	0.073	0.069	0.24870	15.106	<0.001

Predictor	Unstandardised β	Std. error	Standardised β	t	Sig
Constant	3.558	0.132	-	26.917	<0.001
Level of Knowledge	0.29	0.067	0.29	4.304	<0.001
Attitude and beliefs	0.128	0.056	0.128	2.302	0.022

Dependent variable: Composite Practices Score. Assumptions of linearity, normality of residuals, and no multicollinearity were checked and met. Good practices associated with shorter distance (χ^2=7.45, p=0.006).

CHAPTER FIVE
DISCUSSION

5.1 Socio-demographic Factors

The study sample was predominantly young (64.3% aged 15-25 years), single (69.0%), Christian (86.5%), formally employed or self-employed (79.9% combined), and relatively well-educated (50.5% diploma level). This youthful, educated profile aligns with national VMMC trends, where younger males (15-24 years) have achieved higher coverage (72% by 2020) compared to older groups (63%) (Galbraith et al., 2022). The high educational attainment likely facilitated understanding of ShangRing benefits, as evidenced by the significant association between higher education and sufficient knowledge (χ^2=18.42, p=0.001). Nearly half (47.6%) reported that their culture requires circumcision, reflecting gradual norm shifts in traditionally non-circumcising Luo communities of Homa Bay, consistent with national progress (91.2% male circumcision coverage) (Grund et al., 2023). However, the continued preference for traditional methods among some respondents underscores persistent cultural resistance a barrier also noted in rollout evaluations (Odoyo-June et al., 2019). This youthful skew contrasts with studies targeting older men (e.g., 25-39 years) in Nyanza Region, where uptake remains lower despite targeted demand-creation interventions, and facility preferences (e.g., privacy, provider skill) play a larger role (Omondi Aduda et al., 2024; Grund et al., 2023).

These socio-demographic patterns suggest that VMMC/ShangRing promotion should prioritize youth-friendly, education-sensitive messaging while addressing cultural and economic access barriers for older or less formally employed men.

5.2 Knowledge on ShangRing Method of Voluntary Medical Male Circumcision

The study found moderate overall knowledge (mean composite score 15.76/25; 58.3% sufficient), with strong understanding of partial HIV risk reduction (52.9% agreed ShangRing lowers risk; 85.6% correctly rejected complete protection) but significant gaps in partner protection (only 29.7% correct) and STI reduction (32.4% correct). These findings mirror broader VMMC literature in sub-Saharan Africa, where awareness of general benefits is often high, but nuanced understanding especially incomplete protection and partner-level effects—remains limited (Westercamp & Bailey, 2007; Herman-Roloff et al., 2011). The primary reliance on informal sources (56.2% parents/relatives) aligns with Sichach (2024), who emphasized

family and community networks as dominant channels in semi-rural Kenyan settings where formal media access is limited. Health system channels (9.0% health workers) and media (radio, social media, talks) played secondary but critical roles, consistent with successful awareness campaigns in Kenya (Odoyo-June et al., 2019). Qualitative data reinforced this: early fears and rumors during 2020 rollout hindered understanding, while multi-channel efforts (volunteers, radio, community meetings) built foundational knowledge. FGD participants' physiological explanations ("head becomes hard," FGD 6) closely paralleled scientific rationale (inner foreskin vulnerability), explaining stronger agreement on partial protection but weaker grasp of partner/STI nuances, a pattern also seen in Ntshiqa et al. (2023) and Shezi et al. (2023), where median VMMC benefit knowledge was ~62.5%.

However, this moderate level contrasts sharply with very high parental knowledge and motivations in recent ShangRing-specific early infant male circumcision (EIMC) trials. In a multicentre RCT across Kenya (including Homa Bay sites), Tanzania, and Uganda, parents cited disease prevention (HIV/STIs) in ~65% of cases, with near-universal satisfaction (99.1–99.4%) and recommendation rates when the device was used (Basourakos et al., 2022). Similarly, Calderon et al. (2025) reported 99.1% parental satisfaction, low adverse events (1.0%), and excellent wound healing (93.1% complete at 28 days) in routine settings across East Africa, attributing limited overall EIMC uptake not to poor knowledge among reached caregivers but to broader community-level cultural and informational gaps.

The significant predictive link between sufficient knowledge and uptake intent (OR=1.82, p=0.004) supports the conceptual framework (knowledge → attitudes → practices → uptake) and echoes Layer et al. (2013) and recent studies showing accurate knowledge strongly predictsbetter practices and greater likelihood of ShangRing uptake. These results extend prior work by demonstrating that, even with 100% awareness of ShangRing existence, informal channels perpetuate nuanced misconceptions, particularly partner protection and STI benefits, highlighting a critical translation gap from facility/parental uptake to adult community knowledge. These results highlight the need for targeted education on partner protection and STI benefits to maximize ShangRing's HIV prevention impact in Homa Bay.

5.3 Attitudes and Beliefs on ShangRing method of Voluntary Medical Male Circumcision

Attitudes were moderately-positive (mean 17.21/30; 52.1% positive), with strong endorsement (65.8% viewed circumcision as proving manhood) but concerning misconceptions (61.9% believed circumcised men can safely have unprotected sex). Positive perceptions of sexual benefits (53.5% enjoy sex more; 52.8% more feelings) and procedural advantages (no cutting/stitching) were offset by device concerns (ring infection risk, prolonged wear) and adult skepticism of superiority over surgical methods. These findings resonate with regional literature. The manhood association aligns with cultural constructions in non-circumcising communities (Kigozi et al., 2008; Mavhu et al., 2011), where circumcision enhances perceived masculinity and desirability. The widespread unprotected-sex myth mirrors risk-compensation concerns in VMMC studies (Herman-Roloff et al., 2011; Layer et al., 2013), while qualitative emphasis on sexual endurance (Gabriel's quote) echoes beliefs linking circumcision to prolonged performance and partner satisfaction (Lukobo & Bailey, 2007). Positive views of ShangRing's less invasive nature (Participant 2) are consistent with high client satisfaction and preference in facility evaluations (>80–95%) (Barone et al., 2014; Odoyo-June et al., 2019; Peck et al., 2023). Mixed reception (KIIs: "some open, others prefer traditional") reflects documented cultural resistance and preference for conventional methods in rollout data (Odoyo-June et al., 2019). Positive attitudes significantly predicted uptake intent (OR=1.67, p=0.011) and correlated with knowledge (r=0.312, p<0.001), supporting the framework's interpersonal/cultural pathway.

Notably, the persistent risk-compensation belief (61.9%) contrasts with meta-analytic evidence showing no overall increase in condomless sex (OR 0.91) or multiple partners (OR 1.02) post-MMC among heterosexual men (Gao et al., 2021), suggesting study's findings reflect residual myths rather than actual behaviour change. This also diverges from strongly negative attitudes in some settings (e.g., 84.9% negative despite 75.7% knowledgeable among Eswatini high-school males; Shezi et al., 2023). Qualitative device-specific concerns (infection/prolonged wear) align with rollout experiences but contrast sharply with near-universal parental satisfaction in EIMC trials (99.1–99.7% would recommend; Basourakos et al., 2022; Calderon et al., 2025), where advantages like no stitches and self-detachment were actively valued. This generational/contextual difference underscores that adult community attitudes are more influenced by cultural ritual expectations and novelty concerns than parental health-focused

decisions. These results underscore the need to leverage cultural masculinity narratives while directly addressing risk-compensation myths through community dialogue.

5.4 Practices of the use of the ShangRing method of Voluntary Medical Male Circumcision

Practices were moderate-good (mean 16.94/25; 62.1% good), with high willingness to undergo/recommend ShangRing (86.5%; M=4.19) and post-procedure adherence (81.9%; M=4.08), but lower valuation of health education (48.7%) and peer involvement (39.6–40.0%). Shorter distance to facility was associated with good practices (χ^2=7.45, p=0.006). High procedural uptake and recovery satisfaction align with ShangRing's documented advantages (bloodless, topical anesthesia, ~30-day healing, high satisfaction) (WHO, 2019; Awori et al., 2017; Peck et al., 2023). The preference for individualized over communal approaches contrasts with traditional circumcision norms but reflects ShangRing's clinic-based delivery and youth appeal (qualitative: "becoming common among youth"). Lower peer emphasis may indicate reduced cultural ritualization compared to traditional practices, consistent with non-circumcising settings (Odoyo-June et al., 2019). Knowledge and attitudes significantly predicted practices (β=0.290 and 0.128; R^2=0.073), supporting the conceptual framework and literature showing KAP interrelationships drive uptake (Westercamp & Bailey, 2007; Ntshiqa et al., 2023). Qualitative barriers (cultural resistance, misconceptions) explain why facility-level preference has not scaled community-wide.

High willingness (86.5%) yet persistently low programme uptake (2–5%) mirrors patterns in EIMC contexts, where parental satisfaction exceeds 99% but overall community adoption remains limited due to access and cultural factors (Calderon et al., 2025). Lower valuation of peer/education components contrasts with high parental engagement in EIMC trials (99.4% recommendation) and suggests youth-driven individualization may limit diffusion in non-circumcising communities. These findings highlight the need for accessible services, peer education, and culturally tailored demand generation to bridge the uptake gap in Homa Bay.

In summary, the study confirms moderate knowledge, mixed-positive attitudes, and moderate-good practices regarding ShangRing, with persistent gaps in nuanced understanding and cultural/logistical barriers limiting uptake. Findings align with regional VMMC literature while highlighting ShangRing-specific insights. Findings align with regional VMMC literature while

highlighting ShangRing-specific insights: adult community KAP lags behind facility/client and parental EIMC acceptability, filling a critical evidence gap. Addressing misconceptions, leveraging youth/education, and integrating community mobilization could accelerate scale-up, contributing to HIV prevention goals in high-burden Homa Bay County.

CHAPTER SIX
CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

This study provides the first community-based evidence on knowledge, attitudes, and practices (KAP) regarding the ShangRing device for voluntary medical male circumcision (VMMC) in Homa Bay County, a high-HIV-burden setting in Kenya. Despite national scale-up efforts and the device's documented clinical advantages (bloodless procedure, topical anaesthesia, faster healing, and high client satisfaction), community uptake remains critically low (2–5% of VMMC procedures). The findings reveal a clear implementation gap: procedural acceptability exists at the individual level, but deeper community integration is hindered by incomplete understanding, cultural tensions, and behavioural barriers.

Knowledge of the ShangRing method was moderate overall. While participants widely recognized that ShangRing circumcision offers partial protection against HIV acquisition in HIV-negative men and correctly rejected the notion of complete protection, critical gaps persisted in understanding partner-level protection and broader STI risk reduction. Reliance on informal information sources (primarily family and relatives) over formal health channels contributed to these persistent misconceptions. Higher education and younger age were associated with better knowledge, indicating that existing awareness efforts have reached some segments but failed to achieve comprehensive, accurate dissemination across the community.

Attitudes were moderately positive but ambivalent. Cultural resonance was evident in the strong belief that male circumcision (including via ShangRing) affirms manhood and may enhance sexual experience. However, this was undermined by widespread risk-compensation misconceptions notably the belief that circumcised men can safely engage in unprotected sex as well as concerns about the device itself (prolonged ring wear and potential infection) and preference for traditional methods among significant portions of the community. Positive attitudes were significantly linked to cultural norms favouring circumcision and to higher knowledge levels, highlighting the interplay between individual cognition and socio-cultural context.

Practices showed the strongest individual-level support, with high willingness to undergo or recommend the ShangRing procedure and satisfaction with its ease and recovery profile. Nevertheless, valuation of supporting elements such as health education and peer involvement was lower, reflecting a shift toward more individualized decision-making, particularly among younger men. Knowledge and attitudes emerged as significant predictors of better practices, though the modest explanatory power of the model ($R^2 = 0.073$) underscores the influence of unmeasured factors such as service accessibility, cultural norms, and structural barriers.

Collectively, the findings demonstrate that while ShangRing has gained tentative acceptance among youth and those exposed to facility services, systemic barriers: incomplete knowledge of its limitations and benefits, culturally rooted misconceptions, and device-specific concerns continue to limit broader community uptake. This disconnect between facility-level satisfaction and community-scale adoption explains the persistently low programmatic utilization despite the device's technical superiority. The study affirms the conceptual framework: knowledge shapes attitudes, which in turn influence practices, but all are embedded within broader socio-cultural and health-system contexts that must be addressed for meaningful scale-up.

These results have direct implications for HIV prevention in high-burden counties. Targeted, culturally sensitive interventions that correct misconceptions, leverage positive cultural narratives (e.g., manhood and hygiene), strengthen formal information channels, and improve service accessibility are essential to translate ShangRing's clinical promise into public health impact. The study contributes actionable, context-specific KAP evidence to support the National Syndemic Diseases Control Council (NSDCC), Ministry of Health, and implementing partners in accelerating progress toward national VMMC targets and SDG 3.3.

6.2 Recommendations

6.2.1 Recommendations for Policy

To enhance knowledge, targeted, accurate, and multi-channel education should be prioritized. Comprehensive community education campaigns should specifically address the identified gaps in partial HIV protection, lack of partner protection for HIV-positive men, and STI risk reduction. Efforts should shift from heavy reliance on informal sources by strengthening formal channels such as community health volunteers, health workers, radio, social media, and facility-

based talks. Younger and more educated groups who demonstrated better knowledge should be prioritized, while simplified, culturally adapted messages in Dholuo are developed for broader reach. Clear messaging should emphasize that ShangRing must be combined with consistent condom use, HIV testing, and other prevention methods to prevent risk-compensation behaviours.

To improve attitudes, misconceptions should be addressed while leveraging cultural contexts. Traditional leaders, religious figures, elders, and peer influencers should be engaged in community dialogues to tackle cultural resistance, device-specific concerns such as prolonged ring wear and infection fears, and preference for traditional methods. The widespread risk-compensation misconception that circumcised men can safely have unprotected sex should be actively debunked through evidence-based sessions that clarify partial protection. Positive cultural narratives such as male circumcision as proof of manhood, enhanced hygiene, and potential sexual benefits should be leveraged while promoting ShangRing as a modern, safe, and compatible option within these frameworks. ShangRing should be promoted as complementary rather than contradictory to community values, particularly among older men and those whose culture does not traditionally require circumcision.

To strengthen practices and uptake, service delivery improvements and behavioural support are essential. The high willingness to undergo or recommend ShangRing should be capitalized on by expanding access through outreach and mobile services to reduce distance-related barriers. Structured health education and peer-supported components should be integrated into every ShangRing service delivery point to increase their perceived value. Healthcare providers and community mobilisers should be trained to deliver consistent, client-centred counselling on post-procedure care, adherence, and the advantages of ShangRing including its bloodless nature, faster healing, and avoidance of injectable anaesthesia. Youth-friendly demand-creation strategies should be developed that align with the observed shift toward individualized decision-making while gradually incorporating peer and age-mate elements where culturally relevant. Overall, the National Syndemic Diseases Control Council (NSDCC), Ministry of Health, and VMMC implementing partners should use these findings to develop a context-specific ShangRing scale-up strategy for Homa Bay County and similar high-burden settings. Monitoring mechanisms should be established to track changes in community KAP following targeted

interventions. Stronger community-facility linkages should be fostered to convert high individual uptake into sustained programme uptake, thereby contributing to reduced new HIV infections and progress toward SDG 3.3.

6.2.2 Recommendations for Future Studies

Segment analyses by key demographics (e.g., age, education, cultural circumcision norms) to pinpoint groups with highest misconceptions for more precise interventions.

Compare the effectiveness of formal (health workers, media) versus informal (family, peers) information sources in improving accurate ShangRing knowledge and uptake in similar high-burden settings.

Conduct longitudinal research on the impact of cultural beliefs, sexual performance misconceptions, and risk-compensation attitudes on ShangRing uptake and sustained practices across age cohorts (e.g., 15–25 vs. 36–49 years) in traditionally non-circumcising counties.

REFERENCES

Auvert, B., Taljaard, D., Lagarde, E., Sobngwi-Tambekou, J., Sitta, R., & Puren, A. (2005). Randomized, Controlled Intervention Trial of Male Circumcision for Reduction of HIV Infection Risk: The ANRS 1265 Trial. *PLOS Medicine*, *2*(11), e298. https://doi.org/10.1371/journal.pmed.0020298

AVAC. (2020). *New report provides women's perspectives on medical male circumcision for HIV prevention: Findings from community-led research in five African countries*.

Awotidebe, A., Phillips, J., & Lens, W. (2014). Factors Contributing to the Risk of HIV Infection in Rural School-Going Adolescents. In *International Journal of Environmental Research and Public Health* (Vol. 11, Issue 11, pp. 11805–11821). https://doi.org/10.3390/ijerph111111805

Bahariniya, S., & Madadizadeh, F. (2021). Review of the Statistical Methods Used in Original Articles Published in Iranian Journal of Public Health from 2015-2019: A Review Article. *Iranian Journal of Public Health*, *50*(8), 1577–1585. https://doi.org/10.18502/ijph.v50i8.6803

Bailey, D. R. C., Plummer, F. A., & Moses, S. (2001). Male circumcision and HIV prevention: current knowledge and future research directions. *The Lancet Infectious Diseases*, *1*(4), 223–231.

Barone, M. A., Li, P. S., Awori, Q. D., Lee, R., & Goldstein, M. (2014). Clinical trials using the Shang Ring device for male circumcision in Africa: a review. *Translational Andrology and Urology*, *3*(1), 113–124. https://doi.org/10.3978/j.issn.2223-4683.2014.01.09

Centers for Disease Control. (2020). Progress in voluntary medical male circumcision service provision - Kenya, 2008-2011. *MMWR. Morbidity and Mortality Weekly Report*, *61*(47), 957–961.

Chikutsa, A. (2016). *MALE CIRCUMCISION AS AN HIV REDUCTION STRATEGY : IMPLICATIONS FOR MEN AND WOMEN IN*.

Dutta-Bergman, M. J. (2004). Primary Sources of Health Information: Comparisons in the Domain of Health Attitudes, Health Cognitions, and Health Behaviors. *Health Communication*, *16*(3), 273–288. https://doi.org/10.1207/S15327027HC1603_1

Emoit, J. B. (2018). *Factors Influencing Uptake Of Voluntary Medical Male Circumcision Amongst Males Above The Age Of 15 Years Up To 49 Years In Purongo Sub County, Nwoya District*.

Ensor, S., Davies, B., Rai, T., & Ward, H. (2019). The effectiveness of demand creation interventions for voluntary male medical circumcision for HIV prevention in sub-Saharan Africa: a mixed methods systematic review. *Journal of the International AIDS Society*, *22*(S4), e25299. https://doi.org/https://doi.org/10.1002/jia2.25299

Gao, Y., Yuan, T., Zhan, Y., Qian, H.-Z., Sun, Y., Zheng, W., Fu, L., Liang, B., Zhu, Z., Ouyang, L., Liu, M., Fitzpatrick, T., Wu, Z., Meng, X., Baeten, J. M., Zhao, J., Vermund, S. H., Yu, M., Wu, G., … Zou, H. (2021). Association between medical male circumcision and HIV risk compensation among heterosexual men: a systematic review

and meta-analysis. *The Lancet Global Health*, *9*(7), e932–e941. https://doi.org/10.1016/S2214-109X(21)00102-9

Gray, R., Kigozi, G., Kong, X., Ssempiija, V., Makumbi, F., Wattya, S., Serwadda, D., Nalugoda, F., Sewenkambo, N. K., & Wawer, M. J. (2012). The effectiveness of male circumcision for HIV prevention and effects on risk behaviors in a posttrial follow-up study. *AIDS*, *26*(5). https://journals.lww.com/aidsonline/fulltext/2012/03130/the_effectiveness_of_male_circumcision_for_hiv.10.aspx

Grund, J. M., Onchiri, F., Mboya, E., Ussery, F., Musingila, P., Ohaga, S., Odoyo-June, E., Bock, N., Ayieko, B., & Agot, K. (2023). Strategies to increase uptake of voluntary medical male circumcision among men aged 25–39 years in Nyanza Region, Kenya: Results from a cluster randomized controlled trial (the TASCO study). *PLOS ONE*, *18*(2), e0276593. https://doi.org/10.1371/journal.pone.0276593

Halperin, D. T., Mugurungi, O., Hallett, T. B., Muchini, B., Campbell, B., Magure, T., Benedikt, C., & Gregson, S. (2011). A Surprising Prevention Success: Why Did the HIV Epidemic Decline in Zimbabwe? *PLOS Medicine*, *8*(2), e1000414. https://doi.org/10.1371/journal.pmed.1000414

Jones, V., Modeste, N., Hopp Marshak, H., & Fox, C. (2013). The Effect of HIV/AIDS Education on Adolescents in Trinidad and Tobago. *International Scholarly Research Notices*, *2013*(1), 691054. https://doi.org/https://doi.org/10.5402/2013/691054

KENPHIA. (2018). *KENPHIA 2018 Preliminary Report*. https://phia.icap.columbia.edu/wp-content/uploads/2020/04/KENPHIA-2018_Preliminary-Report_final-web.pdf

Krieger, J. N., Mehta, S. D., Bailey, R. C., Agot, K., Ndinya- Achola, J. O., Parker, C., & Moses, S. (2008). Adult Male Circumcision: Effects on Sexual Function and Sexual Satisfaction in Kisumu, Kenya. *The Journal of Sexual Medicine*, *5*(11), 2610–2622. https://doi.org/10.1111/j.1743-6109.2008.00979.x

Lavreys, L., Rakwar, J. P., Thompson, M. Lou, Jackson, D. J., Mandaliya, K., Chohan, B. H., Bwayo, J. J., Ndinya-Achola, J. O., & Kreiss, J. K. (1999). Effect of Circumcision on Incidence of Human Immunodeficiency Virus Type 1 and Other Sexually Transmitted Diseases: A Prospective Cohort Study of Trucking Company Employees in Kenya. *The Journal of Infectious Diseases*, *180*(2), 330–336. https://doi.org/10.1086/314884

Liu, B., & Wei, L. (2023). Unintended effects of open data policy in online behavioral research: An experimental investigation of participants' privacy concerns and research validity. *Computers in Human Behavior*, *139*, 107537. https://doi.org/https://doi.org/10.1016/j.chb.2022.107537

Lukobo, M. D., & Bailey, R. C. (2007). Acceptability of male circumcision for prevention of HIV infection in Zambia. *AIDS Care*, *19*(4), 471–477. https://doi.org/10.1080/09540120601163250

Masson, P., Li, P. S., Barone, M. A., & Goldstein, M. (2010). The ShangRing device for simplified adult circumcision. *Nature Reviews Urology*, *7*(11), 638–642.

https://doi.org/10.1038/nrurol.2010.167

Mavhu, W., Willis, N., Mufuka, J., Bernays, S., Tshuma, M., Mangenah, C., Maheswaran, H., Mangezi, W., Apollo, T., Araya, R., Weiss, H. A., & Cowan, F. M. (2020). Effect of a differentiated service delivery model on virological failure in adolescents with HIV in Zimbabwe (Zvandiri): a cluster-randomised controlled trial. *The Lancet Global Health*, *8*(2), e264–e275. https://doi.org/10.1016/S2214-109X(19)30526-1

Mbachi, F., & Likoko, S. (2013). *Traditional Male Circumcision and Its Implications on the Socio- Economic and Psychosocial Life of the Bukusu Community in Kenya*. *3*(1), 218–225.

Mehta, S. D., Moses, S., Agot, K., Odoyo-June, E., Li, H., Maclean, I., Hedeker, D., & Bailey, R. C. (2013). The long-term efficacy of medical male circumcision against HIV acquisition. *AIDS*, *27*(18). https://journals.lww.com/aidsonline/fulltext/2013/11280/the_long_term_efficacy_of_medical_male.9.aspx

Morris, B. J., & Castellsague, X. (2011). *The Role of Circumcision in Preventing STIs BT - Sexually Transmitted Infections and Sexually Transmitted Diseases* (G. E. Gross & S. K. Tyring (eds.); pp. 715–739). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-642-14663-3_54

Morris, B. J., & Krieger, J. N. (2015). Male Circumcision Does Not Reduce Sexual Function, Sensitivity or Satisfaction. *Advances in Sexual Medicine*, *5*(3), 8. 10.4236/asm.2015.53007

Morris, B. J., & Krieger, J. N. (2020). The Contrasting Evidence Concerning the Effect of Male Circumcision on Sexual Function, Sensation, and Pleasure: A Systematic Review. *Sexual Medicine*, *8*(4), 577–598. https://doi.org/10.1016/j.esxm.2020.08.011

Morris, B. J., Wamai, R. G., Henebeng, E. B., Tobian, A. A. R., Klausner, J. D., Banerjee, J., & Hankins, C. A. (2016). Estimation of country-specific and global prevalence of male circumcision. *Population Health Metrics*, *14*(1), 1–13. https://doi.org/10.1186/s12963-016-0073-5

Moses, S., Bailey, R. C., & Ronald, A. R. (1998). Male circumcision: assessment of health benefits and risks. *Sexually Transmitted Infections*, *74*(5), 368–373. https://doi.org/10.1136/sti.74.5.368

Mphepo, K. Y. G., Muula, A. S., Suzi, J., Phuka, F., & Mfutso-Bengo, J. (2023). Exploring culturally-preferred communication approaches for increased uptake of voluntary medical male circumcision (VMMC) services in rural Malawi. *BMC Public Health*, *23*(1), 590. https://doi.org/10.1186/s12889-023-15363-x

Muzyka, C. N., Thompson, L. H., Bombak, A. E., Driedger, S. M., & Lorway, R. (2012). A Kenyan newspaper analysis of the limitations of voluntary medical male circumcision and the importance of sustained condom use. *BMC Public Health*, *12*(1), 465. https://doi.org/10.1186/1471-2458-12-465

National AIDS Control Council. (2014). Kenya HIV County Profiles. *NACC, Ministry of Health,*

Government of Kenya, 150. http://nacc.or.ke/wp-content/uploads/2016/12/Kenya-HIV-County-Profiles-2016.pdf%0Ahttp://www.nacc.or.ke/attachments/article/464/Kenya County Profiles Book_Nov_print.pdf

National AIDS Control Council (NACC). (2020). Kenya AIDS strategic framework II, 2020/21, 2024/25. *Ministry of Health, Kenya*, 80. http://nacc.or.ke/wp-content/uploads/2015/09/KASF_Final.pdf

Odoyo-June, E., Davis, S., Owuor, N., Laube, C., Wambua, J., Musingila, P., Young, P. W., Aoko, A., Agot, K., Joseph, R., Mwandi, Z., Ojiambo, V., Lucas, T., Toledo, C., & Wanyonyi, A. (2021). Prevalence of male circumcision in four culturally non-circumcising counties in western Kenya after 10 years of program implementation from 2008 to 2019. *PLOS ONE*, *16*(7), e0254140. https://doi.org/10.1371/journal.pone.0254140

Odoyo-June, E., Owuor, N., Kassim, S., Davis, S., Agot, K., Serrem, K., Otieno, G., Awori, Q., Hines, J., Toledo, C., Laube, C., Kisia, C., Aoko, A., Ojiambo, V., Mwandi, Z., Juma, A., & Kigen, B. (2019). Rollout of ShangRing circumcision with active surveillance for adverse events and monitoring for uptake in Kenya. *PLOS ONE*, *14*(9), e0222942. https://doi.org/10.1371/journal.pone.0222942

Omondi Aduda, D. S., Agot, K., Ohaga, S., Aoko, A., Onyango, J., Toroitich-Ruto, C., Kambona, C., & Odoyo-June, E. (2024). Facility characteristics preferred by older men seeking medical male circumcision services in Kenya: qualitative findings from the 'Tasco' study (May 2014-June 2016). *BMC Public Health*, *24*(1), 1718. https://doi.org/10.1186/s12889-024-19234-x

Onyango, J., Ochillo, M., Omanga, E., Spala, O., Wango, G.-N., Lwanya, E., & Agot, K. (2023). Early infant male circumcision: Potential for changing adverse gender norms associated with traditional male circumcision among circumcising communities in Kenya. *African Journal of AIDS Research*, *22*(2), 136–144. https://doi.org/10.2989/16085906.2023.2231912

Osir, O., Wenje, P. N., Kiptoo, M., & Anyonje, L. (2020). *Using The Health Belief Model To Identify Communication Needs In The Male Circumcision Campaigns To Prevent Hiv / Aids In Siaya County Of Kenya*. *August*. https://doi.org/10.14738/assrj.76.8390

Pecchioni, L. L., & Sparks, L. (2007). Health Information Sources of Individuals With Cancer and Their Family Members. *Health Communication*, *21*(2), 143–151. https://doi.org/10.1080/10410230701307162

Peck, M. E., Ong, K. S., Lucas, T., Harvey, P., Lekone, P., Letebele, M., Thomas, V. T., Maziya, V., Mkhontfo, M., Gultie, T., Mulatu, D., Shimelis, M., Zegeye, T., Juma, A. W., Odoyo-June, E., Musingila, P. K., Njenga, J., Auld, A., Kapito, M., … Toledo, C. (2023). Voluntary Medical Male Circumcisions for HIV Prevention — 13 Countries in Eastern and Southern Africa, 2017–2021. *MMWR. Morbidity and Mortality Weekly Report*, *72*(10), 256–260. https://doi.org/10.15585/mmwr.mm7210a2

Prabhakaran, S., Ljuhar, D., Coleman, R., & Nataraja, R. M. (2018). Circumcision in the

paediatric patient: A review of indications, technique and complications. *Journal of Paediatrics and Child Health*, *54*(12), 1299–1307. https://doi.org/https://doi.org/10.1111/jpc.14206

Project IQ Webinar Series. (2019). *Virtual Roundtable on ShangRing for VMMC: Country Perspectives*.

Sabet Sarvestani, A., Bufumbo, L., Geiger, J. D., & Sienko, K. H. (2012). Traditional Male Circumcision in Uganda: A Qualitative Focus Group Discussion Analysis. *PLOS ONE*, *7*(10), e45316. https://doi.org/10.1371/journal.pone.0045316

Savitz, D. A., & Wellenius, G. A. (2023). Can Cross-Sectional Studies Contribute to Causal Inference? It Depends. *American Journal of Epidemiology*, *192*(4), 514–516. https://doi.org/10.1093/aje/kwac037

Sawires, S. R., Dworkin, S. L., Fiamma, A., Peacock, D., Szekeres, G., & Coates, T. J. (2007). Male circumcision and HIV/AIDS: challenges and opportunities. *The Lancet*, *369*(9562), 708–713. https://doi.org/10.1016/S0140-6736(07)60323-7

Sichach, M. (2024). Evaluation on the effectiveness of HIV/ AIDS campaigns around the Lake Region of Kenya: A case study of voluntary Medical Male Circumcision (VMMC) in the lake region Of Kenya. *Daystar University*, *Vmmc*.

Simbayi, L. C., Kalichman, S. C., Jooste, S., Cherry, C., Mfecane, S., & Cain, D. (2005). Risk Factors for HIV-AIDS Among Youth in Cape Town, South Africa. *AIDS and Behavior*, *9*(1), 53–61. https://doi.org/10.1007/s10461-005-1681-4

Stokols, D. (1996). Translating social ecological theory into guidelines for community health promotion. *American Journal of Health Promotion : AJHP*, *10*(4), 282–298. https://doi.org/10.4278/0890-1171-10.4.282

Tarimo, E. A. M., Francis, J. M., Kakoko, D., Munseri, P., Bakari, M., & Sandstrom, E. (2012). The perceptions on male circumcision as a preventive measure against HIV infection and considerations in scaling up of the services: a qualitative study among police officers in Dar es Salaam, Tanzania. *BMC Public Health*, *12*(1), 529. https://doi.org/10.1186/1471-2458-12-529

UNAIDS. (2021). People and HIV. *Young People and HIV*, 1–20. https://www.unaids.org/en/resources/documents/2021/young-people-and-hiv

UNAIDS. (2023). *UNAIDS lobal Report, Regional factsheet*. *2022*.

UNAIDS & World Health Organisation (WHO). (2021). *Voluntary medical male circumcision Progress Report Steady Progress in the scale up of VMMC as an HIV prevention intervention in 15 Eastern and Southern African Countries before the SARsCoV2 Pandemic*. *March*, 1–2. https://www.unaids.org/sites/default/files/media_asset/JC3022_VMMC_en.pdf

UNAIDS, 2022. (2022). Unaids, 2022. *Urban Affairs Quarterly*, *25*(2), 200–211.

UNICEF. (2020). *HIV and AIDS Protecting children and adolescents from HIV and AIDS and providing care*.

Weiss, H. A., Dickson, K. E., Agot, K., & Hankins, C. A. (2010). Male circumcision for HIV

prevention: current research and programmatic issues. *AIDS*, *24*. https://journals.lww.com/aidsonline/fulltext/2010/10004/male_circumcision_for_hiv_prevention__current.7.aspx

Weiss, H. A., Thomas, S. L., Munabi, S. K., & Hayes, R. J. (2006). Male circumcision and risk of syphilis, chancroid, and genital herpes: a systematic review and meta-analysis. *Sexually Transmitted Infections*, *82*(2), 101 LP – 110. https://doi.org/10.1136/sti.2005.017442

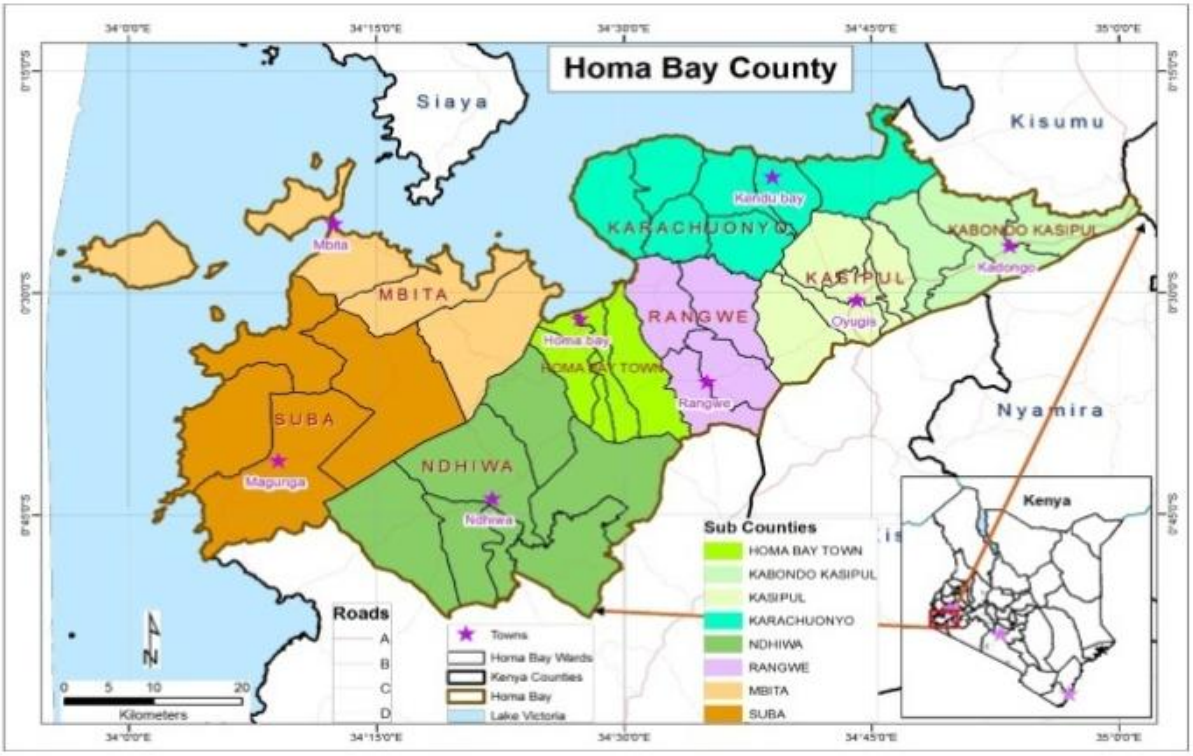
Wilcken, A., & Dick, B. (2010). *Traditional male circumcision in eastern and southern Africa : a systematic review of prevalence and complications*. *May*, 907–914. https://doi.org/10.2471/BLT.09.072975

World Health Organization. (2019). Male Circumcision for HIV Prevention: WHO Technical Advisory Group on Innovations in Male Circumcision. *WHO Technical Advisory Group on Innovations in Male Circumcision*, *January*, 36.

Ziraba, A., Orindi, B., Muuo, S., Floyd, S., Birdthistle, I. J., Mumah, J., Osindo, J., Njoroge, P., & Kabiru, C. W. (2018). Understanding HIV risks among adolescent girls and young women in informal settlements of Nairobi, Kenya: Lessons for DREAMS. *PLOS ONE*, *13*(5), e0197479. https://doi.org/10.1371/journal.pone.0197479

APPENDICES

Appendix I: Map of Homa Bay County



Appendix II: Letter from School of Graduate Studies

MASENO UNIVERSITY
SCHOOL OF GRADUATE STUDIES
Office of the Dean

Our Ref: MPH/PH/00083/2014

Private Bag, MASENO, KENYA
Tel:(057)351 22/351008/351011
FAX: 254-057-351153/351221
Email: sgs@maseno.ac.ke

Date: 30 July, 2024

TO WHOM IT MAY CONCERN

RE: PROPOSAL APPROVAL FOR JACOB OCHIENG' YAHUMA— MPH/PH/00083/2014

The above named is registered in the Master of Public Health Programme of the School of Public Health and Community Development, Maseno University. This is to confirm that his research proposal titled "**Knowledge Attitude and Practices on Shangring Method of Male Circumcision in Preventing of HIV among Community Members in Homa Bay County, Kenya**" has been approved for conduct of research subject to obtaining all other permissions/clearances that may be required beforehand.

Dr. Patrick Onyango
DEAN, SCHOOL OF GRADUATE STUDIES

Maseno University *ISO 9001:2008 Certified*

Appendix III: MUSERC Approval

MASENO UNIVERSITYSCIENTIFIC AND ETHICS REVIEW COMMITTEE

Tel: +254 057 351 622 Ext: 3050
Fax: +254 057 351 221

Private Bag – 40105, Maseno, Kenya
Email: muerc-secretariate@maseno.ac.ke

REF: MSU/DRPI/MUSERC/01411/24 **Date**: 12th November, 2024

TO: Jacob Ochieng' Yahuma
MPH/PH/00083/2014
Department of Public Health
School of Public Health and Community Development
P. O. Box, Private Bag, Maseno, Kenya

Dear Sir,

Re: Knowledge, Attitude and Practices on ShangRing Method of Male Circumcision in Preventing New HIV Infections among Community Members in Homa Bay County, Kenya

This is to inform you that **Maseno University Scientific and Ethics Review Committee (MUSERC)** has reviewed and approved your above research proposal. Your application approval number is MUSERC/01411/24.The approval period is 12th November, 2024– 11th November, 2025.

This approval is subject to compliance with the following requirements;

i. Only approved documents including (informed consents, study instruments, MTA) will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by Maseno University Scientific and Ethics Review Committee (MUSERC).
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to Maseno University Scientific and Ethics Review Committee (MUSERC) within 24 hours of notification.
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to Maseno University Scientific and Ethics Review Committee (MUSERC) within 24 hours.
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to Maseno University Scientific and Ethics Review Committee (MUSERC).

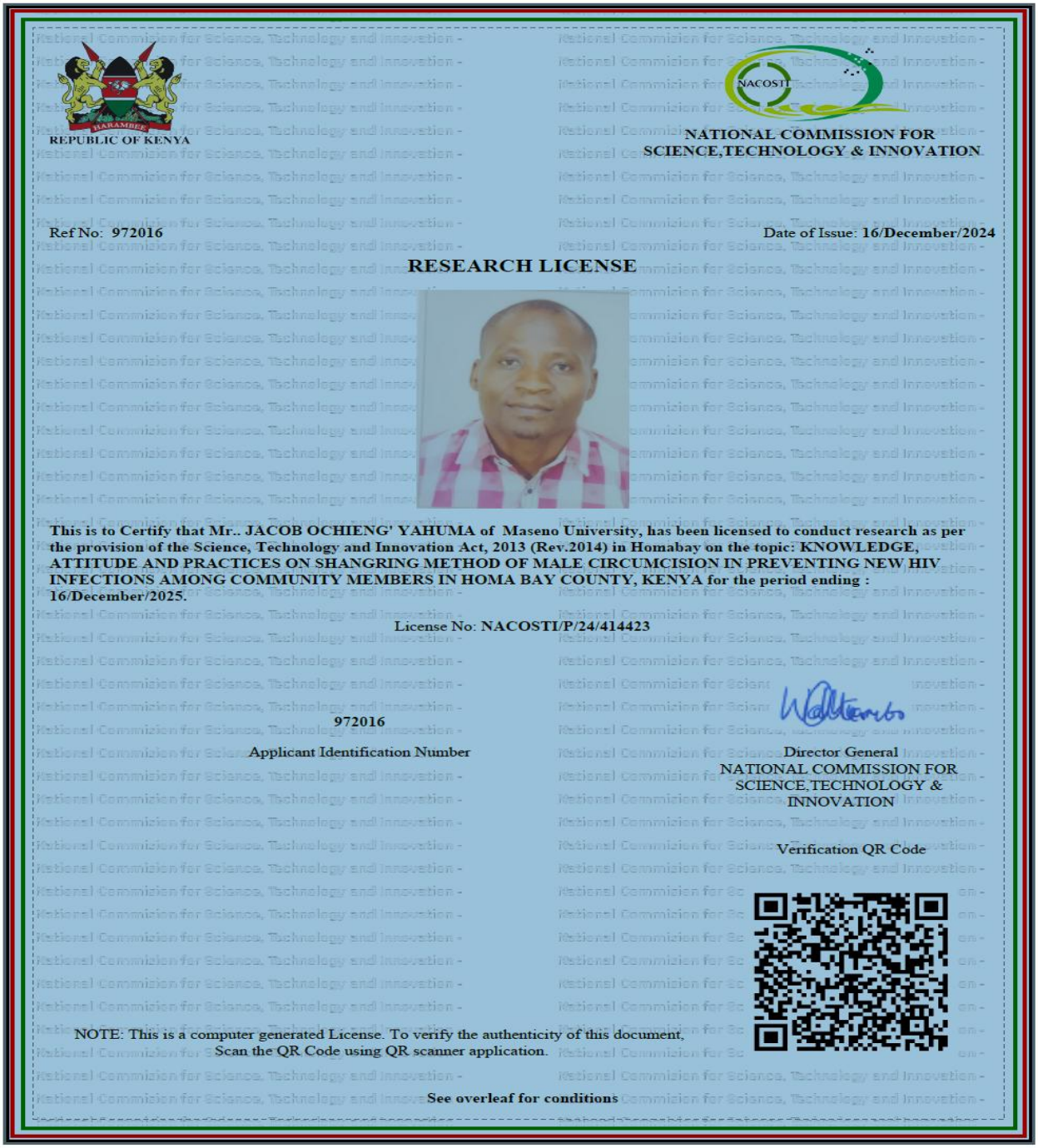
Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://oris.nacosti.go.ke and also obtain other clearances needed.

Yours sincerely

Dr. Bonuke Anyona, PhD
Chairman, MUSERC

MASENO UNIVERSITY ETHICS REVIEW COMMITTEE 12 NOV 2024 P.O. PRIVATE BAG MASENO

Appendix IV: NACOSTI Approval



REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: 972016

Date of Issue: 16/December/2024

RESEARCH LICENSE

This is to Certify that Mr.. JACOB OCHIENG' YAHUMA of Maseno University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Homabay on the topic: KNOWLEDGE, ATTITUDE AND PRACTICES ON SHANGRING METHOD OF MALE CIRCUMCISION IN PREVENTING NEW HIV INFECTIONS AMONG COMMUNITY MEMBERS IN HOMA BAY COUNTY, KENYA for the period ending : 16/December/2025.

License No: NACOSTI/P/24/414423

972016

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

See overleaf for conditions

Appendix V: Informed Consent Form

You are invited to participate in a public health research study aimed at examining community knowledge, attitudes, and practices concerning the use of the ShangRing device for removal of male foreskin as an HIV prevention strategy in Homa Bay County, Kenya. This study is part of a broader academic investigation and has received ethical approval from the Maseno University Ethical Review Committee, as well as authorization from the Homa Bay County administration.

Participation in this study involves completing a structured questionnaire. There are no medical procedures or laboratory tests involved, and there is no anticipated physical risk associated with your participation. To protect your privacy, all data collected will be anonymized using unique identifiers, ensuring that your responses cannot be traced back to your identity.

The results of the study will be presented in aggregate form, and summary findings will be made available upon request. Your involvement in this study is entirely voluntary, and you are free to withdraw at any point without facing any penalty or loss of benefits.

By signing this form, you acknowledge that you have read and understood the information provided above. You affirm that any questions you had have been adequately addressed, and you voluntarily agree to participate in this study.

Participant's Signature: _____
Date: _____

Researcher's Name (Printed): _____
Researcher's Signature: _____
Date: _____

Appendix VI: Questionnaire

Tick the one that applies.

Section A

SOCIO DEMOGRAPHIC FACTORS

1. What age bracket do you belong (in years)?

a) 15-25 ☐

b) 26-35 ☐

c) 36-45 ☐

d) 46-49 ☐

2. What do you consider as your marital status?

a) Still single ☐

b) Married ☐

c) Widowed (partner died) ☐

d) Was married but now divorced ☐

3. What do you do for a living?

a) Formal employment ☐

b) Self employed ☐

c) Peasant farmer ☐

d) Learner ☐

e) Unemployed ☐

4. What Religion do you practice?

a) Christianity ☐

b) Islam ☐

c) Traditionalists ☐

5. Is circumcision required as part of your culture?

a) Yes ☐

b) No ☐

6. What is your educational level?

a) None ☐

b) Certificate ☐

c) Diploma ☐

d) Bachelor's Degree ☐

e) Master's Degree ☐

f) PhD ☐

g) Any other, specify.....☐.....

7. In your educational life, did you acquire knowledge on reproductive health?

Yes ☐ No ☐

8. Have you ever heard about the ShangRing method as a safe technique for male foreskin removal?

a) Yes ☐

b) No ☐

9. Where did you get information about ShangRing Method Safe male foreskin removal technique? Tick all that applies

a. Parent/ relative ☐

b. Teacher ☐

c) Clinic/ health worker ☐

d) Religious leaders ☐

e) Educational programs from TV ☐

f) Newspapers/ books ☐

g) Friends ☐

h) Others (specify)……

10. Do you know how it is beneficial to you?

a. Yes ☐

b. No ☐

11.Please rate the extent to which you agree or disagree with the following statements on knowledge regarding ShangRing Method of male foreskin removal in Preventing of HIV among Community Members in Homa Bay County, Kenya Use a likert scale, Strongly Agree-SA, Agree-A, Undecided UD, Disagree-D and Strongly Disagree-SD.

Statements on knowledge	**SA**	**A**	**UD**	**D**	**SD**
ShangRing Circumcision of a man who does not have HIV reduces his chance of getting HIV					
ShangRing Circumcision of a man who does not have HIV does not completely remove his chance of getting HIV					
There is NO chance for a circumcised man to get HIV					
ShangRing Circumcision of a man with HIV does not protect his partner from getting HIV					
ShangRing Circumcision reduces the risks of STIs					

SECTION B: ATTITUDES AND BELIEFS

12.Please rate the extent to which you agree or disagree with the following statements on the the attitudes and beliefs on ShangRing Method of male foreskin removal in Preventing of HIV among Community Members in Homa Bay County, Kenya. Use a likert scale, Strongly Agree-SA, Agree-A, Undecided UD, Disagree-D and Strongly Disagree-SD.

Statements on attitude	**SA**	**A**	**UD**	**D**	**SD**
Circumcised men enjoy sex more than uncircumcised men					
Circumcised men have more sexual feelings than uncircumcised men					
Circumcised men can safely have sex without using a condom and don't get infected with HIV as compared to uncircumcised men.					
It is important for all males irrespective of their age to be circumcised					
Male Circumcision proves manhood					
ShangRing Method of Male Circumcision is a practice in our community and don't need to be re-introduced					

SECTION C: PRACTICES

13. How far is your home from the health facility?

a) Less than 5km

b) More than 5km

14.Please rate the extent to which you agree or disagree with the following statements on the acceptability on Shangring Method of Male foreskin removal in Preventing of HIV among Community Members in Homa Bay County, Kenya. Use a likert scale, Strongly Agree-SA, Agree-A, Undecided UD, Disagree-D and Strongly Disagree-SD.

Statements on practices	**SA**	**A**	**UD**	**D**	**SD**
Engagement in peer-supported initiation and educational sessions					
Willingness to undergo or refer someone for the ShangRing procedure					
Adherence to and satisfaction with post-procedure expectations was necessary					
Health education as part of the procedure was very important					
Significance of undergoing circumcision with age-mates or peers					

Thank you so much for your time and Participation

END

Appendix VII: Key Informant Interview Guide

Work place _____

1. When did you begin to offer Shang Ring in Male Circumcision Services at the health facility)?

2. In creating awareness for ShangRing, what methods do you employ?

3. How has the community responded generally to ShangRing?

4. What challenges have you experienced while offering ShangRing services?

5. Have there been any reports on complications while still undergoing the ShangRing procedure or after someone has left the facility?

6. Have you been able to meet the demand for ShangRing Services as a technique for male circumcision?

7. What would you report to be some of the hindrances towards of Shang Ring method In Male Circumcision Services at the health facility

Appendix VIII: Focus Group Discussion

Introduction

- Self introduction by respondents (Name, Marital Status,Age)

- Begin with a warm welcome and a brief explanation of the purpose of the discussion. Let participants know why they have been invited and encourage an open, comfortable environment.
- Reassure participants that anything shared during the discussion will be treated with confidentiality and not used against them in any way, either during or after the session.
- Inform them that the session will be audio-recorded and photos may be taken for documentation purposes only. Emphasize that these will be handled respectfully and will not be used in a way that compromises their identity or dignity.
- Establish clear ground rules for respectful participation: no shouting, no interrupting, no mocking or laughing at others' contributions, and no name-calling. Encourage a space where everyone's voice is valued and heard.

Knowledge

1 Awareness: Have you heard about the ShangRing method of removing male fore-skein? If so, where did you first hear about it?

2. **Understanding**: What do you know about how the ShangRing method is performed?
3. **Benefits**: What benefits of the ShangRing method have you heard about?
4. **Comparison**: How do you think the ShangRing method compares to traditional or other medical methods of circumcision?

Attitude

5 Perception: What is your overall opinion of the ShangRing method for male circumcision?

6. **Acceptance**: Do you think the ShangRing method is something you'd suggest to a friend? Why or why not?
7. **Cultural Beliefs**: Do people in this community have any cultural views or traditions that make them more or less likely to accept the ShangRing method?
8. **Concerns**: What concerns, if any, do you have about the ShangRing method?

Practices

9 Adoption: How common is the practice of male circumcision using the ShangRing method in this community?

10. **Decision Factors**: What factors influence someone's decision to choose the ShangRing method over other methods?

11. **Barriers**: What are the main barriers to adopting the ShangRing method in this community?
12. **Experiences**: Can anyone share personal or observed experiences with the ShangRing method in this community?

Prevention of HIV

13 Effectiveness: How much do you believe male circumcision reduces the risk of HIV infection?

14. **Impact of ShangRing**: Do you think the ShangRing method specifically impacts the prevention of HIV? How so?
15. **Education**: What information or education have you been given about how male circumcision, especially using the ShangRing method, helps prevent HIV?

Communication and Outreach

16 Information Sources: What sources of information about male circumcision and HIV prevention do people in your community trust the most?

17. **Community Programs**: Are there any community programs or initiatives promoting the ShangRing method? How effective are they?
18. **Suggestions**: What suggestions do you have for improving the community's knowledge, attitudes, and practices regarding the ShangRing method?

Conclusion

19 Final Thoughts: Do you have any final thoughts or experiences you'd like to talk about regarding the ShangRing method and HIV prevention?