

**A LONGITUDINAL STUDY ON WOMEN'S KNOWLEDGE AND ATTITUDE  
TOWARDS MALE CIRCUMCISION, AND ITS INFLUENCING FACTORS IN  
ZAMBIA.**

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Master of Public Health**

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### DECLARATION

I, Herbert Tato Nyirenda hereby declare that this dissertation is my original work and has not been presented for any other awards at the University of Zambia or any other University.

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*Dedicated To my father, Herbert B.C Nyirenda (Snr) and my mother, Violet Z. Banda*

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## ABSTRACT

**Background:** In Zambia, male circumcision is known to be practised in some parts of the country for traditional, health, and other reasons. Due to scientific evidence that has shown that male circumcision provides protection from HIV transmission to men, the government embarked on a male circumcision scale up program. The study aimed to investigate Women's Knowledge and Attitude towards Male Circumcision and its influencing factors between 2011 and 2013.

**Method:** The study was a longitudinal study and sampled a total of 1350 women aged 15-29 between years. The study analysed three rounds of data collection. The type of analysis involved univariate, bivariate and multivariate. Ordered logistic regression or proportional odds model (POM) was fitted to predict women's knowledge and attitude towards male circumcision.

**Results:** The mean age was 21.8 years. The majority were married (48.9%) and followed by single (45.2%). Only less than a quarter (20.2%) of the total married women had circumcised partners. Close to three-quarters (72.5%) of the respondents were aware of male circumcision. The majority (38%) had poor knowledge at baseline. However, in Round two (44%) and Round three (49%), the majority of women had average knowledge of male circumcision. The increase in knowledge in each successive study round was statistically significant at 95% CI, ( $P < 0.001$ ). The study reveals that women's knowledge was influenced by factors such as; a woman's age, a woman's education level, ethnicity, region, marital status, hearing of male circumcision, talking to a spouse, boyfriend or sex partner and lastly talking to a family member on male circumcision. With regards to attitude, the majority (60%) of women at baseline had neutral attitude towards male circumcision. However, the majority in Round two (54%) and Round three (67%) had a positive attitude towards male circumcision. The change in women's attitude towards male circumcision was statistically significant with p-value  $< 0.001$ . that women's attitude towards male circumcision can be explained by factors such as; a woman's age, her religion, seeing promotional materials on male circumcision, talking to a circumcised person, a boyfriend, sexual partner or a spouse.

**Discussion and Conclusion:** It is evident from the findings that male circumcision campaigns may have failed to correctly educate women on the level of protection MC offers to both men and women. Women had misconceptions on the extent to which MC offers protection. This has implications on risk compensation as women may engage in risky sexual behaviour as they not only believe MC is fully protective of HIV but it also offers protection to women. The exhibited misconceptions may have other implications on women such as gender based violence and reduced negotiating power for safer sex. Nevertheless, women had a positive attitude indicating a favourable environment for scale up of MC.

## ACRONYMS

AIDS	-	Acquired Immune Deficiency Syndrome
CDC	-	Center for disease control
CI	-	Confidence interval
CSO	-	Central statistics office
EIMC	-	Early infant male circumcision
HIV	-	Human Immunodeficiency Virus
MC	-	Male circumcision
MDGs	-	Millennium Development Goals
MMC	-	Medical male circumcision
MOH	-	Ministry of Health
NGO	-	Non-governmental organization
OR	-	Odds ratio
POR	-	Proportional odds ratio
STI	-	Sexually transmitted infection
UNAIDS	-	The Joint United Nations Program on HIV/AIDS
UN	-	United nations
UNZA	-	University of Zambia
UNZABREC	-	University of Zambia Biomedical Research Ethics Committee
VMMC	-	Voluntary Medical Male Circumcision
WHO	-	World Health Organization
ZDHS	-	Zambia Demographic and Health Survey
ZSBS	-	Zambia Sexual Behaviour Survey

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### 1.0 BACKGROUND

Male circumcision (MC) is the surgical removal of some or all of the foreskin (or prepuce) from the penis (CDC, 2008) and is one of the most common medical procedures in the world. The determinants of MC include; ethnicity, supposed benefits, and socio-cultural norms. As a result, estimates in 2006 suggested that 30% of men were circumcised (WHO/UNAIDS, 2008). Male circumcision is practiced in many African countries mainly as a religious or cultural practice (Siegfried, 2003). The practice of (MC) is more pronounced in Northern and Western parts of Africa but is less common in southern Africa (WHO/UNAIDS, 2008). In Zambia, MC is known to be practised in some parts of the country for traditional, health, and other reasons and often serves as a rite of passage to adulthood (ZDHS, 2007).

Despite MC being practised for religious and cultural reasons, it was observed that the Human Immunodeficiency Virus (HIV) prevalence is generally lower in populations or communities that traditionally practise male circumcision (Auvert, 2005). In light of the observed protective nature of MC in acquiring HIV, three randomised controlled trials were conducted in Kenya, South Africa and Uganda. In each of these trials, it was evident and established that male circumcision reduced men's risk of getting HIV from female partners by 60% compared to uncircumcised men enrolled in the trials (Auvert, 2005). Further, a systematic review and meta-analysis, found that circumcised men were two- to three-fold less likely to be infected by HIV than uncircumcised men, with differences most pronounced in men highly exposed to HIV infection (Bailey, 2007 & Gray, 2007). Apart from the benefits of reduced risk of contracting HIV from female to male, male circumcision has other benefits which include; reduced risk of contracting as well as transmitting the Human Papilloma Virus (HPV) to women thereby reducing a woman's risk of developing cervical cancer; improving hygiene and reducing the risk of penile cancer (Hassan et al, 2005).

In 2007, after reviewing the results of the three randomized controlled trials and other evidence which confirmed that male circumcision reduced the risk of males becoming infected with HIV through heterosexual intercourse, the WHO and UNAIDS came up with eleven recommendations to guide country programming. These recommendations were based on the fact that the Human Immunodeficiency Virus (HIV) that causes Acquired Immunodeficiency Syndrome (AIDS) has in the past decade claimed millions of lives and

still exist as a disease burden in many countries of sub-Saharan Africa (United Nations , 2013). It was, therefore, recommended that “countries with low male circumcision rates, high HIV prevalence and predominantly heterosexual epidemics were encouraged to scale up male circumcision programmes as part of their national HIV prevention strategies” (WHO and UNAIDS, 2008).

Zambia is among the Southern African countries severely hit by the HIV/AIDS epidemic with HIV prevalence at 14.3 percent and HIV primarily being transmitted through heterosexual transmission (ZDHS, 2007). As a result of the realization that MMC is an effective method of lessening the likelihood of transmission of HIV, the Zambian Ministry of Health (MoH) in 2007 instigated the provision of Voluntary Medical Male Circumcision (VMMC) services as a method of HIV prevention. This was done in cooperation with WHO and UNAIDS recommendations. However, the National VMMC programme was only formally launched in 2009 and aimed to achieve VMMC coverage of 80% among HIV-negative adult men aged between 15-49 years by 2015. A target of 1,949,000 VMMCs had been set for 2011-2015 and for 2012-2015 it was 1,864,396 VMMCs performed on HIV-negative uncircumcised men ages between 15-49 years old (Ministry of Health, 2012). The Ministry of Health with the support of cooperating partners such as CDC, Society for Family Health (SFH), JHPIEGO, MSI, and ZPCTII embarked on mass campaigns to inform and educate Zambians on male circumcision. Various methods were used to educate the masses and some of these included; television and radio programmes, fliers, posters, community shows, phone messages, website and social medial.

To appraise the influence of MC campaign on HIV/AIDS prevention, it is essential to recognise the behavioural response of both men and women. This is especially true considering that heterosexual intercourse, which is the main mode of HIV transmission, involves a man and a woman. Therefore, successful scaling up of MC was not an exclusively male responsibility, but entailed involving women and understanding their views. According to the 2008 WHO and UNAIDS operational guidance for scaling up male circumcision services for HIV prevention, “male circumcision programme could have an unforeseen impact on various sectors of the population, including women, young people and vulnerable subgroups such as people with HIV infection”. The expansion of access to high quality male circumcision programmes could make a significant contribution to revitalizing HIV prevention. However, this must be done in ways that maximize benefits and minimize harm

for both men and women (WHO/UNAIDS, 2008). These harms are most likely to emerge in the context of community or individual beliefs that male circumcision is completely protective against HIV, and eliminates the need for other risk reduction strategies. Particular attention should be paid to the effect that male circumcision programmes have on women, through careful monitoring and on-going revision and adaptation (WHO/UNAIDS, 2008).

According to the Zambia 2010 census report, the population of Zambia has more females than males. Males constituted 49.3 percent and females 50.7 percent of the total population. It, therefore, follows that the overall sex ratio was 97.2 males per 100 females, while the sex ratio at birth was 103 males per 100 females. The literacy rate at national level was 70.2 percent. Literacy was defined as the ability to both read and write in any language. Literacy rates for rural and urban areas were 60.5 and 83.8 percent, respectively. Males had a higher literacy rate (73.2 percent) than females (67.3 percent) (Census report, 2010).

Considerable knowledge, right attitude and behaviours of female partners of both circumcised and uncircumcised men is crucial to women's well-being and the successful implementation of scale up programmes. This is because, despite male circumcision reducing the risk of HIV infection by 60 percent, it only provides partial protection (WHO/UNAIDS, 2007). In this regard, circumcised men are not invulnerable to the virus and are very capable of contracting or transmitting HIV. It only means that circumcised men are about half as likely as uncircumcised men to get HIV from having vaginal sex with a woman who has HIV (CDC, 2008). This information is cardinal for female partners as it has a profound effect on their well-being and scale up of programmes.

In cultures where decisions about sexual relations are heavily weighted towards men, decreasing the susceptibility of men to HIV acquisition without cautious consideration of existing social norms may have a significantly less beneficial impact on HIV acquisition among women (Sharif, 2007). It is imperative to emphasize that circumcised men can still get infected with HIV and can infect their sexual partners. In view of this, there are concerns around male circumcision for HIV prevention and its implications for women. The concerns include men's risk behaviours, shared sexual decision making, misconceptions about the level of protection, spending allocations for women-focused HIV prevention, and stigma and blame directed at HIV positive women. Considering these concerns in an attempt to introduce or scale up male circumcision for HIV prevention is key and essential.

## 1.1 PROBLEM STATEMENT

As much as MMC is an important intervention, it also has implications on women. These implications include reductions in rates of condom use, increases in coercive sex, increased number of sex partners, and difficulties for women to negotiate safe sex or insist on condom use, particularly with a circumcised man. Women are not only more vulnerable to contracting the HIV virus than men but are also faced with the challenge of having limited access to, and availability of, women-controlled HIV prevention options. According to the (ZDHS, 2013), only 42 percent of women and 49 percent of men age 15-49 have comprehensive knowledge about HIV/AIDS. Therefore, the introduction of MMC for HIV prevention can be perceived as an addition to the existing risks and exposures women face. The Zambia Sexual Behavioural Survey for 2009 reported that only 7.1 percent of the population reported using condoms in their most recent sexual encounter in the past 12 months. According to (Kehler, 2010) the roll-out of MMC for HIV prevention also has the potential to impact negatively on women, especially in the context of community and/or individual beliefs that male circumcision is completely protective against HIV, and eliminates the need for other risk reduction strategies. Behaviour change for men in a highly male-driven culture remains a significant challenge Zambia (MDGs Report, 2013). It is therefore important that both men and women to have comprehensive knowledge of MMC. According to the 2010 census report, compared to men women in Zambia are more vulnerable as they are the worst hit by poverty, HIV/AIDS and high illiteracy levels (CSO, 2010). Of the 14.3% HIV prevalence rates, the majority cases are women. The HIV prevalence among women aged 15-49 is 15 percent as compared to 11 percent among men in the same age group (ZDHS, 2013). According to the Zambia Millennium Development Goals Progress Report (2011), women in Zambia have a higher prevalence rate of 16.1% compared to men (12.3%), and the urban population has rates twice as high as the rural population (19.7% versus 10.3%). The ministry of health and other stake holders have rolled out campaigns to educate the masses about male circumcision (MoH, 2012). However, the extent and impact of these campaigns is not yet known. Particularly, hearing of MMC for HIV prevention does not necessarily translate into having “factual knowledge” about MMC, such as that MMC is only partially protective against HIV risk, the need for condom use after MMC, and the need to abstain from sex during the period of wound healing (WHiPT, 2010). Misconceptions about male circumcision’s level of protection against sexually transmitted diseases have implications on risky sexual behaviour.

## **1.2 JUSTIFICATION**

In June 2008, Global Advocacy for HIV Prevention (AVAC) and WHO convened a meeting in Mombasa, Kenya, to discuss the implications of male circumcision for HIV prevention on women which comprised over 35 civil society representatives. Mainly, the concerns of the influence MC on risk behaviours, negotiating power for safer sex, spending allocations for women-focused HIV prevention, and stigma and blame directed at HIV positive women. Addressing these concerns is essential in scaling up of MMC programmes. Considering the concerns articulated in Mombasa, this study is important in determining the extent to which women are involved in MC programmes as a measure of HIV prevention. Without considering the effects of male circumcision programmes on women, it is extremely difficult to measure the true potential and value of MMC as a measure of HIV prevention. The MC intervention has direct benefits for males and indirect benefits for females, thus this study will provide program implementers with insight of the current knowledge and attitudes of women towards MC. The study will help fill the gaps in the programme intervention of understanding the extent to which male circumcision protects and benefits men, women and new born infants or children. Male Circumcision is part of a comprehensive HIV prevention package and not a stand-alone service for men and understanding women's knowledge and attitudes is cardinal for the success of the intervention. This is because women play a major role in influencing not only men but in making decisions for the newborn or child to take up MC as a measure of HIV prevention and other sexually transmitted diseases. In addition, women's knowledge and attitudes are crucial in promoting circumcision for infant boys, being the main caregiver. Hence, this study is not only relevant to understanding the women's knowledge and attitude of male circumcision but also necessary for the successful implementation of male circumcision programmes and services. Furthermore, the study findings will broaden the existing knowledge and will act as a building base for further research on women and MC. This dissertation will serve as a reference for health policy formulation or amending and for improving strategies on effective programme interventions by relevant Government Ministries and relevant stakeholders.



## CHAPTER TWO: LITERATURE REVIEW

### 2.1 EMPIRICAL REVIEW

Misconceptions exist among men and women about the extent to which male circumcision protects both men and women. Biologically, women unlike men are more likely to contract sexually transmitted diseases including HIV during vaginal intercourse (CDC, 2008). According to the world health organization (WHO, 2003), studies that were conducted in the early 1990s in the United States of America and several European countries found that it is much easier for a woman to contract HIV from sexual contact with a man than it is for a man with a woman after controlling for other risk factors such as sexually transmitted infections. It was further argued that women have a larger surface area of mucous membrane exposed during sexual intercourse, and also because they are exposed to a larger quantity of infectious fluids (semen) than men. Therefore, male circumcision is a protective measure for men while women still remain vulnerable. A randomised control trial was conducted in Uganda found that HIV positive men did not reduce HIV transmission to female partners over a period of 24 months (Wawer et al, 2009). However in a qualitative study in Swaziland some relatively well educated women felt male circumcision protects them by up to 95% (Adams, 2012).

Existing research purports that women's attitude is an important factor in VMMC service adoption. In Jamaica, a study was done (Figueroa, 2008) to determine attitudes towards male circumcision among attendees at a sexually transmitted infection clinic in Kingston. It found that although 60% of men and 67% of women reported that they had heard of circumcision, only 28% of men and 40% of women actually understood what circumcision was. In South Africa, the majority of women in the Eastern Cape (55, 80%) indicated that they had heard about medical male circumcision (Arnott and Kehler, 2010). Women were further asked if they talked to their partners about male circumcision, the majority (71%, 65124) did not and less than a third of the women (29%, 26) indicated having talked about it with their partners (Arnott and Kehler, 2010). In a Windhoek study in Namibia, similar findings were obtained; the study had a sample of 125 males and 125 female respondents. The majority (95.2%) had heard of male circumcision before. Four percent did not know what circumcision is. The study also showed that 92.4% of the respondents have heard that MC reduces the risk of contracting HIV and about 7.6% were ignorant about that (Nashandi, 2013).

Penile hygiene is widely recognized as being extremely important and is perceived as a major benefit of circumcision by both men and women. In a Jamaican study, 41.8% of the women reviewed that circumcision makes it easier to clean the penis. With regards to knowledge on the extent to which male circumcision protects men from STIs, in the same Jamaican study, 20.4% of women said that circumcision lessens the likelihood of STI while 18% of men and 10.2% of women said that the penis looks more attractive when uncircumcised (Figueroa, 2008). Twenty-two per cent of men and 13.3% of women said that the foreskin offers protection. In Kenya specifically in Nyanza Province, 79% of uncircumcised men and 81% of women believed that it was easier for uncircumcised men to acquire STIs compared with circumcised men (Mattson CL et al, 2005). In South Africa, a study measuring the extent of male circumcision protection and the impact of MMC for HIV prevention found that the majority (69%, 60) did not believe that MMC would protect women from the risk of HIV; with 82% (28) of respondents from Kwazulu Nata and 61% (31) in Eastern Cape. However, respondents from Eastern Cape believed twice as much compared to Kwazulu Nata respondents that MMC would provide protection to women (39% as compared to 18%). In Namibia, men and women reported positive attitude (93.6 %) towards MC. Gender was discovered to be associated with attitudes and female respondents were five times more likely to have positive attitudes towards MC, compared to males (P-value > 0.026, OR 5.284) (Nashandi, 2013).

In Uganda Kampala district which found that women were not of the view that circumcised men might feel free to have sex with multiple women (Dr. Sebastian, 2008)

In Tanzania, a study was carried out (Tarimo, 2012) to investigate perceptions on male circumcision as a preventive measure against HIV infection and considerations in scaling up of the services. It was a qualitative study among police officers in Dar es Salaam. The study found that informants perceived male circumcision as a health-promoting practice that may prevent HIV transmission and other sexually transmitted infections. They reported male circumcision promotes sexual pleasure, confidence and hygiene or sexual cleanliness. They added that it is a religious ritual and a cultural practice that enhances the recognition of manhood in the community. However, informants were concerned about the cost involved in male circumcision and cleanliness of instruments used in medical and traditional male circumcision. They also expressed confusion about the shame of undergoing circumcision at an advanced age and pain that could emanate after circumcision. The participants advocated

for health policies that promote medical male circumcision at childhood, specifically along with the vaccination program.

In South Africa a study was done by (Darbes, 2012) attitudes towards child and adult male circumcision among a community-based sample of heterosexual couples in Soweto. The study recruited a sample of 208 heterosexual couples (age: 18–45 years) using venue-based recruiting in both community and clinic settings. It examined the male and female partners' attitudes towards the male partners' circumcision (e.g., "How willing would you be for your partner to be circumcised?") as well as that of their male child. It also examined the discrepancies between partners' attitudes pertaining to each of these topics. The study found that female partner' attitudes towards partner circumcision differed from their male partners' attitudes towards self-circumcision. Women were strongly in favour of partner circumcision, whereas men's responses were more bimodal. Partners in approximately half (46%) of the couples were in perfect agreement in their level of willingness for male partner circumcision. Further, within partnerships, women reported higher willingness than the men for male-partner circumcision.

A study was conducted by (Adipo, 2012) in Kenya that endeavoured to establish women's thoughts about male circumcision specifically the perceptions of female partners of recently circumcised men in Nyanza Province. It was a longitudinal study of behavioural risk compensation following circumcision among 18-35 year-old men in Western Kenya. Men circumcised during the study were asked to refer their female partners to be interviewed for the study. The study recruited 101 women who were in a relationship with the referring man before and after his circumcision. The study found that all female participants reported being satisfied with their partner's decision to become circumcised and his sexual performance after circumcision. Ninety-six percent were satisfied with the appearance of partner's penis and 91% reported enjoying sex more after circumcision. Most women (84%) reported having no or small chance of getting HIV; 38% attributed this low risk to their partner's new circumcision status. Eighty-eight percent felt more protected from sexual diseases after their partners' circumcision. Overall, women and men held similar beliefs about circumcision. However, attitudes that could potentially lead to risk compensation were reported more frequently by women than men: now that circumcision is available, condom use is less necessary (7% men, 35% women, OR=7.00; 95%CI 2.93-16.73); I am less worried about HIV (16% men, 36% women, OR=2.88; 95%CI 1.47-5.65); I am more likely to have more

than one partner (6% men, 18% women, OR=4.42; 95%CI 1.42-13.75); I am more likely to have sex without a condom (6% men, 18% women, OR=3.33; 95%CI 1.26-8.78). The study concluded that women have favourable attitudes toward male circumcision. While men are counselled about the partial protection of circumcision against HIV during the procedure, they do not appear to share this information with their partners. There is need to target women with education on male circumcision.

Socio-economic and demographic factors play a huge role in influencing women's knowledge and attitude towards male circumcision. In Windhoek Namibia, the single and the married were well informed (knowledgeable) about MC (81.8%), 60% of widowed respondents were not knowledgeable about the benefits of MC. Respondents above the age of 21 years appeared more knowledgeable of MC and its benefits. Respondents below 21 years (46.2%) were more ignorant about benefits of MC. All of the widowed participants had positive attitude towards male circumcision services. Overall, 93.6% of participants by marital status indicated positive attitude towards male circumcision. There were 6.4% of participants who had negative attitude towards MC. About 20% of the participants from the age group of 50 years and older indicated more negative attitude towards male circumcision. The age-groups of 36-40 and 46-50 years of age have 100% positive attitude towards MC. Generally, 93.6% of all age groups have positive attitude towards MC. With regards to the influence of ethnicity on knowledge and attitude, the study showed that knowledge among Damara>Nama is relatively low (55%) compared to other ethnic groups who are more knowledgeable on male circumcision. It also found that all cultural groups had positive attitude towards MC, with 10% and 11% of Damara>Nama and Afrikaans groups having negative attitude, respectively (Nashandi, 2013). In Namibia religious groups, knowledge prevailed among the Lutherans (81.4%), with the Roman Catholics being less knowledgeable. However, most religious groups have good knowledge (76.8%), but 23.2% did not possess enough knowledge on male circumcision and its benefits. The study also reviewed that Anglicans had more negative attitude (20%) towards male circumcision, compared to other respondents from other religions (12.4%) (Nashandi, 2013). Respondents also indicated that they had knowledge about MC and its benefits. More knowledge prevailed among the tertiary educated respondents (80.5%), followed by secondary educated respondents (74.1%) and then respondents with primary education (66.7%). Most of participants who were employed, unemployed and student were well informed about MC (76.8%) while all the educated participants, primary, secondary and tertiary had positive attitude towards MC. With regards

to occupation, Unemployed participants had more positive attitude (100%) towards MC, compared to employed respondents and students (92.5% and 91.3% respectively) (Nashandi, 2013).

A situational analysis for male circumcision in Malawi was conducted in 2010 by National AIDS Commission and suggested that behaviours among women may affect VMMC uptake among men. “Concerns were that women may not have the skills to advocate VMMC with their male partners, or they may consider it as an issue that is of concern to men only. The analysis also suggested that women may not know about the benefits of VMMC, both directly, for men, and indirectly, for themselves. Women may also have other concerns which include being apprehensive as to why their partner wants to undergo VMMC if they are married or in long-term relationship and religious and cultural reservations about VMMC” (I-TECH, 2012). In Namibia, Windhoek, Respondents reported barriers that inhibit the uptake of male circumcision. These were pain the highest (28.8%) and followed by safety (23.6%). However, the majority in the study 93.6% had a positive attitude towards MC but 6.4% have negative attitude towards MC (Nashandi, 2013)

## **CHAPTER THREE: RESEARCH QUESTIONS AND OBJECTIVES**

### **3.1 RESEARCH QUESTIONS**

- What is the knowledge and attitude of women on male circumcision?
- Are women's knowledge and attitudes towards MC influenced by the source of information?

### **3.2 GENERAL OBJECTIVE**

- ❖ To investigate Women's Knowledge and Attitude towards Male Circumcision and its influencing factors between 2011 and 2013 in Zambia.

### **3.3 SPECIFIC OBJECTIVES**

1. To determine women's awareness and source of information on male circumcision across study years.
2. To assess women's knowledge on male circumcision across study years.
3. To assess women's attitude towards male circumcision across study years.
4. To assess the influence that male circumcision awareness and source of information has on women's knowledge and attitude towards male circumcision.

## CHAPTER FOUR: METHODOLOGY

### 4.1 STUDY SETTING

This study was conducted in Zambia's seven (out of ten) provinces. These seven provinces include Central, Copperbelt, Lusaka, Southern, Eastern, Luapula and Northern Provinces.

### 4.2 STUDY DESIGN

This study was a prospective cohort study as it involved secondary analysis of data from a longitudinal study. Longitudinal studies are investigation where participant outcomes are collected at multiple follow-up times. Longitudinal studies are usually characterised by multiple or repeated measurements.

#### 4.2.1 Data collection methods and participant selection

Although the study used secondary data from a longitudinal study which involved four rounds of data collection in which participants were followed up for four years, this study only looked at the first three rounds of data collected. This was due to unavailability of fourth round data at the time this study was formulated and conducted; therefore only data from the first, second and third round surveys was used. Female partners of circumcised men were sampled from MC clinics and from a longitudinal survey of a random sample of women from catchment areas of MC clinics. Therefore, the sample for this study was all women aged 15-29 years of age who lived in a subset of areas where MC services were being offered and were followed up to the 3rd round.

Population Council conducted a longitudinal Study on Sexual Behaviour Post Male Circumcision in Zambia. The surveys were conducted between November 2010 and February 2014. Broken down as follows; Round one was conducted from November 2010 to April 2011, Round two was between September 2011 and December 2011, Round three was between September 2012 and January 2013 and the last Round (round four) was from October 2013 to February 2014. Participants were interviewed four times with a time gap between surveys ranging between eight to twelve months. The study used both survey and qualitative research methodologies. Stratified random sampling was used to select the sample. Therefore, a sample of 2399 males (circumcised and uncircumcised) and 1050

females aged 15-29 who lived in subset areas where MC services was accessible were selected. Data was therefore collected progressively. After the interview was conducted, about 60% of the sample was randomly given information packages on male circumcision and the availability of male circumcision services in their respective areas. They were also provided with an opportunity to review the materials and ask questions if they had concerns as the interviewers were trained to address any concerns. This was done from round 1 to round 3 (Hewett, 2014).

### **Sample size calculation**

In the longitudinal study, they study used the DHS 2007 data through two key measures of risk behaviour in determining the sample sizes: (1) an averaged index created from a set of HIV behavioural risk indicators, and (2) the average number of sexual partners in the previous 12 months. Based on DHS estimates of baseline behaviour and STATA's sample size algorithm for repeated observations of continuous outcomes to statistically evaluate a 20% increase in the average number of sexual partners among women 15-29 required a minimum baseline sample of women of approximately 2,600, while the baseline sample needed for assessing changes the constructed index of HIV risk behaviours, yields a sample size of approximately 2,050 women 15-29 but this was not possible due to budget constraints. However, ACASI yielded 10% higher reporting of risk behaviours, the baseline sample size needed to assess change in the outcome indicators over the course of the study thus declined to approximately 1,050 women 15-29 (which includes the required oversample of adolescents and young adults 15-19).

### **Inclusion Criteria**

All women aged 15-29 years followed up to the 3rd round

### **Exclusion Criteria**

- Female sex workers
- Round 4 data

### **4.2.2 Definition of Outcomes**

#### ***Knowledge***

A knowledge variable was generated by aggregating those that correctly responded to the five general knowledge and fact questions on male circumcision. Respondent's knowledge was thus rated at a score of five. Therefore, respondents who scored four and above out of five

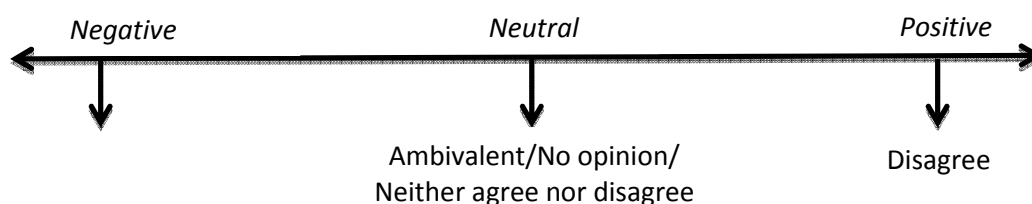


were rated to have had good knowledge, those that scored three out of five were rated having had average knowledge and all those that scored between zero and two were rated to have had poor knowledge about male circumcision. Knowledge is thus defined as knowing that (a) Male circumcision reduces a man's risk of getting HIV; (b) Male circumcision reduces a man's risk of getting sexually transmitted diseases other than HIV; (c) Male circumcision has no effect on a woman's risk of getting HIV if she has sex with a man who is circumcised; (d) Male circumcision improves a man's hygiene or cleanliness; and (e) male circumcision is not fully protective against HIV.

### ***Attitude***

An attitude variable was generated by aggregating four responses to the general belief, attitude and opinion questions on male circumcision. Respondents were assessed from the following four questions; (a) Male circumcision is something that only young people undergo; (b) Male circumcision is something that only certain tribes undergo; (c) Male circumcision is painful; and (d) Male circumcision is unsafe. Hence, respondents whose responses agreed to three or to all the four questions were classified as having a negative attitude towards male circumcision while all those women whose responses disagreed to three or to all the four questions were classified as having a positive attitude towards male circumcision. However, all those that had no opinion plus all those whose responses agreed to two questions and disagreed to the other two were classified as having a neutral or ambivalent attitude towards male circumcision. Figure 1 below illustrates the variation in the attitude variable from positive to negative.

**Figure 1: Attitude measurement**



The attitude variable was measured on a likert scale formulated by Rensis Likert an American psychologist. According to Likert, attitudes towards any object or on any issue varied along the same underlying negative-to-positive dimension and the method became known as the Likert method of attitude measurement (Likert, 1932).

### 4.2.3 Definition of Explanatory variables

#### *Awareness*

Awareness in this study refers to all women who had heard of male circumcision before the interviewer explained what male circumcision is to them. Therefore, women who had heard of male circumcision before it was described to them were aware. Hence, awareness is not synonymous to having knowledge of male circumcision.

#### *Advertisement on male circumcision*

An advertisement in this study refers to a source of information such as radio or television. Therefore, women who saw an advertisement on male circumcision either saw on television or had heard on radio.

#### *Promotional materials on male circumcision*

In this study, promotional materials refer to a source of information such as posters, brochures, or t-shirts.

#### *Primary Sex Partner*

A primary sex partner refers to a man whom a woman had sex with on a regular basis or whom they consider to be a main partner.

### 4.2.4 Operational definition and measurement of variables

**Table 1: Operational Conceptual Framework**

<b>Variable</b>	<b>Indicator</b>	<b>Scale of Measurement</b>
<b>Dependent variables</b>		
MC Knowledge	Poor Knowledge	Ordinal
	Average Knowledge	
	Good Knowledge	
MC Attitude	Negative	Ordinal
	Neutral	
	Positive	
<b>Independent variables</b>		
Age Group	15-19	Ordinal
	20-24	
	25-29	
Region	Rural	Nominal

	Urban	
Level of education	No primary education Primary Secondary Tertiary	Ordinal
Province	Central Copperbelt Eastern Luapula Lusaka Northern Southern	Nominal
Religion	Catholic Other Christian Muslim No religion Other	Nominal
Marital status	Single Married Divorced Separated	Nominal
<i>Primary Sex Partner (Never Married)</i>	Yes No	Nominal
<i>Primary Sex Partner (Widowed, Divorced, Separated)</i>	Yes No	Nominal
<i>Circumcision status of spouse (Married &amp; cohabiting)</i>	Yes No Don't know	Nominal
<i>Circumcision status of Primary Sex Partner (Never Married)</i>	Yes No Don't know	Nominal
Ethnicity	Lozi Nyanja	Nominal

	Tonga	
	Lunda	
	Bemba	
	Kaonde	
	Luvale	
	Non-Zambian	
	Other	
Occupation	Employed	Nominal
	Unemployed	
Sources of information	Yes/no	Nominal
Heard of MC before		
Advertisement		
Promotional materials		
Church		
Health centre		
Medical Professional		
Family member		
Sex Partner		

#### 4.4 DATA ANALYSIS

The datasets were analysed using STATA, version 11 software. The type of analysis involved univariate analysis, bivariate analysis and multiple ordered logistic regression analysis using the cluster option or approach and robust standard errors. Univariate analysis was used to describe the characteristics of the study participants and variable outputs. Bivariate analysis was used to test for association between independent variables and the dependent variable. Ordered logistic regression or proportional odds model (POM) was fitted and multiple ordered logistic regression analysis was done to measure the relationship between the independent variables and the dependent variable.

#### 4.5 ETHICAL CONSIDERATIONS

The study sought ethical approval from ERES CONVERGE research ethics committee and approval was given (Protocol Assurance number: F.W.A. No. 00011697, I.R.B. No.00005948). Permission to use the data for this study was sought from Population Council

authority. Population Council sought ethical approval from University of Zambia's (UNZA) Biomedical Research Ethics Committee (UNZABREC) (Protocol Assurance number: FWA00000338, IRB00001131 of IORG0000774) to conduct the longitudinal study.

#### **4.6 STUDY LIMITATION**

The study was using secondary data and was confined to the available information. The data was skewed towards quantitative data and did not collect in detail women's views and opinions. Therefore attitude was measured quantitatively and no detailed views were collected. The study was conducted in seven out of the nine provinces (Muchinga was sampled as part of Northern Province). This is because some parts in Western and North-Western Provinces are known to practice male circumcision. Therefore, despite the study representing the whole Zambia, Western and North-Western were putatively included. At baseline, about 60% of the sample was randomly given information packages on male circumcision and the availability of male circumcision services in their respective areas. This might have created a bias towards women who accessed information packages.

## CHAPTER FIVE: PRESENTATION OF STUDY FINDINGS

### 5.1. DISTRIBUTION AND ATTRITION OF STUDY PARTICIPANTS

Table 2: Distribution of study participants by each study round

	<i>Round1</i>		<i>Round2</i>		<i>Round3</i>	
	<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>
<i>Completed</i>	1064	78.8	955	79.6	428	39.5
<i>Lost to follow-up</i>	<i>N/A</i>	<i>N/A</i>	150	11.1	116	9.7
<i>Missing &amp; other</i>	286	21.2	245	20.4	656	60.5
<i>Sampled</i>	1350	100	1200	100	1084	100

Note: A brief introduction of the above rounds would be useful to understand data interpretation.

Table 1 above shows the distribution of participants by study round. According to the study findings, in Round1 (R1) (baseline), Round2 (R2) and Round3 (R3), only 78.8%, 79.6% and 39.5% were successfully interviewed respectively. The attrition rate from R1 to R3 was 19.7%. This was calculated by summing all those who were lost to follow-up from baseline to Round three divided by the baseline sample then multiplied by 100.

## 5.2 BASELINE SOCIO-DEMOGRAPHIC CHARACTERISTICS OF STUDY POPULATION

Table 3: Baseline socio-demographic characteristics of the study population

<i>Characteristics</i>	<i>Study Sample (n= 1,064)</i>	<i>Percentage n (%)</i>
<i>Age group</i>		
15-19	378	35.5
20-24	354	33.3
25-29	332	31.2
<i>Mean age</i>	21.8	
<i>Marital Status</i>		
Never Married	481	45.2
Married	520	48.9
Cohabiting	9	0.9
Widowed	8	0.8
Divorced	22	2.1
Separated	24	2.3
<i>Primary Sex Partner (Never Married)</i>		
No	318	66.1
Yes	163	33.9
<i>Primary Sex Partner (Widowed, Divorced, Separated)</i>		
No	40	74.1
Yes	14	25.9
<i>Circumcision status of spouse (Married &amp; cohabiting)</i>		
No	414	79.6
Yes	108	20.2
Don't know	1	0.19
<i>Circumcision status of Primary Sex Partner (Never Married)</i>		
No	107	65.6
Yes	35	21.5
Don't know	21	12.9
<i>Province</i>		
Central	170	15.98
Copperbelt	331	31.11
Eastern	40	3.67
Luapula	32	3.01
Lusaka	269	25.28
Northern	27	2.54
Southern	195	18.33
<i>Region</i>		
Rural	343	32.24
Urban	721	67.76
<i>Religion</i>		
Catholic	207	19.45

Other Christian	845	79.42
Muslim	3	0.28
No religion	6	0.56
Other	3	0.28
<hr/>		
<i>Education</i>		
Primary	378	35.53
Secondary	592	55.64
Trade school/College	10	0.94
University/College	40	3.74
No primary education	44	4.14
<hr/>		
<i>Ethnicity</i>		
Lozi	46	4.32
Nyanja	226	21.24
Tonga	276	25.94
Lunda	20	1.88
Bemba	341	32.05
Kaonde	76	7.14
Luvale	16	1.50
Non-Zambian	13	1.22
Other	50	4.70
<hr/>		
<i>Occupation</i>		
Working	92	8.65
Not working	972	91.35
<hr/>		
<i>Mean income (earned)</i>	635.1	
<hr/>		

Table 2 above presents the socio-demographic characteristics of the respondents in the study at baseline or Round 1. The ages ranged from 15–29 years with the majority (35.53%) of the respondents ages ranging between 15-19 years. The study population had a mean age of 21.8 years. The majority of the respondents (48.6%) were married. The majority (79.4%) of the married women and cohabiting women had partners that were not circumcised. Copperbelt Province had the majority of respondents (31.11%) and (67.76%) of the respondents were in urban areas. The majority of respondents (79.49%) were Christians from other denominations other than Catholic. The majority (55.64%) had a secondary education and Bemba's (32.05%) being the highest. The study population had a high proportion of unemployed women 91%.



### 5.3 AWARENESS AND SOURCES OF KNOWLEDGE ON MALE CIRCUMCISION

Table 4: Sources of knowledge and information on MC

<i>Responses</i>	Round1		Round2		Round3		$X^2$
	%	N	%	N	%	N	p-value
<i>Heard of MC before/Awareness:</i>							
Yes	72.49	(656)	84.67	(453)	no obs		<0.001
No	27.51	(249)	15.33	(82)			
<i>Heard or seen an advertisement on MC:</i>							
Yes	62.56	(518)	75.31	(662)	86.68	(371)	<0.001
No	37.44	(310)	24.69	(217)	13.32	(57)	
<i>Seen promotional materials on MC:</i>							
Yes	37.14	(306)	57.74	(507)	65.89	(282)	<0.001
No	62.86	(518)	42.26	(371)	34.11	(146)	
<i>Heard of MC at church or group meeting:</i>							
Yes	48.30	(398)	44.29	(388)	42.06	(180)	0.076
No	51.70	(426)	55.71	(488)	57.94	(248)	
<i>Talked about MC with a circumcised person:</i>							
Yes	21.12	(173)	28.95	(253)	35.51	(152)	<0.001
No	78.88	(646)	71.05	(621)	64.49	(276)	
<i>Talked to a medical professional about MC:</i>							
Yes	11.36	(93)	19.79	(173)	25.70	(110)	<0.001
No	88.64	(726)	80.21	(701)	74.30	(318)	
<i>Talked to a husband, boyfriend or sex partner about MC:</i>							
Yes	34.19	(280)	39.82	(348)	54.67	(234)	<0.001
No	65.81	(539)	60.18	(526)	45.33	(194)	
<i>Talked with another family member about MC:</i>							
Yes	23.81	(195)	27.00	(236)	31.54	(135)	0.013
No	76.19	(624)	73.00	(638)	68.46	(293)	
<i>Visited a health centre to learn about MC:</i>							
Yes	07.94	(65)	16.70	(146)	25.93	(111)	<0.001
No	92.06	(754)	83.30	(728)	74.07	(317)	

Respondents were asked a series of questions to ascertain their source of information regarding male circumcision as described in the table. Table 3 above shows the response from respondents.

## 5.4 WOMEN'S KNOWLEDGE AND ATTITUDE TOWARDS MALE CIRCUMCISION

### 5.4.1 Women's implicit knowledge of male circumcision by study round

Table 5: Male circumcision risk related knowledge by study round

	Round1	Round2	Round3
	N=820	N=875	N=428
Responses	%	%	%
<i>Effect of male circumcision on a man's risk of getting HIV:</i>			
Increases risk	0.61	0.69	0.23
Reduces risk	82.58	88.00	92.76
Has no effect	4.51	2.86	3.04
Don't know	12.30	8.46	3.97
<i>Effect of male circumcision on a man's risk of getting STI's other than HIV:</i>			
Increases risk	0.61	0.57	0.00
Reduces risk	84.76	88.91	93.22
Has no effect	2.44	1.71	2.57
Don't know	12.20	8.80	4.21
<i>Effect of male circumcision on a woman's risk of getting HIV:</i>			
Increases risk	1.59	0.91	0.93
Reduces risk	63.66	75.89	75.00
Has no effect	15.00	8.34	15.89
Don't know	19.76	14.86	8.18
<i>Effect of male circumcision on a man's hygiene or cleanliness:</i>			
Improves hygiene	82.56	82.51	92.76
Worsens hygiene	0.73	1.14	0.23
Has no effect	1.95	2.40	3.27
Don't know	14.76	13.94	3.74
<i>Male circumcision is fully protective of HIV:</i>			
Agree	37.97	44.62	57.24
No opinion	14.16	10.30	3.97
Disagree	47.86	45.08	38.79

**Note:** The number of respondents is higher in R1 compared to R2 due to high non response in R1.

Women were asked five fact questions on male circumcision. Table 5 shows the responses on questions regarding; (1) effect of male circumcision on a man's risk of getting HIV; (2) the effect of male circumcision on the risk of contracting sexually transmitted diseases other than HIV; (3) the effect of male circumcision protection on women against HIV; (4) its effect on a man's hygiene and (5) the level of protection male circumcision provides against contracting HIV. The table highlights misconceptions of the level of protection that male circumcision provides to women.

### 5.4.2 Aggregated knowledge of women about male circumcision

Figure 2: Women's knowledge of male circumcision by study round

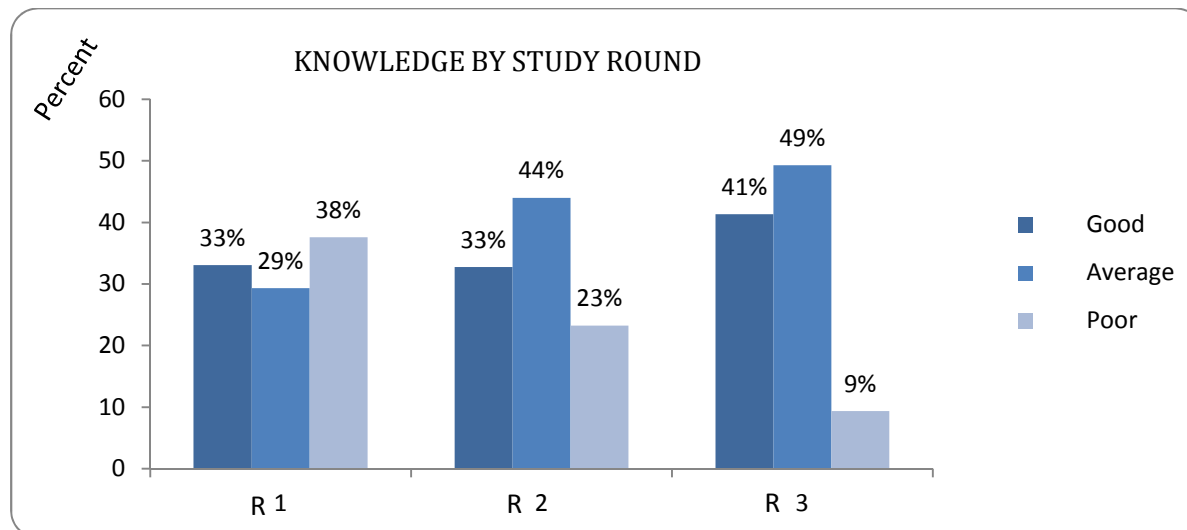


Figure 2 above shows the percentage of respondents who had poor, average or good knowledge about male circumcision per study round. The majority 38% had poor knowledge at baseline. However, in Round 2 and in Round 3 the majority 44% and 49% respectively had average knowledge. The increase in knowledge in each successive study round was statistically significant at 95% CI, ( $P < 0.001$ ). The study, therefore contentedly concludes that women's knowledge of male circumcision changed overtime or during the study period.

### 5.4.3 Women's attitudes, beliefs and opinions about male circumcision by study Round

Table 6: Beliefs, attitudes and opinions of women from baseline to Round three

	Round1 N=720	Round2 N=802	Round3 N=413
Responses	%	%	%
<i>Male circumcision is something only young people undergo:</i>			
Agree	24.54	12.60	10.51
No opinion	9.04	5.84	3.27
Disagree	66.42	81.56	86.21
<i>Male circumcision is something only certain tribes undergo:</i>			
Agree	23.84	12.47	7.24
No opinion	11.98	8.24	3.50
Disagree	64.18	79.29	89.25
<i>Male circumcision is likely to be painful:</i>			
Agree	68.50	72.74	68.46
No opinion	21.37	16.15	14.72
Disagree	10.13	11.11	16.82
<i>Male circumcision is unsafe:</i>			
Agree	10.87	9.51	8.18

No opinion	14.53	7.10	1.64
Disagree	74.60	83.39	90.19

**Note:** The number of respondents is higher in R1 compared to R2 due high non response in R1. The table also excluded all those who responded having had no opinion and were indifferent in the attitude variable.

**Table 6** above shows women’s responses on perceptions, attitudes and opinions about male circumcision. These included whether male circumcision was an activity for young people, for certain tribes, painful and unsafe process to undergo.

#### 5.4.4 Aggregated attitude of women towards male circumcision

**Figure 3: Women’s attitude towards male circumcision**

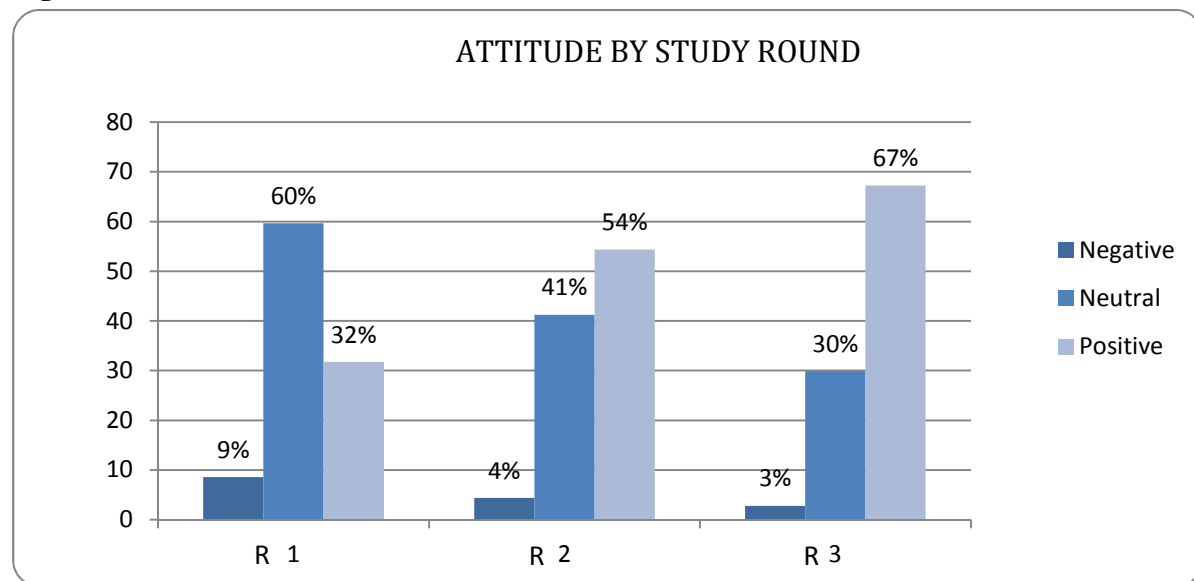


Figure 3 above shows that the majority (60%) of women at baseline had neutral attitude towards male circumcision. However, the majority in Round two (54%) and Round three (67%) had a positive attitude towards male circumcision. The change in women’s attitude towards male circumcision was statistically significant with p-value <0.001. Therefore, the study contentedly concludes that women’s attitude towards male circumcision changed overtime or over the study years.

#### 5.5 THE INFLUENCE OF AWARENESS AND SOURCES OF INFORMATION ON WOMEN’S KNOWLEDGE AND ATTITUDE TOWARDS MALE CIRCUMCISION.

Women in this study acquired information on male circumcision from various sources. The source of information has an influence on the quality of knowledge women acquire and the attitude women develop hence determining the level of knowledge and attitude.

### 5.5.1 The influence of awareness and sources of information on women's knowledge on male circumcision.

**Table 7: Sources of information and women's knowledge on MC**

Awareness & Source of information	Round1			Round2			Round3		
	%			%			%		
	Knowledge			Knowledge			Knowledge		
	Poor	Average	Good	Poor	Average	Good	Poor	Average	Good
<i>Heard of MC before:</i>									
Yes	20.88	37.80	41.31	15.89	43.93	40.18	No observations		
No	98.80	0.00	1.20	100.00	0.00	0.00			
<i>Heard or seen an advert on MC:</i>									
Yes	14.86	36.68	48.46	13.14	48.79	38.07	6.74	49.60	43.67
No	28.06	39.35	32.58	27.65	44.70	27.65	26.32	47.37	26.32
<i>Seen promotional materials on MC:</i>									
Yes	17.65	37.91	44.44	12.82	44.77	42.41	6.03	42.55	51.42
No	20.46	37.84	41.70	21.56	52.02	26.42	15.75	62.33	21.92
<i>Heard of MC at church or group meeting:</i>									
Yes	12.81	36.18	51.01	10.05	45.62	44.33	7.78	55.00	37.22
No	25.59	39.44	34.98	21.31	49.80	28.89	10.48	45.16	44.35
<i>Talked about MC with a circumcised person:</i>									
Yes	7.51	35.26	57.23	7.11	47.43	45.45	1.32	46.71	51.97
No	21.98	38.85	39.16	19.81	48.31	31.88	13.77	50.72	35.51
<i>Talked to a medical professional about MC:</i>									
Yes	5.38	32.26	62.37	4.05	52.02	43.93	1.82	58.18	40.00
No	20.66	38.84	40.50	19.12	47.08	33.81	11.95	46.23	41.82
<i>Talked to a husband, boyfriend or sex partner about MC:</i>									
Yes	9.64	36.79	53.57	9.48	53.16	37.36	4.70	52.56	42.74
No	23.75	38.78	37.48	20.53	44.68	34.79	14.95	45.36	39.69
<i>Talked with another family member about MC:</i>									
Yes	8.72	38.46	52.82	6.78	44.07	49.15	2.22	55.56	42.22
No	22.12	37.98	39.90	19.59	49.53	30.88	12.63	46.42	40.96
<i>Visited a health centre to learn about MC:</i>									
Yes	3.08	47.69	49.23	6.85	50.00	43.15	2.70	58.56	38.74
No	20.29	37.27	42.44	17.99	47.66	34.34	11.67	46.06	42.27

## 5.5.2 The influence of awareness and sources of information on women's attitude towards male circumcision.

**Table 8: Sources of information and women's attitude towards MC**

Awareness & Source of information	Round1 %			Round2 %			Round3 %		
	Attitude			Attitude			Attitude		
	Negative	Neutral	Positive	Negative	Neutral	Positive	Negative	Neutral	Positive
<i>Heard of MC before:</i>									
Yes	11.43	49.54	39.02	3.75	35.32	40.18	No observations		
No	0.00	99.20	8.80	00.00	98.78	1.22			
<i>Heard or seen an advert on MC:</i>									
Yes	10.62	44.79	44.59	3.78	33.08	63.14	1.89	28.57	69.54
No	11.61	53.87	34.52	7.83	46.08	46.08	8.77	38.60	52.63
<i>Seen promotional materials on MC:</i>									
Yes	9.48	46.73	43.79	3.16	33.14	63.71	1.77	24.47	73.76
No	11.97	48.65	39.38	7.01	40.16	54.79	4.79	40.41	54.79
<i>Heard of MC at church or group meeting:</i>									
Yes	13.82	36.68	49.50	5.67	31.44	62.89	2.78	32.22	65.00
No	8.45	58.45	33.10	4.10	39.55	56.35	2.82	28.23	68.95
<i>Talked about MC with a circumcised person:</i>									
Yes	9.25	28.90	61.85	2.77	24.11	73.12	2.63	15.13	82.24
No	11.61	52.63	35.76	5.64	40.58	53.78	2.90	38.04	59.06
<i>Talked to a medical professional about MC:</i>									
Yes	11.83	24.73	63.44	2.31	27.17	70.52	2.73	22.73	74.55
No	11.02	50.55	38.43	5.42	37.95	56.63	2.83	32.39	64.78
<i>Talked to a husband, boyfriend or sex partner about MC:</i>									
Yes	10.71	29.62	59.64	3.45	27.59	68.97	1.71	21.37	76.92
No	11.32	56.96	31.73	5.70	41.25	53.04	4.12	40.21	55.67
<i>Talked with another family member about MC:</i>									
Yes	11.79	33.85	54.36	1.69	25.00	73.31	2.96	19.26	77.78
No	10.90	51.92	37.18	5.96	39.81	54.23	2.73	34.81	62.46
<i>Visited a health centre to learn about MC:</i>									
Yes	9.23	38.46	52.31	2.05	30.14	67.81	3.60	22.52	73.87
No	11.27	48.41	40.32	5.36	36.95	57.69	2.52	32.52	64.98

## 5.6 ORDERED LOGISTIC REGRESSION ANALYSIS

Given that the study is using longitudinal or panel data and that the outcome variables are ordered, ordered logistic regression or proportional odds model (POM) was fitted taking into account of the longitudinal nature of the data using the cluster option or approach and robust standard errors. This study analysed the data using complete case analysis.

### 5.6.1 Bivariate ordered logistic regression analysis

The predictor variables included all the background variables, awareness and source of information on male circumcision. Table 9 below shows the predictors of women's knowledge of male circumcision while table 10 shows the Predictors of women's attitude towards male circumcision.

**Table 9: Predictors of women's knowledge of male circumcision**

Characteristics/factors	Study Sample N (%)	Proportional Odds ratio (POR) (95% CI)	P-value
<i>Age group</i>			
15-19	783 (32.00)	1.0	
20-24	877 (35.84)	1.63 (1.45-1.82)	<0.001
25-29	787 (32.16)	1.48 (1.18-1.87)	0.001
<i>Marital Status</i>			
Never Married	1104 (45.3)	1.0	
Married	1191 (48.6)	0.95 (0.82-1.09)	0.435
Cohabiting	16 (0.85)	1.36 (0.49-3.69)	0.553
Widowed	17 (0.66)	2.42 (0.65-8.97)	0.186
Divorced	63 (2.07)	0.92 (0.43-1.96)	0.826
Separated	56 (2.44)	0.93 (0.56-1.55)	0.787
<i>Primary Sex Partner (Never Married)</i>			
No	676 (61.18)	1.0	
Yes	429 (38.82)	1.57 (1.44-1.72)	<0.001
<i>Primary Sex Partner (Widowed, Divorced, Separated)</i>			
No	90 (66.18)	1.0	
Yes	46 (33.82)	1.68 (1.26-2.24)	<0.001
<i>Circumcision status of spouse (Married &amp; cohabiting)</i>			
No	924 (77.58)	1.0	
Yes	266 (22.33)	3.03 (2.03-4.51)	<0.001
Don't know	1 (0.08)	2.99 (5.00-0.01)	<0.001
<i>Circumcision status of Primary Sex Partner (Never Married)</i>			
No	232 (54.08)	1.0	

Yes	136 (31.70)	2.11 (1.39-3.21)	<0.001
Don't know	61 (14.22)	1.73 (1.26-2.38)	0.001
<i>Province</i>			
Central	368 (15.03)	1.0	
Copperbelt	629 (25.69)	0.50 (0.37-0.67)	<0.001
Eastern	75 (3.06)	0.69 (0.39- 1.22)	0.200
Luapula	59 (2.41)	1.35 (0 .81- 2.22)	0.245
Lusaka	760 (31.05)	0.61 (0 .56- 0.67)	<0.001
Northern	50 (2.04)	1.24 (0 .42- 3.69)	0.695
Southern	507 (20.71)	0.37 (0 .30-0.44)	<0.001
<i>Region</i>			
Urban	1721 (70.33)	1.0	
Rural	727 (29.67)	0.40 (0.31-0.53)	<0.001
<i>Religion</i>			
Catholic	450 (18.39)	1.0	
Other Christian	1973 (80.63)	1.10 (0.89-1.37)	0.378
Muslim	5 (0.20)	0.91 (0.52-1.57)	0.725
No religion	14 (0.57)	1.06 (0.42-2.69)	0.907
Other	5 (0.20)	0.09 (0.01-0.95)	0.045
<i>Education</i>			
No education	104 (4.25)	1.0	
Primary	795 (32.49)	1.31 (0.82-2.10)	0.256
Secondary	1411 (57.66)	2.52 (1.84-3.44)	<0.001
University/College	137 (5.60)	7.60 (4.84-11.93)	<0.001
<i>Ethnicity</i>			
Lozi	102 (4.17)	1.0	
Nyanja	529 (21.62)	0.82 (0.63-1.07)	0.138
Tonga	680 (27.79)	0.59 (0.41-0.86)	0.006
Lunda	13 (1.27)	2.28 (1.60-3.24)	<0.001
Bemba	741 (30.28)	0.81 (0.68-0.95)	0.009
Kaonde	164 (6.70)	1.04 (0.99-1.08)	0.063
Luvale	42 (1.72)	1.19 (0.39-3.65)	0.757
Non-Zambian	27 (1.10)	1.06 (0.82-1.38)	0.637
Other	131 (5.35)	0.71 (0.47-1.07)	0.105
<i>Occupation</i>			
Working	304 (12.42)	1.0	
Not working	2143 (87.58)	0.59 (0.43-0.82)	<0.001
<i>Had heard of male circumcision before:</i>			
No	331 (22.99)	1.0	
Yes	1,109 (77.01)	N/A	
<i>Had seen an advert on male circumcision:</i>			
No	584 (27.35)	1.0	
Yes	1,551 (72.65)	2.09 (1.75-2.49)	<0.001
<i>Had seen promotional materials on male circumcision:</i>			



No	1,035 (48.59)	1.0	
Yes	1,095 (51.41)	1.69 (0.98-2.89)	0.056
<i>Heard of male circumcision from church:</i>			
No	1,162 (54.61)	1.0	
Yes	966 (45.39)	1.73 (1.15-2.62)	0.009
<i>Talked about MC with a circumcised person:</i>			
No	1543 (72.75)	1.0	
Yes	578 (27.25)	2.12 (1.93-2.31)	<0.001
<i>Talked to a medical professional about MC:</i>			
No	1745 (82.27)	1.0	
Yes	376 (17.73)	1.77 (1.32-2.37)	<0.001
<i>Talked to a husband, boyfriend or sex partner about MC:</i>			
No	1259 (59.36)	1.0	
Yes	862 (40.64)	1.64 (1.26-2.12)	<0.001
<i>Talked with another family member about MC:</i>			
No	1555 (73.31)	1.0	
Yes	566 (26.69)	1.98 (1.45-2.48)	<0.001
<i>Visited a health centre to learn about MC:</i>			
No	1799 (84.82)	1.0	
Yes	322 (15.18)	1.45 (0.32-0.88)	<0.001

Note: Robust standard errors adjusted for 3 clusters, Significant at 5%.

In table 9 above, 1.0 was the proportional odds of the reference group. Therefore, the odds of having good and average knowledge versus poor knowledge was POR times greater (POR>1) or times less (POR<1) for the women not in to the reference group compared to those in the reference group. It follows that the odds for all the background characteristics were greater (POM>1) except for region and some categories in marital status, province, religion, education and ethnicity. Similarly, the odds of having good and average knowledge versus poor knowledge was greater (POM>1) among women who had acquired or sourced information on male circumcision compared to those who did not.

**Table 10: Predictors of women's attitude towards male circumcision**

Characteristics/factors	Study Sample N (%)	Proportional Odds ratio (POR) (95% CI)	P-value
<i>Age group</i>			
15-19	783 (32.00)	1.0	
20-24	877 (35.84)	1.57 (1.45-1.70)	<0.001
25-29	787 (32.16)	1.86 (1.71-2.03)	<0.001
<i>Marital Status</i>			
Never Married	1104 (45.3)	1.0	
Married	1191 (48.6)	1.18 (1.12-1.24)	<0.001
Cohabiting	16 (0.85)	1.36 (0.21-8.92)	0.749
Widowed	17 (0.66)	0.72 (0.05-10.33)	0.808
Divorced	63 (2.07)	1.14 (0.72-1.83)	0.569
Separated	56 (2.44)	0.96 (0.75-1.23)	0.729
<i>Primary Sex Partner (Never Married)</i>			
No	676 (61.18)	1.0	
Yes	429 (38.82)	1.89 (1.37-2.63)	<0.001
<i>Primary Sex Partner (Widowed, Divorced, Separated)</i>			
No	90 (66.18)	1.0	
Yes	46 (33.82)	2.52 (2.09-3.03)	<0.001
<i>Circumcision status of spouse (Married &amp; cohabiting)</i>			
No	924 (77.58)	1.0	
Yes	266 (22.33)	2.39 (1.82-3.15)	<0.001
Don't know	1 (0.08)	0.31 (0.15-0.61)	0.001
<i>Circumcision status of Primary Sex Partner (Never Married)</i>			
No	232 (54.08)	1.0	
Yes	136 (31.70)	1.99 (1.26-3.16)	0.003
Don't know	61 (14.22)	0.98 (0.60-1.59)	0.934
<i>Province</i>			
Central	368 (15.03)	1.0	
Copperbelt	629 (25.69)	0.35 (0.13-0.92)	0.034
Eastern	75 (3.06)	0.58 (0.29-1.17)	0.127
Luapula	59 (2.41)	0.31 (0.10-0.93)	0.037
Lusaka	760 (31.05)	0.44 (0.24-0.82)	0.010
Northern	50 (2.04)	0.63 (0.28-1.39)	0.253
Southern	507 (20.71)	0.29 (0.14-0.59)	0.001
<i>Region</i>			
Urban	1721 (70.33)	1.0	
Rural	727 (29.67)	0.47 (0.40-0.55)	<0.001
<i>Religion</i>			
Catholic	450 (18.39)	1.0	
Other Christian	1973 (80.63)	0.98 (0.70-1.36)	0.888

Muslim	5 (0.20)	0.87 (0.67-11.22)	0.916
No religion	14 (0.57)	1.07 (0.13-8.57)	0.948
Other	5 (0.20)	0.26 (0.10-0.67)	0.006
<i>Education</i>			
No education	104 (4.25)	1.0	
Primary	795 (32.49)	0.82 (0.59-1.14)	0.236
Secondary	1411 (57.66)	1.19 (0.71-2.02)	0.499
University/College	137 (5.60)	2.34 (0.98-5.56)	0.055
<i>Ethnicity</i>			
Lozi	102 (4.17)	1.0	
Nyanja	529 (21.62)	0.98 (0.65-1.47)	0.909
Tonga	680 (27.79)	0.76 (0.52-1.10)	0.148
Lunda	13 (1.27)	0.63 (0.38-1.06)	0.083
Bemba	741 (30.28)	0.84 (0.65-1.08)	0.165
Kaonde	164 (6.70)	1.01 (0.79-1.28)	0.925
Luvale	42 (1.72)	0.84 (0.64-1.11)	0.215
Non-Zambian	27 (1.10)	0.86 (0.65-1.15)	0.309
Other	131 (5.35)	0.67 (0.44-1.01)	0.058
<i>Occupation</i>			
Working	304 (12.42)	1.0	
Not working	2143 (87.58)	0.74 (0.57-0.95)	0.017
<i>Had heard of male circumcision before:</i>			
No	331 (22.99)	1.0	
Yes	1,109 (77.01)	4.64 (1.62-13.29)	0.004
<i>Had seen an advert on male circumcision:</i>			
No	584 (27.35)	1.0	
Yes	1,551 (72.65)	2.03 (1.54-2.67)	<0.001
<i>Had seen promotional materials on male circumcision:</i>			
No	1,035 (48.59)	1.0	
Yes	1,095 (51.41)	1.82 (1.39-2.39)	< 0.001
<i>Heard of male circumcision from church:</i>			
No	1,162 (54.61)	1.0	
Yes	966 (45.39)	1.23 (0.96-1.57)	0.103
<i>Talked about MC with a circumcised person:</i>			
No	1543 (72.75)	1.0	
Yes	578 (27.25)	2.79 (2.26-3.46)	<0.001
<i>Talked to a medical professional about MC:</i>			
No	1745 (82.27)	1.0	
Yes	376 (17.73)	2.22 (1.64-3.01)	<0.001
<i>Talked to a husband, boyfriend or sex partner about MC:</i>			
No	1259 (59.36)	1.0	
Yes	862 (40.64)	2.55 (1.84-3.52)	<0.001
<i>Talked with another family member about MC:</i>			

No	1555 (73.31)	1.0	
Yes	566 (26.69)	2.12 (1.81-2.49)	<0.001
<i>Visited a health centre to learn about MC:</i>			
No	1799 (84.82)	1.0	
Yes	322 (15.18)	1.88 (1.53-2.29)	<0.001

Note: Robust standard errors adjusted for 3 clusters, Significant at 5%.

Similarly in table 10 above, 1.0 was the proportional odds of the reference group. Therefore, the odds of having a positive and neutral attitude versus a negative attitude was POR times greater (POR>1) or times less (POR<1) for the women not in the reference group compared to those in the reference group. The table shows the odds for the background characteristics which fluctuated among different variables and within variable categories. However, it shows that the odds of having a positive and neutral attitude versus a negative attitude was greater (POM>1) among women who had acquired or sourced information on male circumcision compared to those who did not.

### 5.6.2 Multivariate ordered logistic regression or proportional odds model (POM)

Using stepwise backward elimination method to explain variations in the women's knowledge of male circumcision, the variations in knowledge can be elucidated by model 2. The final model in model 2 (Appendix 3) reveals that women's knowledge was influenced by factors such as; a woman's age, a woman's education level, ethnicity, region, marital status, hearing of male circumcision, talking to a spouse, boyfriend or sex partner and lastly talking to a family member on male circumcision. Two models were fitted. Model 1 comprised only variables wholly significant at univariate while model 2 comprised variables significant at univariate plus those categorical variables with some categories that were significant (Not wholly significant). Using the Akaike's (AIC) and Schwarz's Bayesian information criterion (BIC) to compare between models the goodness of fit, the AIC and BIC for model 2 was lower than for model 1. Therefore, model 2 was the best model to explain factors influencing male circumcision knowledge among women.

In the same vein, using stepwise backward elimination method to explain variations in the women's attitude towards male circumcision, the model reviews that women's attitude towards male circumcision can be explained by factors such as; a woman's age, her religion, seeing promotional materials on male circumcision, talking to a circumcised person, a boyfriend, sexual partner or a spouse. Similarly, two models were fitted. Model 1 comprised

only variables wholly significant at univariate while model 2 comprised variables significant at univariate plus those categorical variables with some categories that were significant (Not wholly significant). Both models yield the same outcome.

### 6.0 DISCUSSION

#### **Awareness and sources of knowledge on male circumcision**

The majority of women in the study were aware of male circumcision because they had heard of it before it was described to them. This was characterised by a successive increase in the number of women who had heard of male circumcision at baseline to round two. A woman being aware of MC is not a new finding but has been shown by other studies elsewhere. For instance, a Jamaican study (Figueroa, 2008) found that 67% of women reported having heard of circumcision. In South Africa, the majority of women in the Eastern Cape (80%) indicated that they had heard about medical male circumcision (Arnott and Kehler, 2010). It was remarkable to note that the majority of women in all the three rounds had heard or seen male circumcision information from an advert as opposed to hearing it from church or seeing promotional materials on male circumcision. This indicates that adverts (radio and television) were a more pronounced or main source of information on male circumcision. Therefore, using adverts for information dissemination on male circumcision is inexorably essential.

The study revealed that less than 40% of the women talked to a circumcised person, medical personnel, family member, spouse, boyfriend or sex partner or visited a health centre to learn about male circumcision. This implies that the majority of women did not take time to inquire or discuss male circumcision. However, in Round three (54.67%), there was an improvement in the number of women who talked to a spouse, boyfriend or sex partner about male circumcision. This implied that acquiring information on male circumcision by talking to a partner was easier for women compared to talking to a relative, circumcised person or visiting a health centre. This is consistent with a study done by WHiPT (2010), which found that 40% of women talked to sexual partners about male circumcision. The existing programs and policies do not engage women exclusively; hence women's participation is low and ultimately results in their poor knowledge about male circumcision. It is important, however, to note that women are directly attached to male partners as care givers thus making it imperative that women be informed about the basic facts of MMC (WHiPT, 2010). The existing myths and misconceptions about medical male circumcision must therefore be dispelled if the intervention is to succeed and achieve the intended goals.

## **Women's knowledge and attitude towards male circumcision**

Over 80% of the women in the study said male circumcision reduces a man's risk of contracting HIV. This number increased from 83% at baseline to 93% in round three indicating a positive change. This is consistent with findings in a Tanzanian (Tarimo, 2012) study which found that women perceived male circumcision as a health-promoting practice that can prevent HIV transmission and other sexually transmitted infections. In a similar response, many women in this study revealed that male circumcision reduces a man's risk of contracting sexually transmitted infections (STIs). This number increased from 85% at baseline to 93% in round three indicating a strong and positive increase in knowledge. This finding is also consistent with previous studies conducted in Kenya Nyanza Province where 81% of women believed that it was easier for uncircumcised men to acquire STIs compared with circumcised men (Mattson et al, 2005) while women in Jamaica (20.4%) also felt male circumcision lessens the likelihood of STIs (Figueroa, 2008). Only 15% of the women in this study thought male circumcision has no effect on a woman's risk of getting HIV. These findings are consistent with findings in a qualitative study in Swaziland which found that women felt male circumcision protects them by up to 95% (Adams, 2012) However, the findings contradict the findings from South Africa which revealed that women did not believe that medical male circumcision would protect women from the risk of HIV (Arnott and Kehler, 2010). Conversely, this study found that over 82% of the women thought male circumcision improves a man's hygiene or cleanliness. This number increased from 83% at baseline to 93% in Round three, indicating an increase in women's knowledge on the influence that male circumcision has on hygiene. The findings are similar with what was found in a Jamaican study where, 41.8% of the women revealed that circumcision makes it easier to clean the penis (Figueroa, 2008). This study found that the majority (48%) of women thought male circumcision is not fully protective of HIV. However, this decreased from 48% at baseline to 39% in Round three thereby revealing an increase in the number of women who thought male circumcision is fully protective of HIV from 48% at baseline to 57% in Round three. This finding has implications on risk compensation as this may cause women to engage into risky sexual behaviour. The exhibited misconceptions on the level of protection that male circumcision offers also have other implications on women such as gender based violence and reduced negotiating power for safer sex. This entails that women will not practice or even negotiate for safer sex with a circumcised partner as they themselves believe that male circumcision is fully protective against HIV and it also provides

protection to women. In view of the revealed misconceptions, a study conducted by WHIPT, (2010) revealed that participants recognised that MMC leads to an increase in gender-based violence (GBV) and heightened stigma for women living with HIV. They attributed it to circumcised men's misperceptions that they are not HIV-positive and/or cannot transmit the virus.

From the aggregated responses, the study deduced that the majority of the women had poor knowledge of male circumcision at baseline; however women's knowledge increased in round two and three. These findings are similar to findings in Zimbabwe (Mavhu et al, 2011) which showed that male circumcision knowledge and its benefits were low among men and women. Other findings by Castro and others (2010) showed that most practitioners working with sexually transmitted infection and neonate cases reported that the Hispanic community had little or no knowledge about circumcision, thus lack of information about circumcision is perceived as a barrier to the procedure. It is evident from the findings that male circumcision campaigns may have failed to reach out effectively to many women and as a result have been unsuccessful in educating and imparting correct information on male circumcision. Women's knowledge of male circumcision is key in the roll out of male circumcision programs as documented by a study in Zimbabwe (Hatzold et al, 2014 ) that, despite knowledge being lower among females, data suggested that women were likely to have considerable influence over their partner's decision to get circumcised. This is evidence of the need for serious awareness campaigns among women, in as much as in men, to get program success.

Findings of women's' positive attitude towards male circumcision is a critical finding in as far as MC program roll out in Zambia is concerned. This is because positive perceptions, attitudes and opinions about male circumcision inspire acceptance of male circumcision because they act as enhancers or reinforcers (Watson, 1930). Negative perceptions, attitudes and opinions about male circumcision deter acceptance of male circumcision as they act as barriers. This emanates from the fact that, the majority of women in all study rounds felt male circumcision is not for young people, it's not only for certain tribes and its safe; nonetheless a relative majority of women felt male circumcision is painful. This corresponds with findings in Namibia, (Nashandi, 2013) where respondents reported pain (28.8%) as one of the major barriers that inhibit the uptake of male circumcision followed by safety (23.6%). This indicates that less painful methods of circumcision must be instigated if scale up of medical male circumcision is to succeed. Painless methods such as the Shang ring and Prepex need to explore for the Zambian context. More importantly, this study revealed that the majority of



women had a positive attitude towards male circumcision. Similar findings in a Namibian study reported women having a positive attitude towards male circumcision (Nashandi, 2013). The study finding also agrees with a study by Mavhu et al, (2011), which found positive attitudes towards male circumcision in rural Zimbabwe. Thus, women's positive attitude towards male circumcision would imply that Medical Male Circumcision would be integrated into maternal and child health programs with minimal resistance. In addition, this positive attitude could also be linked to other prevention methods, such as condom use and abstinence.

Although the majority of women had a positive attitude towards male circumcision, the majority of women only had average knowledge about male circumcision. This implies that despite not knowing exclusively about male circumcision, women accepted and advocated for male circumcision. More awareness campaigns need to be utilized by governments rolling out MMC and Neonatal Male Circumcision.

#### **Factors influencing women's knowledge and attitude towards male circumcision.**

The study revealed that background characteristics such as a woman's age, a woman's education level, ethnicity, region, marital status, awareness and sources of information had a significant influence on women's knowledge and attitude towards male circumcision. The study showed higher odds of having good and average knowledge versus poor knowledge for women who; were aware of male circumcision; talked to a family member; spouse, boyfriend, girlfriend, sex partner and those that visited health centre to learn about male circumcision. Older women, the divorced, widowed and separated women with sex partners and educated women had higher odds of having good and average knowledge. Varying ethnic groups showed higher odds of having good and average knowledge. Women in rural areas had lower odds of having good and average knowledge. Similarly, the study showed that women that had seen promotional materials and talked to a circumcised person on male circumcision had higher odds of having a positive and neutral attitude towards male circumcision compared to those women who did not. Older women had higher odds of having positive and neutral attitude while women in rural areas had lower odds of having positive and neutral attitude. While the data indicates high odds among the mentioned factors, women just have average knowledge about male circumcision and this is a concern, considering that medical male circumcision programs and education campaigns have been rolled out. Rural parts of Zambia require more education compared to the urban. Educating

males is also key as the study indicates partner influence on women's knowledge. The study indicated that older women had better knowledge and a positive attitude towards male circumcision compared to the younger ones. This implies that higher levels of misconceptions exist among adolescents hence targeted awareness on adolescents as a policy agenda is key to programs success. The study findings also indicate that hearing about male circumcision does not entail having correct or factual information about male circumcision, hence the need for education and making changes to the information that was used as it is evident from these shortcomings.

## **6.1 CONCLUSION**

While data indicates women having a positive attitude towards male circumcision, it also highlights the need for education due to inadequate knowledge about male circumcision. However, the positive attitude towards male circumcision signifies an enabling and conducive environment for the scale-up of male circumcision. With the aforementioned however, awareness and communication campaigns on male circumcision still need to be intensified and embedded in all programmes offering male circumcision services. Misconceptions about the extent to which male circumcision is protective against HIV are highly prominent among women in Zambia. Consequently amending misconceptions and misinformation should also be part of an overall plan for social change communication. Without curbing the existing misconceptions, the scaling up of male circumcision may result in risk compensation which would in turn increase the number of sexually transmitted diseases including HIV, and effectively undoing all the gains so far. Impliedly, the purpose of using male circumcision as a preventive measure for HIV would be to no avail and a waste of scarce resources.

## **6.2 RECOMMENDATIONS TO POLICY MAKERS AND PROGRAMME IMPLEMENTERS**

The identified knowledge gaps must be addressed by making available or providing comprehensive male circumcision education campaigns. This must involve dispelling all misconceptions and misinformation that exists about male circumcision. An extensive communication campaign must be embarked on or strengthened through various forms of information dissemination pathways especially advertisements, which has been shown in this study to be an effective information dissemination forum. The information should target various audiences putting into consideration individuals' background characteristics. Male

circumcision roll out programs must actively involve key stakeholders including religious leaders, chiefs, young people's groups and women groups. Community involvement is very important. Women must be involved in male circumcision programmes because women are frequently involved in the process of decision making to circumcise neonates, children and at times consulted by their male partners about adult MC. Male circumcision scale-up programmes must ensure women understand that male circumcision does not provide complete protection against STIs/HIV infection. Women must be well informed that male circumcision is just a supplement to comprehensive HIV prevention package which includes the correct and consistent use of condoms, reductions in the number of sexual partners, delaying the onset of sexual relations, avoidance of penetrative sex, and testing and counselling to know one's HIV serostatus. Due to insufficient knowledge women have on male circumcision, further studies should be carried out to investigate in detail the implications of male circumcision on women especially in communities or regions where gender based violence is high. Future research can also investigate the level to which females influence their male partners to take up or opt out of MMC.

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## APPENDIX

### A1: Budget

<i>ITEM</i>	<i>DESCRIPTION</i>	<i>QUANTITY</i>	<i>UNIT PRICE</i>	<i>AMOUNT</i>
1	Software (STATA Windows)	1	1500	1500
2	paper	2 rims	30	60
3	Pens	10	1.5	15
4	Pencil	10	1	10
5	Writing Pads	4	15	60
6	Ring Binder	2	20	40
<b>Thesis Writing</b>				
1	Paper	2 rims	30	60
2	Printing of preliminary Thesis	2	60	120
3	Printing of final Thesis	1	60	120
4	Binding	3	100	300
5	Incidental costs + Transport		2500	500
<b>Total</b>				<b>4785</b>
<b>GRAND TOTAL</b>				<b>4785</b>



**A2: Model 1-Knowledge****Table 11: Predictors of women's knowledge of male circumcision**

Characteristics/factors	Study Sample N (%)	Proportional Odds ratio (POR) (95% CI)	P-value
<i>Age group</i>			
15-19	783 (32.00)	1.0	
20-24	877 (35.84)	16.75 (1.69-165.62)	0.016
25-29	787 (32.16)	17.54 (1.44- 214.04)	0.025
<i>Primary Sex Partner (Widowed, Divorced, Separated)</i>			
No	90 (66.18)	1.0	
Yes	46 (33.82)	2.04 (1.65-2.52)	<0.001
<i>Region</i>			
Urban	1721 (70.33)	1.0	
Rural	727 (29.67)	0.35 (0.15-0.79)	<0.001
<i>Occupation</i>			
Working	304 (12.42)	1.0	
Not working	2143 (87.58)	0.54 (0.45-0.73)	<0.001
<i>Heard of male circumcision from church:</i>			
No	1,162 (54.61)	1.0	
Yes	966 (45.39)	2.35 (1.28-4.31)	0.006
<i>Talked about MC with a circumcised person:</i>			
No	1543 (72.75)	1.0	
Yes	578 (27.25)	1.71 (1.65-1.78)	<0.001
<i>Talked to a husband, boyfriend or sex partner about MC:</i>			
No	1259 (59.36)	1.0	
Yes	862 (40.64)	0.57 (.43-0.77)	<0.001

Note: Robust standard errors adjusted for 3 clusters, Significant at 5%

### A3: Model 2-Knowledge

**Table 12: Predictors of women's knowledge of male circumcision**

Characteristics/factors	Study Sample N (%)	Proportional Odds ratio (POR) (95% CI)	P-value
<i>Age group</i>			
15-19	783 (32.00)	1.0	
20-24	877 (35.84)	17.67 (2.76-113.20)	0.002
25-29	787 (32.16)	20.49 (1.85-226.88)	0.014
<i>Primary Sex Partner (Widowed, Divorced, Separated)</i>			
No	90 (66.18)	1.0	
Yes	46 (33.82)	1.82 (1.59-2.07)	<0.001
<i>Region</i>			
Urban	1721 (70.33)	1.0	
Rural	727 (29.67)	0.38 (0.23-0.63)	<0.001
<i>Education</i>			
No education	104 (4.25)	1.0	
Primary	795 (32.49)	2.92 (2.52-3.39)	<0.001
Secondary	1411 (57.66)	2.02 (0.82-4.97)	0.127
University/College	137 (5.60)	5.79 (33-9.97)	<0.001
<i>Ethnicity</i>			
Lozi	102 (4.17)	1.0	
Nyanja	529 (21.62)	7.87 (1.85-33.52)	0.005
Tonga	680 (27.79)	6.73 (1.35-33.59)	0.020
Lunda	13 (1.27)	7.04 (1.10-4.51)	<0.001
Bemba	741 (30.28)	2.89 (1.35-6.19)	0.006
Kaonde	164 (6.70)	44.29 (22.33-87.87)	<0.001
Luvale	42 (1.72)	7.12 (4.85-10.47)	<0.001
Non-Zambian	27 (1.10)	4.26 (1.6-1.11)	<0.001
Other	131 (5.35)	2.98 (1.40-22.04)	0.284
<i>Heard of male circumcision from church:</i>			
No	1,162 (54.61)	1.0	
Yes	966 (45.39)	3.24 (1.04-10.09)	0.043
<i>Talked to a husband, boyfriend or sex partner about MC:</i>			
No	1259 (59.36)	1.0	
Yes	862 (40.64)	0.54 (0.33-0.86)	0.011
<i>Talked with another family member about MC:</i>			
No	1555 (73.31)	1.0	
Yes	566 (26.69)	2.14 (1.09- 4.16)	0.026

Note: Robust standard errors adjusted for 3 clusters, Significant at 5%.

#### A4: Model -Attitude

**Table 13: Predictors of women’s attitude towards male circumcision**

Characteristics/factors	Study Sample N (%)	Proportional Odds ratio (POR) (95% CI)	P-value
<i>Age group</i>			
15-19	783 (32.00)	1.0	
20-24	877 (35.84)	1.56 (1.03-1.29)	0.011
25-29	787 (32.16)	1.43 (1.26-1.62)	0.001
<i>Region</i>			
Urban	1721 (70.33)	1.0	
Rural	727 (29.67)	0.66 (.61-0.72)	<0.001
<i>Had seen promotional materials on male circumcision:</i>			
No	331 (22.99)	1.0	
Yes	1,109 (77.01)	1.46 (1.14-1.87)	0.002
<i>Talked about MC with a circumcised person:</i>			
No	1543 (72.75)	1.0	
Yes	578 (27.25)	1.97 (1.89-2.06)	<0.001
<i>Talked to a husband, boyfriend or sex partner about MC:</i>			
No	1259 (59.36)	1.0	
Yes	862 (40.64)	1.89 (1.39-2.55)	<0.001

Note: Robust standard errors adjusted for 3 clusters, Significant at 5%.