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DETERMINANTS OF CHOICE OF MALE CIRCUMCISION METHOD AMONG MALES IN SOUTH AFRICA IN 2012

A RESEARCH REPORT SUBMITTED TO THE FACULTY OF HUMANITIES, SCHOOL OF SOCIAL SCIENCES, UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS IN THE FIELD OF DEMOGRAPHY AND POPULATION STUDIES

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NOVEMBER 2016

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DECLARATION

I, **Dineo Angelina Thaele**, declare that this research report is my own work. It is being submitted in partial fulfilment for the degree of Master of Arts in Demography and Population Studies at the University of the Witwatersrand, Johannesburg. To the best of my knowledge, it has not been submitted before, in part or in full, for any degree or examination at this or any other University.

…….. [Signature of candidate]

…… day of ……, 20….

DEDICATION

I humbly dedicate this work to my parents, Sophie Thaele and Eni Tsotetsi; and my grandmother Puseletso Mahlangu.

ACKNOWLEDGEMENTS

I would like to thank my Lord and Saviour Jesus Christ for giving me the strength and wisdom to do this work.

My sincere gratitude and appreciation goes to my supervisor, Dr Nicole De Wet, for the support and guidance. Working with you was such a privilege. I would also like to thank the Head of Department, Professor Clifford Odimegwu for giving me the opportunity to study Demography.

To my parents, Sophie Thaele and Eni Tsotetsi thank you being patient and supportive throughout my academic journey - I thank God for you. To my Grandmother thank you for your prayers and strength that kept me strong all the time.

To the DPS family, thank you for all the ideas and support; and especially to Vesper Chisumpa for all the lessons and support. Thank you to my family in academia Khuthala, Mercy, Doreen, Takalani, Sadson, Palesa and Thabang for all the ideas, endless support and happy times.

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ABSTRACT

Introduction: South African men practice both traditional and voluntary medical male circumcision. Voluntary Medical Male Circumcision (VMMC) was introduced as a health intervention strategy against HIV/AIDS. On the other hand, traditional male circumcision (TMC) is a ritual that marks the rite of passage into manhood. TMC has been identified as a public health hazard associated with high numbers of complications and even deaths.

The South African government has launched and promotes the VMMC programme. The programme aims to reach a target of 80% coverage in order to effectively reduce HIV infections in the country. However, TMC remains a popular practice. In 2009, the National HIV Community Survey reported that 67% of men were traditionally circumcised, while 33% had been circumcised medically. This study aims to identify factors associated with VMMC, in order to inform the current programme. Furthermore, this study will add to the body of knowledge regarding VMMC and TMC, as previous literature has focused on identifying factors associated with circumcision status rather than the choice of circumcision type (VMMC vs TMC).

Objective: The aim of this study was to the identify levels of circumcision status and circumcision types (VMMC vs TMC). Furthermore, this study aimed to examine the relationship between demographic, socio-economic, cognitive and environmental factors associated with VMMC and TMC in South Africa.

Methodology: The study used data from the Third National HIV Communication Survey, 2012. The study sample is 6 828 473 males aged 16-55 years who underwent VMMC or TMC. The first step of the analysis was descriptive, using cross tabulations and graphs. Finally, multivariate analysis was employed using binary logistic to examine the relationship between VMMC and TMC with demographic, socio-economic, cognitive and environmental factors.

Results Fifty-one percent (51%) of circumcised males were circumcised medically, while 49% were traditionally circumcised. As expected; ethnic groups known to practice TMC were less likely to choose VMMC. In terms of socioeconomic variables, education was significantly associated with whether males were medically circumcised ($p<0.05$; CI1.66=5.11). Availability of VMMC at the health facility significantly influenced the males choice of selecting VMMC as the type of circumcision to undergo ($p<0.05$; CI 0.43=0.79).

Conclusion: Findings from the study show that the levels of VMMC have increased from 38.2% in 2002 and 40.6% in 2008 (Shisana et al., 2014), to 55% in 2012. This suggests that there has been a shift towards VMMC amongst South African males, and that the VMMC programme has made progress since its inception. Education can be used as an important tool to promote VMMC through sex and HIV prevention education, as the study found that educated males were more likely to get medically circumcised. However, access to VMMC at health facilities is still low across the country, and therefore the government should increase access by providing VMMC in more health facilities across the country.

CHAPTER 1: INTRODUCTION

1.1 Background

Historically male circumcision has been associated with cultural and religious practices and rites of passage. It is a cultural practice that lies at the centre of African beliefs and way of living (Gwandure, 2011). There is no country in Africa that does not have an ethnic group that practices male circumcision for religious or cultural reasons including, but not limited to, Malawi, South Africa, and Nigeria (Gwandure, 2011). However, in non-circumcising communities in Eastern and Southern Africa, reasons cited by men are that they circumcise for hygiene and health reasons (Bailey et al., 2001). In 2007, the World Health Organisation (WHO) reported that 30% of males were circumcised globally, and most of them were from developing countries (WHO, 2007). Male circumcision is almost a universal practice in West and North Africa (WHO, 2007). However, in Eastern Africa male circumcision rates vary, ranging from 15% in Burundi and Rwanda, to 84% in Kenya, and 93% in Ethiopia (WHO, 2007). On the other hand, in Southern Africa male circumcision is a rare practice. In 2007 less than 15% of males were circumcised from Botswana, Zambia, and Zimbabwe (WHO, 2007).

South Africa is a country that practices both traditional male circumcision (TCM) and Voluntary Medical Male Circumcision (VMMC). TMC, in particular, is performed primarily on youth to mark a rite of passage from boyhood to manhood. The initiation season commences with the translocation of the initiate to a grass hut built in the bush or mountain for four to six weeks (Bottoman, 2008). TMC in South Africa is practiced by particular ethnic groups. It is highly prevalent among the Xhosa, Pedi, and Venda ethnic groups, and to a lesser extent the Tsonga, Sotho, Ndebele. A study that was done by the Human Science Research Council (HSRC) in 2002 found that circumcision was high among ethnic groups known to practice TMC, such the Venda (90.2%), Pedi (71.2%) and Xhosa (64.3%) (Connolly et al., 2008). Although TMC was once dominant amongst the Nguni ethnic groups, in modern day times the Zulu, Tswana, and Swati ethnic groups are not known to practice TMC generally (Garenne, 2008). Amongst the Zulu and Swati, the practice was abolished in the 19th Century by King Shaka and King Mswati II, as it was difficult to hold initiation schools during the wars at the time (Marck, 1997, Jimmyns et al., 2013).

According to the HSRC National Survey report in 2002, 35% of males were circumcised. Of these, 57.2% were traditionally circumcised and 42.8% were medically circumcised (Connolly et al., 2008). Furthermore, by 2009 the National HIV Community Survey (NCS)

reported that 42% of males were circumcised, while 67% were traditionally circumcised and 33% were medically circumcised (Johnson et al., 2010).

VMMC gained its popularity globally by being introduced as a preventive strategy against HIV. Three randomised trials conducted in Uganda, South Africa and Kenya found that medical male circumcision reduces HIV risk acquisition by between 51% and 60% (Auvert et al., 2005; Bailey et al., 2007 and Gray et al., 2007). These findings led to the WHO and UNAIDS to officially recognise and recommend VMMC as a preventive strategy against HIV (Auvert et al, 2009). Thus, VMMC was introduced to 14 priority countries with high HIV rates and low levels of male circumcision rates (Auvert et al, 2009), including South Africa.

The South African Department of Health introduced the VMMC Programme (VMMC) in 2010. The goal of the VMMC programme is to circumcise 4.3 million (80%) males by 2016 to reduce HIV infection (Govender et al., 2013). Results from mathematical models indicate that scaling up VMMC to 80% among men aged 15 to 49 from 2011 to 2016 could avert over one million HIV infections by 2025 (George et al, 2014). The South Africa government has therefore included medical male circumcision as a health package service for HIV prevention. Benefits of VMMC are not limited to reducing HIV infection, but also reduce the likelihood of genital ulcers, syphilis and penile cancer (Hankins, Forsythe, and Njeuhmeli, 2011). The South African Department of Health aims to increase access to VMMC by integrating safe medical male circumcision in traditional circumcising communities, as well as in health facilities across the country (Department of Health, 2012).

1.2 Problem Statement

TMC has been faced with numerous challenges in South Africa. This includes inexperienced surgeons performing circumcisions, complications such as genital mutilations, penile amputations, gangrene and even deaths (Meissner and Buso, 2007; Behrens, 2014; Dyonana, 2003; Skhosana, 2013). Since 1995 over 853 initiates have died in the Eastern Cape due to complications from TMC (Govender et al., 2014). Between 2001 and 2006 the Eastern Cape Provincial Department of Health recorded 2262 hospital admissions, 115 deaths and 208 genital amputations due to TMC (Meissner and Buso, 2007). During 2008 and 2010 3277 initiates were hospitalised, 146 had penile amputations and 269 died from TMC complications in the Eastern Cape (The Commission for the Promotion and Protection of the Rights of Cultural, Religious and Linguistic Communities, 2010). Furthermore, in the beginning of the TMC season in 2013 the Eastern Cape provincial government reported that

30 initiates died and 104 initiates were rescued from unregistered/illegal initiation schools (Makinana, 2013). In 2015, during the winter initiation, 28 initiates died in the Eastern Cape, 3 died in Limpopo and 1 died in both North West and Mpumalanga (Nicolson, 2015).

Southern Africa houses countries with the lowest circumcision rates but the highest high HIV rates. The national HIV prevalence among males aged 15-49 years in Malawi is 8% while the circumcision rate is 21%, and in Lesotho HIV rate is 18% and the circumcision rate is 51.6%. While, In South Africa, the HIV rate is 14.5% and circumcision rate is 45% (WHO, 2007; UNAIDS, 2014; Lesotho Demographic Health Survey, 2010; Malawi Demographic Health Survey, 2010; Shisana et al., 2014). Fourteen priority countries including South Africa, Malawi and Lesotho are introducing VMMC campaigns to increase the rates of VMMC in the country (Muvha et al, 2014). VMMC, however, is also associated with common minor and moderate adverse events such as pain, bleeding and infection (Auvert et al., 2008), albeit minor complications in comparison to TMC. During the randomised control trials South Africa reported 3.6% of adverse events versus 1.5% in Kenya (Bailey et al, 2008, Auvert et al., 2005, Bailey et al., 2007). In Kenya, the reported complications were two infections and bleeding (Muula et al., 2010). In South Africa, the numbers of complications were higher and included excessive bleeding, damage to penis, as well as excessive and insufficient skin removal (Muula et al., 2010).

Although the South Africa government aims to circumcise 80% (4.3 million) of males by 2016, by 2014 South Africa had only achieved around a quarter of the official VMMC target. Unofficial results from the National Department of Health revealed that 1.44 million circumcisions have been performed between 2010 and March 2013 (Govender et al., 2014). This challenge is exacerbated by a lack of financial and human resources in the country. Even though South Africa is a middle-income country, it is faced with a scarce number of nurses and physicians (Garenne, 2008). Furthermore, Sheldon et al., (2012) found that fewer physicians wanted to be trained to provide VMMC services in South Africa, compared to Zimbabwe (Sheldon et al., 2012). These challenges could hamper South Africa achieving the 4.3 million circumcisions by 2016.

It is, therefore, imperative to identify factors associated with the choice of circumcision amongst males in South Africa, to inform policy and programmes to help integrate safe medical circumcision in traditional circumcising schools to avert HIV infections and reduce complications and deaths to unsafe practices.

1.3 Research Question

What are the determinants of the choice of male circumcision method (VMMC vs TMC) among males in South Africa?

1.4 Objectives

1.4.1 Main Objective

1. To identify the level of circumcision by method (VMMC vs TMC) and examine the relationship between demographic, socio-economic, cognitive and community factors associated with choice of male circumcision method in South Africa.

1.4.2 Specific Research Objectives

1. To identify the levels of male circumcision methods and circumcision status.
2. To examine the relationship between demographic, socio-economic, cognitive and environmental factors associated with VMMC and TMC in South Africa.

1.5 Justification

The South African Department of Health introduced VMMC in 2010, as part of a comprehensive package of measures to combat the spread of HIV in South Africa. The Department aims to increase medical male circumcision coverage from 18.6% to 80% by 2016 (Govender et al., 2014). However available data shows that South Africa still lags behind in achieving its goal. During the period of 2010 to March 2013 only 1.44 million circumcisions were performed (Govender et al. 2014). Furthermore, TMC continues to be more popular. In 2009, 67% of males were traditionally circumcised while only 33% of circumcised men had been circumcised medically (Johnson et al., 2010). It is therefore important to identify factors that can influence the uptake of medical male circumcision, and to inform and improve existing policies of medical and traditional male circumcision.

Much research on male circumcision in South Africa has taken a qualitative approach, focusing on understanding perceptions, attitudes and acceptability of male circumcision in the Eastern Cape and KwaZulu-Natal provinces (Bottoma et al 2009; Buso and Meissner

2007; Vincent 2008; Scott et al., 2005; Lagarde et al., 2003). The focus of these studies was to explore the acceptance of male circumcision in non-circumcising communities with the view to promote the uptake of medical male circumcision. This study is taking a different approach it is quantitative, and looks at circumcision by method (whether VMMC or TMC) rather than circumcision status alone. Furthermore, the studies that have been conducted to assess the practice of male circumcision in South Africa have focused on provincial level analysis (Vincent, 2008; Buso 2007; Meissner 2007; Peltzer et al; 2008). On a national level, only one study was done, using the 2002 HSRC National Survey, which explored the determinants of male circumcision and the risk of HIV infection (Connolly et al, 2008). This research uses the 2012 NCS, and therefore results can be generalised to the whole of South Africa. Therefore, this study will add to the body of knowledge that exists on the determinants of male circumcision status (Vincent, 2008; Peltzer et al, 2008, Lissouba et al, 2011; Gwandure, 2011), as well as on the determinants of male circumcision methods (VMMC vs TMC).

The aim of this study is to identify factors that are associated with the choice of circumcision men choose, to inform policies and programmes that aim to scale up medical male circumcision rates. This research will identify factors associated with choosing VMMC and TMC, and will also enable the identification of factors that can increase uptake of medical male circumcision in non-circumcising communities as well as introducing medical male circumcision effectively in traditionally circumcising communities without interfering in the cultural practice. As it is anticipated medical male circumcision can result in reduction of 174000 new HIV infections per year (William et al., 2006). Therefore, findings from this study will guide policy–makers in the formulation and improving of current policies, programmes and interventions. Aimed to increase male circumcision rates, promote safe circumcision and reduce new HIV infections particularly the VMMC programme.

1.6 Definition of Terms

- Male Circumcision (MC) refers to the removal of the foreskin of the penis (Peltzer and Kanter 2009).

- Traditional Male Circumcision (TMC) is a cultural ritual that marks a rite of passage into manhood, through the removal of the foreskin without anaesthetic. TMC is conducted by a non-medical traditional circumciser using an assegai/stone in the mountainside or bush (Meissner and Buso, 2007).

- Voluntary Medical Male Circumcision (VMMC) refers to circumcision done by a medical clinician, in a medical facility (Wambura et al., 2011).

CHAPTER 2: LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Literature Review

Male circumcision is an important cultural practice (TMC), but also forms part of a comprehensive package of services for HIV prevention in South Africa (VMMC). The South African government has introduced VMMC to reduce HIV infections in the country. TMC remains a valued cultural practice marking a rite of passage into manhood, marriageability and social status. Several studies on male circumcision in general have come up with diverse findings on the determinants of male circumcision. This chapter discusses the practice, acceptance and preference of male circumcision amongst men. Furthermore, this chapter discusses the determinants of male circumcision methods (VMMC vs TMC); including the benefits of circumcision, age at circumcision, ethnicity, duration of healing, place of residence and access to medical facilities. The chapter also provides the theoretical framework guiding this study, as well as the conceptual framework. The study hypotheses are also provided at the end of the chapter.

Male circumcision is not just the removal of the foreskin, but also has a significant meaning that could be social, cultural, medical and religious (Peltzer and Kanter 2009). In South Africa, it is a significant rite of passage amongst certain ethnic groups (Gwata, 2009). Religiously, for many Christians it marks a covenant with God and is also an ancient practice amongst Jews and Muslims (Aggleton, 2007). TMC in particular is a common practice in South Africa and remains the most common form of circumcision practiced in the country. A boy from a young age knows that for him to become a man, and be accepted in his society, he must be circumcised (Rain-Taljaard et al., 2003). In 2002, 57.2% of circumcised males were traditionally circumcised, and by 2009 this had increased to 67% (Connolly et al., 2008; Johnson et al., 2010). VMMC has been introduced as prevention method for HIV, and has been introduced to areas where male circumcision has no cultural and religious significance (Sawires et al., 2007). Furthermore, VMMC is highly practiced in societies where it is not a traditional practice (Rain-Taljaard et al., 2003), and is widely accepted within these communities (Lagarde et al., 2003; Scott et al., 2005; Peltzer and Mlambo, 2012).

In Sub-Saharan Africa, It is estimated that over 65% of uncircumcised males are willing to circumcise (Westercamp and Bailey, 2007). Cultural norms, ethnic identity and religious affiliation have been identified as the main reasons for the desire to circumcise (Westercamp and Bailey, 2007). In South Africa specifically, existing literature shows that there is some

acceptance of MC. A study that was done in a non-circumcising community in KwaZulu-Natal found that 51% of uncircumcised were willing circumcise if it was pain free and cost effective (Scott et al., 2005). Another study in Westonaria District South Africa, found that 72.5% of uncircumcised men were willing to circumcise if circumcision protected them against STIs and HIV/AIDS (Lagarde et al., 2003). A qualitative study that was done in South Africa found that male circumcision was accepted in some ethnic groups, regardless of whether it was done traditionally or medically (Majaja et al., 2010).

Although there is a high level of acceptance of male circumcision, acceptance in terms of choice of method (whether VMMC or TMC) differ. In 2012 it was reported that less than 40% of uncircumcised males were willing to do VMMC in South Africa (Govender et al., 2014). However, a study that was done in a non-circumcising community in KwaZulu-Natal found that 77% of men preferred VMMC, while only 11% would opt for TMC (Scott et al., 2005). Another study that was done in four provinces in South Africa found that 23.7% of participants chose VMMC, while only 15.3% chose TMC (Peltzer and Mlambo, 2012).

Some of the factors which influence the uptake of VMMC include the perception that VMMC increases sexual pleasure (George et al., 201). Furthermore, studies have found that there has been a shift towards VMMC due to the high costs associated with TMC (Rain-Taljaard et al., 2003). Another factor that has influenced the uptake of VMMC is the fear of death and infection that may occur after TMC (Lagarde et al., 2003; Westercamp and Bailey, 2007). The above-mentioned factors have contributed to the uptake of VMMC, not only in South Africa, but in many of the 14 priority countries.

In South Africa TMC has been reported as a highly accepted and practiced form of circumcision. In 2002 24.8% of males were traditionally circumcised; increasing to 25.2% in 2008 and 26.1% in 2012 (Shisana et al., 2014). Across all traditionally circumcising ethnic groups in South Africa; male circumcision in a traditional setting is preferred to circumcision conducted in a medical facility, as the preservation of culture is valued more than issues of complication, hygiene and safety (Majaja et al., 2010). Another study that was done in the Transkei (Eastern Cape) found that 63% of the interviewed males preferred TMC because of its cultural value (Meel, 2005). Furthermore, a study that was done in Westonaria district in South Africa 64.8% of males were traditionally circumcised and 28.7% were medically circumcised (Lagarde eat al., 2003). Reasons given for their choice of circumcision were 63.3% traditional and 15% medical (Lagarde eat al., 2003). TMC is an extremely valued practice as it maintains social order (Vincent, 2008; Meissner and Buso, 2007). Furthermore,

during the initiation period initiates are taught about issues of gender-based violence, HIV/AIDS and safe sex practices, and culture (Meissner and Buso, 2007).

VMMC was introduced as part of a comprehensive package of services for HIV prevention. After findings from three randomised trials that were conducted in Kenya, Uganda and South Africa, that found that medical male circumcision reduces the risk of getting HIV by between 51% to 60% (Auvert et al., 2005; Bailey et al., 2007 and Gray et al., 2007). In fact, Westercamp and Bailey (2007) found that in sub-Saharan Africa protection against STIs and HIV were the main reasons males decided to circumcise. Furthermore, a study that was done in a non-circumcising community in KwaZulu-Natal found that 51% of uncircumcised males were willing to circumcise, because circumcision protected against STI/HIV and enhanced sexual pleasure (Scott et al., 2005). A study that was done in four provinces in South Africa found that 84.1% of males were willing to get circumcised because they knew the benefits of VMMC (Peltzer and Mlambo, 2012). However regardless of extensive knowledge of benefits of VMMC amongst study participants, some of these studies report risky sexual behaviour post-circumcision as circumcision can be accompanied by a false sense of security.

TMC is a valued cultural practice, that is viewed as carrying high prestige. It includes traditional authorities, sacred teachings and performance of sexual customs that are approved in different communities (Gwandure, 2011). TMC marks the separation of a boy from his mother, confirmation to marriage, property inheritance, societal membership and recognition by ancestors (Vincent, 2008; Peltzer and Kanta 2009; Buso and Meissner, 2007). For those that undergo and value TMC, VMMC is regarded as forgery; and medically circumcised males are not regarded as “men”. One of the reasons, is that in hospital circumcised males are not taught cultural values and given anaesthesia for pain (Peltzer and Kanta, 2009). TMC has been associated with the enduring of pain, bravery and being a man (Peltzer and Kanta, 2009). A study that was done in the Eastern Cape reported that 89% of boys regarded only traditionally circumcised males as men (Maughan-Brown et al., 2011). Traditional initiation schools are important as initiates are taught cultural values, about marriage and family, health issues such as hygiene of genitals, as well as responsible sexual behaviour (Buso and Meissner, 2007). However, TMC is starting to lose its cultural value, and has been reported by some as becoming a gateway to sex (Vincent, 2008).

Initially, in Southern Africa, men were supposed to be circumcised before getting married as circumcision conferred adulthood and time for marriage (Messner and Buso, 2007). Among circumcising ethnic groups, uncircumcised males are more likely to be rejected by women

and this could serve as a barrier to marriage (Bailey et al. 2002). Rain-Taljaard et al. (2003) found that uncircumcised males are more likely to be unmarried than circumcised males. In traditional circumcising communities women fear being stigmatised against and laughed by their peers and communities if their partner is not traditionally circumcised (Majaja et al. 2010). A number of studies have included the women's opinions with regards to the choice of circumcision methods (VMMC vs TMC), and their acceptance of male circumcision in South Africa (Lagarde et al., 2003; Rain-Taljaard et al., 2003; Majaja et al., 2003). Women can play a pivotal role in promoting male circumcision, as having a circumcised partner reduces the risk of getting cervical cancer (Hakins, 2007). Furthermore, studies have found that most women prefer VMMC over TMC. It was found that 69% of women in sub-Saharan Africa, and 75% of women in rural KwaZulu-Natal, preferred that their spouses underwent VMMC (Westercamp and Bailey, 2007; Scott et al., 2005).

Age of circumcision varies within and across countries for both methods of circumcision. In Ghana, neonatal circumcision is most common (WHO, 2007). In Southern and Eastern Africa, the median age of circumcision varies - in Zambia the most common ages are between 7 to 10 years, 8 16 years in Kenya, and between late teen years and early 20s in Tanzania and South Africa (WHO, 2007). There is a sense of conflict between whether boys should be circumcised as babies when the procedure is simpler, less painful and safer or as adults when they are free to decide for themselves (Scott et al., 2005). Using findings from the 2002 National Survey conducted by HSRC, it was found that the median age for circumcision varies across race and ethnicity in South Africa. The study found that most Whites and Coloureds circumcised between the ages 2 to 10 years, while amongst Blacks the median age was 18 years (Connolly et al, 2008). Furthermore, in terms of ethnicity the study found that most Xhosas were circumcised after the age of 17 years and most Tshivenda's were circumcised before the age of 17 years (Connolly et al, 2008). Another study that was done in KwaZulu-Natal found that the median age of circumcision also varied across ethnic groups. Among Xhosas it was 23 years, whilst among the Basotho and Batswana it was 18 years (Rain-Taljaard et al., 2003).

VMMC is usually done in the pre-pubescent ages. A study that was done in South Africa found that 75% of Whites and Indians were circumcised before the age of 12 years within a health facility (Connolly et al., 2008). To gain from benefits of VMMC, such as reducing the risk HIV/STI acquisition, it has been suggested that it is better to circumcise before sexual debut which is often in the pre-pubescent ages (Connolly et al., 2008). A study that was done in South Africa found that 13.5% of males who circumcised after the age of 12 years were HIV positive (Connolly et al., 2008). Another study in Uganda found that 14.5% of

males who circumcised after the age of 13 years (post-puberty) were HIV positive, and this was because most of them were already sexually active by the time of circumcision (Kelly et al., 1999). Furthermore, a study that was done in Kenya recommended that educational programmes should be implemented to promote circumcision before puberty (Bailey et al., 2008). As most pre-pubescent boys have not yet initiated sex circumcising at younger ages could aid in reducing the number of new HIV infections (Bailey et al., 2008).

The practice of male circumcision is varying amongst different ethnic groups in South Africa; in this study home language is used as a proxy for ethnicity. Furthermore, a study that was done in South Africa found that home language was strongly associated with circumcision specifically among Sepedi and Xhosa speaking males (Connolly et al., 2008). The practice of TMC in South Africa differs among ethnic groups, and it is highly prevalent among the Xhosa, Pedi, and Venda ethnic groups. It is less common amongst Tsonga, Sotho, Ndebele, and least common among Zulu, Tswana, and Swati (Garenne, 2008). Whether males choose to undergo VMMC or TMC is also related to ethnicity. In one study it was found that 62% of Xhosa's were circumcised by a traditional circumciser, while 63% of Batswana were circumcised by a medical surgeon (Rain-Taljaard et al., 2003). Among the Zulus, male circumcision is being reintegrated medically after it was abolished by King Shaka. A study done in KwaZulu-Natal found that 56% of IsiZulu speaking males were willing to circumcise medically, if it was safe and at a low cost (Scott et al., 2005). Ethnic groups known to practice circumcision as a cultural practice prefer traditional circumcision, while those known to rarely practice male circumcision tend to prefer VMMC.

The WHO recommends that circumcised males should abstain from sex for a period of six weeks after circumcision (Gruskin, 2007). However, the healing period of 6 weeks has been identified as a barrier to circumcision, as many may be tempted to resume sexual intercourse during the healing period (George et al., 2014). Findings from the three clinical trials that were done in South Africa, Uganda and Kenya revealed that 11% to 14% of males had sex before their wound healed, regardless of being given intensive counselling on safe sex after circumcision (Gruskin, 2007).

The level of circumcision in South Africa tends to vary across place of residence. In South Africa, TMC is an ancient practice among the Xhosa ethnic group and was done by their forefathers in the rural areas (Rain-Taljaard et al., 2003). However, with increasing urbanisation, several Black urban residents continue this traditional practice but within urban areas (Vincent, 2008; Meissner and Buso, 2007). A study that was done in Gauteng, which is predominantly urban, found that uncircumcised males are more likely to reside in towns

and cities (Rain-Taljaard et al., 2003). Another study done in South Africa also found that males from rural areas were more likely to be circumcised than males from urban areas (Connolly et al., 2008).

In order to increase the coverage of VMMC, the South Africa Department of Health has introduced VMMC in public clinics and hospitals for free. However, the implementation of VMMC in heathcare facilities can cause a strain to the available financial and human resources (Sawires et al., 2007). As the demand for VMMC increases because of its protection against STIs/HIV and low adverse events rates in hospitals, there is a need to improve health facilities and train more practitioners (Bailey et al., 2001). In sub-Saharan Africa, there is a lack of proper equipment and good working environments to perform safe circumcision (Gwandure, 2011). This study will assess the level of available medical facilities that conduct VMMC, and if it influences the choice of men to undergo circumcision and whether this influences their choice to undergo TMC or VMMC.

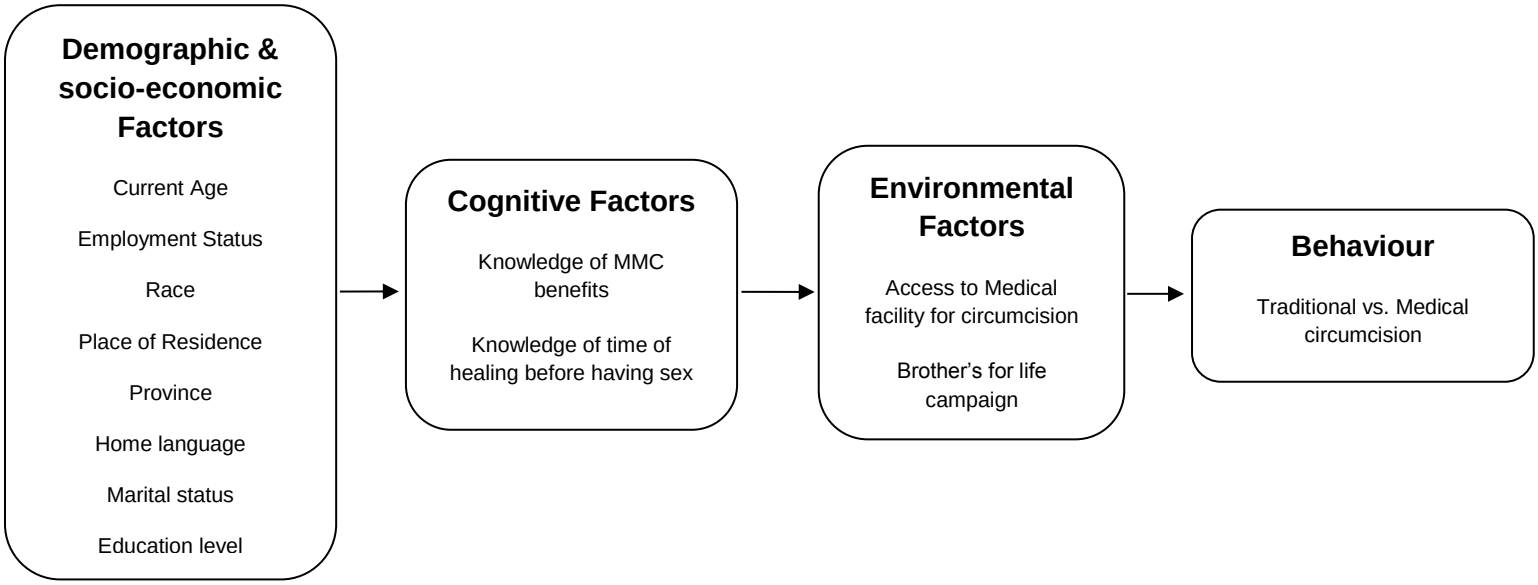
A study using the 2002 National Survey found that circumcisions varied across provinces, ranging from 13.1% in Northern Cape, to 69.4% in Limpopo and 56% in the Eastern Cape (Connolly et al., 2008). In the Eastern Cape, where TMC is highly practiced by the Xhosa ethnic group, about 10 000 circumcisions are done annually (Vincent, 2008). KwaZulu-Natal is one of the provinces with lowest rate of male circumcision, and has the highest HIV prevalence rate in South Africa (George et al., 2014). A study that was done in KwaZulu-Natal, in Hlabisa, found that the HIV prevalence was 42% and 87% of males were uncircumcised (Scott et al., 2005). This study will include all nine provinces and find the trend of circumcision in terms of the choice of circumcision method as previous research has focused mainly on whether men are circumcised or not.

2.2 Theoretical Framework

Social Cognitive Theory presents a conceptual framework based on human agency, analysed through psychological and social factors that can influence human thought and behaviour in a bidirectional manner (Bandura, 2001). The theory is based on the idea that humans are not only products of the society, but the producers as well (Bandura, 2001). According to the theory personal factors are beliefs and capabilities that an individual has to control their thoughts and actions in order to achieve a certain health behaviour. Environmental factors are a form of collective agency, which includes social networks such

as family and friends; as well as physical environments, such as access to facilities and services that can assist to achieve a desired behaviour.

Figure 2.1: Conceptual Framework of Social Cognitive Theory adapted from Bandura (1986)



One of the studies that made use of this model analysed the interrelationship between socio-economic status and coronary heart disease (CDH), and found that there is a relationship between socio-economic status and risk of CDH (Philips et al, 2010). Another study that was done in KwaZulu-Natal in a non-circumcising community used the social cognitive to identify the barriers and facilitators of male circumcision (George et al., 2014). The study found that the main individual facilitators of circumcision included knowledge of benefits of VMMC, while barriers included social factors such as disapproval of families and stigma (George et al., 2014). In this study the interrelationship will be analysed through demographic, socio-economic, cognitive and environmental factors directly influencing choice of circumcision method and status.

For this study the health behaviour to be achieved is choosing VMMC rather than TMC. While the research will adapt the theory, the conceptual framework is modified to include demographic and socio-economic factors. The interaction between the identified factors is direct instead of bidirectional as in the theory. The relationship will be direct from demographic and socio-economic to cognitive to environmental factors in determining choice of circumcision method. In this model the demographic and economic factors relate to economic and social status, which can increase the level of confidence and ability of a person to do VMMC rather than TMC. Cognitive factors from the conceptual framework include knowledge about male circumcision. According to the social cognitive theory, cognitive factors are behavioural capabilities that include skills and knowledge that can

influence healthy behaviour, in this study this healthy behaviour is circumcising medically rather than circumcising traditionally. In terms of environmental factors these are support systems that are external to an individual and can be physical and social. In this study, it is the availability of medical facilities that have VMMC services and exposure to the Brothers for Life campaign.

2.3 Statement of Hypotheses

Based on the reviewed literature and the conceptual framework presented in Figure 2.1 above, the following hypotheses were drawn and were tested in this study. In Africa, there is no country without an ethnic group that practices male circumcision for religious or cultural reasons, including in South Africa (Gwandure, 2011). In 2002, the National Survey reported that 57.2% of circumcised males were circumcised traditionally circumcised over 67% of in 2009 (Connolly et al., 2008; Johnson et al., 2010). In the Eastern Cape, the province known to most commonly practice TMC, over 10 000 circumcisions are done annually (Vincent, 2008).

Generally demographic, socio-economic and community factors are important in achieving healthy behaviour. Healthy behaviour is more likely to be prevalent among those in higher socio-economic status. Furthermore, there is higher prevalence of risky behaviour among those with low educational attainment and low socio-economic status (Lantz et al., 1998). For example, a study that was analysing dental attendance found that factors that were associated with dental attendance were age, education level and level of socio-economic status (Slack-Smith and Hyndman, 2008). The above-mentioned studies show that demographic factors and socio-economic status are significant in achieving health behaviour.

Based on the evidence illustrated above, this study hypothesises the below:

H_0: Levels of traditional male circumcision (TMC) are not higher than levels of voluntary medical male circumcision (VMMC) in South Africa.

H_1: Levels of traditional male circumcision (TMC) are higher than levels of voluntary medical male circumcision (VMMC) in South Africa.

H_0: There is no significant association between demographic, socio-economic, cognitive, and environmental factors on the choice of circumcision method (VMMC vs. TMC).

H_1: There is a significant association between demographic, socio-economic, cognitive, and environmental factors on the choice of circumcision method (VMMC vs. TMC).

CHAPTER 3: METHODOLOGY

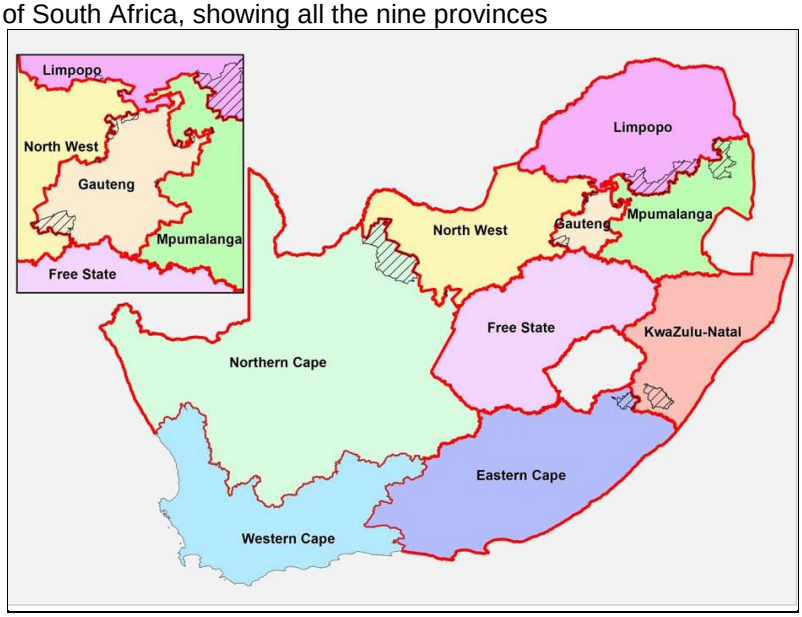
3.1 Introduction

This chapter presents the description of the study setting, source of data, survey design, sample size and variable definition. Details on statistical analysis techniques employed, as well as ethical issues are also discussed.

3.2 Study Area

South Africa is the region of study for this research. The country is in Southern Africa, its neighbouring countries include Botswana, Mozambique, Zimbabwe, Namibia, Lesotho and Swaziland. According to the mid-year estimates of 2014 there are 54 million people living in the nine provinces. Gauteng province has the largest population of 12.91 million (23.9% of the total population), and Northern Cape has the smallest population of 1.17 million (2.2%) (Statistics South Africa, 2015). The country has four main racial groups, namely Black Africans, Indians, Coloureds and Whites; as well as eleven official languages. The country has one of the highest HIV prevalence rates in the world, and as of 2015 was 10.2% (Statistics South Africa, 2015). Among males aged 15-49 years, however, 14.5% are HIV positive; while only 46.4% of males are circumcised in the country (Shisana et al., 2014).

Figure 3.1: Map of South Africa, showing all the nine provinces



Source (Statistic South Africa, 2011)

3.3 Data Source

The study used a cross sectional study design. The data was drawn from the Third National HIV Community Survey (NCS) conducted in 2012 in South Africa. This is a national survey conducted in all nine provinces of South Africa. The study was collaboration between the Johns Hopkins Health and Education in South Africa, Love Life and Soul City (Johnson et al., 2010).

3.4 Study Population

The study population for this study is 2069 males aged 16 to 55 years who are circumcised, and whom have undergone either TMC or VMMC. This study weighted the sample in order to assure that the results are representative of the population of South Africa with respect to sex, age, population group, urban/rural residence, and province (Johnson et al., 2013). The sample weights were constructed using the 2007 Community Survey conducted by Statistics South Africa (Johnson et al, 2013).

3.5 Instrument

The data collection instrument used to collect information for NCS 2012 was a structured questionnaire. The questionnaire was designed to get information on socio-demographic characteristics, exposure to HIV, exposure to communication programmes, risky behaviour, and support and care behaviour (Johnson et al., 2010). The questionnaire was translated from English to the other ten South African official languages (Johnson et al., 2010).

3.6 Study Design

The Third National HIV Communication Survey (NCS) was designed to examine the extent to which HIV communication programmes in South Africa have impacted on people's knowledge, influenced their lifestyle, and challenged their existing views about the risk of HIV (Johnson et al., 2013). A multi-stage cluster sampling approach was employed involving three stages. At first 400 primary sampling units (PSUs) were drawn with each sub-place

being randomly selected in each province (Johnson et al., 2010). Secondly, the country was stratified into nine provinces and the sample was drawn to be representative of each province. Furthermore, a systematic sampling approach was used to select households to be interviewed in each sub-place. The third stage of the sampling involved interviewing an individual between the ages 16 and 55 years who stayed in the household permanently, or at least spent four nights in the household for most days of the year (Johnson et al., 2010).

3.7 Variables and Variable Measurement

3.7.1 Dependent Variable

The dependent variable for this study is choice of circumcision method. The outcome variable includes only the two methods of circumcision - medical and traditional. Which was measured through the question "Who performed the circumcision"?

Table 3.1: Definition of dependent variable

Dependent variables	Definition	Measurement
Choice of circumcision method	Whether the male did medical male circumcision or traditional male circumcision	0 Traditional 1 Medical

3.7.2 Independent Variables

Demographic variables

The variable race was highly correlated, but could not be re-categorised because racial status is a highly contested political term in South Africa due to the historical background. Furthermore, the practice of circumcision and choice of circumcision method varies extensively among the racial groups. The category other was included in the descriptive statistics, but was dropped for multivariate analysis because of the small sample size. Age was categorised per circumcision practice. In South Africa circumcision is practiced from neo-natal stage, late puberty and adulthood. The WHO reported that in Southern Africa the median age of circumcision is from late teens (18 years) to early 20s in Tanzania and South Africa (WHO, 2007). In the case of TMC age is not as important as the actual "journey to the mountain", or the cultural belief that a male is not a man until he has been circumcised as a rite of passage (Gwata, 2009; Peltzer and Kanta, 2009). In fact, males as old as 50 years go

to the mountain to be accepted in their society and be classified as a man. In the case of VMMC the goal is to circumcise males within the ages of 15 to 49 years (Govender et al., 2013). The current study analyses both methods of circumcision, and therefore no age group was excluded from the analysis. Age was categorised from 16-24, 25-49 to 50-55 years. In this study home language was used as a proxy for ethnicity and all the eleven official languages were left in their original categorisation for the binary logistic regression. Due to multicollinearity, the variable had to be re-categorised for the multinomial logistic regression analysis. Ethnic groups known to rarely practice male circumcision were grouped together, namely the IsiZulu, SiSwati and Setswana speaking males. Ethnic groups that commonly practice TMC were also grouped together namely the Xhosa, Tsonga, Tshivenda, Sepedi and Sesotho. Finally, the Afrikaans and English speaking males were grouped together. For marital status, the widowed and divorced were grouped together to make up the group of the "formerly married" because the sample size for each of these categories was very small. The category "other" for marital status was included in the descriptive statistics, but was dropped for multivariate analysis due to the small sample size.

Socio-economic variables

Socio-economic variables included employment status and education level. In terms of employment status, the unemployed, pensioners, students and those living on grant were combined to form the category of "unemployed". For employed status, those working part time and permanent workers were grouped together. For education level those with no education and primary education were grouped together because the sample size was small. For secondary education, there is a category of incomplete secondary education that is up to Grade 11, complete education up to Grade 12, while the final category was tertiary education. The category "other" for education level was included in the descriptive statistics, but was dropped for multivariate analysis due to the small sample size.

Cognitive variables

The following variables are cognitive variables about knowledge about male circumcision. According to social cognitive theory, cognitive factors are a form of knowledge and skills that can result in achieving health behaviour. First is the "knowledge of benefits of VMMC" variable, which included all the biomedical benefits of circumcision such as reducing STIs and HIV infection, hygiene and sexual pleasure. For the variable "knowledge of duration of healing before having sex" those who said circumcised males can have sex after five weeks and those who said they should not wait were grouped together and categorised as "incorrect knowledge". Those who answered that they "do not know" and "6 weeks" were left

to their original code. The category “other” for the variable “duration of healing” was included in the descriptive statistics, but was dropped for multivariate analysis due to the small sample size.

Environmental variables

According to Social Cognitive Theory environmental variables are a form of social support and opportunity to achieve a healthy behaviour. Brothers for Life is a campaign used by Lov Life to promote health behaviour in society, including males getting medically circumcised. Therefore, exposure to Brothers for Life was a variable used in this study. The variable “availability to a medical facility that offers VMMC services” is a proxy variable for access to resources to achieve healthy behaviour.

Table 3.2: Definition of Independent variables

Independent Variable	Definition	Measurement
Demographic factors		
Race	The four main racial groups in the country	0 Indians 1 Coloureds 2 Whites 3 Africans 4 Other
Province	All nine provinces	0 Western Cape 1 Eastern Cape 2 Free State 3 Gauteng 4 KwaZulu-Natal 5 Limpopo 6 Mpumalanga 7 North West 8 Northern Cape
Current age	The respondent’s current age	0 16-24 1 25-49 2 50-55
Home language	The language mostly spoken at home, coded per circumcision practice	0 IsiZulu, siSwati, Setswana and Ndebele 1 IsiXhosa, Sesotho, Sepedi, Tshivenda and Xitsonga 2 English and Afrikaans
Home Language	The language mostly spoken at home, in its original code	0 IsiXhosa 1 IsiZulu 2 siSwati 3 Setswana 4 Ndebele 5 Sesotho 6 Sepedi 7 Tshivenda 8 Xitsonga 9 English 10 Afrikaans
Place of residence	Locale or settlement type where respondent lives	1 Rural 2 Urban
Marital status	Marital status[1]	1 Never married

[1] The widowed and divorced were merged to create category of the formerly married

		2 Formerly married 3 Married 4 Other
Socioeconomic factors		
Employment status	Current employment status[2]	0 Not Working 1 Working
Education level	Highest level of education completed[3]	1 No Education/ Primary 2 Up to Grade 11 3 Complete Secondary 4 Tertiary 5 Other
Cognitive factors		
Knowledge of benefits VMMC	Knowledge of the biomedical benefits of VMMC	0 No Knowledge of benefits of MMC 1 Knowledge of benefits of MMC
Knowledge of having sex post-circumcision	Knowledge of the time men should wait to have sex after they are circumcised[4]	0 Should not wait/5 weeks 1 6 weeks 2 Do not know 3 Other
Environmental Factors		
Awareness of Brothers for Life Campaign	Seen logo of brothers for life in the past 12 months	1 Not aware of brothers for life campaign 2 Aware of brothers for life campaign
Availability to medical male circumcision facility	Availability of facility/service for VMMC in respondent's community	1 Available 2 Not Available

3.8 Statistical Analysis

STATA Software version 12.0 was used for all data management and analysis. Test of association was done at the 95% confidence interval and 5% level of significance. Univariate, bivariate and multivariate analysis were conducted to achieve the study objectives.

3.8.1 Achieving Objective 1

First univariate analysis was done to give a profile description of the population under study, using tables showing frequency distributions as well as graphs.

[2] Unemployed category included pensioners, students and those living on grant. For employed status, those working part time and permanent workers were grouped together.
[3] Those with no education and those with primary education were merged because the sample for both was small
[4] Those who had incorrect knowledge those who said 5weeks and said should not wait were merged.

3.8.2 Achieving Objective 2

Bivariate analysis was conducted to examine the relationship between demographic, socio-economic, cognitive and environmental factors associated with VMMC and TMC in South Africa.

First bivariate analysis was conducted using Chi-square tests; this was to show the association and distribution of male circumcision method (VMMC vs TMC). The test only shows the association, and not the strength of the relationship. Therefore, it was used as it allows one to determine whether examination of the relationship between variables is worth being continued. Furthermore, all the variables were categorical.

Chi-square formula

$\chi^2 = \Sigma\ (o-e)\ ^2e$

Where:

χ^2 = Chi-square value

o = Observed value

e = Expected value

Secondly, a multivariate analysis was conducted using logistic regression. This was to identify factors associated with the choice of circumcision method (VMMC vs TMC). Binary logistic regression was the appropriate statistical technique, because the outcome variable is dichotomous. The category of interest is VMMC so it was coded as 1, and TMC was coded 0. It is important to identify factors associated with VMMC to inform the current policy of VMMC, aimed at increasing VMMC coverage to reduce HIV infections. Furthermore, to add to the body of knowledge as existing literature has focused on identifying factors associated with male circumcision status only; and not by method of circumcision chosen (Vincent, 2008; Peltzer et al, 2008, Lissouba et al, 2011; Gwandure, 201).

Formula for binary logistic regression

$$Y = B_0 + \beta_1 x_1 + \beta_2 x_2 + ...\beta_i x_i$$

Where

Y = the probability of choices of male circumcision method

βO = the logistic intercept

β = the regression parameters or coefficients of the explanatory variables

x = the explanatory variables

Source LaValley, (2008)

Multivariate analysis was done again using multinomial logistic regression. The current study is based on making a choice between VMMC and TMC. Therefore, to identify factors associated with both methods, non-circumcision was used as the base category. The analysis allowed a comparison between factors associated with both methods, which was not achieved when using binary logistic regression. Tables for this analysis are included in the appendix section.

3.9 Ethical Issues

This study used secondary data from the 2012 NCS. Ethical permission to make use of this data was granted by John Hopkins Health and Education in South Africa. Confidentiality of the respondents is guaranteed as no personal information or name of the respondents were included in the dataset. Thus, anonymity and confidentiality of the study respondents is guaranteed.

CHAPTER 4: RESULTS

4.1 Characteristics of the Respondents

The results in figure 4.1 show that 55% of males were circumcised and 45% were not circumcised.

Figure 4.1: Percentage distribution of circumcision status among males aged 16-55 years in South Africa, 2012

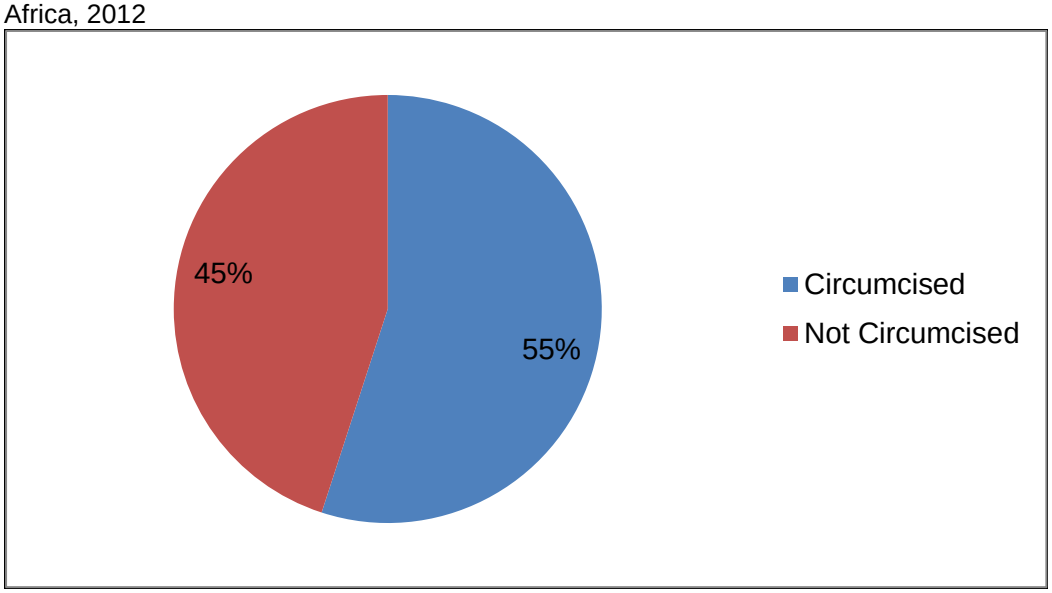


Figure 4.2 shows that among circumcised males, 49% underwent TMC and 51% did VMMC.

Figure 4.2: Percentage distribution of circumcision method among males aged 16-55 years in South Africa, 2012

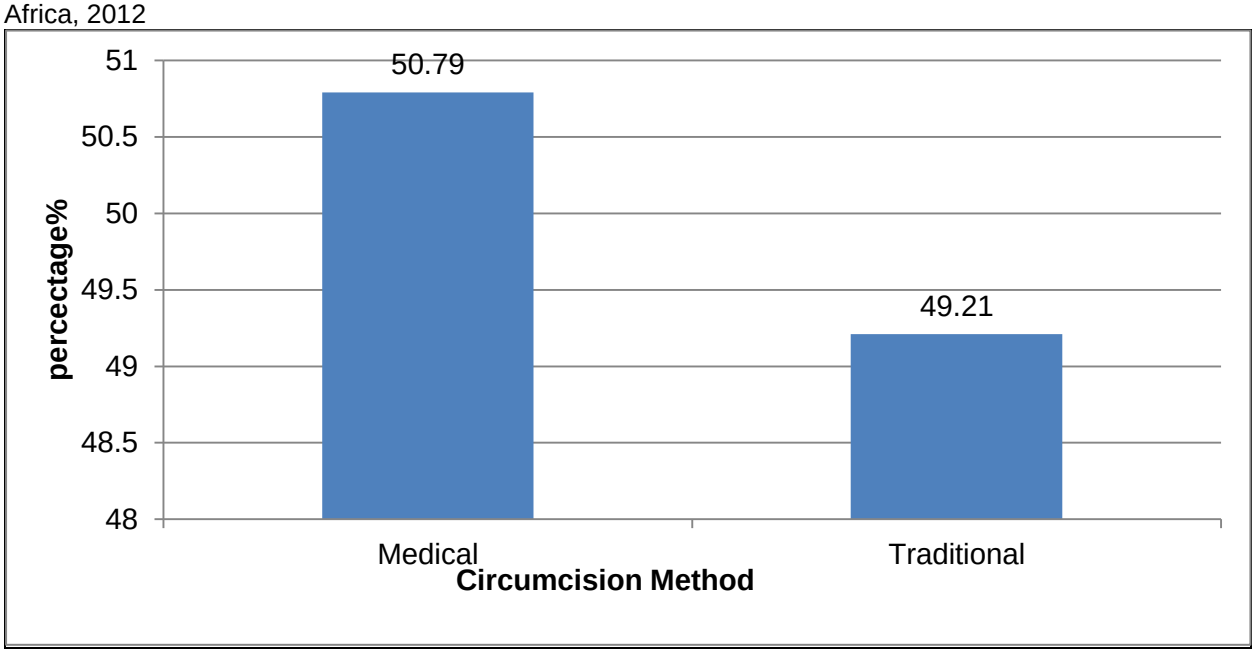


Table 4.1 shows the profile of the respondents by selected characteristics. Thirty two percent of the respondents were between the ages of 16 and 19 years (32%), while the smallest number of participants were between the ages of 50 and 55 years (8%). Home language was used as a proxy for ethnicity. Twenty-four percent (24%) of the respondents were Zulu-speaking, while the least were Tshivenda speaking (3%). Eighty one percent (81%) of the population resided in urban areas, and the remaining 19% were from the rural areas. In terms of marital status, 72% of the males were never married, 22% were married and 5% were formerly married (either widowed and divorced). The majority (78%) of the males were Black Africans, 9% were Coloureds, 10% were Whites and only 3% were Indians. Around a quarter (24%) of males resided in Gauteng Province, while 2% were from Northern Cape.

More than half of the males were not working (56%), while 44% were employed. Majority of the males were educated, while 11% had no formal education and primary education, 34% had completed secondary school, and 16% had tertiary qualification.

Fifty nine percent (59%) of males had access to a medical facility that conducted VMMC, and 49% had no access. Almost half of the respondents (54%) were not aware of the Brother's for Life campaign. Over two thirds of males were well-informed about the benefits of VMMC (68%). Finally, almost half of the men (49%) knew that circumcised men had to wait six weeks before having sex, while 26% of them stated they did not know how long a circumcised man had to wait before resuming sexual intercourse.

Table 4.1: Weighted frequency and percentage distribution of all uncircumcised and circumcised males by demographic, socio-economic, cognitive and environmental factors towards male circumcision in South Africa, 2012

	Frequency	Percentage
Demographic factors		
Age		
16-24	4,257,093	31.73
25-49	8,104,811	60.40
50-55	1,056,230	7.87
Home language		
isiZulu	3,239,982	24.15
isiXhosa	1,784,111	13.30
isiNdebele	104,812	0.78
siSwati	308,037	2.30
English	1,600,248	11.93
Afrikaans	1,725,927	12.86
Sesotho	1,226,191	9.14
Northern Sesotho	1,306,807	9.74
Setswana	1,259,930	9.39
Tshivenda	356,062	2.65
Xitsonga	506,027	3.77
Place of residence		
Rural	2,541,762	18.94

Urban	10,876,372	81.06
Race		
Black	10,439,830	77.80
Coloured	1,256,830	9.37
Indian	337,822	2.52
White	1,371,393	10.22
Other	12,259	0.09
Marital status		
Never married	9,657,258	71.97
Married	2,912,429	21.71
Formerly married	693,797	5.17
Other	154,650	1.15
Province		
Western Cape	1,577,145	11.75
Eastern Cape	1,588,218	11.84
Free State	758,743	5.65
Gauteng	3,305,001	24.63
KwaZulu-Natal	2,683,534	20.00
Limpopo	1,256,041	9.36
Mpumalanga	978,849	7.29
North West	968,738	7.22
Northern Cape	301,865	2.25
Socio-economic factors		
Employment status		
Not working	7,463,166	55.62
Working	5,954,968	44.38
Level of education		
No education/Primary	1,487,609	11.09
Some Secondary	5,147,313	38.36
Matriculated	4,618,396	34.42
Tertiary	2,149,208	16.02
Other	15,608	0.12
Environmental factors about male circumcision		
Access to medical facility for medical male circumcision		
Yes	6,884,885	51.31
No	6,533,249	48.69
Awareness of brothers for life campaign		
Yes	6,121,264	45.62
No	7,296,870	54.38
Cognitive factors about male circumcision		
Knowledge of benefits of VMMC		
No	4,251,808	31.69
Yes	9,166,326	68.31
Knowledge of duration of healing		
Should not wait/1-5 weeks	2,635,494	19.64
Six weeks	6,528,866	48.66
Other	716,907	5.34
Do not know	3,536,867	26.36

4.2 Bivariate Analysis

To examine the patterns and association of male circumcision method, chi-square tests were conducted. The results in table 4.2 revealed that all variables in the study were significantly associated with the choice of circumcision method – whether men opted to be circumcised medically or traditionally. A high proportion of males between the ages of 25 and 49 years (66%) were traditionally circumcised. Thirty two percent (32%) of males between the ages of 16 and 24 were medically circumcised, and 10% of males aged 50 to 55 years were traditionally circumcised. In terms of home language, over a third of IsiXhosa speaking males (38%) were traditionally circumcised, followed by Northern Sotho speaking males (18%). Twenty four percent (24%) of IsiZulu speaking males were medically circumcised, while only 1% of IsiNdebele speaking males were medically circumcised. Most males who were traditionally and medically circumcised were Black Africans (96% and 77% respectively), while 11% of those medically circumcised were White. Eighty four percent (84%) of males who resided in urban areas were medically circumcised, and 20% of males from rural areas were traditionally circumcised. Seventy-three percent (73%) of never married men were medically circumcised, 23% of married men were traditionally and medically circumcised each. Six percent (6%) of those who were formerly married were traditionally circumcised. Over a quarter of males who had undergone VMMC were from Gauteng (28%), 15% were from KwaZulu-Natal and 12% were from Mpumalanga. Amongst those who had undergone TMC, 23% were from Gauteng, 19% were from Western Cape and 18% were from Limpopo and Eastern Cape each.

In terms of level of education 45% of males with some secondary education (up to the eleventh grade) were traditionally circumcised. Among those with complete secondary education, 40% were medically circumcised. A higher proportion of those with tertiary education were medically circumcised (25%), compared to 13% who had been traditionally circumcised. Over half of unemployed males were medically circumcised (56%); and a higher proportion of employed males were medically circumcised (45%).

Seventy one percent (71%) of medically circumcised males did not have a medical facility that performed VMMC in their community. One of the interesting findings is that 48% of males who had undergone TMC had a medical facility that did VMMC in their community. Furthermore, only 29% of males who underwent VMMC did not have access to a medical facility that performed VMMC in their community. A higher proportion of medically

circumcised males were aware of Brother's for Life campaign (56%), than their traditionally circumcised counterparts. More than half of traditionally circumcised males (52%) were not aware of the Brother's for Life campaign. One of the interesting findings is that 74% of traditionally circumcised males knew the benefits of VMMC, while 82% of men who had undergone medical circumcision knew the benefits of being medically circumcised, while 18% did not know the benefits of being medically circumcised. A higher proportion of medically circumcised males (69%) knew that circumcised males had to wait six weeks before having sex, compared to 56% of traditionally circumcised males. Only a small proportion of medically circumcised males (5%) did not know circumcised males had to wait six weeks before having sex, compared to 9% of traditionally circumcised.

Table 4.2: Weighted frequency and percentage distribution of respondents by method of circumcision and per selected demographic, socio economic, cognitive and environmental characteristics

Variables	Traditional MC		VMMC	
	Frequency	Percentage	Frequency	Percentage
Demographic factors				
Age				
16-24	825,927	24.58	1,136,164	32.76
25-49	2,209,925	65.77	2,126,164	61.30
50-55	324,386	9.65	205,907	5.94
Total	**3,360,238**	**100**	**3,468,235**	**100**
				P-value = 0.000
Race				
Africans	3,215,324	95.69	2,688,684	77.52
Coloureds	67,264	2	354,704	10.24
Whites	50,101	1.49	392,771	11.33
Indians	21,135	0.63	29,251	0.84
Other	6,414	0.19	2,825	0.08
Total	**3,360,238**	**100**	**3,468,235**	**100**
				P-value = 0.000
Marital status				
Never married	2,379,157	71.39	2,207,545	72.681
Married	762,989	22.89	778,159	22.75
Formerly married	190,591	5.72	124,523	3.64
Other	27,501	0.82	45,008	1.30
Total	**3,360,238**	**100**	**3,468,235**	**100**
				P-value = 0.000
Province				
Western Cape	636,160	18.93	275,232	7.94
Eastern Cape	597,463	17.78	303,460	8.76
Free State	162,435	4.83	270,292	7.8
Gauteng	789,134	23.48	976,318	28.17
KwaZulu-Natal	225,346	6.71	527,015	15.21
Limpopo	611,564	18.2	375,641	10.84
Mpumalanga	164,201	4.89	424,808	12.26
North West	154,217	4.59	257,605	7.43
Northern Cape	19,718	0.59	57,864	1.67
Total	**3,360,238**	**100**	**3,468,235**	**100**
				P-value = 0.000
Home language				

isiZulu	279,152	7.31	830,191	23.94
isiXhosa	1,287,980	38.33	96,512	2.78
isiNdebele	40,401	1.20	30,646	0.88
siSwati	47,529	1.41	163,167	4.70
English	109,711	3.26	467,999	14.4
Afrikaans	81,918	2.44	476,358	13.73
Sesotho	299,496	8.91	404,241	12.02
Northern Sesotho	605,902	18.03	400,540	11.55
Setswana	213,489	6.35	403,221	11.63
Tshivenda	168,458	5.01	93,715	2.70
Xitsonga	226,202	6.73	152,641	4.40
Total	**3,360,238**	**100**	**3,468,235**	**100**
				P-value = 0.000
Place of residence				
Rural	695,661	20.7	521,723	15.06
Urban	2,664,577	79.3	2,946,512	84.96
Total	**3,360,238**	**100**	**3,468,235**	**100**
				P-value = 0.000
Socio-economic factors				
Employment status				
Unemployed	1,894,120	56.37	1,919,414	55.34
Employed	1,466,118	43.63	1,548,821	44.7
Total	**3,360,238**	**100**	**3,468,235**	**100**
				P-value = 0.000
Education level				
No education/Primary	467,940	13.94	152,946	4.42
Some Secondary	1,514,330	45.07	1,048,625	30.26
Matric	955,962	28.45	1,401,252	40.40
Tertiary	419,136	12.48	862,542	24.91
Other	2,870	0.09	2,870	0.08
Total	**3,357,368**	**100**	**3,468,235**	**100**
				P-value = 0.000
Environmental Factors about male circumcision				
Availability of medical facility				
Available	1,609,601	47.9	2,478,714	71.47
No available	1,750,637	52.1	989,521	28.56
Total	**3,360,238**	**100**	**3,468,235**	**100**
				P-value = 0.000
Awareness to Brothers for Life campaign				
Yes	1,606,363	47.81	1,928,288	55.65
No	1,753,875	52.19	1,539,947	44.40
Total	**3,360,238**	**100**	**3,468,235**	**100**
				P-value = 0.000
Cognitive factors about male circumcision				
Benefits of medical male circumcision				
No knowledge of benefits	861,202	25.63	623,968	17.99
Knowledge of benefits	2,499,036	74.37	2,844,267	82.08
Total	**3,360,238**	**100**	**3,468,235**	**100**
				P-value = 0.000
Knowledge of duration of healing				
Should not wait/1-5 weeks	860,582	25.61	515,851	14.97
6 weeks	1,866,896	55.56	2,402,563	69.33
Do not Know	313,767	9.34	179,992	5.19
Other	318,993	9.49	366,959	10.58
Total	**3,360,238**	**100**	**3,468,235**	**100**
				P-value = 0.000

4.3 Multivariate Analysis

Results in Table 4.3 shows that there was a significant association between choice of male circumcision method (VMMC vs TMC) and home language. Home language was used as a proxy for ethnicity, and results revealed that Northern Sesotho, siSwati and Xitsonga speaking males were 0.24 times less likely to choose VMMC when compared to Xhosa speaking males. The above mentioned ethnic groups are known to practice TMC. Province was significantly associated with choosing VMMC; as males from Free State and Gauteng were 0.45 and 0.49 times less likely to get medically circumcised when compared to males from Northern Cape respectively. Age was also significantly associated with choosing VMMC; as males between the ages of 25 and 49 years were 0.78 times less likely to get medically circumcised compared to males aged 16 and 24 years. Race was significantly associated with choosing VMMC - Coloureds were 0.71 times less likely to choose VMMC as compared to Indians.

Level of education was significantly associated with choice of male circumcision method. Males with secondary education were 2.91 times more likely to choose VMMC, compared to males with no formal education/primary education. Furthermore, males with tertiary education were 3.41 times more likely to choose VMMC when compared to those with no education/primary education.

Access to VMMC was significantly associated with choosing VMMC, as males who did not have a medical facility that conducted VMMC in their community were 0.58 times less likely to choose VMMC compared to those who had a medical facility in their community. Males who knew circumcised males had to wait six weeks before having sex were 1.99 times more likely to choose VMMC, compared to those who had incorrect knowledge (should not wait, should wait 1-5 weeks).

Table 4.3: Binary logistic for all circumcised males by demographic, socio-economic, cognitive and environmental factors of male circumcision[5]

Variables	Odd Ratios	Conf. Interval	
Demographic Variables factors			
Age			
16-24 (***REF***)	1.00		
25-49	0.78	0.56	1.07
50-55	0.53 *	0.29	0.97
Race			
Indians (***REF***)	1.00		
Coloureds	0.71	0.16	3.11
Whites	0.08	0.01	0.47

[5] The reference category is traditional male circumcision compared to medical male circumcision

Africans	0.07	0.00	0.89
Marital Status			
Never married (***REF***)	1.00		
Married	0.86	0.58	1.29
Formerly married	0.47	0.22	1.01
Province			
Northern Cape (***REF***)	1.00		
Eastern Cape	0.12*	0.03	0.49
Free State	0.45	0.13	1.52
Gauteng	0.49	0.15	1.55
KwaZulu-Natal	0.59	0.16	2.16
Limpopo	0.39	0.10	1.54
Mpumalanga	0.63	0.17	2.30
North West	0.46	0.14	1.50
Western Cape	0.11 *	0.03	0.46
Home Language			
isiXhosa (***REF***)	1.00		
isiNdebele	0.07*	0.03	0.15
siSwati	0.24*	0.05	1.02
isiZulu	0.92	0.33	2.51
English	1.06	0.47	2.38
Afrikaans	1.25	0.47	3.32
Sesotho	0.47*	0.27	0.82
Northern Sesotho	0.24*	0.14	0.41
Setswana	0.65	0.33	1.25
Tshivenda	0.16*	0.08	0.32
Xitsonga	0.24*	0.13	0.42
Place of residence			
Rural (***REF***)	1.00		
Urban	0.75.	0.39	1.46
Socio-economic factors			
Employment Status			
Unemployed (***REF***)	1.00		
Employed	0.75	0.57	0.99
Education level			
No education/Primary (***REF***)	1.00		
Some Secondary	1.37	0.77	2.43
Matriculated	2.91*	1.66	5.11
Tertiary	3.41*	1.79	6.52
Environmental Factors about male circumcision			
Access to Medical Facility			
Access (***REF***)	1.00		
No access	0.58*	0.43	0.79
Awareness to Brother s for Life Campaign			
Yes (***REF***)	1.00		
No	0.76	0.57	1.02
Cognitive factors about male circumcision			
Benefits of medical male circumcision			
No knowledge of Benefits (***REF***)	1.00		
Knowledge of benefits	1.01	0.70	1.46
Knowledge of duration healing before having sex			
Should not wait/5weeks (***REF***)	1.00		
Si x week	1.99*	1.15	3.46
Do not Know	1.34	0.89	2.03

1.00=Reference Category (RC) , CI=Confidence Interval , OR=Odd Ratio P-value<0.05

CHAPTER 5: DISCUSSION

5.1 Introduction

The purpose of this study was to identify factors associated with choice of circumcision method (VMMC vs TMC) among males 16 to 55 years, using the NCS data of 2012. Therefore, the following section discusses the results found in relation to the literature reviewed.

5.2 Discussion

5.2.1 Prevalence of Male Circumcision

The study found that 51% of males were circumcised in South Africa in 2012. The results indicate an increase when compared to previous findings. In 2002 the National Survey by HSRC reported that 35% of males were circumcised in South Africa (Connolly et al., 2008). The South African National HIV prevalence, Incidence and Behaviour Survey, reported that in 2002 38.2% of males were circumcised and in 2008 40.6% (Shisana et al., 2014). Furthermore, in 2009 the National HIV Communication Survey reported that 42% of males were circumcised in South Arica (Johnson et al., 2010). The increasing level of male circumcision in South Africa might be an indication of increasing acceptability and uptake of male circumcision. Furthermore, the existing literature shows that main facilitators of male circumcision include knowledge of benefits of male circumcision such as prevention against STI/HIV, penile hygiene, increased sexual pleasure and supportive social networks (family and friends) (Westercamp and Bailey 2007; Scott et al., 2005; Lagarde et al. 2003; Rain-taljaard, 2003;Peltzer and Mlambo, 2012).

5.2.2 Factors Influencing Medical Male Circumcision

Figure 5.2 shows that among circumcised males about 51% underwent VMMC, while 49% underwent TMC. This finding indicates a change over time as thought TMC has remained a popular practice in South Africa, its percentage contribution to overall circumcision has decreased. In 2002 about 57% of circumcised males were traditionally circumcised and 43% were medically circumcised (Connolly et al., 2008). Furthermore, in 2009 studies showed

that 33% of circumcised males were circumcised medically, while 67% were circumcised traditionally (Johnson et al., 2010). Factors that might have contributed to a shift towards VMMC could be high reports of adverse events at traditional initiation schools, including deaths of initiates. A study review of 13 sub-Saharan African studies found that fear, death and pain were the main barriers towards male circumcision specifically in regards to TMC (Westercamp and Bailey, 2007).

Westercamp and Bailey (2007) found that cost was another barrier towards TMC. Traditional male circumcision is expensive; the total cost of TMC can range between R3500-R5000 (Meel, 2005). On the other hand, VMMC is free in public clinics and hospitals and at most amounts to a R15 outpatient fee (Scott et al, 2005). Therefore, the low costs of VMMC might have increased the uptake of men being medically circumcised.

Other factors that might have increased the uptake of VMMC include knowledge of benefits of VMMC, specifically prevention against STIs and HIV (Peltzer and Mlambo, 2012; Westercamp and Bailey 2007). For example, a study that was conducted in a township with a high HIV rate reported that 59% of males were willing to get circumcised if circumcision reduced the chance of getting HIV (Rain-Taljaard et al., 2003). Furthermore, the randomised trials proved that its only VMMC that provides a 51% to 60% protection against HIV, and not traditional circumcision (Auvert et al., 2005; Bailey et al., 2007 and Gray et al., 2007).

5.2.3 Benefits of Medical Male Circumcision

A high proportion of males (68%) knew the benefits of VMMC. Existing literature shows that the biomedical benefits of VMMC (penile hygiene, reducing STI/HIV acquisition) are significant in promoting circumcisions done within a health facility (Westercamp and Bailey, 2007; Rain-taljaard et al, 2003; Peltzer and Mlambo, 2012). For example, one study that was done in South Africa, in a district with low circumcision prevalence and high HIV rate, found that 70% of uncircumcised males were willing to circumcise if circumcision proved to protect against STIs and HIV (Lagarde et al., 2003). Furthermore, a study that was done in non-circumcising community in KwaZulu-Natal found that most males were willing to circumcise because circumcision protects them from being infected by HIV (Scott et al., 2005). Increasing knowledge about the benefits of VMMC is important to promote its uptake. However, it should be noted that intensive health education is important to reduce HIV infection, which can be done at health facilities providing VMMC – this is particularly

important given that studies have found that VMMC can be misinterpreted as a natural condom and followed by risky sexual behaviour (Lagarde et al., 2003; Khan et al., 2003).

5.2.4 Provinces and Traditional Male Circumcision

Traditional male circumcision patterns are changing. This study found that in provinces known to have ethnic groups that practice TMC (Ndebele's, Northern Sotho, Tshivenda and Xitsonga), there is increasing levels of VMMC. For example, in Limpopo (11%), Free State (8%) and Mpumalanga (12%) men are now opting to become medically circumcised. This finding contradicts a study that was done in South Africa that found that TMC to be high in the northern provinces of South Africa (Limpopo, Mpumalanga and Gauteng) (Connolly et al. 2008). This suggests that the government should increase services of VMMC in traditionally circumcising communities, but which must be done in a way that still respects the cultural practice (Wambura et al., 2011). Furthermore, a study that was done in South Africa suggested that the government should take advantage of such above mentioned changes, increasing some acceptability of VMMC in traditional circumcising communities by increasing VMMC services that are affordable and safe within the practice (Peltzer and Mlambo, 2012).

5.2.5 Practice of Medical Male Circumcision in Non-Circumcising Provinces

One of the goals of the VMMC campaign is to increase the uptake of VMMC in non-circumcising communities (Govender et al., 2013). VMMC is being widely promoted in non-circumcising provinces, such as KwaZulu-Natal, because of the high rate of HIV (16.9%) (Shisana et al., 2014). Results show that there is increasing coverage of VMMC in non-circumcising communities. For example, KwaZulu-Natal had the second highest proportion of medically circumcised males (15%). Furthermore, there is increasing acceptance of VMMC in non-circumcising communities. A study that was done in KwaZulu-Natal found that 77% of males preferred VMMC, and only 11% had undergone traditional male circumcision (Scott et al, 2005). Furthermore, the high rate of medically circumcised males in KwaZulu-Natal might be an indication of the success of scaling up VMMC in non-circumcising communities.

5.3 Hypothesis Discussion

The first hypotheses were the following:

H_0: Levels of traditional male circumcision (TMC) are not higher than levels of voluntary medical male circumcision (VMMC) in South Africa.

H_1: Levels of traditional male circumcision (TMC) are higher than levels of voluntary medical male circumcision (VMMC) in South Africa.

The study tested the hypothesis above based on the literature reviewed; the results show that the null hypothesis is correct. Therefore, this study supports that levels of TMC are not higher than levels of VMMC. As weighted results show that level of VMMC (51%) were higher than TMC (49%). The results show that there is a shift towards VMMC. As previously TMC had remained a popular practice in the country. In 2009, 67% of males were traditionally circumcised nationally and only 33% were medically circumcised (Johnson et al., 2010). Reason for this change could be because of the high adverse rates and deaths of initiates in traditional initiation. Between 2008 and 2013, 400 boys died and half million initiates were hospitalised from dehydration, gangrene and septicaemia in South Africa (CRL Commission, 2010). Furthermore, a study review that included nine countries in sub-Saharan Africa reported that most males preferred VMMC because they feared infection and death in the hands of traditional circumcisers (Westercamp and Bailey, 2007). The above statements can serve as evidence that there is a shift towards VMMC in South Africa.

The second hypotheses were the following:

H_0: There is no significant association between demographic, socio-economic, cognitive, and environmental factors on the choice of circumcision method (VMMC vs. TMC).

H_1: There is a significant association between demographic, socio-economic, cognitive, and environmental factors on the choice of circumcision method (VMMC vs. TMC).

The study found a significant association between some demographic, socio-economic, cognitive and environmental factors and the choice circumcision method (VMMC vs TMC). Hence the study supports the alternative hypothesis. In terms of demographic factors only marital status was not significantly associated with choice of male circumcision method. In terms of socio-economic variables there was no significant relationship between employment status and medical male circumcision. In terms of community factors only awareness to

Brothers for Life campaign was not significantly associated with both methods of circumcision.

CHAPTER 6: CONCLUSSION AND RECCOMENDATIONS

6.1 Introduction

This part of the research includes the conclusion section. Policy recommendations and future study recommendations are also provided. Lastly, the strengths and limitations of the study are outlined.

6.2 Conclusion

The study found that education was a significant predictor for promoting VMMC. Males with tertiary education were 3.41 times more likely to get medically circumcised than males with no education/primary education. Furthermore, 40% of medically circumcised males completed secondary education and 25% tertiary education. Several studies have reported a high practice of VMMC among educated males. For example, a study that was done in Tanzania found that 88% of males who did VMMC had education above primary (Wambura et al., 2011). Another study in Tanzania found that circumcision was popular among boys who stayed in urban areas and had secondary education (Nnko et al., 2001). Although the quoted studies were done outside South Africa, they serve as evidence that education is an important tool to promote VMMC and achieve the goal of circumcising 4.3 million (80%) males in South Africa by 2016.

Already the education curriculum in South Africa includes sexual health and HIV/AIDS education. However, there is a need to emphasise preventive measures such as VMMC in HIV/AIDS education. A study that was done in Kenya recommended that educational programmes should be implemented to promote circumcision before puberty as most males have not initiated sex (Bailey et al., 2008). Furthermore, most of the learners at school are between the ages of 15 and 20 years, this is one of the target age groups for promoting VMMC. Therefore, schools can be used as a viable tool for promoting VMMC through subjects such as Life Orientation and Life Science. Schools can use peer-education to promote health behaviour. Evidence shows that peer-education is an effective method for providing health education at schools (Frantz, 2015). The Department of Heath can also send health workers to schools and universities to increase knowledge and awareness about VMMC.

The study found that 27% of traditionally circumcised males and 18% of medically circumcised males did not know the benefits of VMMC. The findings show that there is still a need to increase knowledge about the benefits of VMMC through existing organisations; such as Sonke Gender Justice, Soul City and Brothers for Life. Campaigns that promote VMMC in the 14 priority countries have mostly focused on using mass media (TV, radio) and women to promote the uptake of VMMC (Sgaier et al., 2015). The government can therefore use old ways to promote VMMC. Such as home visits by health workers and the use of mobile clinics, specifically in remote areas and rural communities.

This study supports the Social Cognitive Theory that environmental and personal factors can influence human thought and behaviour to achieve health behaviour. There was a significant relationship between choosing VMMC and personal factors. These included demographic, socio-economic and cognitive factors. There was also a relationship between environmental factors (availability of a medical facility that offers VMMC in the community) and choosing VMMC. Results show that personal factors, which represent a sense of agency influence health behaviour and, thus, supports the Social Cognitive Theory. Furthermore, the study shows that environmental factors which present a sense of social support and availability to resources influence health behaviour, further supporting the Social Cognitive Theory. The direct relationship from the conceptual framework is supported by the findings from this study that personal factors and environmental factors interact to influence health behaviour (being circumcised medically) in this study.

6.3 Recommendations

6.3.1 Policy Recommendation

The study found that the levels of VMMC (51%) were slightly higher, compared to TMC (49%). The South African government aims to circumcise 80% (4.3 million) of males under the VMMC programme by 2016. To achieve the 80% VMMC coverage by 2016, there is a need to integrate the medical and traditional circumcision practices. In South Africa, six ethnic groups practice traditional circumcision (Xhosa, Xitsonga, Tshivenda, Sesotho, Ndebele and Sepedi) and only three are not practising TMC (IsiZulu, SiSwati and Setswana). The current VMMC campaign aims at scaling up VMMC in non-circumcising communities excluding most of the ethnic groups that practice circumcision. Ignoring traditional circumcising communities makes the targeted 80% coverage highly ambitious for South Africa to reach. Therefore, this study recommends that there is a need to integrate the

two forms of circumcision to achieve the 80% coverage with the overall aim to reduce HIV infections in the near future.

TMC is labelled as a public health hazard, hampered by adverse events such as mutilations, amputations and (in some cases) deaths of initiates. There have been attempts to reduce adverse events and regulate TMC practices in Eastern Cape, through the introduction of the application of health standards in traditional circumcision Act in 2001. The act stipulated that the legal age of circumcision is 18 years and it included legalising the initiation schools and including pre-medical examination of initiates (Meissner and Buso, 2007). However, the Act has received negative feedback from traditional circumcising communities. Medical interventions were refused, and blamed for the ongoing deaths of initiates (Meissner and Buso, 2007). Failure of these measures stemmed from the fact that the Department of Health failed to engage traditional leaders, traditional circumcisers and communities to reduce adverse events and promote safe circumcisions in traditionally circumcising communities (Meissner and Buso, 2007). A study that was conducted in South Africa and Zimbabwe noted that consultations with traditionally circumcising communities increases the acceptability of VMMC in traditionally circumcising communities (Khumalo et al., 2013). However, the problem is that government does not see the importance of consulting with traditionally circumcising communities (Khumalo et al, 2013).

South Africa needs a national policy that will focus on promoting safe circumcision at initiation schools; as previously introduced measures are limited to the provincial level. To integrate the two practices and bring about safe circumcision and reduce adverse events from initiation schools. Government policies and programmes should focus on engaging all stakeholders from community leaders, traditional circumcisers and community members. VMMC should be introduced as one of the HIV prevention methods in traditional circumcising communities, and not as a replacement of TMC (Gwandure, 2011).

6.3.2 Research Recommendation

This study recommends that a policy based study should be conducted on how to integrate the two practices of circumcision drawing from existing literature. As the existence of the two types of circumcision are important for public health and traditional customs in South Africa.

6.4 Study Limitations

The study used cross-sectional data and because of this, the analysis is limited to measuring association and not causal effect. Therefore, the relationship between the outcome and independent variables could not be directly analysed. Furthermore, the data for this research was secondary and the researcher had no control over the data collection. As such, some important variables such as: does access to a medical facility influence your choice of circumcision method could not be analysed. However, this does not affect the validity and reliability of data but rather gives an opportunity for conducting future research using a qualitative approach to complement the current study.

The circumcision status was self-reported and not examined by physicians or medical practitioners. TMC is a valued cultural practice and males from traditionally circumcising ethnic groups may say they are circumcised whilst they are not. This could lead to desirability biasness. For example, a study that was done in South Africa found that half of the males who self-reported that they were circumcised had their foreskin intact (Lissouba et al., 2011). The reason for this may be that in some cultural initiation schools in South Africa the foreskin is not completely removed; however initiates still consider themselves circumcised (Lissouba et al., 2011).

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APPENDICES

Appendix A

Table A: Binary logistic for all circumcised males by demographic factors, the reference category is traditional male circumcision compared to medical male circumcision

Variables	Odd Ratios	Conf. Interval	
Demographic factors			
Age			
16-24 (***REF***)	1.00		
25-49	0.75	0.55	1.03
50-55	0.42	0.23	0.76
Race			
Indians (***REF***)	1.00		
Coloureds	0.49	0.11	2.28
Whites	0.07	0.01	0.42
Africans	0.04	0.00	0.50
Marital Status			
Never married (***REF***)	1.00		
Married	0.83	0.56	1.22
Formerly married	0.47	0.23	0.95
Province			
Northern Cape (***REF***)	1.00		
Eastern Cape	0.09	0.02	0.32
Free State	0.52	0.17	1.64
Gauteng	0.52	0.17	1.60
KwaZulu-Natal	0.53	0.15	1.88
Limpopo	0.37	0.10	1.30
Mpumalanga	0.68	0.20	2.29
North West	0.48	0.16	1.46
Western Cape	0.09	0.02	0.36
Home Language			
IsiXhosa (***REF***)	1.00		
isiNdebele	0.07	0.03	0.14
siSwati	0.33	0.12	0.89
isiZulu	0.85	0.34	2.10
English	1.42	0.58	3.46
Afrikaans	1.22	0.45	3.27
Sesotho	0.48	0.27	0.86
Northern Sesotho	0.26	0.15	0.44
Setswana	0.64	0.33	1.25
Tshivenda	0.19	0.10	0.39
Xitsonga	0.23	0.14	0.39
Place of residence			
Rural (***REF***)	1.00		
Urban	1.01	0.60	2.01

1.00=Reference Category (RC) , CI=Confidence Interval , OR=Odd Ratio P-value<0.05

Appendix B

Table B: Binary logistic for all circumcised males by demographic and socio-economic factors, the reference category is traditional male circumcision compared to medical male circumcision

Variables	Odd Ratios	Conf. Interval	
Demographic factors			
Age			
16-24 (***REF***)	1.00		
25-49	0.78	0.56	1.08
50-55	0.54	0.30	0.99
Home Language			
IsiXhosa (***REF***)	1.00		
isiNdebele	0.06	0.03	0.13
siSwati	0.27	0.08	0.96
isiZulu	0.94	0.35	2.55
English	1.02	0.45	2.34
Afrikaans	1.16	0.44	3.07
Sesotho	0.47	0.27	0.81
Northern Sesotho	0.24	0.14	0.42
Setswana	0.65	0.34	1.25
Tshivenda	0.17	0.08	0.34
Xitsonga	0.26	0.15	0.46
Province			
Northern Cape (***REF***)	1.00		
Eastern Cape	0.10	0.03	0.38
Free State	0.51	0.16	1.62
Gauteng	0.50	0.17	1.48
KwaZulu-Natal	0.57	0.17	1.91
Limpopo	0.37	0.10	1.36
Mpumalanga	0.66	0.19	2.23
North West	0.48	0.16	1.42
Western Cape	0.10	0.03	0.39
Place of residence			
Rural (***REF***)	1.00		
Urban	0.92	0.48	1.76
Marital status			
Never married (***REF***)	1.00		
Married	0.87	0.58	1.30
Formerly married	0.50	0.24	1.03
Race			
Indians (***REF***)	1.00		
Coloureds	0.71	0.16	3.21
Whites	0.08	0.01	0.45
Africans	0.05	0.00	0.79
Socio-economic factors			
Employment Status			
Unemployed (***REF***)	1.00		
Employed	0.74	0.56	0.97
Education level			
No education/Primary (***REF***)	1.00		
Some Secondary	1.50	0.87	2.58
Matriculated	3.30	1.93	5.62
Tertiary	3.96	2.14	7.33

1.00=Reference Category (RC) , CI=Confidence Interval , OR=Odd Ratio P-value<0.05

Appendix C

Table C: Multinomial logistic regression results of all males circumcised and non-circumcised by demographic factors with the reference category being non-circumcision compared to medical and traditional male circumcision

Variables	RRR	CI	RRR	CI
	Traditional MC vs. Uncircumcised males (base)		VMMC vs. Uncircumcised males (base)	
Demographic factors				
Age				
16-24 (***REF***)	1.00		1.00	
25-49	2.02*	1.52-2.68	1.32	0.97-1.78
50-55	2.74*	1.69-4.44	1.03	0.61-1.73
Race				
Africans (***REF***)	1.00		1.00	
Coloureds	0.11*	0.03-0.43	0.78	0.41-1.50
Whites	0.58	0.09-3.71	0.20*	0.07-0.60
Indians	0.08	0.01-1.19	0.72	0.33-1.59
Marital Status				
Never married (***REF***)	1.00		1.00	
Married	1.40*	1.00-1.96	1.21	0.89-1.66
Formerly married	1.17*	0.65-2.12	0.69	0.29-1.67
Province				
Western Cape (***REF***)	1.00		1.00	
Eastern Cape	2.00*	1.09-3.67	0.30*	0.13-0.70
Free State	0.14*	0.07-0.31	0.33*	0.18-0.59
Gauteng	0.23*	0.12-0.43	0.33*	0.18-0.58
KwaZulu-Natal	0.12*	0.05-0.28	0.17*	0.09-0.32
Limpopo	1.25	0.51-3.10	0.22*	0.08-0.55
Mpumalanga	0.29*	0.13-0.64	0.55	0.28-1.08
North West	0.35*	0.18-0.69	0.37*	0.18-0.73
Northern Cape	0.11*	0.03-0.42	0.12*	0.02-0.64
Home Language				
isiZulu, I siSwati, Setswana (***REF***)	1.00		1.00	
isiXhosa, isiNdebele, Sesotho, Sepedi, Tshivenda Xitsonga	4.47*	3.00-6.67	1.21	0.90-1.63
English/Afrikaans	0.52	0.12-2.33	1.14	0.67-1.93
Place of residence				
Rural (***REF***)	1.00		1.00	
Urban	2.29*	1.32-3.31	2.29*	1.58-3.34

1.00=Reference Category (RC) , CI=Confidence Interval , RR=Relative Risk Ratio P-value<0.05

Appendix D

Table D: Multinomial logistic regression results of all males circumcised and non-circumcised by demographic, socio-economic factors, with the reference category being non-circumcision compared to medical and traditional male circumcision

Variables	RRR	CI	RRR	CI
	Traditional MC vs. Uncircumcised males (base)		VMMC vs. Uncircumcised males (base)	
Demographic factors				
Age				
16-24 (***REF***)	1.00		1.00	
25-49	2.02*	1.52-2.68	1.34*	1.01-1.78
50-55	3.02*	1.80-5.09	1.49	0.86-2.58
Race				
Africans (***REF***)	1.00		1.00	
Coloureds	0.11*	0.03-0.41	0.95	0.49-1.83
Whites	0.57	0.09-3.65	0.20*	0.06-0.63
Indians	0.08*	0.01-1.04	0.57	0.25-1.32
Marital Status				
Never married (***REF***)	1.00		1.00	
Married	1.27	0.91-1.78	1.08	0.76-1.54
Formerly married	1.14	0.65-1.98	0.77	0.35-1.72
Province				
Western Cape (***REF***)	1.00		1.00	
Eastern Cape	2.11*	1.14-3.89	0.37*	0.16-0.84
Free State	0.15*	0.07-0.32	0.33*	0.19-0.59
Gauteng	0.23*	0.12-0.44	0.30*	0.17-0.53
KwaZulu-Natal	0.12*	0.05-0.29	0.17*	0.09-0.32
Limpopo	1.28	0.52-3.15	0.23*	0.09-0.56
Mpumalanga	0.29*	0.13-0.65	0.54	0.28-1.05
North West	0.38*	0.19-0.72	0.38*	0.20-0.70
Northern Cape	0.11*	0.03-0.45	0.13*	0.02-0.76
Home Language				
isiZulu, I siSwati, Setswana (***REF***)	1.00		1.00	
isiXhosa, isiNdebele, Sesotho, Sepedi, Tshivenda Xitsonga	3.45*	3.03-6.78	1.16	0.85-1.58
English/Afrikaans	0.45	0.12-2.27	0.97	0.56-1.66
Place of residence				
Rural (***REF***)	1.00		1.00	
Urban	1.98*	1.23-3.18	1.88*	1.28-2.75
Socio-economic factors				
Employment Status				
Unemployed (***REF***)	1.00		1.00	
Employed	1.08	0.84-1.38	0.82	0.62-1.09
Education level				
No education/Primary (***REF***)	1.00		1.00	
Some Secondary	1.42*	1.02-1.97	2.32*	1.53-3.54
Matriculated	1.18	0.81-1.70	3.79*	2.53-5.69
Tertiary	1.73*	1.07-2.79	7.09*	4.41-11.40

1.00=Reference Category (RC) , CI=Confidence Interval , RR=Relative Risk Ratio P-value<0.05

Appendix E

Table E: Multinomial logistic regression results of all males circumcised and non-circumcised by demographic, socio-economic, cognitive and community factors of male circumcision, with the reference category being non-circumcision compared to medical and traditional male circumcision

Variables	RRR	CI	RRR	CI
	Traditional MC vs. Uncircumcised males (base)		VMMC vs. Uncircumcised males (base)	
Demographic Variables				
Age				
16-24 (***REF***)	1.00		1.00	
25-49	2.15*	1.60-2.89	1.43*	1.05-1.95
50-55	3.08*	1.81-5.22	1.48	0.86-2.52
Race				
Africans (***REF***)	1.00		1.00	
Coloureds	0.09*	0.03-0.28	0.75	0.37-1.53
Indians	0.45	0.08-2.58	0.26*	0.07-0.94
Whites	0.07*	0.01-0.62	0.73	0.32-1.66
Marital Status				
Never married (***REF***)	1.00		1.00	
Married	1.15	0.84-1.59	0.93	0.67-1.29
Formerly married	1.12	0.57-2.20	0.65	0.24-1.78
Province				
Western Cape (***REF***)	1.00		1.00	
Eastern Cape	1.81	0.88-3.72	1.62	0.66-3.96
Free State	0.07*	0.03-0.16	0.68	0.30-1.52
Gauteng	0.16*	0.08-0.32	1.06	0.49-2.29
KwaZulu-Natal	0.07*	0.03-0.20	0.54	0.23-1.25
Limpopo	0.52	0.19-1.37	2.59*	1.05-6.39
Mpumalanga	0.17*	0.07-0.43	1.54	0.67-3.52
North West	0.26*	0.11-0.59	1.24	0.56-2.74
Northern Cape	0.08*	0.02-0.29	0.72	0.26-1.99
Home Language				
isiZulu, I siSwati, Setswana (***REF***)	1.00		1.00	
isiXhosa, isiNdebele, Sesotho, Sepedi, Tshivenda Xitsonga	5.27*	3.48-8.00	1.34*	0.95-1.90
English/Afrikaans	0.62	0.19-2.02	1.25	0.72-2.17
Place of residence				
Rural (***REF***)	1.00		1.00	
Urban	1.98*	1.16-3.38	1.58*	1.06-2.35
Socio-economic variables				
Employment Status				
Unemployed (***REF***)	1.00		1.00	
Employed	0.98	0.73-1.31	0.76	0.54-1.07
Education level				
No education/Primary (***REF***)	1.00		1.00	
Some Secondary	1.15	0.79-1.66	1.67*	1.06-2.64
Matriculated	0.91	0.61-1.37	2.58*	1.67-3.98
Tertiary	1.19	0.71-1.99	4.01*	2.44-6.61
Cognitive and community factors about male circumcision				
Access to Medical Facility				
Access (***REF***)	1.00		1.00	
No access	0.81	0.60-1.10	0.47*	00.37-0.60
Awareness to Brother s for Life Campaign				

Yes (***REF***)	1.00		1.00	
No	1.05	0.80-1.37	0.83	0.67-1.03
Benefits of medical male circumcision				
No knowledge of Benefits (***REF***)	1.00		1.00	
Knowledge of benefits	1.70*	1.20-2.39	1.48*	1.01-2.18
Knowledge of duration healing before having sex				
Should not wait/5weeks (***REF***)	1.00		1.00	
Do not Know	0.17*	0.11-0.25	0.30*	0.17-0.54
Six Weeks	1.26	0.91-1.75	1.95*	1.34-2.84

1.00=Reference Category (RC) , CI=Confidence Interval , RR=Relative Risk Ratio P-value<0.05