Male Circumcision and Multiple Sexual partners in South Africa

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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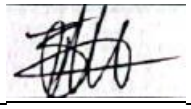
DECLARATION

I, Theophelus Mahlangu, hereby declare that this research report is my own original work. It is being submitted to the Faculty of Humanities and School of Social Sciences, University of the Witwatersrand in Johannesburg, South Africa. It is submitted in partial fulfilment of the requirements for the degree of Master of Arts in the field of Demography and Population Studies. I declare that this report has not been submitted before in part, or in full, for any other degree or examination at this or any other university.

Signature: 

DEDICATION

To my beloved Busisiwe Gloria Mlondozi

This thesis is a testament to my academic journey and the unwavering support, love, and loyalty you have bestowed upon me throughout this profound endeavour. As I reflect on the countless hours spent in pursuit of knowledge, I am reminded of the profound impact you have had on my life. Your unwavering support has been the bedrock upon which my academic aspirations have flourished. In moments of doubt and frustration, you stood by my side, offering words of encouragement and belief in my abilities. Your faith in me never wavered, even when my, confidence faltered. Your unwavering support has fuelled my determination, allowing me to push beyond my perceived limits and strive for excellence.

Love has been the guiding force that has propelled me forward on this intellectual journey. Your love has imbued every page of this thesis with a profound sense of purpose and passion. It is your love that has infused my research with depth and meaning, transforming it from a mere academic pursuit to a reflection of our shared dreams and aspirations. Your love has taught me the importance of embracing curiosity, seeking knowledge, and relentlessly pursuing my goals. Amidst the challenges and obstacles that we encountered along the way, your loyalty remained steadfast. Your unwavering presence has been a source of strength, reminding me that I am never alone in this pursuit. Through the highs and lows, your loyalty has anchored me, providing a sense of stability and security that has allowed me to flourish.

I am forever grateful for the love, support, and loyalty you have showered upon me. This thesis is a celebration of your wildest dreams coming true, a tribute to the profound impact you have had on my life and academic journey. Your unwavering belief in me has been an invaluable gift, and I dedicate this thesis to you with all my heart.

With deepest love and gratitude,

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ABSTRACT

Introduction: The high prevalence of Multiple Sexual Partners (MSP) and increasing rates of HIV infection in South Africa highlight the urgent need to delve into the factors influencing risky sexual behaviour. Despite efforts to promote safe sex practices, MSP remains a significant driver of the HIV epidemic in Sub-Saharan Africa, particularly in South Africa. This study focuses to investigate the association between MC and MSP among males aged 15 years and above in South Africa, elucidating a potential relationship between MC, risky sexual behavior (RSB), and HIV prevalence.

Method: This quantitative study employed a cross-sectional design using data from the 2017 South African National HIV Prevalence, Incidence, Behaviour and Communication Survey. (SABSSM), with a weighted sample of 27,620,422 men in the male recode. Data analysis involved three phases: frequency and percentage distributions, Pearson's chi-square test, and binary logistic regression.

Results: The study revealed that 94.04 % of circumcised South African men reported having MSP, with higher rates in Mpumalanga (97.29%) and among white males (97.33%). MSP was associated with demographic factors like type of residence, educational background, race, paying for sex, and geographical location. Men not using condoms were also more likely to engage in MSP. However, the study did not find any significant association between male circumcision and multiple sexual partners. The study found that males who were circumcised were less likely to have multiple sexual partners compared to uncircumcised males. Specifically, the odds ratio for MSP was (AOR 0.82; p<;0.05; CI: 0.81–0.82) among circumcised males.

Conclusion: The study emphasizes the importance of considering sociodemographic and behavioural factors in designing effective prevention programs targeting risky sexual behaviour in South Africa. Understanding the underlying factors driving men's engagement in multiple sexual partnerships is crucial for developing targeted interventions to address this behaviour. This study provides evidence that male circumcision does not adversely affect sexual function or lead to increased risky sexual behaviours, such as having multiple sexual partners. These findings have important implications for public health policies and individual decision-making regarding circumcision. Further research is needed to confirm these results and explore other potential factors

that may influence sexual outcomes. Additionally, it is crucial to consider the individual's overall sexual health and behaviour to ensure that the benefits of circumcision are not outweighed by risky sexual practices. This is an important consideration in the context of HIV prevention and sexual health, as some studies have suggested that circumcision may lead to increased risky sexual behaviours. However, our findings suggest that circumcision alone does not necessarily influence the number of sexual partners a man has.

Keywords: Multiple Sexual Partners, sociodemographic factors, behavioural factors.

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ABBREVIATIONS AND ACRONYMS

AIDS: Acquired Immunodeficiency Syndrome

AOR: Adjusted Odds Ratio

ART: Antiretroviral Therapy

HIV: Human Immunodeficiency Virus

MC: Male Circumcision.

MSM: Men who have Sex with other Men.

MSP: Multiple Sexual Partners

RSB: Risky Sexual Behaviour

SABSSM: South African National HIV Prevalence, Incidence, Behaviour and Communication Survey

SANSP: South African National Strategic Plan

SDG: Sustainable Development Goals

STI: Sexual Transmitted Infection

TB: Tuberculosis

UNAIDS: Joint United Nations Programme on HIV/AIDS

UOR: Unadjusted Odds Ratio

VMMC: Voluntary Medical Male Circumcision

WHO: World Health Organisation

CHAPTER 1: INTRODUCTION

1.1 Introduction

The prevalence of Human Immunodeficiency Virus (HIV) remains a formidable global public health challenge, particularly in Sub-Saharan Africa, with South Africa being a prominent focal point due to risky sexual behaviours (Osuafor and Okoli., 2021). Despite ongoing efforts, the persistence of unsafe sexual practices, exemplified by Multiple Sexual Partners (MSP)**,** contributes to the escalating rates of HIV (Chawla and Sarkar, 2019). Moreover, regardless of the promotion of condom usage, the increase in HIV infections among adults from 2010 to 2019 can, to some extent, be attributed to the prevalence of MSP (UNAIDS, 2020). Sub-Saharan Africa continues to witness ongoing increase of HIV infection, even though global trends in HIV infection indicate a decline in HIV incidence in various regions. Women and girls, constituting 59% of all new HIV infections and a significant portion of those living with HIV in Eastern and Southern Africa (12.3 million women under the age of 15 compared to 7.3 million men under the age of 15), bear an unequal burden of HIV (UNIAIDS, 2020). This underscores the imperative to explore preventive strategies comprehensively, such as Voluntary Medical Male Circumcision (VMMC), to curb HIV transmission.

Male circumcision (MC), the removal of the foreskin from the human penis, is a global practice carried out either by healthcare professionals in clinical settings or by traditional practitioners in non-clinical environments (Kibira et al., 2013). In South Africa, MC is deeply rooted in cultural traditions, particularly among the Xhosa, Ndebele, and Sotho communities, often serving as a rite of passage into manhood or for religious reasons (Govender, 2013). Globally, the prevalence of male circumcision (MC) is estimated to be between 36.7% and 38.7%, with significant variations based on cultural and religious practices, particularly among Jewish and Muslim populations where circumcision rates can approach 100% (Elsayed, 2024). In sub-Saharan Africa (SSA), approximately 46% of men of reproductive age are circumcised, with higher proportions observed in Muslim-majority countries and ongoing efforts to increase voluntary medical male circumcision (VMMC) as a key strategy in HIV prevention (Elsayed, 2024). These statistics highlight the critical role of MC and multiple sexual partnerships (MSP) as predictors of risky sexual behavior (RSB) within the target population for this study.

Notably, the World Health Organization (WHO) and the Joint United Nations Programme on HIV/AIDS (UNAIDS) recommended VMMC in 2007 as part of an HIV prevention strategy, especially in regions with low circumcision rates and high HIV prevalence (Reed et al., 2012; Westercamp et al., 2014). In South Africa the implementation strategy began in 2010, with the national government aiming to circumcise 4.3 million men by 2015, intending to prevent over 1 million new HIV infections (Tchuenche et al., 2016). While a study by Kripke et al., (2016) indicate that the implementation of the male circumcision strategy in South Africa did not meet the target; based on the evidence that in the beginning of 2015, the progress toward meeting the specified goal was significantly behind schedule, with a mere 43% of the target having been accomplished to circumcise 4.3 million men by 2015 to prevent over 1 million new HIV infections.

It is evident that ambitious targets were set in 2010 to achieve 80% circumcision coverage among men aged 15–49 years by 2015. Subsequently, complementary targets were established in 2016 to attain 90% circumcision coverage among adolescent boys and young men aged 10–29 years by 2021. National circumcision coverage witnessed a significant increase between 2008 and 2019; however, notable subnational variation across districts and age groups persists, underscoring the necessity for further advancements to meet both national and international targets. The information from recent study by Thomas et al., (2024), that looks at the substantial progress in promoting voluntary medical male circumcision (VMMC) for HIV prevention in South Africa; supports the notion that substantial progress has been made in enhancing male circumcision coverage in South Africa.

Despite these efforts, risky sexual behaviours, such as having (MSP), continue to contribute significantly to the spread of HIV and sexually transmitted infections (STIs) globally and particularly in South Africa (Sathiyasusuman, 2015). The prevalence of HIV infections remains disproportionately high among young people, particularly in sub-Saharan Africa, where 74% of all HIV-related deaths and 70% of new HIV infections occur (Unicef, 2019; Yeboah et al., 2022). Research has consistently linked risky sexual behaviours, including early sex, inconsistent condom usage, and intergenerational sex, to the high rates of STIs and HIV infections in sub-Saharan Africa (McCloskey et al., 2021). Notably, MSPs, defined as individuals with two or more sexual partners concurrently or sequentially, are identified as a significant public health risk, with men more likely than women to report engaging in such behaviour (Yeboah et al., 2022). Despite numerous studies

exploring various sexual and reproductive health issues related to MSPs, the specific connection between MSPs and male circumcision remains an understudied phenomenon (Ahinkorah et al., 2020).

A comprehensive analysis across multiple countries examining risky sexual behaviour among male youths in certain developing nations revealed that the prevalence of high-risk sexual practices, including engaging in MSP, can reach as high as 90% (CDC, 2020). Moreover, empirical evidence indicates that the practice of having multiple sexual partners is prevalent among young people globally, with Nigeria being no exception. Of particular concern to public health is the engagement of young adults in risky sexual behaviours, such as early sex before the age of 16, engaging in MSP, or practicing unprotected sex (Fatusi et al., 2019). Globally, over 37.6 million people were living with HIV in 2020, with 1.5 million new infections predicted for the same year, emphasising the ongoing challenge in achieving the goals set by UNAIDS's 90-90-90 plan to curb the AIDS epidemic (UNIAIDS, 2021).

The persistence of HIV as an incurable disease underscores the urgency in addressing risky sexual behaviours, such as having MSP, particularly in regions like South Africa with prolonged and prevalent HIV/AIDS epidemics (Godswill et al., 2021). In the South African context, it has been observed that various elements, including engaging in MSP and initiating sexual activity before the age of 16, significantly correlate with the likelihood of contracting HIV (Godswill et al., 2020). VMMC emerges as a potential intervention to reduce HIV transmission in heterosexual relationships. A study by Cork et al. (2020) revealed that male circumcision could decrease HIV transmission by 50-60% during heterosexual intercourse in sub-Saharan Africa, emphasising the need for implementing VMMC services in regions with high HIV prevalence. Additionally, studies conducted in South Africa and Zimbabwe reported varying rates of risky sexual behaviours among circumcised and uncircumcised men (Zungu et al., 2016; Chikutsa et al., 2015).

Contradictory findings exist regarding the association between MC and MSP, with some studies suggesting a positive correlation, while others show circumcised men engaging in more risky sexual behaviours than their uncircumcised counterparts (Balekang & Dintwa, 2016; Shi & Dushoff, 2017). This study aims to investigate the association between MC and MSP among males

over 15 in South Africa, elucidating a potential relationship between circumcision, risky sexual behaviour, and HIV prevalence.

1.2 Problem Statement

The high prevalence of MSP and increasing rates of HIV infection in South Africa underscore the significance of understanding the factors influencing risky sexual behaviour. Despite initiatives promoting safe sex practices, MSP remains a critical driver of the HIV epidemic in Sub-Saharan Africa, including South Africa (Ahinkorah et al., 2020). The context of South Africa is particularly relevant, as it has a high HIV burden and has implemented VMMC as a prevention strategy (Matharu et al., 2023). To articulate the importance of MC in reducing RSB and HIV prevalence in South Africa, it is essential to identify existing gaps in the literature. Despite the significant role of voluntary medical male circumcision (VMMC) in HIV prevention strategies, A study by Sikula (2019), that investigated A Profile of Male Circumcision in South Africa: Socio-demographic predictors of the type of circumcision among circumcised men, indicate that the uptake of circumcision remains low in certain populations, particularly among men who engage in MSP (Sikula, 2019).

Research has shown that circumcision can reduce the risk of HIV transmission by approximately 60%, yet the prevalence of MC in South Africa is still below optimal levels, with estimates suggesting that only about 46% of men are circumcised (Zuma et al., 2022). Furthermore, the high incidence of RSB, particularly among young men, underscores the need for targeted interventions that incorporate MC as a preventive measure. For instance, a study highlighted that 25.5% of males reported having multiple sexual partners in the past year, which is linked to increased vulnerability to HIV infection (Zuma et al., 2022). Therefore, focusing on these gaps is crucial, as enhancing MC rates could significantly contribute to reducing RSB and, consequently, HIV prevalence in South Africa. By focusing on MC as a primary explanatory variable, this research aims to provide insights into its potential as a key intervention in the broader context of sexual health and HIV prevention strategies.

The correlation between MC and MSP among South African men aged 15 years and older is a critical area of research due to the high prevalence of HIV infection and MSP in the country because they represent a significant proportion of the population engaging in risky sexual behavior.

According to the 2019 South African National HIV Prevalence, Incidence, Behaviour and Communication Survey, 25.1% of males aged 15-24 years reported having multiple sexual partners in the past 12 months, highlighting the importance of focusing on this age group in understanding the relationship between MC, RSB, and HIV prevalence (Simbayi, 2019). South Africa has one of the highest HIV prevalence rates globally, with approximately 17.9% of the adult population being HIV positive (Grund et al., 2018). The country has implemented MMC as a prevention strategy, with approximately 1.86 million circumcisions conducted since 2009 (Grund et al., 2018). However, there is evidence that circumcised men may engage in riskier sexual behaviours, which could offset the protective benefits of circumcision in preventing HIV transmission (Zungu et al., 2016). A study conducted in Ghana found that circumcised men were more likely to engage in MSP compared to those who had not been circumcised (Ahinkorah et al., 2020).

Finally, the insights generated by this study can guide the design of interventions that target both individual and community-level factors influencing risky sexual behaviours among circumcised men, such as addressing social norms and gender dynamics that may encourage MSP, as suggested by research in South Africa and other African countries. By providing a comprehensive understanding of the link between male circumcision and MSP, this study can contribute to the development of more effective and targeted interventions to reduce HIV transmission in South Africa, ultimately advancing national and global efforts to achieve the 2030 sustainable development goal of ending AIDS as a public health threat.

1.3 Justification of the study

The South African National Strategic Plan (NSP) sets goals to reduce new HIV infections, emphasising comprehensive sexuality education and reproductive services, including VMMC (COP, 2020). However, the persistence of high HIV incidence necessitates a nuanced examination of factors influencing risky sexual behaviour, such as MSP. This study addresses a significant gap by exploring the statistical link between male circumcision and MSP, utilizing data from the 2017 South African HIV Behavioural, Sero-Status and Media Impact Survey. The findings may inform targeted interventions, advancing national and global efforts to reduce HIV transmission and enhance sexual and reproductive health. Through an in-depth exploration of male circumcision's

impact on MSP, this study contributes to the broader discourse on achieving the 2030 sustainable development goal of ending AIDS as a public health threat.

The specific focus on the link between male circumcision and multiple sexual partnerships (MSP) is crucial for generating actionable insights that can inform evidence-based interventions to reduce HIV transmission in South Africa. By exploring this relationship, this study can provide a nuanced understanding of the complex factors influencing risky sexual behaviors among circumcised men, which is essential for designing targeted interventions. For instance, a study in Ghana by Ahinkorah et al (2020), found that circumcised men were more likely to have multiple sexual partners compared to uncircumcised men, highlighting the need to address this specific population in HIV prevention efforts. Furthermore, identifying sociodemographic factors associated with MSP among circumcised men, such as education level, age, type of residence, and region, can guide the tailoring of interventions to specific contexts and populations.

The findings of this study can also inform the content and messaging of educational campaigns to promote safe sexual practices, emphasising that male circumcision does not eliminate the need for other preventive measures like consistent condom use, reducing number of partners, and delaying sexual debut. Moreover, integrating information on the potential increased risk of MSP among circumcised men into comprehensive sexuality education programs can help manage expectations and promote responsible sexual behaviour among circumcised individuals, as advocated by the WHO on male circumcision: Global trends and determinants of prevalence, safety, and acceptability (2008) and the Joint United Nations Programme on HIV/AIDS consultation on male circumcision HIV prevention (UNAIDS) (2020).

This research on male circumcision (MC) and its relationship with HIV prevalence, risky sexual behavior (RSB), and multiple sexual partnerships (MSP) among males over 15 in South Africa is not only timely but also vital in addressing public health challenges. By focusing on this demographic, the study aligns with several Sustainable Development Goals (SDGs), particularly SDG 3: Good Health and Well-Being. This goal emphasizes the importance of ensuring healthy lives and promoting well-being for all ages, with specific targets aimed at ending the epidemics of communicable diseases, including HIV. The insights gained from this research will contribute significantly to the understanding of how MC can be leveraged as an effective intervention in the

fight against HIV, thereby supporting national and international efforts to improve health outcomes and reduce the burden of disease in South Africa.

1.4 Research questions

What is the association between MC and MSP among males aged 15 years and above in South Africa?

Sub-Questions:

- What is the prevalence of MSP among males aged 15 years and above in South Africa?
- What are the socio-demographic factors influencing MC and MSP among males aged 15 years and above in SA?

1.5 Objectives

To investigate the association between male circumcision and MSP among males aged 15 years and above in South Africa.

Sub-Objectives

- To investigate the prevalence of MSP among males aged 15 years and above in South Africa.
- To examine the socio-demographic factors influencing MC and MSP among males aged 15 years and above in SA.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This section examines the relationship between MSP, socio-demographic factors, risky behaviour factors, and male circumcision. The review explores the impact of socio-demographic factors on MSP and risky behaviour factors, as well as the potential influence of male circumcision on these behaviours. By analysing the available literature, the review aimed to provide a comprehensive understanding of the complex relationship between these factors and their impact on sexual health outcomes.

2.2 MSP and demographic factors

2.2.1 MSP and age

The examination of the correlation between age and engagement in MSP reveals a nuanced and intricate relationship. Empirical studies consistently prove that younger individuals show a higher propensity for engaging in risky sexual behaviours involving multiple partners compared to their older counterparts. Notably, research by Mercer et al. (2018) and Mitchell et al. (2017) corroborates this trend, showing a distinct age-related gradient in such behaviours. However, the study conducted by Liu et al. (2019) introduces a more complex perspective by highlighting a peak in the prevalence of MSP within the 25-34 age group, followed by a decline in older age cohorts. This suggests a non-linear association between age and engagement in MSP.

Recent research conducted by Brainard et al. (2023), explores the relationship between age and the number of sexual partners during the Mpox outbreak in the UK in 2022. The study collected data from individuals about their partner counts in the preceding three weeks, which is approximately the same as the usual infectious period for persons with active Mpox. Furthermore, the study contributes to this discourse by elucidating how the number of sexual partners evolves with heterosexual relationships and same sex however for MSM they seemed to be in a highly sexually active subgroup. The study concluded that the data collected can be used to describe sex partner counts during the British Mpox epidemic and show distinctive partner count relationships with age, dependent on partnership types (Brainard et al., 2023). These findings challenge conventional

assumptions about age-related sexual behaviours, emphasising the variability in sexual practices across diverse demographics (Brainard et al., 2023). The study also underscores the necessity for more refined mathematical models of sexually transmitted infections that accurately reflect the diverse behavioural patterns seen across various population segments (Brainard et al., 2023).

Despite notable advancements in understanding the interplay between age and MSP in the study, there exist areas of contention and lacunae in current scholarship (Brainard et al., 2023). One contentious issue pertains to the disparate patterns seen across distinct populations, including MSM, heterosexual individuals, and specific demographic subgroups like African American women. These discrepancies suggest that factors beyond chronological age play pivotal roles in influencing engagement in risky sexual behaviours (Brainard et al., 2023).

2.2.2 MSP and education

A plethora of studies have investigated the association between MSP and educational background. (Dendup et al., 2023; Lanari et al., 2020; Lungu et al., 2022; Ogbonna et al., 2023; Yeboah et al., 2022). found that the prevalence of MSP among students in colleges and universities in sub-Saharan Africa, including South Africa, is high, ranging from 12% to 65%. The pooled prevalence of having more than one sexual partner was 36.0 times more likely (95% CI: 30.0% - 42.0%).

This finding is consistent with Lanari et al. (2020), who indicated that educated adolescent boys and young men are exposed to MSP. The search results also suggest that there is a positive association between MSP and higher education attainment among both female and male youths. Specifically, female youth with higher education attainment (AOR = 1.36, CI = 0.76--2.41) and male youth with higher education attainment (AOR = 6.50, CI = 1.66--25.56) had increased odds of exposure to having MSP.

Ogbonna et al. (2023) assert that individuals whose fathers possess a secondary level of education are less inclined to engage in MSP (MSPs) as opposed to those whose fathers have primary or lower level of education. This implies that the educational background of parents, particularly fathers, can impact the sexual behaviours of adolescents. Moreover, the study revealed that adolescents in Rivers State who have attained higher prevalence of education are more prone to participating in MSPs. Precisely, adolescents with secondary and tertiary education have a five-

and fifteen-fold higher probability of engaging in MSPs, respectively, in comparison to those with no formal education (Ogbonna et al., 2023)

A study conducted by Norbu et al. (2013) in Bhutan found that being male, unmarried, and older were associated with having MSP. Although factors such as casual intercourse, low condom usage, MSP, high mobility, low HIV knowledge, and substance use are believed to contribute to the burden of STIs among adolescents, there is currently a lack of research specifically examining the factors influencing MSP among adolescents in Bhutan.

Hence the study by Dendup et al. (2023), was examining the specific factors influencing MSP among adolescents in Bhutan. The following were the findings on MSP and educational background suggest that higher education attainment is positively associated with having MSP among 31.9% of males who had two or more sexual partners. Yeboah et al. (2022) highlighted that education was significantly associated with MSP among adolescent boys and young men in Ghana. Specifically, those with secondary or higher education were more likely to have MSP compared to those with no education.

Controversies arise from the discrepancies in findings across these studies, showing potential complexities in the relationship between educational background and MSP. While there are studies suggest higher rates of MSP in specific type of educational background, others present contrasting results, pointing to the need for further investigation to reconcile these divergent outcomes.

2.2.3 MSP and province

Studies reveal intriguing insights into provincial disparities in sexual behaviour. Studies by (Madhavan et al., 2021; Magadi and Curtis, 2019; Maharaj et al., 2020) shed light on the varying prevalence of MSP across provinces in South Africa. Maharaj et al. (2020) found that individuals in KwaZulu-Natal showed a higher likelihood of engaging in MSP compared to other provinces. In contrast, Magadi and Curtis (2019) indicated that young people in Gauteng and Western Cape had a lower propensity for having MSP than those in other provinces. Furthermore, Madhavan et al. (2021) highlighted a higher likelihood of MSP among men in the Eastern Cape province compared to other regions (Madhavan et al., 2021). While several studies have been conducted on

a number of provinces, this study aims to examine this relationship by utilising data collected across the 9 provinces.

2.2.4 MSP and type of residence

A study by Odimegwu and Ugwu (2022) found that approximately 46.8% of males residing in rural areas exhibit a propensity for engaging in multiple sexual relationships. Furthermore, their study revealed that 17.3% of these males are specifically from KwaZulu-Natal, thereby designating it as the province exhibiting the greatest prevalence of unsafe sexual behaviour among rural males. Additionally, Manyaapelo et al. (2019) determined that cultural factors play a substantial role in influencing this behaviour. Most participants professed their belief that a man's worth is determined by the number of sexual partners he possesses, a notion deeply ingrained in their upbringing, which leads to a desire for respect and validation. While a few participants regarded this as a personal choice, only two individuals reported abstaining from MSP, a stark contrast to the remainder of the participants (Manyaapelo et al., 2019).

In contrast Ali et al. (2021) and Yeboah et al. (2022), revealed that males residing in urban areas exhibit a higher propensity for engaging in multiple sexual relationships when compared to their rural counterparts. Ali et al. (2021) discovered that males in urban areas displayed an increased likelihood of having MSP (UOR = 22.8 CI = 18.8–27.8) and (AOR = 1.21 CI = 1.04–1.41). Similarly, Yeboah et al. (2022) reported a rise in the prevalence of males with MSP, from 39.0% in 2008 to 56.8% in 2014, indicating a 17.8% increase over a six-year period in Ghana.

2.2.5 MSP and population group

A study by Beauclair et al (2015) investigated the prevalence and duration of concurrent partnerships (CPs) in Cape Town, South Africa, and how they are influenced by race and sex. It also explores the variation in the prevalence of CPs and the duration of overlap in these relationships, which are poorly documented in Southern Africa. The study found that 45.9% of men that had MSP where Black men and followed by coloured men with 21.2%. These two races where the highest race of men to have MSP in Cape Town in 2015, compared to other races. Furthermore, black men were more likely to have MSP compared to coloured men and other races

as the findings of prevalence were 2.16 (95% CI: 1.10 4.27). These men reported to have three or more MSP (Beauclair et al., 2015).

However, Kenyon et al (2016) found that black people both men and women have the association with MSP. The study found that despite the same race having the association, in the findings it was black women who had a significant association of MSP compared to black men and other races as well in South Africa. Furthermore, Mabaso et al (2019) found similar that black people both men and women still having high prevalence in MSP compared to other races in South Africa, although it is black women compared to black men with high prevalence of MSP. Mabaso et al (2019) found that black men had a significance of [AOR = 7.79 (95% CI: 4.71–12.89] MSP while black women results were [AOR = 8.91 (95% CI: 2.19–36.22] making them more likely than black men to have MSP.

2.3. Perceived susceptibility and Risk/Behavioural factors

MSP is a major public health concern due to its association with the spread of sexually transmitted infections (STIs), including HIV/AIDS (Osuafor and Okoli., 2021). The prevalence of MSP varies across populations and is influenced by various behavioural factors such as alcohol and drug use, sexual orientation, and sexual risk-taking behaviours (McCloskey et al., 2021). Understanding the behavioural factors that contribute to MSP is crucial in designing effective interventions to reduce the incidence and prevalence of STIs. This section will explore the existing research on MSP and its behavioural determinants. Specifically, examine the role of alcohol and drug use, sexual orientation, and other sexual behaviours such as condom use and age of sexual debut in the context of MSP (Ogbonna et al., 2023).

2.3.1 MSP and perceived susceptibility of perceived HIV risk

MSP are a significant risk factor for HIV transmission in South Africa, particularly among men and women (Zuma et al., 2022). Research has identified various determinants of MSP in the country, shedding light on the factors contributing to this behaviour and its implications for HIV risk (Zuma et al., 2022).

A study by Onoya et al. (2016) examining the determinants of MSP among South African men and women found common predictors across genders, including race, a history of sexually transmitted infections (STIs), being in short relationships (<1 year), and suspecting the current partner of infidelity. MSP among men were associated with greater community acceptance and were often driven by social status. On the other hand, determinants of MSP among women included economic vulnerability, younger age at sexual debut, and living in formal urban areas (Onoya et al., 2016).

Another study explored the relationship between reported sexual partner concurrency (one's partner having another partner) and the risk of HIV infection in South Africa. The findings suggested that partner concurrency may increase the risk of HIV infection for black South African women, particularly younger women (Kenyon et al., 2016). The association between partner concurrency and HIV prevalence varied by race, highlighting disparities in HIV risk based on partner behaviours (Kenyon et al., 2016).

Research conducted by (Venkatesh et al., 2012), focusing on sexually active HIV-infected individuals in South Africa revealed insights into sexual risk behaviours within partnerships. The study highlighted differences in sexual behaviours between men and women, with women more likely to report having a HIV-negative or status unknown partner and engaging in unprotected sex. These findings underscored the importance of couples-based prevention strategies to address sexual risk behaviours among HIV-infected individuals and their partners] (Venkatesh et al., 2012).

The research underscores the complex interplay between MSP and perceived HIV risk in South Africa Understanding the determinants of MSPs, partner concurrency dynamics, and sexual risk behaviours among HIV-infected individuals is crucial for developing targeted interventions to reduce HIV transmission rates within the country.

2.3.2. MSP and first sex

Understanding the age at which individuals engage in sexual activity for the first time and the subsequent involvement with MSP is crucial in the realm of sexual health and behaviour. A study by Osuafor and Okoli (2021) found that Individuals who engage in sexual activity at a younger age (before 16) may be more inclined to have a higher number of sexual partners over their lifetime by [OR 3.6 (95% CI: 1.3–9.6], compared to those who become sexually active at a later age

(between 16-19). Furthermore, the study found out that males are more likely to have MSP than female in South Africa (Osuafor & Okoli, 2021). These findings are like the study by Liga et al. (2022) in Ethiopia, Men who had their first sexual encounter at the age of 20 or older had 0.67 times (or 33% fewer) the odds of experiencing MSP, compared to those who had their first sexual experience at the age of 15 or younger. The 95% confidence interval for this estimate ranges from 0.47 to 0.94, indicating that the true effect size likely falls within this range.

In the study by Odimegwu and Somefun (2017) in Nigeria investigating the Ethnicity, gender and risky sexual behaviour among Nigerian youth, the observation on the findings that are looking at first sex debut the results were, females aged 22-24 were less likely to have MSP compared to females aged 15-17 (OR 0.11, 95% CI 0.09-0.15). However, males aged 22-24 were more likely to have MSP compared to males aged 15-17 (OR 3.32, 95% CI 1.15-9.55). While there are studies suggest higher rates of MSP in specific range of first sex debut, pointing to the need for further investigation to reconcile these outcomes.

2.3.3. MSP and condom use

MSP and condom use are critical factors in understanding and addressing sexually transmitted infections (STIs) and HIV/AIDS risk. The study by Liga et al., (2022) was conducted to identify the predictors of MSP among men in Ethiopia. The study was motivated by the need to understand the factors that contribute to MSP, which is a significant public health issue in Ethiopia. The study aimed to provide insights into the determinants of MSP among men which could inform the development of targeted interventions to reduce the prevalence of this behaviour and its associated risks, such as sexually transmitted infections and unintended pregnancies. The findings are as followed that there is an association between MSP and condom use, as 94.7% of men of the study have MSP and they do not use condoms (Liga et al., 2022).

Furthermore, the study found that among male participants, those who had ever used condoms were 0.24 times (95% CI: 0.07, 0.76) less likely to have MSP compared to those who had never used condoms (Liga et al., 2022). Similarly, to the study by Odimegwu and Somefun (2017) found that Over 35% of young women and approximately 81% of young men reported having MSP. Additionally, over half of the youth did not use a condom during their last sexual encounter, with a higher percentage observed among young women (84%) compared to young men (57%)

However, the study by Osuafor and Okoli (2021) found that over half of the respondents reported inconsistent condom use in the previous month. Despite these finding the study also found that condom use was not associated with having MSP. This finding contradicts previous research, which had suggested a link between condom use and having MSP.

2.3.4. MSP and paid sex

MSP and transactional sex are complex phenomena that involve various beliefs, risks, and benefits. The study by Durojaiye et al (2020). Found that female (odds ratio 1.93, CI == 1.61-2.32), aged 25 to 44 years, had MSP, compared to males and they were engaged in transactional sex making them even more likely to be HIV positive. The study by Armstrong et al. (2021) found that no heterosexual men who reported transactional sex tended to have more sexual partners and attend sex parties, behaviours which increase the risk of HIV and STI transmission. However, this heightened sexual risk did not translate to a higher prevalence of HIV among those engaging in transactional sex. A study by Magni et al. (2020) revealed that, men who reported having six or more MSP were highly likely to pay for sex (AOR 3.86, 95% CI 2.92–5.10), compared to men who had two or fewer sexual partners in the preceding year.

Furthermore, approximately half (47%) of men residing in an informal South African settlement were found to have participated in transactional sex within the last year, indicating a prevalent practice in this community. The study revealed that these men exchanged money or goods for sex for various reasons. Factors such as having three or more sexual partners in the previous year, hazardous drinking habits, controlling behaviours, and longer community residency (7 or more years) were associated with increased likelihood of engaging in transactional sex. The prevalence of transactional sex in this study was notably higher (47%) compared to a previous study in 2007 involving young men (17.7%).

2.4. MC: Procedure, Benefits, and Acceptability

(MC) is a surgical procedure that involves the removal of the foreskin covering the head of the penis (Nxumalo & Mchunu, 2020). This practice is commonly performed for cultural, religious, or medical reasons. The benefits of male circumcision include reduced risk of urinary tract infections, sexually transmitted infections (STIs), including HIV, and penile cancer (Cock et al., 2022).

Additionally, male circumcision has been associated with improved genital hygiene and reduced risk of certain medical conditions (Nxumalo & Mchunu, 2020). A study by Ntshiqa et al. (2023), MC was shown to have high acceptability among various populations globally. The procedure's acceptability is influenced by cultural norms, religious beliefs, perceived health benefits, and recommendations from healthcare providers. Understanding the acceptability of MC is essential for promoting its uptake as a preventive measure against various health conditions (Ntshiqa et al., 2023).

MC has been identified as a potential factor influencing sexual behaviours, including engaging in MSP. Recent study by Zuma et al. (2022) have explored the correlation between MC status and behaviours related to MSP. Research has investigated how MC may impact sexual functioning, satisfaction, and dynamics within relationships, shedding light on its role in shaping individuals' sexual behaviours (Zuma et al., 2022). For instance, studies analysing data from demographic and health surveys have sought to understand the association between MC status and engaging in MSP among specific populations. These studies provide insights into how male circumcision practices may influence individuals' likelihood of having MSP (Cock et al., 2022).

In conclusion, MC plays a significant role in shaping sexual health outcomes and behaviours, including the potential influence on engaging in MSP.

2.5 MC and MSP

MC has been a subject of interest in relation to sexual behaviour, particularly concerning the association between circumcision and engaging in MSP. Research shows a significant association between male circumcision and MSP (Mukama et al., 2015). A study highlighted that circumcised men are more likely to engage in MSP compared to uncircumcised men (Ahinkorah et al., 2020). Additionally, perceptions exist that circumcision could lead to having MSP, especially among males (Mukama et al., 2015). These findings underscore the complex interplay between male circumcision and sexual behaviours. Controversies arise about the impact of MC on sexual behaviours. While some studies suggest that having a circumcised male partner can be protective for women and girls (Luseno et al., 2023), others show potential risk compensation behaviours post-circumcision, such as engaging in riskier behaviours or reduced condom use (Luseno et al.,

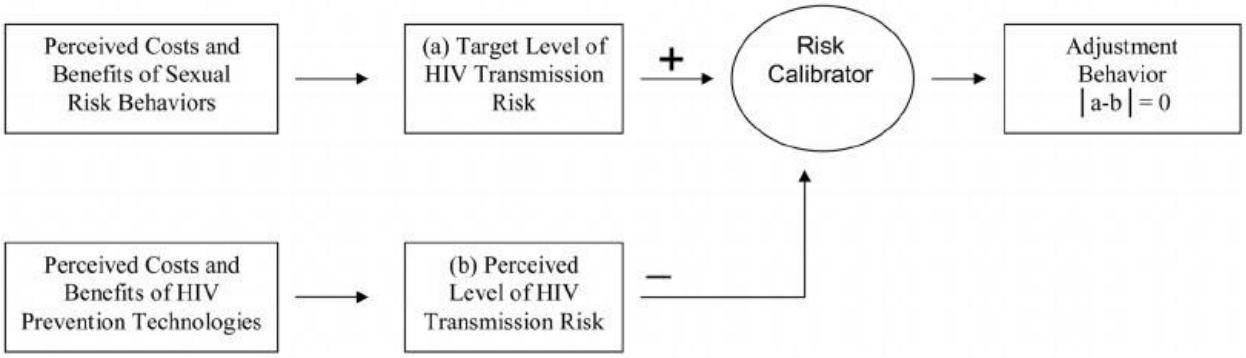
2023). These contested claims highlight the need for further research to clarify the implications of MC on sexual practices.

2.6 Theoretical Framework

The research incorporates the Risk Compensation Theory (RCT) and Health Belief Model (HBM) as a secondary framework. The RCT theory is utilized to demonstrate the correlation between male circumcision (MC) and male sexual partner (MSP) acquisition among males aged 15 and above in South Africa. In 1975, Sam Peltzman was the first to develop the RCT, which explained the observed changes in risks following the implementation of mandatory motor vehicle safety regulations in the United States of America (Pless, 2016). He proposed that if vehicles were made safer, drivers would compensate by driving more aggressively compared to when the cars were less safe (Feng, 2017). The research findings indicated that people were prone to participate in hazardous driving behaviors, such as speeding, because they believed that the risk had been minimized after an intervention. This outcome supports Peltzman's theory (Feng, 2017).

The RCT theory has been widely applied in HIV prevention and research on health behaviors. In this field of study, researchers utilize this theory to explore how individuals perceive their own risk, especially considering the growing availability of biomedical interventions aimed at reducing their risk of contracting HIV infections (Rojas-Castro et al., 2019). While many studies have employed this theory to elucidate potential changes in behavior following an intervention, a lingering concern for all partially effective HIV prevention strategies is whether individuals may engage in riskier behaviors due to a false sense of protection. The study's objective was to explore the impact of MC on unsafe sexual behaviors, particularly MSP. In this study, an RCT was employed to ascertain whether individuals are more inclined to partake in extremely risky sexual conduct because of the perceived risk reduction after undergoing MC as an intervention (Rojas-Castro et al., 2019).

Figure 1. 1 A model of risk compensation and sexual risk behaviours

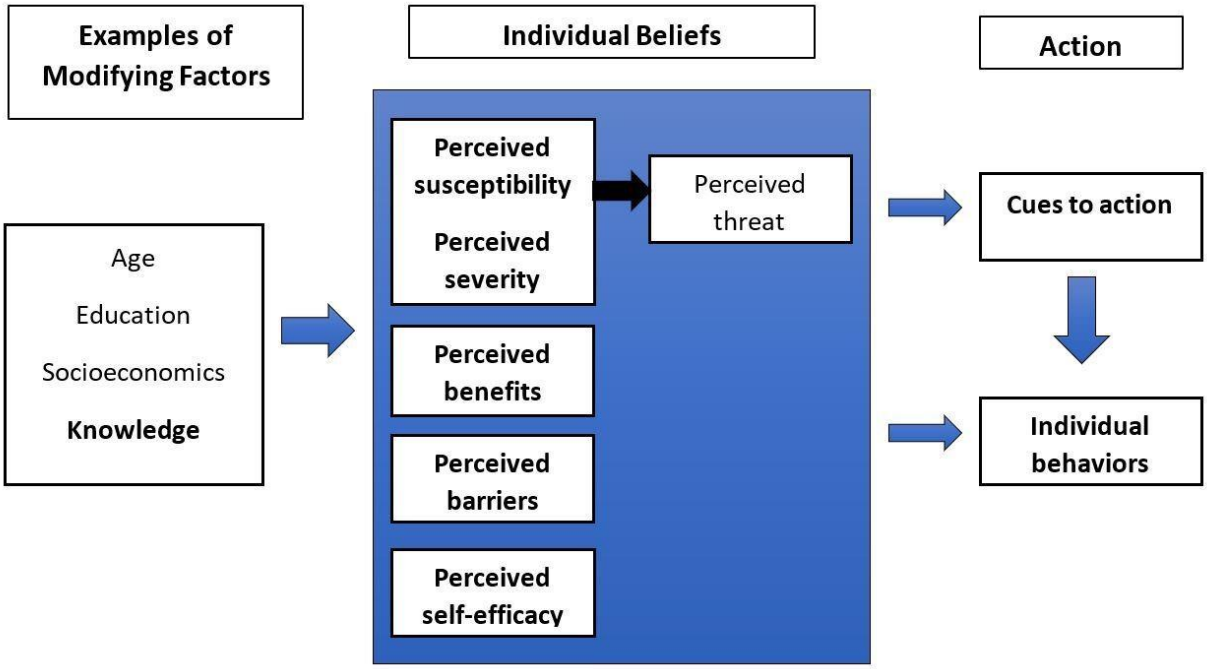


Source: Eaton and Kalichman (2008).

The Health Belief Model (HBM) is a psychological health behaviour change model developed in the 1950s by social psychologists Irwin M. Rosenstock, Godfrey M. Hochbaum, S. Stephen Kegeles, and Howard Leventhal at the U.S. Public Health Service to explain and predict health related behaviours, particularly in relation to the uptake of health services (Abraham & Sheeran, 2015). This model suggests that individuals' beliefs about health problems, perceived benefits of action, barriers to action, and self-efficacy influence their engagement in health-promoting behaviours. Additionally, a cue to action is necessary to trigger health-promoting behaviour (Abraham & Sheeran, 2015).

The HBM offers a comprehensive theoretical framework for investigating the correlation between MC and MSP within the realm of public health and sexual/reproductive health. This model comprises six key constructs that shape individuals' health behaviour decisions: risk susceptibility, risk severity, benefits to action, barriers to action, self-efficacy, and cues to action (Abraham & Sheeran, 2015). In the context of MC and MSP, these constructs play a pivotal role in influencing attitudes, intentions, and behaviours related to preventive measures and risky practices. Individuals' perceptions of risk susceptibility and severity regarding sexually transmitted infections (STIs), or HIV are crucial factors in understanding their decisions regarding MC and engaging in MSP.

Figure 2. 1 Constructs of the Health Belief Model



Source: Glanz, Rimer and Viswanath (2015).

By applying the construct of the HBM to examine attitudes towards male circumcision, intent to adopt the procedure, and perceptions of partial protection against HIV, researchers seek to gain valuable insights into how individuals perceive risks associated with MC and MSP. This understanding can inform targeted public health interventions aimed at addressing barriers, enhancing self-efficacy, and providing clear cues to action to promote safer behaviours within the context of socio-demographic factors and risky behaviours.

Integrating the Health Belief Model into the framework provides a structured approach to exploring the complex interplay between MC, MSP, and public health outcomes. By leveraging this theoretical framework alongside other models like the Theory of Reasoned Action, researchers can develop a comprehensive understanding of health behaviours in relation to male circumcision and sexual practices while informing effective strategies for promoting positive health outcomes in the field of public health and sexual/reproductive health.

2.7 Conceptual Framework

The Health Belief Model (HBM) served as a secondary theory to help establish the conceptual framework of the Risk Compensation Theory by providing insights into how individuals perceive health risks and make decisions regarding health behaviours.

In the context of risky behaviours like MSP in public health and sexual reproductive health realms such as male circumcision, the Health Belief Model can explain how socio-demographic factors interact with risky behaviours. For instance, perceived susceptibility to HIV, can influence individuals' decisions regarding MC and engaging in MSP. On the other hand, Risk Compensation Theory suggests that individuals adjust their behaviour based on their perception of risk. When safety measures are introduced (e.g., medical interventions VCCM reducing HIV contraction by 60%), individuals may compensate by engaging in riskier behaviours due to a reduced sense of threat. This phenomenon can potentially counteract the intended benefits of safety interventions by leading to increased risky behaviours.

This study adopted the Risk Compensation Theory and Health Belief Model to investigate whether circumcision is a significant predictor of MSP among males aged 15 and older in South Africa. While the HBM provides a framework for understanding health behaviors, it lacks specificity on the interactions between variables and their influence on outcomes (MSP). The current study aims to address this gap by adopting the Risk Compensation Theory alongside the HBM to investigate whether circumcision status is a significant predictor of MSP among males over 15 in South Africa. By examining the effect of socio-demographic factors on circumcision status, and how this indirectly influences perceived HIV risk and MSP, the study provides insights into the complex interplay of variables in health decision-making. By drawing from the Risk Compensation Theory and Health Belief Model, the study seeks to examine the effect of socio-demographic factors on circumcision status, which further indirectly influences the perceived risk of HIV infection.

Figure 3.1 shows the link between socio-demographic factors, which have a direct influence on circumcision status and an indirect influence on MSP.

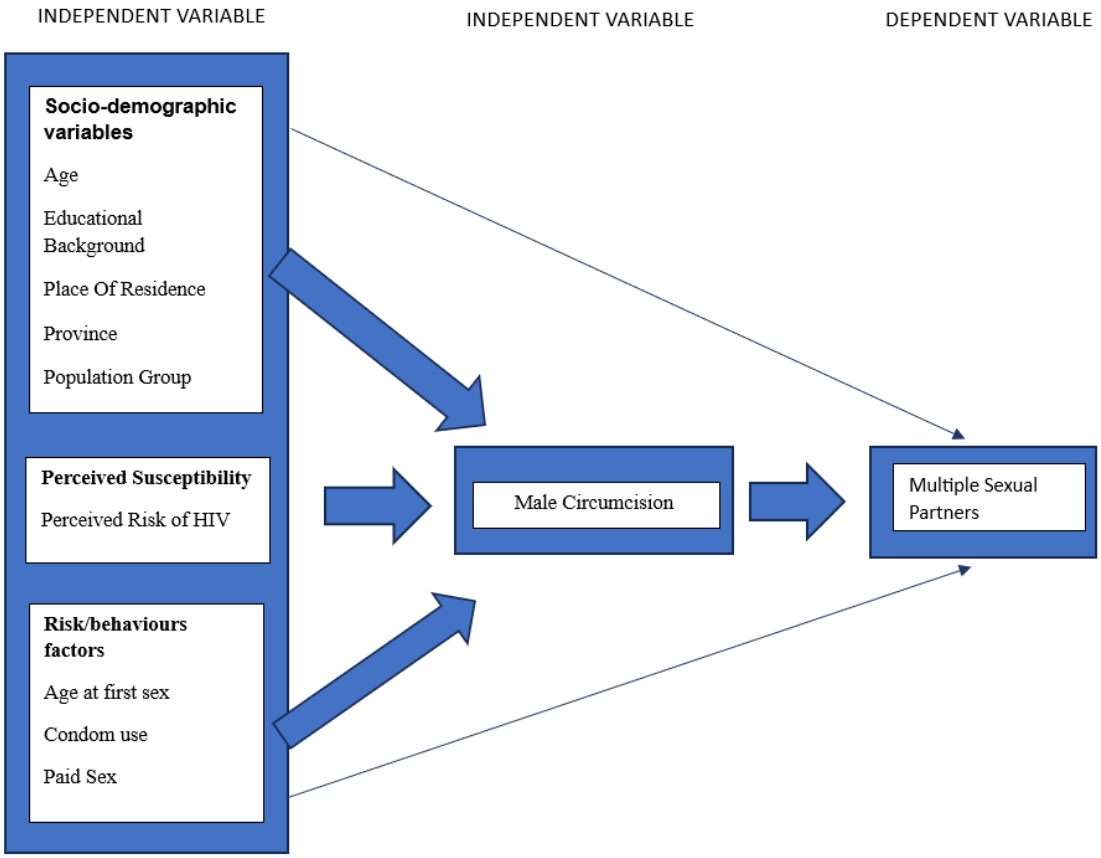


Figure 3. 1 Conceptual Framework of a relationship between MC and MSP Among Males aged 15 years and above in South Africa

2.8 Hypotheses

The following hypotheses will be tested at the 0.05 significance level.

H0: There is no relationship between MC and MSP in South Africa among men aged 15 and older.

H1: There is a relationship between MC and MSP in South Africa among men aged 15 and older.

CHAPTER THREE: METHODOLOGY

The approach used to answer the study's research questions and achieve the objectives is covered in this chapter. The study's design, data source, study population, sample size, and questionnaire structure were all described at the beginning. It also described the dependent and independent variables, ethical concerns, hypotheses, the data analysis plan, and the study's limitations.

3.1 Study design

The study utilized a cross-sectional design and drew data from the 2017 South African National HIV Prevalence, Incidence, and Behaviour Survey (SABSSM V). The sampling frame for this survey was established from the 2015 national population sampling frame, which comprised 84,907 small area layers (SALs) developed by Statistics South Africa (StatsSA, 2017). These SALs were treated as the primary sampling units (PSUs) and included geographical data relevant to urban and rural areas.

The sample encompassed all nine provinces of South Africa, ensuring representation of key national indicators across both urban and rural settings. The data were stratified into various categories, including urban, rural informal, and rural formal areas, resulting in a total of 27 sampling strata (StatsSA, 2017). The survey employed a two-stage sampling design, where probability proportional to size sampling of PSUs was conducted in the first stage, followed by the systematic selection of 15 visiting points (VPs) from each selected SAL in the second stage.

The measure of size (MOS) for the PSUs was derived from the estimated number of VPs from the 2011 Census. A total of 1,000 PSUs were sampled, with disproportionate allocation based on province, race group, and geographic type to ensure adequate representation of diverse populations. Interview eligibility was extended to all households within the selected VPs, with all individuals residing in these households invited to participate in the survey. The study aimed to capture comprehensive data on HIV prevalence, incidence, and associated behaviours among all consenting members of the household, thereby providing critical insights into the HIV epidemic in South Africa (StatsSA, 2017).

3.2 Data source

The 2017 South African National HIV Prevalence, Incidence, and Behaviour Survey (SABSSM V) is a comprehensive population-based survey designed to collect critical data on HIV prevalence, incidence, and associated behaviours among the South African population (Human Sciences Research Council, 2020). Conducted by the Human Sciences Research Council (HSRC), this survey aims to inform policy and guide strategic programs for addressing the HIV epidemic in South Africa. The SABSSM 2017 utilized a structured methodology involving the administration of standardized questionnaires to ensure consistency over time, facilitating monitoring and evaluation (M&E) of health indicators.

The survey focused on various demographic and health-related indicators, including sexual behaviour, knowledge of HIV, and access to healthcare services. This data collection process provides participants with insights into their health status, contributing to broader public health objectives (StatsSA, 2017). The survey's findings are integral to South Africa's National Development Plan (NDP) and align with health-related Sustainable Development Goals (SDGs). By tracking progress towards these goals, the SABSSM V plays a crucial role in evaluating the effectiveness of interventions aimed at controlling the HIV epidemic and improving health outcomes across the country (Human Sciences Research Council, 2020). Data collection for the SABSSM V took place from November 2017 to March 2018, with a total of 12,435 visiting points (VPs) approached, resulting in a household response rate of 82.2%. The survey included a diverse range of participants, ensuring that findings reflect the demographic and geographic diversity of South Africa (Human Sciences Research Council, 2020).

3.3 Study population and sample size

Study Population

The population of interest that this study focused on South African males aged 15-49 years who participated in the survey. The study population was limited to men who reported to being circumcised and not circumcised and are sexually active. All male participants under the age of 15 were excluded from the analysis. This choice was made because the South African Voluntary

Medical Male Circumcision (SA VMMC) program requires individuals to be at least 15 years old due to parental consent regulations. Additionally, many males in this age group lacked data on perception variables, and most had been circumcised because of decisions made by adults. Before conducting the analysis, sampling weights were applied to the data to address potential biases arising from the study design, unequal sampling probabilities, and to account for non-responses.

Sample size.

The SABSSM 2017 had a response rate of 82.2% resulting in 9 656 household. Therein a total of 36,692 women were interviewed and 29,388 men were interviewed resulting in a total of 66,080 participants aged 15 years and older, this total was the data before it weighted (SABSSM, 2017). Due to the study focusing only on males aged 15 and older, females were drop. Resulting on the weighted males successfully interviewed being 27,620,422 (SABSSM, 2017). The data for this study was collected from the Questionnaire for people aged 15 years and older, which provides sufficient information on the demographic and socioeconomic variables that was necessary to examine MC and MSP in South Africa. The study weighted the data to ensure national representativeness as well as addressing any imbalances in sample profiles after data collection.

3.4 Questionnaire Design

The SABSSM is made up of four questionnaires, namely: Household questionnaire (also known as a visiting-point questionnaire), Questionnaire for parents and guardians of children aged 0–11 years, Questionnaire for children aged 12–14 years and Questionnaire for people aged 15 years and older SABSSM ,2017. This study used the Questionnaire for people aged 15 years and older from SABSSM survey as it contains the variables to be used in the study.

3.5 Study variables

3.5.1 Dependent variable

The dependent variable for this study is self-reported MSP that circumcised and uncircumcised men had. In the survey, the question that was used to MSP is “Apart from this person, have you had sexual intercourse with any other person in the last 12 months? In total, with how many

different people have you had sexual intercourse in the last 12 months"? The answers to these questions were "yes I have had sexual intercourse with someone else, I am sleeping with someone else," and "No I only have one person I am having sexual intercourse with." For the aim of this study, MSP was categorised into two categories, and they were '1' = Yes (I have had sexual intercourse with 2 or more people), '0' = No (I do not have more than one sexual partner).

3.5.2 Independent Variable

The main independent variable is circumcision status, which has a binary outcome of "No" or "Yes" to the question "Are you circumcised?" This variable was categorised as uncircumcised (0) and circumcised (1).

3.5.3 Independent Variables

Table 3.2 below demonstrates the variables that were applied in the conduction of this study as briefed by the literature and conceptual framework. Perceived HIV risk is categorised into one category which (1) Do you believe you are at risk of contracting HIV? This variable was included in this study as previous literature has established its effect on health seeking behaviours and HIV preventative measures such as MC (Saragih, 2015). Furthermore, the age first sex was categorised into seven categories to see at what age did the participants have their first sexual encounter: (0) = 15-19 years, (1) = 20-24 years, (2) = 25-29 years, (3) = 30-34 years, (4) = 35-39 years, (5) = 4044 years and (6) = 45-49 years. Condom use is categorised into two, if they have used condom every time with their sexual partner's (1) = Yes, they have used condoms consistently, and (2) = No they have not used condoms consistently. Paid sex is categorised into 2 categories to investigate if the participants have received money or paid money for sex, (1) = Yes, they have; followed by (2) = No, they have not. In the Risk Compensation Theory, perceived risk is the most important predictor of behaviour change.

In this study, age, province of residence and type of place of residence, education, and population group were controlled for. The age of the participants is categorised into seven: (0) = 15-19 years, (1) = 20-24 years, (2) = 25-29 years, (3) = 30-34 years, (4) = 35-39 years, (5) = 40-44 years and (6) = 45-49 years. Province of residence is including all nine South African provinces. Type of place of residence is categorised as (0) rural and (1) urban. This study also controlled for education categorised into (0) primary education, (combining no education, primary education completed and primary education incomplete), (1) secondary education (Complete secondary education and incomplete secondary education), and (2) tertiary education. Population group is categorised as (0) Black African, (1) White, (2) Coloured, (3) Indian/Asian.

Table 3. 2 Variables used in the Study.

Variable	**Definition**	**Variable code and Category**
	Dependant Variable	
MSP	Do you have two or more sexual partners now?	0 = No (I have 2 or more sexual partners now) 1 = Yes (I do not have 2 or more sexual partners now)
	Independent Variable	
Circumcision status	Are you circumcised?	0= Uncircumcised 1= Circumcised.
	Socio-demographic variables	
Age	The current age of the respondent based on the category	0 = 15-19 years. 1 = 20-24 years. 2 = 25-29 years 3 = 30-34 years 4 = 35-39 years 5 = 40-44 years 6 = 45 -49 years
Education background	Level of education completed	0 = Primary education 1 = Secondary education2= Tertiary education.
Place of Residence	Resident type rural or urban	0 = rural 1 = urban

Province	Province of residence	0 = Western Cape 1 = Eastern Cape 2 = Northern Cape 3 = Free-State 4 = KwaZulu-Natal 5 = North-West 6 = Gauteng 7 = Mpumalanga 8 = Limpopo
Population group	The population group that the respondent consider himself to be.	0 = Black African 1 = White 2 = Coloured 3 = Indian/Asian
	Perceived Susceptibility	
Perceived HIV Risk	Do you believe you are at risk of contracting HIV?	0 = Yes 1 = No
	Risk/behaviours factors	
Age first sex	How old were you when you sex for the first time?	0 = 15-19 years. 1 = 20-24 years.2 = 25-29 years 3 = 30-34 years 4 = 35-39 years 5 = 40-44 years 6 = 45 -49 years
Condom use	Do you use condoms with your sexual partners?	0 = Yes 1 = No
Paid sex	Have you ever paid, received money or gift in exchange for sex?	0 = Yes 1 = No

3.7 Ethical Considerations

The 2017 South African National HIV Prevalence, Incidence, Behaviour and Communication Survey (SABSSM) provided the secondary data used in this study. Due to the anonymity of the study, no participant agreement nor ethics approval were necessary. Participants were not contacted during the data collection for this study. While participant information, such as names, identity

numbers, etc., was not made public in the survey or associated datasets, no privacy violations occurred. The Department of Demography and Population Studies at the University of the Witwatersrand also received an application for ethics. After that, permission to conduct this study was given with a waiver of ethics. In the end, the study received the following ethical number: **WDEMG2023/07/01.**

3.8 Data Analysis

The study used a bivariate analysis between each independent variable and the dependent (outcome) variable for the first objective. By using a multivariate analysis to determine the relationship between the study's independent variables and MSP, the study's second objective was achieved. In this stage of the data analysis, a binary logistic regression was used. Each element of the statistical analysis plan was described in detail in the study's following section.

Objective 1: To describe the prevalence of MSP among males over the age 15 years.

The distribution of the study sample in relation to the background characteristics of men was obtained to show the prevalence of MSP in South Africa. Using weighted parameters from the 2017 SABSSM, for the univariant results; frequencies and percentage distributions were produced and a Pie chart. MSP and each of the study's independent variables were then subjected to a bivariate analysis. The outcome variable, primary independent variable, and control variables were all cross tabulated and weighted. Chi-square tests were used to evaluate bivariate associations, allowing the study to determine the strength of the basic correlations between MSP and the study's independent variables. The chi-square test considered and interpreted associations registered at $P<0.05$ as statistically significant. MC, age, education level, location of residence, province, demographic group, perceived risk of HIV, age at first sex, condom use, and paid sex were the independent variables that were examined in the study. A table labelled 4.1 below was used to present the bivariant results.

Objective 2: To examine the association between male MC and number of MSP among males aged 15 years and above in South Africa, while controlling for socio-demographic factors.

To look at the relationship between MC and MSP in men aged 15 and older while considering their age, education, place of residence, province, social class, perception of their risk of contracting HIV, age at first sex, condom use, and paid sex. The study used a binary logistic regression to do a multivariate analysis because the survey's results were categorised as either yes or no in binary responses. The results of the binary logistic regression, including both the unadjusted and modified models, were displayed in tabular format. The adjusted binary logistic regression simultaneously tested all of the independent factors in the model against the outcome while the unadjusted binary model regression looked at associations between each independent variable and MSP.

Odds ratios greater than 1.00 were considered as "more likely" in favour of the outcome, while odds ratios less than 1.00 were interpreted as "less likely" against the study's Intended outcome. At the 95% level of confidence, outcomes with a p-value score of 0.05 or less were considered statistically significant.

The following format was used to calculate the logistic model using Stata statistical software:

$$Logit\ (Y)\ = \binom{\pi}{1-n} = \alpha\ +\ \beta_1 X_1 +\ \beta_2 X_2 \ldots\ldots\ldots..$$

Thus,

$$\pi = Probability\ \{Y = outcome\ of\ interest | X_1 = x_1 X_2 = x_2\}$$

$$\frac{e^{\alpha+\beta_1 X_1+\beta_2 X_2}}{1+e^{\alpha+\beta_1 X_1+\beta_2 X_2}}$$

Where **π** is the success chance that an observation belongs to a particular binary category

Y variable (MSP)

α = intercept

β = regression coefficients

Xs = the study independent variables

3.9 Data Management

Data management and statistical analysis were performed using Stata 13, which is equipped to handle survey data analysis. This capability is essential because the sampling design influences both the computation of point estimates and their standard errors (Institute for Digital Research and Education, 2019). Due to the sampling design, certain individuals may have varying probabilities of being selected. To address this, the data were weighted prior to analysis to mitigate bias at the enumeration area, household, and individual levels, and to account for non-responses (Shisana et al., 2014). This approach ensured that the final sample accurately represented the South African population in terms of age, educational background, race, locality type, and province (Shisana et al., 2014). The sampling weight impacts the calculation of point estimates, while stratification and/or clustering influence the standard errors (Institute for Digital Research and Education, 2019).

Neglecting the clustering may result in underestimated standard errors, potentially leading to misleadingly significant statistical results (Institute for Digital Research and Education, 2019). The data will be analysed at univariate, bivariate, and multivariate levels. The survey data used in the analysis contained some missing values or non-responses. These were incorporated using the missing option during tabulations in Stata and were reflected in the descriptive statistics tables for the study population characteristics by variable. However, complete case analysis was applied for regression models and bivariate associations.

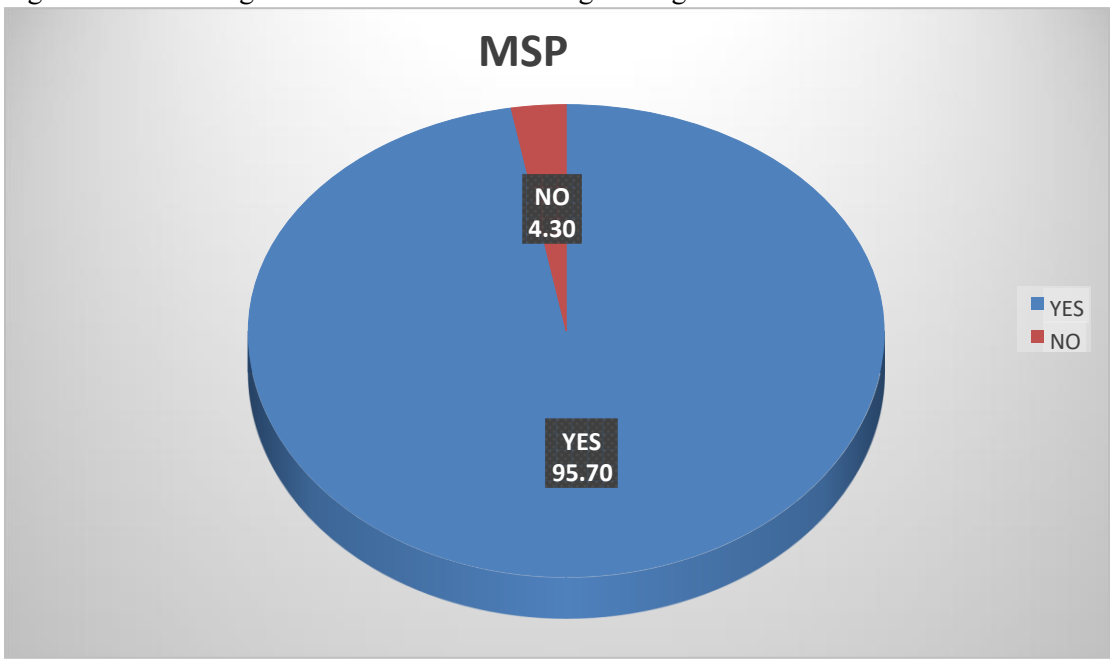
CHAPTER FOUR: RESULTS

The findings of this investigation are presented in this chapter. The findings pertaining to the study's first objective are initially provided. This includes the prevalence of MSP in South Africa. A univariate and bivariate analysis was conducted to provide the first objective response. The background characteristics of men and the prevalence of MSP in South African men over the age of 15 are included in the univariate analysis. Using the chi-square test and cross-tabulation, the bivariate analysis evaluated MSP in conjunction with the study's independent variables. The second data presentation refers to the study's secondary objective, which was to investigate the relationship between MC and MSP in males older than 15 years.

4.1 Prevalence of MSP among men aged 15 and older in South Africa

The study aimed to assess the prevalence of MSP among men aged 15 and older in South Africa. Through a univariate analysis of the frequency distribution, the study found that 4.30% of men in this age group of 15 years and older reported “NO” in having MSP, when asked whether they have two or more sexual partners. While 95.70% of men in this age group of 15 years and older reported “YES” in having MSP, when asked whether they have two or more sexual partners. This data indicates a high prevalence of men with MSP in the specified age group in South Africa.

Figure 4. 1 Percentage distribution of MSP among men aged 15 and older.



4.2. Descriptive Characteristics of the Study Population

Looking at the table below, 95.70 % men reported to have MSP, which is high given that MSP is one of the drives for HIV epidemic only 4.30% men of the population study stated that they do not have MSP (Table 4.1). Furthermore, when looking at the alternative measure that is used to reduce the chances of contracting HIV, which is male circumcision. Just over half of the men reported to be circumcised (55.62%), which is not that high given the aim of this preventative measure, while 44.38% were not circumcised. Which highlights the need to increase the MC preventative measure and drop the HIV epidemic drive MSP. When looking at the age differences that dominated the study men aged 15 -19 made 38.63% of the study population followed by men aged 45-49 years old at 18.80%.

Furthermore, men aged between 25-29 years old made 9.96% followed by men aged 30-34 at 9.54%. The percentages of age differences start to drop from men aged 20-24 at 9.07%, followed by men aged 35-39 at 7.76% and the lowest age group of men in the study is 40-45 years old at 6.25%. Looking the educational background of the men who partake the study, 57.28% had primary education which is the highest, followed by secondary education at 34.65% making tertiary education background at 8.07%. When looking at the place of residence 66.96% of men reported from the rural place, while 33.04% reported to be from the urban areas. Rural places are known to have issues when it comes to access of human needs, compared to urban areas. South Africa has 9 provinces, Gauteng is the first province to have most men who partake at the study with 26.21%, followed by KwaZulu-Natal at 18.22%, and Western Cape at 11.94% as well as Eastern Cape at 11.38%.

Furthermore, the following provinces are the ones with fewer participants; Limpopo at 9.94%, Mpumalanga with 8.22, followed by Northwest at 6.92% Free-State at 5.01% and Northern Cape being the lowest at 2.17%. Diversity and inclusivity are important when doing a human study, therefore when looking at the race of men who partake the study; Black men are the majority as they make 81.24%, followed Coloured 8.84%, and White 8.11% the lowest was Indian men at 1.80%.

As the study is investigating one of the risky behaviours that contribute to HIV epidemic, it is important to find out more about the participants perceived susceptibility to HIV risk. Men who reported that they are at risk of contracting HIV made 55.58% and the remaining 44.42% reported that they are not at risk. When looking at the first age these men had sex, 87.20% of the men reported that between the ages of 15-19 years of age it was when their first sexual intercourse, followed by 20-24 years old at 9.86% and 25-29 years old at 2.26%. Furthermore, from the ages of 30-34 the rate dropped to 0.51%, 35-39 it was 0.11% and, the lowest being 40-44 at 0.02% and 45-49 years at 0.05%.

When investigating the condom use amongst these men, 66.53% reported to be using condoms when have sexual intercourse and 33.47% reported that they do not use condoms when having intercourse, which is it a sexual risky behaviour. To investigate if men do pay for sexual intercourse, when asked to have they ever paid, received money or gift in exchange for sex? 68.80% of men reported Yes, they have been compared to the ones who said No at 39.20% they were not paid for sex.

Table 4. 1 Weighted Frequency and Percentage Distributions of Sample Characteristics

Variable	FREQUENCY (n)	PERCENTAGE (%)
MSP		
Yes	26 431 715,1	95.70 %
No	1 188 707	4.30 %
Male Circumcision		
Yes	15 362 816,6	55.62 %
No	12 257 605,6	44.38 %
Age		
15-19	10 669 990,4	38.63 %
20-24	2 504 334	9.07 %
25-29	2 751 293	9.96 %
30-34	2 635 256	9.54 %
35-39	2 142 780	7.76 %
40-44	1 725 089	6.25 %
45-49	5 191 678	18.80 %

Educational background		
Primary Education	15 821 342,7	57.28 %
Secondary Education	9 569 517	34.65 %
Tertiary Education	2 229 563	8.07 %
Place of residence		
Rural	18 493 467,7	66.96 %
Urban	9 126 954	33.04 %
Province		
Western Cape	3 297 612	11.94 %
Eastern Cape	3 142 230	11.38 %
Northern Cape	598 976,56	2.17 %
Free-State	1 383 236	5.01 %
KwaZulu-Natal	5 033 588	18.22 %
North-West	1 910 178	6.92 %
Gauteng	7 239 182	26.21 %
Mpumalanga	2 269 254	8.22 %
Limpopo	2 746 167	9.94 %
Population group		
Black African	22 439 649,4	81.24 %
Coloured	2 442 184	8.84%
Indian	498 433.48	1.80 %
White	2 240 156	8.11 %
Do you believe you are at risk of contracting HIV?		
Yes	15 351 198	55.58 %
No	12 269 224.1	44.42 %
Age at first sex		
15-19	24 084 418.8	87.20 %
20-24	2 723 413	9.86 %
25-29	623 208,69	2.26 %
30-34	140 530,68	0.51 %
35-39	31 093 351	0.11 %
40-44	4 252 642,3	0.02 %

45-49	13 505 366,9	0.05 %
Condom use		
Yes	18 377 141,6	66.53 %
No	9 243 280	33.47 %
Paid sex		
Yes	16 794 324,3	68.80 %
No	10 826 097,8	39.20 %
Total	**27 620 422,1**	**100 %**

Note: Inconsistencies in the total number for all the above variables is due to missing cases.

4.3 Bivariate associations between predictor variables and MSP in South Africa

To show the relationship between the MSP and other independent variables in the study, a bivariate analysis was used. Men who claim having MSP and being circumcised make up 94.04% of the population, while the largest proportion of males who report having multiple partners and not being circumcised is 97.77%. (chi2= 98.73; $p<0.05$) There was statistically significant association between MC and MSP. Men with MSP in urban areas, 97,11% of the population, while males with MSP in rural areas, were 95.00 % of the population. (chi2=36.86; $p<0.05$) indicated that there was statistically significant relationship between MSP and residential area.

Men between the ages of 15 to 19 that have MSP were (99.02%), followed by men between the ages of 45-49 that have MSP were (97.16), men between the ages of 40-44 that have MSP were, (95.32) men between the ages of 35-39 that have MSP (95.10), men between the ages of 3034 that have MSP were (92.13), men between the ages of 20-24 that have MSP were (90.16), compared to men between the ages of 25 to 29 who had MSP (89.23%). Age and MSP were shown to be statistically significantly associated (chi2=70.00; $p<0.05$). Men with primary education made up the majority of those with MSP in terms of educational attainment (98.11%), followed by those with tertiary education (93,92%) and secondary education being (92,13%). It was shown that there was statistically significant relationship between education level and MSP (chi2=36.86; $p<0.05$).

Men from Mpumalanga made up the highest proportion of men with MSP by province (97,29%), followed by men from the KwaZulu-Natal (97,10%), Eastern Cape (96,48%), Northern Cape (96,29%), Western Cape (95,93%), North-West (95,74%), Limpopo (95.25%), Free-State

(94,26%), and Gauteng (94,15%). Province and MSP were found to be statistically significantly associated (chi2=74.96; p<0.05). According to which race has MSP, White males made up to (97,33%) men with MSP, while Indian males made (96,51%) followed by coloured men (96.00%) of men with MSP and lastly Black African made (95.48%) men with MSP. There was no statistically significant relationship between race and MSP (chi2=5.24; p<0.15). Men who believe they are at risk of contracting HIV and had MSP (93.88%), whereas men who believe they are not at risk of contracting HIV and had MSP (97,97%). It was shown that there was a statistically significant relationship between MSP and Having tested for HIV (chi2=28.44; p<0.05).

Men who reported having sex for the first time between the ages of 40 and 44 made up the largest percentage of males with MSP (100%), men who reported having sex for the first time between the ages of 45 and 49 made up the largest percentage of males with MSP (100%), Men who reported having sex for the first time between the ages of 35 and 39 made up the second largest percentage of males with MSP (98,46%). Men who reported having sex for the first time between the ages of 30 and 34 with MSP (98,15%), Men who reported having sex for the first time between the ages of 20 and 24 with MSP (94,50%). Men who reported having sex for the first time between the ages of 25 and 29 with MSP (94,46%) as compared to men who had their first sexual experience between the ages of 15 and 19 with MSP (91.09%). It was shown that there was statistically significant relationship between the age at first sex and MSP (chi2=15.58; p<0.05).

In comparison to males who use condoms and have MSP (96,97%), men who do not use condoms and with MSP make up to (93,16%). It was shown that there was a statistically significant link between condom use and MSP (chi2=33,46; p<0.05). Finally, compared to males who have MSP but have not paid for sex (90,15%), men who have paid for sex had a higher percentage of MSP (99,27%). It was shown that there was a statistically significant relationship between paid sex and MSP (chi2=42.83; p<0.05).

Table 4. 2 Bivariate associations between predictor variables and MSP in South Africa.

Variable	**MSP (%) YES**	**MSP (%) NO**
Male Circumcision		
Yes	14,447,504 (94.04)	915,321.3 (5.96)
No	11,984,211 (97.77)	273,394.7 (2.23)

		Pearson chi2(1) = 98.7375; Pr = 0.000
Age		
15-19	10,564,932 (99.02)	105,058.6 (0.98)
20-24	2,257,848.9 (90.16)	246,485.3 (9.84)
25-29	2,455,030.7 (89.23)	296,262.6 (10.77)
30-34	2,427,791.6 (92.13)	207,464.9 (7.87)
35-39	2,037,732.7 (95.10)	105,047.7 (4.90)
40-44	1,644,390.9 (95.32)	85,698.35 (4.68)
45-49	5,043,988.6 (97.16)	147,689.6 (2.84)
		Pearsonchi2(6) =790.079; Pr = 0.000
Educational background		
Primary Education	15,521,750 (98.11)	299,592.4 (1.89)
Secondary Education	8,815,974.5 (92.13)	753,542.2 (7.87)
Tertiary Education	2,093,990.3 (93.92)	135,572.4 (6.08)
		Pearson chi2(2) =700.041; Pr = 0.000
Place of residence		
Rural	17,568,216 (95.00)	925,251.6 (5.00)
Urban	8,863,499 (97.11)	263,455.4 (2.89)
		Pearson chi2(1) = 36.8679; Pr = 0.000
Province		
Western Cape	3,163,499.3 (95.93)	134,112.4 (4.07)
Eastern Cape	3,031,733.4 (96.48)	110,496.5 (3.52)
Northern Cape	576,740 (96.29)	22,236.59 (3.71)
Free-State	1,303,882.8 (94.26)	79,353.24 (5.74)
KwaZulu-Natal	4,887,723.4 (97.10)	145,864.3 (2.90)
North-West	1,828,752.3 (95.74)	81,425.52 (4.26)
Gauteng	6,815,962.3 (94.15)	423,219.3 (5.85)
Mpumalanga	2,207,681.8 (97.29)	61,572.07 (2.71)
Limpopo	2,615,739.9 (95.25)	130,427 (4.75)
		Pearson chi2(8) = 74.9686; Pr = 0.000
Population group		
Black African	21,425,983 (95.48)	1,013,666.5 (4.52)
Coloured	2,344,421.3 (96.00)	97,762.229 (4.00)

Indian	481,022.2 (96.51)	17,411.24 (3.49)
White	2,180,288.7 (97.33)	59,866.99 (2.67)
		Pearson chi2(3) = 5.2491; Pr = 0.154
Do you believe you are at risk of contracting HIV?		
Yes	14,411,134 (93.88)	940,064.1 (6.12)
No	12,020,581 (97.97)	248,642.9 (2.03)
		Pearsonchi2(1) = 284.412; Pr = 0.000
Age at first sex		
15-19	9,926,729.3 (91.09)	970,859.2 (8.91)
20-24	2,573,518.9 (94.50)	149,893.6 (5.50)
25-29	588,714 (94.46)	34,494.65 (5.54)
30-34	137,937.7 (98.15)	2,592.965 (1.58)
35-39	30,614.55 (98.46)	478,800.33 (1.54)
40-44	4,252.642 (100.00)	0
45-49	13,505.37 (100.00)	0
		Pearsonchi2(1) =15.5822; Pr = 0.016
Condom use		
Yes	17,820,476 (96.97)	556,665.2 (3.03)
No	8,611,238.7 (93.16)	632,041.8 (6.84)
		Pearsonchi2(1) = 43.4676; Pr = 0.000
Paid sex		
Yes	16,672,069 (99.27)	122,255.5 (0.73)
No	9,759,646.3 (90.15)	1,066,451.5 (9.85)
		Pearson chi2(1) = 42.8394; Pr = 0.000

***Significance level p<0.05*

4.4. The association between MC and MSP among men aged 15 and older while controlling for sociodemographic variables.

Examining the relationship between MC and MSP in men aged 15 and older while adjusting for sociodemographic factors was the study's second objective. Binary regression models, both unadjusted and adjusted, have been used to achieve this. This section presents the study's unadjusted odds ratios (UOR) to show the relationship between the background variables of the study and MSP among South African men aged 15 and older.

Table 4. 3 Bivariate association between independent variables, MC and MSP in South Africa

Variables	UOR	P-Value	C-I	AOR	P-Value	C-I
MC						
Yes	0.36	0.00**	0.35 – 0.36	0.82	0.00**	0.81 – 0.82
No	1					
Age						
15-19	1					
20-24	10.9	0.00**	10.8 – 11.0	0.90	0.00**	0.89 – 0.90
25-29	12.1	0.00**	12.0 – 12.2	0.81	0.00**	0.81 – 0.82
30-34	8.59	0.00**	8.52 – 8.65	0.54	0.00**	0.54 – 0.55
35-39	5.18	0.00**	5.13 – 5.22	0.32	0.00**	0.31 – 0.32
40-44	4.93	0.00**	4.88 – 4.98	0.30	0.00**	0.29 – 0.30
45-49	2.94	0.00**	2.92 – 2.96	0.22	0.00**	0.21 – 0.22
Educational background						
Primary Education	1					
Secondary Education	4.42	0.00**	4.40 – 4.44	1.25	0.00**	1.25 – 1.26
Tertiary Education	3.35	0.00**	3.33 – 3.37	1.18	0.00**	1.17 – 1.18
Place of residence						
Rural	1					
Urban	0.56	0.00**	0.56 – 0.57	0.72	0.00**	0.72 – 0.73
Province						
Western Cape	1					

Eastern Cape	0.86	0.00**	0.85 – 0.86	1.05	0.00**	1.04 – 1.06
Northern Cape	0.91	0.00**	0.89 – 0.92	1.07	0.00**	1.06 – 1.09
Free-State	1.43	0.00**	1.42 – 1.44	1.29	0.00**	1.28 – 1.30
KwaZulu-Natal	0.70	0.00**	0.69 – 0.70	0.79	0.00**	0.78 – 0.80
North-West	1.05	0.00**	1.04 – 1.05	1.12	0.00**	1.11 – 1.14
Gauteng	1.46	0.00**	1.45 – 1.47	1.18	0.00**	1.17 – 1.19
Mpumalanga	0.65	0.00**	0.65 – 0.66	0.60	0.00**	0.59 – 0.61
Limpopo	1.17	0.00**	1.16 – 1.18	1.40	0.00**	1.38 – 1.41
Population group						
Black African	1					
Coloured	0.88	0.00**	0.87 – 0.88	1.08	0.00**	1.07 – 1.09
Indian	0.76	0.00**	0.75 – 0.77	0.96	0.00**	0.95 – 0.98
White	0.58	0.00**	0.57 – 0.58	0.56	0.00**	0.55 – 0.56
Do you believe you are at risk of contracting HIV?						
Yes	1					
No	0.31	0.00**	0.31 – 0.32	0.83	0.00**	0.83 – 0.84
Age at first sex						
15-19	1					
20-24	0.59	0.00**	0.59 – 0.60	0.89	0.00**	0.88 – 0.89
25-29	0.59	0.00**	0.59 – 0.60	1.10	0.00**	1.09 – 1.11
30-34	0.19	0.00**	0.18 –0.19	0.50	0.00**	0.48 – 0.52
35-39	0.15	0.00**	0.14 –0.17	0.45	0.00**	0.41 – 0.50
40-44	1					
45-49	1					

Condom use						
Yes	1					
No	2.34	0.00**	2.34 – 2.35	1.14	0.00**	1.14 –1.15
Paid sex						
No	1					
Yes	14.9	0.00**	14.8 – 14.9	2.96	0.00**	2.94 –2.98

1 = Reference Category, **p < 0.05 represents significant results at 95% level of confidence, Unadjusted Odds Ratio = UOR

The Unadjusted Odds Ratio according to Table 4.3, circumcised men had a significantly less likelihood risk of having MSP than non-circumcised males (UOR: 0.36; p<0.05 CI: 0.35 -0.36). Men who lived in urban regions had a significantly less risk of MSP than men who lived in rural areas (UOR: 0.58; p<0.05; CI: 0.57-0.58).

Men between the ages of 20 and 24 were significantly more likely than men between the ages of 15 and 19 to have MSP (UOR: 10.9; p<0.05; CI: 10.8 -11.0). Men between the ages of 25 and 29 were significantly more likely than men between the ages of 15 and 19 to have MSP (UOR: 12.1; p<0.05; CI: 12.0 -12.2). Men between the ages of 30 and 34 were significantly more likely than men between the ages of 15 and 19 to have MSP (UOR: 8.59; p<0.05; CI: 8.52 -8.65). Men between the ages of 35 and 39 were significantly more likely than men between the ages of 15 and 19 to have MSP (UOR: 5.18; p<0.05; CI: 5.13 -5.22). Men between the ages of 40 and 44 were significantly more likely than men between the ages of 15 and 19 to have MSP (UOR: 4.93; p<0.05; CI: 4.88 -4.98). Men between the ages of 45 and 49 were significantly more likely than men between the ages of 15 and 19 to have MSP (UOR: 2.94; p<0.05; CI: 2.92 -2.96).

Men with secondary education were more likely to have MSP than males with primary education, according to education level (UOR: 4.42; p<0.05; CI: 4.40-4.44). Compared to males with primary education, men with tertiary education had a more risk of MSP (UOR: 3.35; p<0.05; CI: 3.33-3.37).

Men from the Gauteng were noticeably more likely than men from Western Cape to have MSP, (UOR: 1.46; p <0.05; CI: 1.45-1.47). As comparison to men from Western Cape, men from the Free-State had a higher likelihood of having MSP (UOR: 1.43; p<0.05; CI: 1.42-1.44). As comparison to men from Western Cape, men from Limpopo were more likely to have MSP (UOR: 1.17; p<0.05; CI: 1.16-1.18). When compared to men from the Western Cape, men from North-west were more likely to have MSP (UOR: 1.05; p=<0.05; CI: 1.04-1.05). As comparison to men from Western Cape, men from the Northern Cape had a less likelihood of having MSP (UOR: 0.91; p<0.05; CI: 0.89-0.92). As comparison to men from the Western Cape, men from Eastern Cape were less likely to have MSP (UOR: 0.86; p<0.05; CI: 0.85-0.86).

As comparison to men from Western Cape, men from KwaZulu-Natal were less likely to have MSP (UOR: 0.70 p<0.05; CI: 0.69-0.70). As comparison to men from the Western Cape, men from Mpumalanga were less likely to have MSP (UOR: 0.65; p<0.05; CI: 0.65-0.66). Comparing Black or African men, coloured men had a significantly lower likelihood of having MSP (UOR: 0.88; p<0.05; CI: 0.870.88). Contrarily, compared to Black or African men, Indian men were less likely to have many partners (UOR: 0.76; p<0.05; CI: 0.75-0.77). compared to Black or African men; White men were less likely to have many partners (UOR: 0.58; p<0.05; CI: 0.57-0.58). Men who believed they are not at risk of contracting HIV had a significantly lower likelihood of having MSP (UOR: 0.31; p<0.05; CI: 0.31 – 0.32), as comparison men who reported to be at risk of HIV.
Men who had their first sexual intercourse between the ages of 20 and 24 were significantly less likely than men between the ages of (15 -19), (40-44) and (45-49) to have MSP (UOR: 0.59; p<0.05; CI: 0.59 -0.60). Men who had their first sexual intercourse between the ages of 25 and 29 were significantly less likely than men between the ages of (15 -19), (40-44) and (45-49) to have MSP (UOR: 0.59; p<0.05; CI: 0.59 -0.59). Men who had their first sexual intercourse between the ages of 30 and 34 were significantly less likely than men between the ages of (15 -19), (40-44) and (45-49) to have MSP (UOR: 0.19; p<0.05; CI: 0.18 -0.19).

Men who had their first sexual intercourse between the ages of 35 and 39 were significantly less likely than men between the ages of (15 -19), (40-44) and (45-49) to have MSP (UOR: 0.15; p<0.05; CI: 0.14 -0.17). Men who do not use condoms are more likely to have MSP than men who use them (UOR: 2.34; p<0.00; CI: 2.34-2.35). Men who do pay for sex are more likely to have

MSP than men who do not pay (UOR: 14.9; p<0.05; CI: 14.8-14.9). The Adjusted Odds Ratio according to Table 4.3, circumcised men had a significantly less likelihood of having MSP than non-circumcised males (AOR: 0.82; p<0.05; CI: 0.81 -0.82). Men who lived in Urban regions had a significantly lower likelihood of MSP than men who lived in rural areas (AOR: 0.72; p<0.05; CI: 0.72 -0.73).

Men between the ages of 20 and 24 were significantly less likely than men between the ages of 15 and 19 to have MSP (AOR: 0.90; p<0.05; CI: 0.89 -0.90). Men between the ages of 25 and 29 were significantly less likely than men between the ages of 15 and 19 to have MSP (AOR: 0.81; p<0.05; CI: 0.81 -0.82). Men between the ages of 30 and 34 were significantly less likely than men between the ages of 15 and 19 to have MSP (AOR: 0.54; p<0.05; CI: 0.54 -0.55). Men between the ages of 35 and 39 were significantly less likely than men between the ages of 15 and 19 to have MSP (AOR: 0.32; p<0.05; CI: 0.31 -0.32).

Men between the ages of 40 and 44 were significantly more likely than men between the ages of 15 and 19 to have MSP (AOR: 0.30; p<0.05; CI: 0.29 0.30). Men between the ages of 45 and 49 were significantly less likely than men between the ages of 15 and 19 to have MSP (AOR: 0.22; p<0.05; CI: 0.21-0.22). Men with secondary education were more likely to have MSP than males with primary education, according to education level (AOR: 1.25; p<0.05; CI: 1.25-1.26). Men with tertiary education were more likely to have MSP than males with primary education, according to education level (AOR: 1.18; p<0.05; CI: 1.17-1.18). Men from the Limpopo were noticeably more likely than men from the Western Cape to have MSP (AOR: 1.40; p<0.05; CI: 1.38 – 1.41). Men from the Free-State were noticeably more likely than men from the Western Cape to have MSP (AOR: 1.29; p<0.05; CI: 1.28-1.30). As comparison to men from the Western Cape, men from the Gauteng had more likelihood of having MSP (AOR: 1.18; p<0.05; CI: 1.17-1.19). As comparison to men from the Western Cape, men from the North-West were more likely to have MSP (AOR: 1.12; p<0.05; CI: 1.11 – 1.14). When compared to men from the Western Cape, men from Northern Cape had a higher risk of MSP (AOR: 1.07; p=0.05; CI: 1.06-1.09).

As comparison to men from Western Cape, men from the Eastern Cape had more likelihood of having MSP (AOR: 1.05; p<0.05; CI: 1.04-1.06). As comparison to men from Western Cape, men from KwaZulu-Natal were less likely to have MSP (AOR: 0.79; p<0.05; CI: 0.78-0.80). As

comparison to men from the Western Cape, men from Mpumalanga were less likely to have MSP (AOR: 0.60; p<0.05; CI: 0.59-0.61). Comparing Black males to coloured men, coloured men had a significantly more likelihood of having MSP (AOR: 1.08; p<0.05; CI: 1.07 - 1.09). Contrarily, compared to Black men, Indian men were less likely to have many partners (AOR: 0.96; p<0.05; CI: 0.95 – 0.98). compared to Black men; White men were less likely to have many partners (UOR: 0.56; p<0.05; CI: 0.55 – 0.56).

Men who believe they are not at risk to contract HIV had a significantly lower likelihood of having MSP (AOR: 0.83; p<0.05; CI: 0.83 – 0.84), as comparison men who reported to be at risk for HIV. Men who had their first sexual intercourse between the ages of 20 and 24 were significantly less likely than men between the ages of (15 -19), (40-44) and (45-49) to have MSP (AOR: 0.89; p<0.05; CI: 0.88 -0.89). Men who had their first sexual intercourse between the ages of 25 and 29 were significantly more likely than men between the ages of (15 -19), (40-44) and (45-49) to have MSP (AOR: 1.10; p<0.05; CI: 1.09 -1.11).

Men who had their first sexual intercourse between the ages of 30 and 34 were significantly less likely than men between the ages of (15 -19), (40-44) and (45-49) to have MSP (AOR: 0.50; p<0.05; CI: 0.48 -0.52). Men who had their first sexual intercourse between the ages of 35 and 39 were significantly less likely than men between the ages of (15 -19), (40-44) and (45-49) to have MSP (AOR: 0.45; p<0.05; CI: 0.41 -0.50). Men who do not use condoms are more likely to have MSP than men who use condoms (AOR: 1.14; p<0.05; CI: 1.14– 1.15). Men who pay for sex are more likely to have MSP than men who do not (AOR:
2.96; p<0.05; CI: 2.94 – 2.98).

CHAPTER FIVE: DISCUSSION OF FINDINGS AND CONCLUSION

5.1 Introduction

This research sought to fill a gap in the current literature by exploring the relationship between male circumcision (MC) and risky sexual behaviors. Specifically, it investigated the connection between MC and multiple sexual partnerships (MSP), the prevalence of MSP, and the correlation between MC and the number of MSP among males aged 15 and older in South Africa. Socio-demographic factors were also considered in the analysis. The findings are discussed in relation to the research questions, followed by an evaluation of the study's strengths and limitations. Additionally, the theoretical and practical implications are addressed, along with suggestions for future research.

5.2 Key findings and discussion.

The study revealed the following results according to its objectives: MSP among Males aged 15 years and above in South Africa: The study found that 95.70% of men aged 15 and older reported having MSP, indicating a high prevalence of MSP within this demographic group. Specifically, 4.30% of men in this age group reported no instances of having MSP, while the vast majority reported engaging in this behaviour. Similar to the study conducted by Zuma et al., (2016) that was looking at the key findings from the National HIV Prevalence, Incidence and Behaviour Survey in 2012; The result of MSP is that there has been an increase over the years than decrease in South Africa. The data on MSP at the national level reflects a significant escalation from 11.5% in 2002 to 18.3% in 2012, indicating a concerning trend among the population aged between 15 and 24 years (Zuma et al., 2016).

This rise is further emphasised by the fact that among sexually active youth in this age group, the rate of MSP was 22.4%, which is twice the national average. Furthermore, among males aged 15-24 years, the rate of having MSP simultaneously increased from 23.0% to 37.5% within a decade, highlighting the severity of this issue (Zuma et al., 2016). The study's findings suggest that MSP is a significant driver of the HIV epidemic in South Africa, emphasising the need for targeted interventions to address this risky behaviour. In support with the study conducted by Zuma et al.,

(2016) the risk of contracting HIV through MSP was estimated to be as high as 79% among individuals aged between 15 and 24 years, as evidenced by a national study (Zuma et al., 2016).

Additionally, the study indicates a concerning lack of uptake of MC as a preventative measure, with only just over half of the men reporting being circumcised. This highlights the importance of increasing the use of MC as a strategy to reduce the prevalence of MSP and its contribution to the HIV epidemic. With regards to association between MSP and MC among males aged 15 years and above, controlling for other sociodemographic variables: The study found that males who were circumcised were less likely to have multiple sexual partners compared to uncircumcised males. Specifically, the odds ratio for MSP was (AOR 0.82; p<;0.05; CI: 0.81–0.82) among circumcised males.

Previous studies have consistently shown that male circumcision is not associated with MSP. For example, a systematic review and meta-analysis found that male circumcision is not associated with any risk sexual behaviour including MSP (PP −0.4, 95% CI −2.4 to 1.6, p=0.67) among men in KwaZulu-Natal, South Africa (Ortblad et al., 2019). Another study in South Africa did not find any significant association between medical male circumcision and factors like multiple sexual partners (Okhue & Mash, 2022). The current study's findings support the existing literature on the protective effect of male circumcision against STIs. However, the study also highlights the importance of considering the specific context and population in which the research is being conducted. For instance, the study found that the association between circumcision and MSP was stronger among males that do not use condoms compared to knows who use condoms.

MSP was associated with demographic factors which include the type of residence; men from urban area were less likely to have MSP compared to men from the rural areas (AOR: 0.72; p<;0.05; CI: 0.72 -0.73). The literature shown that urbanization is associated with increased sexual risk behaviors, including multiple sexual partners. For example, a study in South Africa found that urban males were more likely to engage in risky sexual behaviors compared to their rural counterpart (Odimegwu & Ugwu, 2024).

Another study in sub-Saharan Africa found that urbanization was a significant predictor of multiple sexual partnerships among young people (Sathiyasusuman, 2015). This study findings support the existing literature on the association between urbanization and multiple sexual partnerships.

However, the study also highlights the importance of considering the specific context and population in which the research is being conducted. For instance, the study found that the association between rural residence and MSP was stronger among males that do not use condoms compared to males that use condoms. The results suggest that urbanization is an important factor in the prevalence of multiple sexual partners among males in South Africa. The increased exposure to sexual stimuli and peer pressure in urban areas may contribute to the higher likelihood of engaging in multiple sexual partnerships. Additionally, the study's findings underscore the need for targeted interventions aimed at reducing sexual risk behaviors among young people in rural areas.

Furthermore, secondary educational background (AOR: 1.25; p<;0.05; CI: 1.25-1.26), Previous studies have consistently shown that education is associated with multiple sexual partners. For example, a study conducted in South Africa found that males with higher prevalence of education were more likely to engage in risky sexual behaviors compared to those with lower prevalence of education (Onoya et al., 2016), which is similar to what this study has found as well. Furthermore, a study in sub-Saharan Africa found that education was a significant predictor of multiple sexual partnerships among young people (Odimegwu & Ugwu, 2024). The results suggest that education is an important factor in the prevalence of multiple sexual partners among males in South Africa. The increased exposure to sexual stimuli and peer pressure in educational settings may contribute to the higher likelihood of engaging in multiple sexual partnerships.

Men who paid for sex (AOR: 2.96; p<;0.05; CI: 2.94 – 2.98). was significantly associated with MSP (vs men who did not pay). Literature has shown that transactional sex is associated with increased sexual risk behaviors, including multiple sexual partners. For example, a study in sub-Saharan Africa found that young women who reported transactional sex were more likely to have multiple partners and to have older partners (Ranganathan et al., 2020). Additionally, a study in South Africa found that transactional sex was a significant predictor of multiple sexual partnerships among young people (Odimegwu & Ugwu, 2024).

MSP was also associated with men who do not use condoms (vs men who use them) (AOR: 1.14; p<;0.05; CI: 1.14– 1.15). MSP was also associated with men who do not use condoms (vs men who use them) (AOR: 1.14; p<;0.05; CI: 1.14– 1.15). Previous studies have consistently shown that condom use is associated with MSP. For example, a South African study found that condom use is inconsistent among people who have multiple sexual partners. For instance, only 26.0% of

men reported condom use at the last intercourse than men who reported no condom use at the last intercourse, indicating that although condoms are freely available, their use is inconsistent similarly to this current study's findings (Heeren et al., 2014). However, another study found that having two or more multiple concurrent sexual partners or not using condoms were variables similarly and highly associated with HIV risk. An association was found between multiple lifetime partners and 'any condom use' (OR = 2.99; 95%CI: 2.14-4.19), but not with consistent use. Both having two or more multiple concurrent sexual partners or not using condoms were variables similarly and highly associated with HIV risk.

The unadjusted and adjusted odds ratios for various sociodemographic variables in relation to the likelihood of having MSP among men aged 15 and older indicated that Circumcised men had a significantly lower likelihood of having MSP than non-circumcised males (UOR: 0.36; $p<0.05$; CI: 0.35-0.36). However, the study by Keetile (2022), that was investigating sexual risk behaviours among circumcised and uncircumcised men before and after the implementation of the safe male circumcision programme in Botswana, found that in the adjusted analyses, being circumcised was significantly associated with having MSP in 2008=adjusted PR=1.31, CI=1.10-1.57; and in 2013= adjusted PR=1.12, CI=1.01-1.41 (Keetile, 2022).

Men who lived in urban regions had a significantly lower likelihood of having MSP than men who lived in rural areas (UOR: 0.58; $p<0.05$; CI: 0.57-0.58). In line with the study by Odimegwu et al. (2022) found that approximately 46.8% of males residing in rural areas exhibit a higher propensity for engaging in multiple sexual relationships. Furthermore, their study revealed that 17.3% of these males are specifically from KwaZulu-Natal, thereby designating it as the province exhibiting the greatest prevalence of unsafe sexual behaviour among rural males (Odimegwu et al., 2022). However, Ali et al. (2021) discovered that males in urban areas in Sub-Saharan African countries displayed an increased likelihood of having MSP (UOR = 22.8 CI = 18.8–27.8) and (AOR = 1.21 CI = 1.04–1.41). This highlights that location and different cultures and societal norms play a role in the individuals' behaviours.

Men between the ages of 20 and 24 were significantly more likely than men between the ages of 15 and 19 to have MSP (UOR: 10.9; $p<0.05$; CI: 10.8-11.0). Men between the ages of 25 and 29 were significantly more likely than men between the ages of 15 and 19 to have MSP (UOR: 12.1;

p<0.05; CI: 12.0-12.2). Previous studies have consistently shown that age is an important factor in sexual behavior and HIV risk. For example, a study in South Africa found that younger males were more likely to engage in risky sexual behavior and have multiple sexual partners compared to older males (Mabaso et al., 2021). Another study in sub-Saharan Africa found that older males were more likely to have multiple sexual partners and engage in risky sexual behavior compared to younger males (Odimegwu & Ugwu, 2024). The current study's findings support the existing literature on the association between age and MSP. However, the study also highlights the importance of considering the specific context and population in which the research is being conducted. For instance, the study found that the association between first age sex and MSP was stronger among younger males (25–29 years) compared to other ages.

The unadjusted odds ratios suggest a higher likelihood of MSP among men with primary education compared to tertiary and secondary education. However, the adjusted odds ratios indicate that this relationship may be confounded by other factors such as age and place of residence. The unadjusted odds ratios demonstrate a significant association between place of residence and MSP, with urban areas having a lower likelihood of MSP than rural areas. After adjusting for other variables, this relationship remains significant. The unadjusted odds ratios show a significant association between perceived risk of HIV and MSP, with men who believed they were not at risk of HIV having a higher likelihood of MSP. This relationship remained significant even after adjusting for other sociodemographic factors. The adjusted odds ratios for various sociodemographic variables, such as age, education level, and region, were used to control for the effects of these factors on the likelihood of having MSP among men aged 15 and older in South Africa.

The adjusted odds allowed the study to assess the independent effects of these variables on the likelihood of having MSP while accounting for the influence of other relevant factors. With regards to the main aim of the study, the results of the bivariate analysis examining the relationship between male circumcision (MC) and MSP (MSP) in males over the age of 15 found statistically significant association between MC and MSP, indicating that there is a correlation between male circumcision and the likelihood of having MSP. It was observed that men who claimed to have MSP and were circumcised constituted 94.04% of the population, emphasizing the relationship between MC and MSP.

Interestingly, the results also showed that the largest proportion of males who reported having multiple partners and were not circumcised accounted for 97.77% of the population, further highlighting the significant association between male circumcision and the prevalence of MSP. The findings demonstrate that among South African men aged 15 and older, there is a correlation between male circumcision and the prevalence of MSP, indicating a potential risk compensation behaviour. Specifically, the data revealed that men aged 15-29 were more likely to engage in risky sexual behaviour, such as having MSP, compared to those aged 30 years and older. Additionally, the study identified a higher likelihood of non-condom use among men with elevated prevalence of risky sexual behaviour, aligning with the risk compensation concept that individuals may adjust their behaviour in response to perceived changes in risk. These findings provide empirical support for the Risk Compensation Theory within the specific context of male circumcision and risky sexual behaviour among South African men.

5.3 Strength and Limitations of the study

5.3.1 Strengths

The strength of the study lies in its systematic approach to examining the relationship between male circumcision and the prevalence of MSP among males aged 15 and older in South Africa. The use of both univariate and bivariate analyses, as well as binary regression models, enhances the robustness of the findings. Additionally, the rejection of the null hypothesis and the identification of significant associations provide valuable insights that contribute to the existing literature on this topic. Furthermore, the study's use of statistical methods such as the chi-square test and cross-tabulation adds to its strength by providing a rigorous analytical framework. The specific focus on a relevant and important public health issue, combined with the use of representative data, contributes to the study's significance. Additionally, the investigation of the relationship between male circumcision and MSP addresses an important aspect of sexual health, with potential implications for interventions and public health strategies.

5.3.2 Limitations

However, the study is not without limitations. The study's findings may not be generalizable to the entire South African male population due to potential sampling biases or limitations. The data on male circumcision and sexual behaviour are self-reported by the participants, which can introduce recall and social desirability biases. The study's cross-sectional design restricts the ability to establish causality or determine the temporal relationship between male circumcision and MSP. The analysis may not have controlled for all potential confounding variables that could influence the relationship between male circumcision and the prevalence of MSP.

The study focused on men aged 15 and older in South Africa, which may not fully capture the broader dynamics of male circumcision and sexual behaviour in the population. Another limitation not being able to look at the difference between those who underwent MC as an infant or rite of passage vs those who did VMMC [which comes with counselling and sexual health information] - so the two are different Is the important that these differences between infant male circumcision (IMC) and voluntary medical male circumcision (VMMC) should be considered when comparing their impacts.

IMC is typically performed shortly after birth, often for religious or cultural reasons, without the child's consent. In contrast, VMMC is an elective procedure done later in life, usually in adolescence or adulthood. VMMC is accompanied by counselling on sexual health and HIV prevention (Sgaier et al., 2017). Parents often choose IMC based on their own beliefs and preferences, without the child's input. VMMC allows the individual to make an informed decision for themselves, considering the health benefits (Susan et al., 2012). IMC is associated with a higher degree of acceptability compared to VMMC in some settings, with up to 74% of circumcisions in priority countries being performed on adolescents.

This suggests that VMMC may face more resistance (Sgaier et al., 2017). The timing of circumcision can impact the decision-making process. Parents considering IMC may have concerns about the baby's small size and inability to consent, while VMMC allows the individual to be involved in the choice. While both IMC and VMMC aim to provide health benefits, the differences in timing, consent, and counselling make them distinct procedures that should be evaluated separately. The additional sexual health education provided with VMMC is an important

factor that does not present with IMC. These limitations underscore the need for future research to address these shortcomings and provide a more comprehensive understanding of the relationship between male circumcision and sexual behaviour in South Africa.

5.4 Implications of findings

The implications of the study's results are important for public health interventions and policies in South Africa. The identified association between male circumcision and the prevalence of MSP suggests that strategies promoting male circumcision could potentially contribute to reducing risky sexual behaviour. By recognizing this association, public health initiatives can leverage male circumcision as a potential component of comprehensive sexual health programs aimed at mitigating the transmission of sexually transmitted infections, including HIV, and promoting safer sexual practices among men in South Africa. Furthermore, the findings underscore the need for targeted interventions and resources to address sexual health disparities and risk factors associated with MSP among men in this population.

5.5 Suggestions for future research

Given the limitations and strengths of the current study, several recommendations for future research can be proposed. Future research should consider longitudinal designs to determine the temporal relationship between male circumcision and the prevalence of MSP, allowing for a better understanding of causality. Inclusion of Confounding Variables: Additional research should aim to include a broader range of sociodemographic, behavioural, and psychosocial variables to better control for potential confounding factors that may impact the association between male circumcision and sexual behaviour.

Complementary qualitative studies could provide insights into the cultural, social, and individual factors influencing the relationship between male circumcision and sexual behaviour, offering a more comprehensive understanding of this association. Research focusing on the development and evaluation of interventions that promote male circumcision and address sexual health behaviours among men in South Africa could provide valuable insights into the efficacy of such programs. Future studies should strive for larger and more representative samples to enhance the generalizability of findings to the broader South African male population. These recommendations

aim to address the gaps in the current literature and contribute to a more nuanced understanding of the relationship between male circumcision and sexual behaviour, ultimately informing evidence-based interventions and policies.

5.6 Discussion of Research Hypotheses

This section presents the testing of the hypotheses stated in section 2.4. According to the main theoretical frameworks guiding this study, the Risk Compensation Theory, individuals are more likely to engage in an increased risky behaviour in response to a perceived risk reduction following an intervention (Westercamp et al., 2014). Health Belief Model can explain how sociodemographic factors interact with risky behaviours. For instance, perceived susceptibility to HIV, can influence individuals' decisions regarding male circumcision and engaging in MSP (Abraham & Sheeran, 2015). Therefore, the hypothesis for this study was:

H0: There is no relationship between male circumcision and MSP in South Africa among men aged 15 and older.

H1: There is a relationship between male circumcision and MSP in South Africa among men aged 15 and older. $a = 0.05$ used to test significance.

Following the analysis, the study rejected the null hypothesis (H0) in favour of the alternative (H1), which states that there is a correlation between MC and MSP among men in South Africa who are 15 years of age and older.

This study, therefore, rejects the null hypothesis (**H0**).

The current study hypothesised that an association between MSP and MC in South Africa. This assumption is based on both the theoretical frameworks and past literature that MC and sociodemographic, risk behaviours of men as associated with MSP. Findings from this study were consistent with the hypothesis that age, education background, province, condom use, and paid sex were significantly associated with MSP. Given that the p-value of these variables was less than 0.05, this study rejects the null hypothesis and concludes that there is a significant association between male circumcision and MSP in South Africa.

5.7 Conclusion

The study concluded that there is a significant relationship between MC and MSP among men aged 15 and older in South Africa. The findings also indicate a high prevalence of MSP among men in this age group, highlighting the need for targeted interventions to address this public health concern. Additionally, the data suggested the importance of promoting male circumcision as a preventive measure in reducing the prevalence of MSP and its associated risks, such as HIV transmission. This is an important finding, as some studies have suggested that circumcision may lead to increased risky sexual behaviours. However, our study did not support this notion, and we did not observe any significant differences in the number of sexual partners between circumcised and uncircumcised men, which is an important consideration in the context of HIV prevention and sexual health.

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