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2013 No. 102

DEMOGRAPHIC AND HEALTH SURVEYS

September 2013

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September 2013

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ACKNOWLEDGMENTS

We would like to express our most sincere gratitude to ICF International and USAID for funding us through the MEASURE DHS Fellowship program. We are very grateful to our facilitators Sarah Staveteig (PhD), Wenjuan Wang (PhD), Kerry MacQuarrie, Ambrose Akinlo (PhD), and Samwel Mbugua. Special mention goes to Sarah for her constructive comments on our paper. We are also greatly indebted to our colleagues in the 2013 DHS Fellowship program for their support and feedback. We also wish to thank Joanna Lowell (PhD) for her reviews of earlier drafts, Bryant Robey for editing, and Yuan Cheng for formatting.

ABSTRACT

Background: Zimbabwe has one of the highest HIV prevalence rates in the world, currently estimated at 15.2 percent among adults age 15-49. In 2009, voluntary medical male circumcision (VMMC) was adopted as an additional method of HIV prevention and since then has become a significant dimension of Zimbabwe's HIV prevention strategy. The promotion of VMMC has raised a major concern that it might lead to an increase in high-risk sexual behavior, because circumcision could lead to a false sense of effective protection against HIV, a phenomenon known as risk compensation or behavioral disinhibition. According to the risk compensation hypothesis, as the risk of an undesirable outcome is reduced, people may compensate by behaving in riskier ways. In Zimbabwe, as in other countries with high HIV prevalence, male circumcision is often promoted using evidence that it reduces the risk of HIV.

Purpose: This study sought to test whether circumcised men in Zimbabwe are more likely to have engaged in risky sexual behavior. The study also investigated the association among uncircumcised men between wanting male circumcision and engaging in high-risk sexual behavior.

Data and methods: The study used data collected from men age 15-54 who were interviewed during the 2010-11 Zimbabwe Demographic and Health Survey (ZDHS). A total of 7,480 men were included in the sample for this study. Logistic regression was used to assess the association between circumcision and risky sexual behaviors.

Findings: The findings of this study do not support the risk compensation hypothesis. The study found no statistically significant association between male circumcision and risky sexual behavior. In contrast, the findings do show a strong association among uncircumcised men between wanting male circumcision and engaging in risky sexual behaviors.

Recommendations: Given the recency of the campaign to promote male circumcision in Zimbabwe, these results suggest a need to continue monitoring the relationships between ongoing VMCC campaigns and men's risky sexual behavior. Communication and information dissemination on VMMC should emphasize caution in messages promoting medical male circumcision to avoid giving the impression that it provides immunity against HIV.

INTRODUCTION

Zimbabwe has one of the highest HIV prevalence rates in the world, currently estimated at 15.2 percent among adults age 15-49 (ZIMSTAT and ICF International, 2012). While HIV can spread through many channels, it has been suggested that most HIV infections (92 percent) in Zimbabwe occur through heterosexual contact, followed by mother-to-child transmission (Zimbabwe National AIDS Council, 2005). Existing approaches to preventing the spread of HIV have mainly been based on the "ABC" approach to behavior change, which promotes abstinence, faithfulness and correct use of condoms. In devising policy guidelines on the effective prevention of new HIV infections, Zimbabwe came up with a Behavior Change Strategy, which focuses on increasing the age at sexual debut, increasing correct condom use, and reducing the average number of sexual partners. The approach also encouraged individuals and couples to get tested for HIV.

In 2009, Zimbabwe adopted voluntary medical male circumcision (VMMC) as an additional HIV prevention strategy to the existing ABC behavior change model. The campaign for scaling up VMMC for HIV prevention focuses on men from the age of 13 who are HIV-negative. The procedure is offered free of charge at designated public hospitals and health centers throughout the country.

Medical male circumcision has become a significant dimension of HIV prevention interventions, after the results of three randomized controlled trials (RCTs) in Uganda, South Africa and Kenya demonstrated that circumcision has a protective effect against contracting HIV of up to 60 percent for men having sex with women (Auvert et al., 2005; Bailey et al., 2007; Gray et al., 2007). Pursuant to these findings, the World Health Organization (WHO) and UNAIDS recommended that VMMC be implemented immediately as an additional HIV prevention strategy in countries with high HIV prevalence rates but low male circumcision rates (WHO and UNAIDS, 2007).

Notwithstanding the WHO and UNAIDS recommendation, and the promotion of VMMC as an additional HIV prevention strategy in a number of sub-Saharan African countries, including Zimbabwe, fundamental questions remain about whether promoting VMMC as an HIV prevention intervention will result in decreases in HIV incidence. A major concern is that promoting VMMC may lead circumcised men to develop a false sense of effective protection

against HIV and engage in risk compensation or behavioral disinhibition. The Zimbabwe National AIDS Council (NAC) highlighted concern over the risk compensation behaviors among circumcised men (Yikoniko, 2012). This phenomenon involves either halting or decreasing previous protective behaviors such as condom use or partner reduction, thus reducing or nullifying the protective effects of male circumcision (Westercamp et al., 2012).

However, studies have not found evidence of this phenomenon. Mattson and colleagues (2008) developed an 18-item measure of risky sexual behavior for their RCT in Kisumu, Kenya, and found no significant differences in the risk propensity scores between circumcised and uncircumcised men. Another study in Kenya by Westercamp and colleagues (2012) followed up circumcised men after 24 months and compared their perception of risk and their sexual behavior with that of uncircumcised males. The findings supported the earlier findings by Mattson and colleagues. In a related study in Malawi, Godlonton and colleagues (2010) concluded that after learning that circumcision lowers the risk of HIV infection, circumcised men did not become riskier in their sexual behavior. Despite this evidence, there is still debate on the issue of behavioral disinhibition.

In Zimbabwe, male circumcision is not significantly related to HIV status (see Appendix A). In light of the discourse on male circumcision and risky sexual behavior, the present study instead sought to investigate the relationship between male circumcision status and engaging in risky sexual behavior. Proxies of risky sexual behavior were developed and compared between circumcised and uncircumcised men interviewed in the 2010-11 Zimbabwe Demographic and Health Survey (ZDHS). The present study also sought to understand whether, among men who are not circumcised, those who engage in riskier sexual behaviors are more likely to want to be circumcised.

Research Questions

The present analysis was guided by two key questions:

- What individual and household factors are associated with male circumcision?
    - Among uncircumcised men, what individual and household factors are associated with wanting male circumcision?

- What is the relationship between male circumcision and high-risk sexual behavior?
    - Among uncircumcised men, what is the relationship between wanting male circumcision and high-risk sexual behavior?

Hypothesis

Risk compensation theory suggests that as the risk of an undesirable outcome is reduced, people may compensate by behaving in riskier ways that keep their overall level of risk constant (cf. Hedlund, 2000). This study tests the hypothesis that in Zimbabwe men who are circumcised engage in riskier sexual behaviors. As a secondary hypothesis, it tests whether—among men who are not circumcised—those who engage in riskier sexual behaviors are more likely to want to be circumcised. The corresponding null hypotheses for this study are that there is no significant association between male circumcision status and risky sexual behavior, and that there is no significant association between wanting a circumcision and risky sexual behavior.

Conceptual Framework

The conceptual framework designed for this study shows the possible individual and household factors associated with male circumcision on one hand, and the link between male circumcision status and indicators of risky sexual behavior on the other (see Figure 1).

It is not clear how or when male circumcision began, but it is known that religion has an influence on circumcision. Among Jews and Muslims, male circumcision is practiced as a symbol of keeping the covenant with God[1], although circumcision is not mentioned in the Holy Koran (Aldeeb Abu Sahlieh, 1999). Thus, in the present study we have included religion as determinant of circumcision.

Another significant determinant of circumcision is ethnicity. Male circumcision has been practiced for many decades as a rite of passage into adulthood among some groups of the Xhosa of South Africa and the Aborigines of Australia (Vincent, 2008; Emery, 2005). However, the present study did not include ethnicity as a determinant of circumcision because most national

[1] See Genesis 17:9-14

surveys in Zimbabwe, including the ZDHS, do not collect statistics on ethnicity as a national policy.

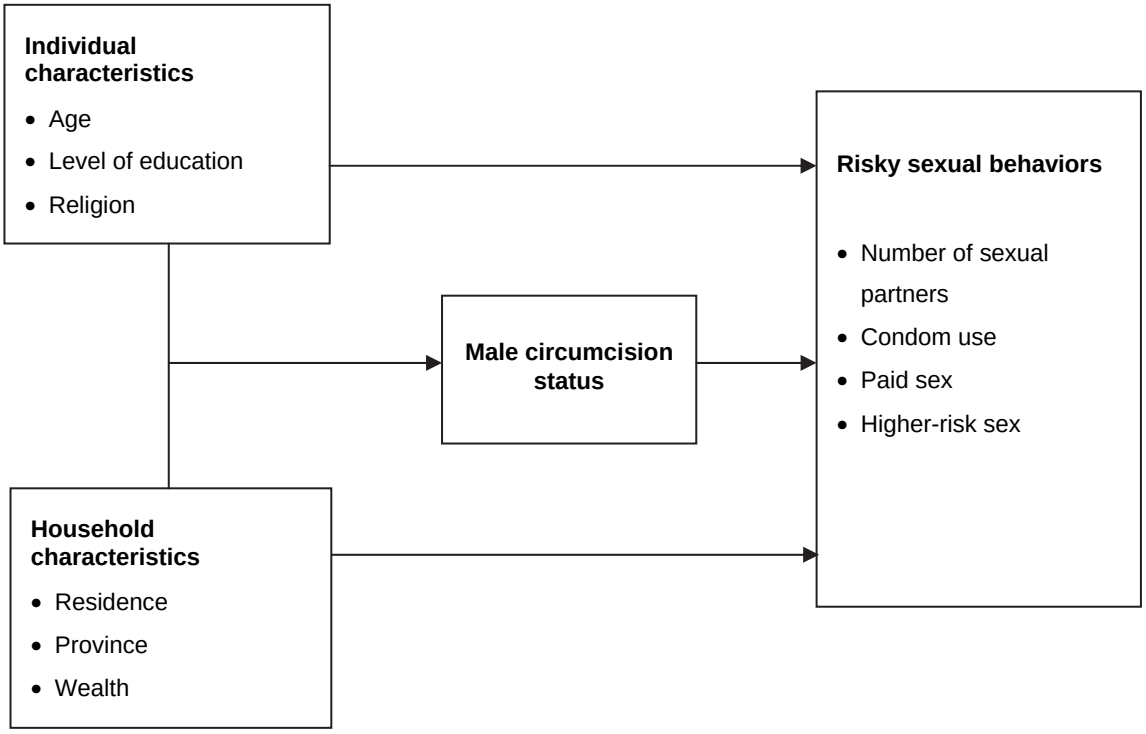
Other studies have linked male circumcision to demographic and socioeconomic variables, such as level of education. The 2004-05 Tanzania DHS shows higher rates of circumcision among men with higher levels of education compared with men with lower levels of education. Tanzanian males with above primary school education had significantly higher odds of being circumcised than those with incomplete primary school education (Wambura et al., 2009). The 2005-06 ZDHS found a weak relationship between education and circumcision; men with primary school education were the most likely to be circumcised (CSO and Macro International, 2007). In Central Uganda the willingness to undergo MMC was found to have an inverse relationship with education (Asiimwe, 2012).

The influence of age as a determinant of male circumcision cannot be understood outside of the context of ethnicity and the generally accepted culture. In many Western countries, and among Jewish people, circumcision is generally performed at birth or within the first week of life (Gallaher, 2000). Among Muslims, circumcision may be performed in early childhood or adolescence. Studies in the United Kingdom have found that circumcision is mostly done by the upper middle class (Gallaher, 2000). In Zimbabwe, traditional circumcision is done at different ages depending on the ethnic group performing the ritual.

Several major surveys have explored the measurement of risky sexual behaviors. Consecutive studies in the British National Survey of Sexual Attitudes and Lifestyles (Natsal) have used proxies of risky sexual behavior such as a person's number of sexual partners and condom use during intercourse (Mercer, 2010). Data for common indicators of risky sexual behaviors used by agencies such as UNAIDS[2] are collected by MEASURE DHS. As well as number of sexual partners and condom use, these indicators also include having paid sex and higher-risk sex (defined as recent sex with a non-marital or non-cohabiting partner). In the conceptual framework of this study, shown in Figure 1, male circumcision is hypothesized to be a determinant of these risky sexual behaviors.

[2] See also http://www.unaids.org/en/media/unaids/contentassets/documents/document/2010/8_2-Intro-to-Indicators FMEF.pdf

Figure 1. Conceptual framework of male circumcision and risky sexual behavior



METHODS

This study used data on men from the 2010-11 ZDHS. The ZDHS is designed to produce nationally and provincially representative estimates of data on population and health indicators. The survey interviewed men age 15-54 who are usual residents of a household or were visitors who stayed in the household the night before the survey. In total, 7,480 men were interviewed in the survey.

Of particular interest for this study were the data on men's circumcision status and sexual behavior. All interviewed men (7,480) were included in the analysis of factors associated with circumcision, regardless of whether or not the men reported having ever had sex. Men who were not circumcised or who did not know if they were circumcised (6,795) were included in the analysis of factors associated with wanting circumcision.

Individual and household characteristics included in the analysis were men's age, level of education, religion, province, and urban-rural residence. These were considered as determinants of male circumcision. The categories of religion, education and province were collapsed into summary categories according to the characteristics considered to be most salient for the analysis. The key variables in the present analysis were defined as highlighted below.

Background Variables

All of the respondents were grouped into 10-year age groups due to their relative homogeneity. Education was defined as highest level of education attended. Secondary and higher categories were combined into the "Secondary and above" category. Similarly, marital status categories were also combined to produce "never married", "married/living together" and "formerly married" categories. The latter category included all men who reported that they were divorced, separated or widowed at the time of the survey. Wealth was regrouped into terciles at the household level.

For the purposes of this study, Zimbabwe's 10 provinces were collapsed into five groups. Mashonaland Central, Mashonaland East, Mashonaland West and Masvingo provinces were combined into "Mashonaland"; Matabeleland North and South and Midlands were combined

into “Matabeleland/Midlands”; while Manicaland, Harare and Bulawayo were left as is because of their uniqueness in relation to the rest of the country.

The ZDHS asked respondents to state their religion according to nine categories. For the purposes of this study, respondents were reclassified into four groups: Christian, Muslim, None, and Traditional/Other.

Circumcision

There are varying definitions of male circumcision across cultures (Hewett et al., 2012). However, the ZDHS defined circumcision as the complete removal of the foreskin. This was necessary to achieve a common understanding of the concept between interviewers and respondents. Thus for this study, circumcision status was determined by the responses to the question: *“Some men are circumcised, that is, the foreskin is completely removed from the penis. Are you circumcised?”* A small proportion of men who reported that they did not know their circumcision status were assumed to be uncircumcised. Men who reported that they were not circumcised or did not know if they were circumcised were asked: *“If circumcision were available for free and was safe, would you want to be circumcised?”* Men who responded “yes” were considered to want circumcision; all others were assumed to not want circumcision.

Risky Sexual Behavior

Four indicators of risky sexual behavior were considered for this study, as follows:

(1) *Paid sex:* In the present study, all men who reported to have ever paid for sex were considered to have engaged in risky sexual behavior.

(2) *Multiple sexual partners in the past 12 months:* Having had two or more sex partners in the 12 months preceding the survey. While this indicator is often reported as a percentage of sexually active men, we considered all men to be ‘at risk’; hence the denominator is all men.

(3) *Higher-risk sex in the past 12 months:* Higher-risk sex is defined as any sexual intercourse with a non-marital or non-cohabiting partner, among those who had sex in the 12 months before the survey.

(4) *Not using a condom during last higher-risk sex:* Condom use during sexual intercourse is considered a preventive measure against the transmission of sexually transmitted infections (STIs). The ZDHS collected data on condom use in the past 12 months during last sexual intercourse with up to three different partners. Not using a condom at the last sexual intercourse with a high-risk partner was considered a risky behavior. In eight cases, men reported higher-risk sex in the past 12 months, but use of a condom with that partner could not be determined because their last three partners were spousal; these men were excluded from the denominator.

Data Analysis

The analysis was done using STATA version 12. Bivariate analysis using unadjusted odds ratios was conducted to determine the strength of the association between male circumcision and selected individual and household characteristics. Multivariate analysis was also done to measure whether there is an association between male circumcision status or wanting circumcision and the indicators of risky sexual behavior, net of other factors. In the data analysis, we took into account the complex multi-stage sampling design and the weights that were calculated for the ZDHS.

RESULTS

Sample Characteristics

Table 1a summarizes the characteristics of the 7,480 men age 15-54 interviewed by the 2010-11 ZDHS. Forty-two percent were age 15-24, while 30 percent were age 25-34. Seventy-six percent of the respondents had at least some secondary education, 51 percent were married or living together, 74 percent gave their religion as Christian, and 63 percent resided in a rural area at the time of the survey.

Table 1a. Sample characteristics

Background characteristic	Weighted percent	Number of men
Age		
15-24	41.6	3,107
25-34	29.5	2,207
35-44	18.9	1,417
45-54	10.0	749
Education		
No education	1.0	77
Primary	23.0	1,724
Secondary and above	75.9	5,680
Religion		
Traditional/other	4.3	324
Christians	73.5	5,501
Muslim	0.6	44
None	21.6	1,612
Marital status		
Never married	44.5	3,329
Married/living together	50.7	3,794
Formerly married	4.8	357
Residence		
Urban	36.9	2,757
Rural	63.1	4,723
Region		
Manicaland	13.6	1,013
Mashonaland	40.3	3,017
Matabeleland/Midlands	22.3	1,669
Harare	18.3	1,371
Bulawayo	5.5	410
Total age 15-54	**100.0**	**7,480**

Table 1b shows the proportion of men reporting risky sexual behavior. Eighteen percent reported having ever paid for sex in their lifetime. Eleven percent of all men reported having had two or more partners in the past 12 months, while 33 percent of sexually-active men had sex with a higher-risk partner, that is a non-marital non-spousal partner, in the past year. Of the men who reported having had a higher-risk partner in the past year, 22 percent did not use a condom during their last sexual encounter with that partner.

Table 1b: Indicators of risky sexual behavior

Indicator	Weighted percent	Denominator
Ever paid for sex	18.0	7,480
Two or more partners in the past 12 months	10.5	7,480
Higher-risk sex[a] in the past 12 months	33.2	5,100
Did not use condom use at last higher-risk sex[b]	22.3	1,686

[a] Higher-risk sex is defined as sex with a non-marital, non-cohabiting partner in the past 12 months among men who had sex in the past 12 months.
[b] In eight weighted cases, men who had higher-risk sex in the past 12 months were excluded because their last 3 partners were spouses; condom use with non-spousal partner could not be determined

Characteristics of Circumcised and Uncircumcised Men

Of the 7,480 men interviewed, 9 percent (685) reported being circumcised. An additional 37 percent of men responded that they would want to be circumcised if it were available for free and were safe. Table 2 shows the proportion of men who are circumcised, want circumcision, or do not want circumcision by their background characteristics. Men age 35-44, men who attended only primary education, Muslim men, men who are married, and men from the Manicaland region are most likely to be circumcised. The proportion of circumcised men is lowest in the Mashonaland region, where only 7 percent of men are circumcised.

Table 2. Characteristics of circumcised and uncircumcised men

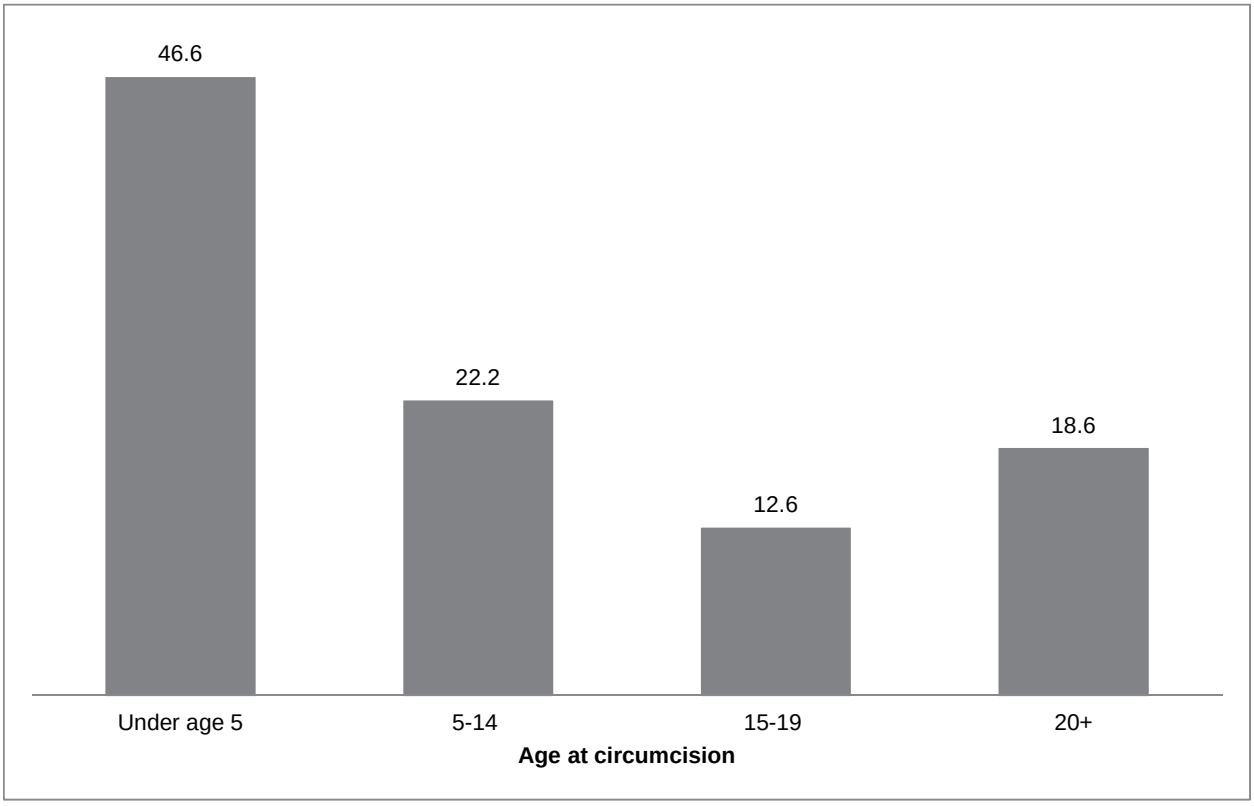
Background characteristics	Circumcision status			Total	Number of men
	Circumcised	Not circumcised			
		Want circumcision	Do not want circumcision[a]		
Age					
15-24	6.5	34.6	58.9	100.0	3,107
25-34	9.8	41.5	48.1	100.0	2,207
35-44	11.8	38.5	50.1	100.0	1,417
45-54	11.5	27.0	60.8	100.0	749
Education					
No education	9.0	21.4	69.6	100.0	77
Primary	9.8	28.9	61.3	100.0	1,724
Secondary and above	9.0	39.2	51.8	100.0	5,680
Religion					
Traditional/other	12.6	40.5	46.9	100.0	324
Christians	8.7	37.3	54.0	100.0	5,501
Muslim	77.9	14.7	7.4	100.0	44
None	8.0	34.1	57.9	100.0	1,612
Marital status					
Never married	6.6	34.7	58.7	100.0	3,329
Married/living together	11.2	37.8	51.0	100.0	3,794
Formerly married	10.7	41.0	48.3	100.0	357
Residence					
Urban	9.7	40.4	49.9	100.0	2,757
Rural	8.8	34.5	56.7	100.0	4,723
Region					
Manicaland	13.1	32.3	54.5	100.0	1,013
Mashonaland	6.9	34.8	58.4	100.0	3,017
Matabeleland/Midlands	11	38.3	50.7	100.0	1,669
Harare	8.6	38.6	52.9	100.0	1,371
Bulawayo	12.4	47.1	40.5	100.0	410
Total age 15-54	**9.2**	**36.6**	**54.2**	**100.0**	**7,480**

[a] Includes men who either didn't know if they were circumcised or didn't know if they would want to be (54 and 146 weighted cases, respectively)

The 2010-11 ZDHS did not ask men whether they were circumcised as a result of Zimbabwe's voluntary medical male circumcision (VMMC) campaign, but did ask about their age at circumcision and who performed their circumcision. Figure 2 shows the distribution of circumcision by age at circumcision. Nearly half of men (47 percent) were circumcised before age 5, while 31 percent of respondents were circumcised at age 15 or above. As mentioned,

Zimbabwe's male circumcision campaign was scaled up in 2009; few of the respondents in the 2010-11 ZDHS had been circumcised in the two years preceding the survey.[3] Moreover, only health professionals are employed as part of the VMMC program, whereas 58 percent of the circumcised men were circumcised by a traditional practitioner or a family friend, while 24 percent were circumcised by a health professional (data not shown). In all, the findings indicate that relatively few men interviewed by the ZDHS could have been circumcised as a result of the VMMC campaign.

Figure 2. Distribution of circumcised men by age at circumcision



[3] The circumcision scale-up began in 2009 and the survey was fielded in 2010-2011. In the ZDHS 58 men (weighted=62.6 cases) reported having been circumcised in the past two years.

Factors Associated with Male Circumcision

The present study analyzed background factors that are associated with male circumcision. We fitted logistic regression models and computed unadjusted and adjusted odds ratios. Table 3 presents the results of the analysis. Unadjusted odds ratios of being circumcised increase with men's age, which is consistent with later ages of circumcision overall in Zimbabwe. Ever-married men are significantly more likely to be circumcised. Education and urban-rural residence are not significantly associated with circumcision.

After controlling for other factors, age is not significantly associated with circumcision; only religion, province, and marital status are significant in the adjusted odds ratios (see Table 3). Married men are more likely to be circumcised compared with never-married men. Men in Mashonaland and Harare are significantly less likely to be circumcised compared with men in Manicaland (the reference group). Muslim men are overwhelmingly more likely to be circumcised compared with other religions.

Table 3. Factors associated with male circumcision

Variable	Unadjusted ORs		Adjusted ORs	
Age				
15-24	1.00		1.00	
25-34	1.67***	[1.34-2.08]	1.33	[0.97-1.83]
35-44	1.85***	[1.47-2.32]	1.34	[0.94-1.89]
45-54	1.99***	[1.54-2.57]	1.41	[0.98-2.04]
Level of education				
None	1.00		1.00	
Primary	1.09	[0.50-2.41]	1.26	[0.55-2.88]
Secondary and above	0.99	[0.44-2.22]	1.10	[0.48-2.54]
Religion				
Traditional/Other	1.00		1.00	
Christians	0.66*	[0.45-0.97]	0.82	[0.57-1.18]
Muslim[+]	24.4***	[9.56-62.4]	35.9***	[12.82-100.5]
None	0.60*	[0.39-0.93]	0.74	[0.49-1.12]
Residence				
Urban	1.00		1.00	
Rural	0.89	[0.72-1.12]	1.07	[0.77-1.48]
Province				
Manicaland	1.00		1.00	
Mashonaland	0.48***	[0.35-0.69]	0.46***	[0.33-0.64]
Matabeleland/Midlands	0.78	[0.53-1.15]	0.78	[0.54-1.14]
Harare	0.62*	[0.42-0.91]	0.57*	[0.36-0.88]
Bulawayo	0.94	[0.63-1.40]	0.87	[0.55-1.38]
Marital status				
Never married	1.00		1.00	
Married/Living together	1.79***	[1.51-2.12]	1.45**	[1.10-1.92]
Formerly married	1.69***	[1.17-2.46]	1.34	[0.86-2.10]
Wealth tercile				
Lowest	1.00		1.00	
Middle	0.81	[0.61-1.06]	0.85	[0.65-1.12]
Highest	1.11	[0.83-1.47]	1.13	[0.82-1.57]
N	7,480			

Exponential coefficients; 95percent confidence intervals in brackets

*p<0.05, **p<0.01, ***p<0.001

[+] based on <50 weighted cases

“Mashonaland Province” includes Mashonaland East, Mashonaland West, Mashonaland Central and Masvingo

“Matabeleland/Midlands” includes Matabeleland North, Matabeleland South and Midlands

Factors Associated with Wanting Circumcision

The 2010-11 ZDHS asked the 6,795 men who were not circumcised at the time of the survey if they would want to be circumcised, if circumcision were available for free and were safe. Forty percent (2,741 men) said they would want circumcision if it were free and safe (data not shown). Table 4 shows factors associated with wanting to be circumcised, presenting unadjusted and adjusted odds ratios. Men age 45-54 are significantly less likely to want circumcision compared with men age 15-24. Men in Matabeleland/Midlands and Bulawayo are significantly more likely to want circumcision than men in the other provinces. Currently or formerly married men are significantly more likely than never-married men to want circumcision. This finding is intriguing in that if married men were in stable and monogamous relationships, then presumably they would be at lower risk for HIV.

Table 4. Factors associated with wanting to be circumcised

Variable	Unadjusted ORs		Adjusted ORs	
Age				
15-24	1.00		1.00	
25-34	1.47***	[1.29-1.66]	1.21*	[1.01-1.44]
35-44	1.31***	[1.13-1.51]	1.01	[0.82-1.24]
45-54	0.75**	[0.61-0.93]	0.63**	[0.48-0.84]
Level of education				
None	1.00		1.00	
Primary	1.53	[0.87-2.68]	1.40	[0.78-2.51]
Secondary and above	2.45**	[1.40-4.28]	1.98	[1.10-3.56]
Religion				
Traditional/Other	1.00		1.00	
Christians	0.79	[0.59-1.08]	0.74*	[0.54-0.99]
Muslim[+]	2.30	[0.48-10.8]	1.70	[0.34-8.42]
None	0.68*	[0.49-0.93]	0.67*	[0.49-0.91]
Residence				
Urban	1.00		1.00	
Rural	0.75***	[0.66-0.85]	1.02	[0.82-1.29]
Province				
Manicaland	1.00		1.00	
Mashonaland	1.00	[0.79-1.27]	1.06	[0.84-1.32]
Matabeleland/Midlands	1.27*	[1.00-1.61]	1.41**	[1.12-1.76]
Harare	1.23	[0.94-1.61]	1.06	[0.77-1.44]
Bulawayo	1.96***	[1.45-2.65]	1.73**	[1.23-2.42]
Marital status				
Never married	1.00		1.00	
Married/Living together	1.26***	[1.13-1.40]	1.34**	[1.13-1.59]
Formerly married	1.44**	[1.14-1.82]	1.57**	[1.19-2.07]
Wealth tercile				
Lowest	1.00		1.00	
Middle	1.11	[0.95-1.28]	1.12	[0.97-1.29]
Highest	1.49***	[1.30-1.72]	1.36**	[1.11-1.67]
N	6,795			

Exponential coefficients; 95 percent confidence intervals in brackets

*p<0.05, **p<0.01, ***p<0.001

[+] based on <50 weighted cases

“Mashonaland Province” includes Mashonaland East, Mashonaland West, Mashonaland Central and Masvingo

“Matabeleland/Midlands” includes Matabeleland North, Matabeleland South and Midlands

Male Circumcision and Risky Sexual Behavior

The major objective of this study was to determine if there are significant differences among circumcised and uncircumcised men in engaging in risky sexual behavior, and whether wanting circumcision is related to risky sexual behavior. We examined unadjusted and adjusted odds of the association between male circumcision and risky sexual behaviors, as shown in Tables 5-8. The unadjusted odds ratios show that circumcised men are significantly more likely to have ever paid for sex (Table 5) and to have had multiple sexual partners in the past 12 months (Table 6). However, these associations are not statistically significant after adjusting for other background factors. Being circumcised is not significantly associated with higher-risk sex in the past 12 months (Table 7) nor with condom use at last higher-risk sex (Table 8).

The adjusted models for each of these dependent variables indicate that older men and men who have ever been married are more likely to have ever paid for sex (Table 5). Ever-married men also have more than twice the relative odds of having multiple sexual partners in the past 12 months, while men's age has an inverse association with having multiple sexual partners (Table 6). Currently and formerly married men are significantly less likely to have had higher-risk sex in the past 12 months. Wealth and education have no significant relationship with higher-risk sexual behaviors. The relationship between province and risky sexual behavior is inconsistent across indicators.

Table 5. Unadjusted and adjusted odds ratios of having ever paid for sex, by circumcision status

Variable	Unadjusted ORs		Adjusted ORs	
Circumcised (ref=no or DK)	1.44***	[1.21-1.62]	1.17	[0.93-1.48]
Age				
15-24	1.00		1.00	
25-34	4.58***	[3.69-5.69]	2.47 ***	[1.84-3.32]
35-44	6.10***	[4.91-7.58]	3.04***	[2.18-4.22]
45-54	10.3***	[7.95-13.3]	5.28***	[3.73-7.46]
Level of education				
None	1.00		1.00	
Primary	1.29	[0.53-3.09]	1.69	[0.65-4.36]
Secondary and above	1.08	[0.45-2.56]	1.65	[0.64-4.24]
Religion				
Traditional/Other	1.00		1.00	
Christians	0.37***	[0.27-0.49]	0.52***	[0.37-0.71]
Muslim[+]	0.86	[0.43-1.69]	0.88	[0.39-1.99]
None	0.68*	[0.48-0.93]	0.94	[0.68-1.29]
Residence				
Urban	1.00		1.00	
Rural	0.69***	[0.58-0.80]	0.59**	[0.44-0.80]
Province				
Manicaland	1.00		1.00	
Mashonaland	0.88	[0.69-1.12]	0.86	[0.66-1.11]
Matabeleland/Midlands	0.79	[0.62-1.02]	0.79	[0.61-1.04]
Harare	1.29	[0.98-1.69]	0.89	[0.64-1.26]
Bulawayo	0.53**	[0.35-0.79]	0.33***	[0.21-0.54]
Marital status				
Never married	1.00		1.00	
Married/Living together	5.19***	[4.33-6.23]	2.18***	[1.64-2.89]
Formerly married	7.70***	[5.7-10.3]	3.40***	[2.38-4.86]
Wealth tercile				
Lowest	1.00		1.00	
Middle	1.16	[0.94-1.43]	1.25*	[1.03-1.53]
Highest	1.36***	[1.14-1.61]	1.21	[0.88-1.66]
N	7,480			

Exponential coefficients; 95 percent confidence intervals in brackets

*p<0.05, **p<0.01, ***p<0.001

[+] based on <50 weighted cases

“Mashonaland Province” includes Mashonaland East, Mashonaland West, Mashonaland Central and Masvingo

“Matabeleland/Midlands” includes Matabeleland North, Matabeleland South and Midlands

Table 6. Unadjusted and adjusted odds ratios of having multiple sex partners in the past 12 months, by circumcision status

Variable	Unadjusted ORs		Adjusted ORs	
Circumcised (ref=no or DK)	1.33*	[1.03-1.72]	1.21	[0.92-1.59]
Age				
15-24	1.00		1.00	
25-34	2.03***	[1.67-2.46]	0.95	[0.92-1.59]
35-44	1.52**	[1.19-1.94]	0.63	[0.68-1.33]
45-54	1.27	[0.91-1.76]	0.55**	[0.43-0.89]
Level of education				
None	1.00		1.00	
Primary	0.95	[0.37-2.45]	0.97	[0.37-2.52]
Secondary and above	1.10	[0.43-2.85]	1.22	[0.48-3.10]
Religion				
Traditional/Other	1.00		1.00	
Christians	0.61*	[0.41-0.91]	0.69	[0.46-1.02]
Muslim[+]	0.94	[0.27-3.28]	0.86	[0.24-3.12]
None	0.97	[0.65-1.42]	1.06	[0.73-1.55]
Residence				
Urban	1.00		1.00	
Rural	0.84	[0.68-1.03]	0.69	[0.48-1.01]
Province				
Manicaland	1.00		1.00	
Mashonaland	0.76	[0.56-1.05]	0.72*	[0.53-0.98]
Matabeleland/Midlands	0.81	[0.58-1.13]	0.81	[0.58-1.13]
Harare	0.97	[0.66-1.42]	0.82	[0.52-1.29]
Bulawayo	0.66*	[0.44-0.99]	0.61*	[0.38-0.98]
Marital status				
Never married	1.00		1.00	
Married/Living together	2.36***	[1.93-2.90]	2.84***	[2.01-4.01]
Formerly married	2.42***	[1.59-3.66]	2.87***	[1.68-4.91]
Wealth tercile				
Lowest	1.00		1.00	
Middle	0.92	[0.71-1.19]	0.89	[0.71-1.12]
Highest	0.95	[0.76-1.72]	0.77	[0.53-1.11]
N	7,480			

Exponential coefficients; 95 percent confidence intervals in brackets

*p<0.05, **p<0.01, ***p<0.001

[+] based on <50 weighted cases

“Mashonaland Province” includes Mashonaland East, Mashonaland West, Mashonaland Central and Masvingo

“Matabeleland/Midlands” includes Matabeleland North, Matabeleland South and Midlands

Table 7. Unadjusted and adjusted odds ratios of higher-risk sex in the past 12 months, by circumcision status

Variable	Unadjusted ORs		Adjusted ORs	
Circumcised (ref=no or DK)	0.94	[0.77-1.14]	1.37	[0.98-1.90]
Age				
15-24	1.00		1.00	
25-34	0.15***	[0.12-0.18]	0.54***	[0.41-0.73]
35-44	0.06***	[0.05-0.08]	0.34***	[0.25-0.47]
45-54	0.04***	[0.03-0.05]	0.21***	[0.14-0.32]
Level of education				
None	1.00		1.00	
Primary	2.95**	[1.44-6.07]	4.08	[0.76-22.1]
Secondary and above	3.64***	[1.77-7.48]	4.62	[0.84-25.1]
Religion				
Traditional/Other	1.00		1.00	
Christians	1.36	[0.97-1.92]	0.57*	[0.35-0.92]
Muslim[+]	1.23	[0.49-3.06]	0.27*	[0.10-0.75]
None	1.76	[1.24-2.49]	0.89	[0.56-1.43]
Residence				
Urban	1.00		1.00	
Rural	0.78**	[0.67-0.90]	0.65*	[0.44-0.95]
Province				
Manicaland	1.00		1.00	
Mashonaland	0.82	[0.63-1.08]	0.87	[0.58-1.29]
Matabeleland/Midlands	1.41*	[1.06-1.88]	1.25	[0.83-1.89]
Harare	1.24	[0.92-1.67]	1.15	[0.69-1.88]
Bulawayo	1.69**	[1.25-2.29]	0.91	[0.57-1.45]
Marital status				
Never married	1.00		1.00	
Married/Living together	0.00***	[0.00-0.00]	0.00***	[0.00-0.00]
Formerly married	0.01***	[0.00-0.03]	0.02***	[0.01-0.06]
Wealth tercile				
Lowest	1.00		1.00	
Middle	1.41***	[1.18-1.69]	0.96	[0.72-1.29]
Highest	1.43***	[1.21-1.70]	0.89	[0.59-1.33]
N	5,100			

Higher-risk sex is defined as sex with a non-marital, non-cohabiting partner in the past 12 months.
Exponential coefficients; 95 percent confidence intervals in brackets
*p<0.05, **p<0.01, ***p<0.001
[+] based on <50 weighted cases
“Mashonaland Province” includes Mashonaland East, Mashonaland West, Mashonaland Central and Masvingo
“Matabeleland/Midlands” includes Matabeleland North, Matabeleland South and Midlands

Table 8. Unadjusted and adjusted odds ratios of not using a condom at last higher-risk sex, by circumcision status

Variable	Unadjusted ORs		Adjusted ORs	
Circumcised (ref=no or DK)	1.12	[0.73-1.71]	1.13	[0.73-1.73]
Age				
15-24	1.00		1.00	
25-34	0.62***	[0.46-0.83]	0.71	[0.49-1.00]
35-44	0.71	[0.47-1.08]	0.79	[0.47-1.33]
45-54	0.75	[0.39-1.43]	0.73	[0.36-1.47]
Level of education				
None	1.00		1.00	
Primary	0.75	[0.17-3.32]	0.82	[0.18-3.77]
Secondary and above	0.33	[0.07-1.50]	0.45	[0.09-2.16]
Religion				
Traditional/Other	1.00		1.00	
Christians	1.57	[0.77-3.20]	1.64	[0.75-3.56]
Muslim‡		1.00		1.00
None	1.75	[0.83-3.67]	1.57	[0.72-3.41]
Residence				
Urban	1.00		1.00	
Rural	1.61***	[1.23-2.11]	0.85	[0.49-1.45]
Province				
Manicaland	1.00		1.00	
Mashonaland	1.31	[0.80-2.17]	1.21	[0.71-2.05]
Matabeleland/Midlands	2.05**	[1.24-3.39]	1.76*	[1.03-3.01]
Harare	0.86	[0.49-1.47]	1.05	[0.51-2.11]
Bulawayo	0.99	[0.54-1.84]	1.26	[0.59-2.68]
Marital status				
Never married	1.00		1.00	
Married/Living together	0.78	[0.57-1.07]	0.93	[0.63-1.39]
Formerly married	0.79	[0.53-1.17]	0.91	[0.57-1.46]
Wealth tercile				
Lowest	1.00		1.00	
Middle	0.69*	[0.51-0.93]	0.83	[0.60-1.15]
Highest	0.42***	[0.31-0.57]	0.57*	[0.36-0.88]
N	1,686			

Not using a condom at last sexual encounter with a non-marital, non-cohabiting partner in the past 12 months, among men who had such a partner. Eight cases were excluded because men's last three partners were spousal, so they were not eligible for questions about condom use with the last high-risk partner.

Exponential coefficients; 95 percent confidence intervals in brackets

*p<0.05, **p<0.01, ***p<0.001

‡ eliminated due to perfect collinearity; all 12 Muslim men who had higher-risk sex in past year used a condom during their last encounter.

"Mashonaland Province" includes Mashonaland East, Mashonaland West, Mashonaland Central and Masvingo

"Matabeleland/Midlands" includes Matabeleland North, Matabeleland South and Midlands

Wanting Circumcision and Engaging in Risky Sexual Behavior

We also assessed a possible link between wanting to be circumcised and engaging in risky sexual behavior, using the four indicators described above: having ever paid for sex, having multiple sexual partners in the past 12 months, higher-risk sex in the past 12 months, and condom use during last higher-risk sex. We used logistic regression models to compute unadjusted and adjusted odds ratios for each measure.

The results show that men who wanted a circumcision are statistically significantly more likely to have ever paid for sex (Table 9), to have had multiple sexual partners in the past 12 months (Table 10), and to have engaged in higher-risk sex in the past 12 months (Table 11), even after controlling for other socio-demographic characteristics. However, men who wanted a circumcision are significantly less likely to have engaged in the risky behavior of not using a condom at last higher-risk sex (Table 12), even after controlling for other socio-demographic covariates. This finding was marginally significant (the high end of the confidence interval for the exponentiated beta is 0.999), but nonetheless runs counter to findings on other indicators of risky sexual behaviors.

Table 9. Unadjusted and adjusted odds ratios of having ever paid for sex

Variable	Unadjusted ORs		Adjusted ORs	
Want to be circumcised (ref=no or DK)	1.40***	[1.22-1.62]	1.42***	[1.22-1.66]
Age				
15-24	1.00		1.00	
25-34	4.58***	[3.69-5.69]	2.47 ***	[1.81-3.35]
35-44	6.10***	[4.91-7.58]	3.11***	[2.20-4.39]
45-54	10.3***	[7.95-13.3]	5.80***	[3.99-8.44]
Level of education				
None	1.00		1.00	
Primary	1.29	[0.53-3.09]	1.46	[0.55-3.86]
Secondary and above	1.08	[0.45-2.56]	1.40	[0.52-3.71]
Religion				
Traditional/Other	1.00		1.00	
Christians	0.37***	[0.27-0.49]	0.54***	[0.38-0.74]
Muslim[+]	0.86	[0.43-1.69]	1.86	[0.49-7.01]
None	0.68*	[0.48-0.93]	0.98	[0.70-1.35]
Residence				
Urban	1.00		1.00	
Rural	0.69***	[0.58-0.80]	0.55***	[0.41-0.76]
Province				
Manicaland	1.00		1.00	
Mashonaland	0.88	[0.69-1.12]	0.83	[0.63-1.09]
Matabeleland/Midlands	0.79	[0.62-1.02]	0.74*	[0.55-0.99]
Harare	1.29	[0.98-1.69]	0.81	[0.56-1.18]
Bulawayo	0.53**	[0.35-0.79]	0.31***	[0.18-0.50]
Marital status				
Never married	1.00		1.00	
Married/Living together	5.19***	[4.33-6.23]	2.13***	[1.58-2.87]
Formerly married	7.70***	[5.7-10.3]	3.39***	[2.30-4.98]
Wealth tercile				
Lowest	1.00		1.00	
Middle	1.16	[0.94-1.43]	1.25*	[1.03-1.53]
Highest	1.36***	[1.14-1.61]	1.16	[0.85-1.58]
N	6,795			

Exponential coefficients; 95 percent confidence intervals in brackets

*p<0.05, **p<0.01, ***p<0.001

[+] based on <50 weighted cases

“Mashonaland Province” includes Mashonaland East, Mashonaland West, Mashonaland Central and Masvingo

“Matabeleland/Midlands” includes Matabeleland North, Matabeleland South and Midlands

Table 10. Unadjusted and adjusted odds ratios of having multiple sex partners in the past 12 months

Variable	Unadjusted ORs		Adjusted ORs	
Want to be circumcised (ref=no or DK)	1.44***	[1.20-1.73]	1.35**	[1.12-1.63]
Age				
15-24	1.00		1.00	
25-34	2.03***	[1.67-2.46]	0.87	[0.62-1.23]
35-44	1.52**	[1.19-1.94]	0.61**	[0.42-0.88]
45-54	1.27	[0.91-1.76]	0.61**	[0.41-0.91]
Level of education				
None	1.00		1.00	
Primary	0.95	[0.37-2.45]	0.95	[0.33-2.65]
Secondary and above	1.10	[0.43-2.85]	1.18	[0.43-3.21]
Religion				
Traditional/Other	1.00		1.00	
Christians	0.61*	[0.41-0.91]	0.59**	[0.40-0.88]
Muslim[+]	0.94	[0.27-3.28]	0.44	[0.04-5.01]
None	0.97	[0.65-1.42]	0.97	[0.66-1.43]
Residence				
Urban	1.00		1.00	
Rural	0.84	[0.68-1.03]	0.70	[0.47-1.03]
Province				
Manicaland	1.00		1.00	
Mashonaland	0.76	[0.56-1.05]	0.69*	[0.50-0.96]
Matabeleland/Midlands	0.81	[0.58-1.13]	0.75	[0.53-1.06]
Harare	0.97	[0.66-1.42]	0.81	[0.51-1.30]
Bulawayo	0.66*	[0.44-0.99]	0.59*	[0.35-0.98]
Marital status				
Never married	1.00		1.00	
Married/Living together	2.36***	[1.93-2.90]	2.99***	[2.10-4.30]
Formerly married	2.42***	[1.59-3.66]	2.94***	[1.66-5.21]
Wealth tercile				
Lowest	1.00		1.00	
Middle	0.92	[0.71-1.19]	0.88	[0.69-1.11]
Highest	0.95	[0.76-1.72]	0.79	[0.55-1.12]
N	6,795			

Exponential coefficients; 95 percent confidence intervals in brackets

*p<0.05, **p<0.01, ***p<0.001

[+] based on <50 weighted cases

“Mashonaland Province” includes Mashonaland East, Mashonaland West, Mashonaland Central and Masvingo

“Matabeleland/Midlands” includes Matabeleland North, Matabeleland South and Midlands

Table 11. Unadjusted and adjusted odds ratios of higher-risk sex in the past 12 months

Variable	Unadjusted ORs		Adjusted ORs	
Want to be circumcised (ref=no or DK)	1.23**	[1.08-1.41]	1.36**	[1.06-1.74]
Age				
15-24	1.00		1.00	
25-34	0.15***	[0.12-0.18]	0.52***	[0.37-0.72]
35-44	0.06***	[0.05-0.08]	0.35***	[0.25-0.49]
45-54	0.04***	[0.03-0.05]	0.24***	[0.15-0.37]
Level of education				
None	1.00		1.00	
Primary	2.95**	[1.44-6.07]	3.79	[0.39-36.1]
Secondary and above	3.64***	[1.77-7.48]	4.14	[0.44-38.8]
Religion				
Traditional/Other	1.00		1.00	
Christians	1.36	[0.97-1.92]	0.51**	[0.31-0.82]
Muslim[+]	1.23	[0.49-3.06]	0.05***	[0.02-0.15]
None	1.76	[1.24-2.49]	0.86	[0.54-1.39]
Residence				
Urban	1.00		1.00	
Rural	0.78**	[0.67-0.90]	0.66**	[0.44-0.99]
Province				
Manicaland	1.00		1.00	
Mashonaland	0.82	[0.63-1.08]	0.88	[0.57-1.35]
Matabeleland/Midlands	1.41*	[1.06-1.88]	1.18	[0.74-1.85]
Harare	1.24	[0.92-1.67]	1.21	[0.74-1.99]
Bulawayo	1.69**	[1.25-2.29]	0.83	[0.49-1.39]
Marital status				
Never married	1.00		1.00	
Married/Living together	0.00***	[0.00-0.00]	0.00***	[0.00-0.00]
Formerly married	0.01***	[0.00-0.03]	0.02***	[0.00-0.05]
Wealth tercile				
Lowest	1.00		1.00	
Middle	1.41***	[1.18-1.69]	0.95	[0.69-1.31]
Highest	1.43***	[1.21-1.70]	0.96	[0.64-1.44]
N	4,571			

Higher-risk sex is defined as sex with a non-marital, non-cohabiting partner in the past 12 months.
Exponential coefficients; 95 percent confidence intervals in brackets
*p<0.05, **p<0.01, ***p<0.001
[+] based on <50 weighted cases
“Mashonaland Province” includes Mashonaland East, Mashonaland West, Mashonaland Central and Masvingo
“Matabeleland/Midlands” includes Matabeleland North, Matabeleland South and Midlands

Table 12. Unadjusted and adjusted odds ratios of not using a condom at last higher-risk sex

Variable	Unadjusted ORs		Adjusted ORs	
Want to be circumcised (ref=no or DK)	0.67**	[0.52-0.87]	0.76*	[0.57-1.00]
Age				
15-24	1.00		1.00	
25-34	0.62***	[0.46-0.83]	0.67*	[0.47-0.98]
35-44	0.71	[0.47-1.08]	0.74	[0.42-1.29]
45-54	0.75	[0.39-1.43]	0.59	[0.27-1.28]
Level of education				
None	1.00		1.00	
Primary	0.75	[0.17-3.32]	1.28	[0.19-8.51]
Secondary and above	0.33	[0.07-1.50]	0.70	[0.09-4.91]
Religion				
Traditional/Other	1.00		1.00	
Christians	1.57	[0.77-3.20]	1.46	[0.67-3.19]
Muslim‡	1.00		1.00	
None	1.75	[0.83-3.67]	1.38	[0.63-3.03]
Residence				
Urban	1.00		1.00	
Rural	1.61***	[1.23-2.11]	0.85	[0.48-1.51]
Province				
Manicaland	1.00		1.00	
Mashonaland	1.31	[0.80-2.17]	1.25	[0.71-2.19]
Matabeleland/Midlands	2.05**	[1.24-3.39]	1.86*	[1.04-3.32]
Harare	0.86	[0.49-1.47]	1.01	[0.46-2.23]
Bulawayo	0.99	[0.54-1.84]	1.06	[0.43-2.57]
Marital status				
Never married	1.00		1.00	
Married/Living together	0.78	[0.57-1.07]	1.01	[0.65-1.54]
Formerly married	0.79	[0.53-1.17]	0.88	[0.52-1.48]
Wealth tercile				
Lowest	1.00		1.00	
Middle	0.69*	[0.51-0.93]	0.86	[0.61-1.23]
Highest	0.42***	[0.31-0.57]	0.61*	[0.38-0.98]
N	1,518			

Not using a condom at last sexual encounter with a non-marital, non-cohabiting partner in the past 12 months, among men who had such a partner. Eight cases were excluded because men's last three partners were spousal, so they were not eligible for questions about condom use with the last high-risk partner.

Exponential coefficients; 95 percent confidence intervals in brackets

*p<0.05, **p<0.01, ***p<0.001

‡ eliminated due to perfect collinearity; all 3 Muslim men who had higher-risk sex in past year used a condom during their last encounter.

"Mashonaland Province" includes Mashonaland East, Mashonaland West, Mashonaland Central and Masvingo

"Matabeleland/Midlands" includes Matabeleland North, Matabeleland South and Midlands

DISCUSSION AND CONCLUSION

The present study investigated the association between male circumcision and risky sexual behavior and also the association between wanting male circumcision and engaging in risky sexual behaviors among men who participated in the 2010-11 ZDHS. The study is set against the backdrop of the recent promotion in Zimbabwe of voluntary medical male circumcision as an additional HIV prevention method. VMMC has raised fears among critics of the program on the basis that circumcision would lead to an increase in high-risk behavior. These fears emanate from the concern that circumcised men might experience a decline in the perception of their risk of contracting HIV, a phenomenon known as risk compensation or behavioral disinhibition.

The study results support the null hypothesis that there is no association between male circumcision and risky sexual behavior. These results are in line with earlier findings from studies in Kenya (Mattson et al., 2008, Westercamp et al., 2012). While the current study is limited to cross-sectional data and thus cannot establish causality, the lack of a relationship between circumcision and risky sexual behavior likely reflects the fact that men are circumcised for many reasons besides HIV prevention. In fact, given the timing of the ZDHS fieldwork (2010-11) in relation to the scale-up of the VMMC campaign (2009), few men surveyed are likely to have been circumcised as a result of the campaign.

The results suggest a strong association between wanting circumcision and risky sexual behavior: with the exception of condom use at last high-risk sexual encounter, men who report that they want circumcision are more likely to be engaging in risky sexual behavior. It is possible that their desire for circumcision could be an outcome of the recent promotion of VMMC for HIV prevention. The campaigns could possibly have affected men's risk perception, leading them to want 'protection' from HIV through male circumcision.

All in all, the findings of this study do not support the argument that circumcised men are prone to engage in risky sex behaviors compared with uncircumcised men. Nevertheless, the study has established a positive association between wanting circumcision and risky sexual behavior for three of four indicators. The lack of observed relationship between medical male circumcision and risky sex may be due to the short period between the start of the male medical circumcision in Zimbabwe which started in 2009 and the collection of ZDHS data (2010-2011).

Subsequent surveys in Zimbabwe may indeed find a significant association between circumcision and sexual risk-taking behavior.

The results of this study lead us to make the following policy recommendations: 1) There is a need to continue observing the relationship between ongoing medical male circumcision campaigns and risky sexual behavior. 2) There is a need to continue studies on the acceptability and feasibility of medical male circumcision among non-circumcised populations with high incidence of HIV. 3) Communication and information dissemination policy must emphasize the need to take caution in messages promoting medical male circumcision, to avoid giving the false impression that circumcision provides immunity against HIV.

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APPENDIX: MALE CIRCUMCISION AND HIV STATUS

Table A1. Male circumcision status and HIV test result

	Blood test result	
Circumcision status	**HIV negative**	**HIV positive**
Not circumcised	.8753 [.8652-.8847]	.1247 [.1153-.1348]
Circumcised	.8540 [.8192-.8830]	.1460 [.1170-.1808]
Total	.8734 [.8633-.8828]	.1266 [.1172-.1367]

95 percent confidence intervals in brackets

Pearson:

Uncorrected chi2 (1) = 2.0186

Design-based F (1, 387) = 1.9235 P = 0.1663

Table A2. Unadjusted odds ratios of being HIV positive by circumcision status

Variable	**Unadjusted ORs**
Circumcision status (ref=not circumcised)	1.199 [0.93-1.55]

Table A3. Wanting male circumcision and HIV test result

	Blood test result	
Want circumcision	**HIV negative**	**HIV positive**
No or don't know	.8900 [.8771-.9016]	.1100 [.0984-.1229]
Yes	.8555 [.8382-.8712]	.1445 [.1288-.1618]
Total	.8753 [.8652-.8847]	.1247 [.1153-.1348]

95 percent confidence intervals in brackets

Pearson:

Uncorrected chi2 (1) = 14.6435

Design-based F (1, 387) = 10.9583 P = 0.0010

Table A4. Unadjusted odds ratios of being HIV positive by desire for circumcision

Variable	**Unadjusted ORs**
Want circumcision (ref=no)	1.366** [1.13-1.65]