

Factors Associated with Uptake of Male Circumcision: Evidence from the 2015 Zimbabwe Demographic and Health Survey

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Abstract

Male circumcision (MC) is on the increase in some parts of Africa. It has been associated with multiple health benefits. Randomised control trials have shown that MC reduces the risks of HIV infection in men. Zimbabwe adopted male circumcision as one of its HIV prevention strategies in 2009. This study examined the socio-demographic determinants of MC in Zimbabwe using secondary data from the Zimbabwe Demographic and Health Survey conducted in 2015. We used self-reported data extracted from the 2015 Zimbabwe Demographic and Health Survey, with a sample of 8 396 males aged 15-54 years, from the males' file. Descriptive and chi-square test statistics, as well as binary regression, were employed in the analysis. The findings showed that the majority of males in the sample (84.2%) were not circumcised. We found no significant association between type of place of residence and wealth with male circumcision. Education, province, religion, marital status, age and knowledge about circumcision all had an influence on male circumcision status as well as ever tested for HIV in the Zimbabwean context. The results from the study indicated that concerted efforts are required to make more men see circumcision as a necessity and they should perceive themselves as at risk from HIV, hence they should take circumcision as a preventative strategy.

Key words: Male circumcision, HIV, voluntary medical male circumcision, adolescent male

Introduction

Hetro-sexual relationships are the key driver of local HIV transmission in sub-Saharan Africa (Potterat, 2009). Globally, HIV has remained a public health challenge with sub-Saharan Africa having the highest number of infections. For instance, HIV and AIDS in Africa continues to be a long-term development challenge with East and Southern Africa disproportional affected. However, the region has shown a substantial decrease in new infections with a 38% reduction since 2010 (UNAIDS, 2020). Those affected are the people in the prime age of their lives and are responsible for the economic growth of the country, but illness and death do not sustain economic growth and development. Zimbabwe has a high HIV prevalence, with unprotected heterosexual sex continuing to be the main transmission route for new infections (Zimbabwe National Statistics Agency (ZIMSTAT) & ICF International, 2015).

The Joint United Nations Programme on HIV and AIDS (UNAIDS) and the WHO recommend the implementation of safe voluntary medical male circumcision (VMMC) as one of the HIV prevention strategies (Bailey et al., 2007). Further studies concluded that countries with a high prevalence of Voluntary Medical Male Circumcision are more likely to have low rates of HIV in comparison to those that do not practice it (Bailey et al., 2007; Herman-Roloff et al., 2011).

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According to studies, the foreskin was found to be the main carrier of HIV and contains langerhans's cells which can be a primary entry point for the HIV (Szabo & Short, 2000) Thus, making uncircumcised men susceptible to HIV infection. Further observational data and ecological studies confirm that male circumcision can be used as a preventative measure for HIV infection in men (Cameron *et al.*, 1989; Moses *et al.*, 1990).

It has been found that circumcision reduces the number of sexual and reproductive diseases (Gray *et al.*, 2007; Larke *et al.*, 2011; Tobian & Gray, 2011). Studies have also shown that MC indirectly prevent female partners from contracting HIV due to decreased prevalence in infected men (Moodley *et al.*, 2020; Morris *et al.*, 2019). Even though circumcision can greatly reduce the rate of HIV transmission, and antiretroviral drugs keep HIV neutral to date; HIV and AIDS has no cure. Consequently, prevention of HIV transmission is extremely important. It is against this background that WHO and UNAIDS recommended that VMMC should be adopted as an HIV prevention programme in regions with high HIV prevalence and with low VMMC uptake (UNAIDS, 2008). A decade ago, MC was already launched in 14 priority countries in southern and eastern Africa (Curran *et al.*, 2011). In addition, by 2018 South Sudan was included thus bringing the total priority countries to fifteen (Stegman *et al.*, 2021). In Zimbabwe, evidence continues to show that VMMC is still low and has failed to attract the originally intended target age group to circumcise 80% of men aged 15-29 by 2016. Male circumcision is alien to most Zimbabwean males. It is practised by a few ethnic groups such as the VaRemba, Xhosa and Tshangan (Hove *et al.*, 2019).

A remarkable number of males have adopted VMMC as one of the HIV prevention strategies in Zimbabwe since it was adopted as National Male Circumcision Policy in 2009. For instance, by 2016 only 845 000 (men of all ages) have been circumcised under the VMMC programme and the uptake remained low (McGillen *et al.*, 2018). Consequently, the government revised its target programme to 80% of 15–29-year-old men and 30% of 10–14 year-olds by 2021 (McGillen *et al.*, 2018). In as much as, Zimbabwe shifted its target to circumcise 10-14-year-olds as well by 2021, modelling elsewhere has shown circumcision of males ages 25–29 and 20–24 provides the most immediate reduction in HIV incidence (Kripke *et al.*, 2016). Previous studies point to the effect that circumcision of minors has raised controversies (Hammond & Carmack, 2017; Svoboda, 2017; Svoboda *et al.*, 2016). Most studies maintain that circumcision should be deferred until the child can provide his own fully informed consent (Sardi & Livingston, 2015). In another context, adults who were circumcised in childhood, have undergone surgery to regain their prepuce or foreskin (Collier, 2011).

In Zimbabwe, several studies have conducted MC-related studies however many of these studies utilized very small samples (Khumalo-Sakutukwa *et al.*, 2013; Mangombe & Kalule-Sabiti, 2019; Montaña *et al.*, 2014; Printer & Mbusa, 2014). Besides, these studies are limited in two areas: they did not exclusively include males of reproductive age 15-54 and left out males aged 15-17. Yet studies elsewhere found that the prevalence of risky sexual behaviour was alarming among male adolescents aged 15-19 years (Srahbzu & Tirfeneh, 2020). A study using the latest 2015 Zimbabwe Demographic and Health Survey data is essential in providing general conclusions and acceptability about the correlates of MC. The current paper, therefore, assessed the factors associated with MC uptake among men aged 15-54 years. Results from the study could be useful to provide informed policy intervention that can be used to generate demand for VMMC and further closely integrate with HIV testing and treatment scale-up.

Methods

This study used data from the 2015 Zimbabwe Demographic and Health Survey (ZDHS) to investigate factors associated with the uptake of male circumcision. The 2015 ZDHS is part of the worldwide series of nationally representative cross-sectional household survey programmes. It collects individual- and household- levels socio-demographic, health and sexual activity, maternal and child health, mortality, fertility, family planning, domestic violence, circumcision, and nutrition data. The Zimbabwe National Statistics Agency (ZIMSTAT) with technical assistance from ICF International and USAID did the data collection. It was funded by the Government of Zimbabwe and other external donors. At the implementation stage, each province was divided into districts and each district into wards and each ward into enumeration areas (EAs). A sample of 11,197 households was selected following a two-stage cluster sampling design. In the first stage, 400 EAs were selected (166 enumeration areas in urban areas and 234 in rural areas) were selected from the 2012 Zimbabwean national population and housing census. In the second stage, a listing of households was compiled in each of the 400 EAs. All men aged 15-54 found in the selected household the night before the survey were eligible to be interviewed; and out of the 9 132 eligible men, 8 396 men were interviewed.

Measures of outcome variables

The dependent variable was created based on the respondent's circumcision status. Circumcision status was assessed using an open-ended question, "Some men are circumcised or have their foreskin completely removed from the penis. Are you circumcised?" Based on this question, a dummy variable was created indicating whether the man respondent was circumcised or not. In this study, whoever was circumcised was coded as 1 (Yes) and as 0 (otherwise). Because men who said that they "don't know" were non-committal, for analysis purposes, they collapsed with men who were not circumcised. The outcome variable should be treated with caution. The data on male circumcision status were based on self-reported information. No medical examination was done to establish the circumcision status of the respondents. Therefore, some respondents could have lied about their circumcision status to conform to societal expectations. In addition, no follow-up question is asked on the reason why circumcision was undertaken. Therefore, one cannot ascertain whether circumcision was solely for HIV prevention rather than for initiation rites to manhood.

Measures of explanatory variables

The independent variables include age, marital status, religion, wealth, level of education, HIV status, type of place of residence, province, and knowledge about male circumcision. During data collection, age was captured as a continuous variable however during analysis, it was grouped as 15-24, 25-34, 35-44 and 45-54. Marital status was categorized as never married, married and divorced/ separated. Religion is represented as a nominal variable with seven categories; Traditionalist, Roman Catholic, Protestant, Pentecostal, Apostolic Sect, Other Christians, and None. At the analysis stage, the following were adopted for easy analysis. Religion was categorized as Mainline Christians which combined Catholic and Protestant, Pentecostal, Apostolic sects, and Other religions. The Other religion was composed of the following: Other Christians, Traditionalists and None. The wealth quintile collapsed into poor, middle and rich. Education level was categorized as no education, primary, secondary and post-secondary but modelled as no education and primary, and secondary and higher education; ever been tested for HIV is coded as "yes" and "no". The type of place of residence was grouped as urban and rural. Provinces coded as Manicaland,

Masvingo, Harare and Bulawayo. Knowledge about male circumcision was coded 0 and 1, with 0 indicating no knowledge while 1 indicated that an individual knows.

Statistical Analyses

Data were weighted to account for the effect of sampling imbalances, complex survey design and nonresponse. Frequency distributions were computed to describe and summarise the characteristics of men considered in the sample. The relationship between the dependent variable as to whether the man respondent was circumcised or not and the independent variables were established at the bi-variate level and tested using the chi-square test, set at $p < 0.05$. Logistic regression was used at the multivariate level to isolate the net effect of sociodemographic factors on the dependent variable. In modelling, men who were not circumcised were the reference category, giving us a subsample of 8396 men respondents for the analysis. The covariates included in the final model were based on the statistical significance of $p < 0.05$ at the bivariate level. The logit function obliges the model prediction to be between 0 and 1, as is always the case when modelling probabilities (Hosmer *et al.*, 1989). The fitted model was subjected to Hosmer-Lemeshow goodness-of-fit (H-L gof) to assess its specification and goodness of fit (Cleves *et al.*, 2010; Johnson, 2012). The test uses the chi-square statistic and if the model is correctly specified and is appropriate, the test is insignificant ($p > 0.05$).

Findings

Frequency distribution of respondents by background variables

Table 1 represents the distribution of respondents by socio-demographic factors. Nearly 16% of the male respondents in the sample had been circumcised. More than 10% of the respondents resided in the following provinces: Manicaland, Mashonaland Central, Mashonaland West, Midlands and Harare. Matabeleland South had the least number of men who were sampled for the survey (7.9%). Approximately 59% of the respondents were residing in rural areas. About 41% were aged 15-24 and 11% were aged 45-54, and the majority of the men were married (52%). Among all men included in the data, approximately 37% of the respondents were affiliated with the Apostolic sect and other Christians, and 15% were with the Pentecostals. The majority of the respondents (66%) had secondary education while 11% were of higher-level education. Nearly 52% of the men were from the rich wealth tertile and 17% from the middle tertile, and about 34% never tested for HIV.

Table 1: Percent distribution of selected characteristics of respondents

Variable Name	Frequency (n)	Percentage (%)
Circumcision status		
Yes	1327	15.8
No	7069	84.2
Province		
Manicaland	895	10.7
Mashonaland Central	987	11.8
Mashonaland East	790	9.4
Mashonaland West	931	11.1
Matabeleland North	745	8.9
Matabeleland South	664	7.9
Midlands	884	10.5
Masvingo	783	9.3
Harare	994	11.8
Bulawayo	723	8.6

Type of place of residence		
Urban	3456	41.2
Rural	4940	58.8
Age		
15-24	3441	41.0
25-34	2270	27.0
35-44	1729	20.6
45-54	956	11.4
Marital status		
Never in union	3619	43.1
Married	4337	51.7
Divorced/separated	440	5.2
Religion		
Other Religions	1762	21.0
Mainline Christians	2249	26.8
Pentecostal	1272	15.2
Apostolic sect	3113	37.1
Level of Education		
No education & primary	1912	22.8
Secondary	5524	65.8
Higher	960	11.4
Wealth Index quantile		
Poor	2529	30.1
Middle	1480	17.6
Rich	4387	52.3
Ever been tested for HIV		
Yes	5507	65.6
No	2889	34.4
Total	8 396	100

Source: 2015 Zimbabwe Demographic and Health Survey

Differentials in circumcision status by socio-demographic characteristics

Table 2 presents differentials in circumcision status by selected socio-demographic variables. In the table, results show that significant association were observed for province of residence ($\chi^2=297.2, p=0.000$). Circumcision status significantly varied by type of place of residence ($\chi^2=70.1, p=0.000$), age of respondent ($\chi^2=118.6, p=0.000$), marital status ($\chi^2=138.3, p=0.000$), religion ($\chi^2=24.9, p=0.000$), level of education ($\chi^2=44.9, p=0.000$), wealth quintile ($\chi^2=57.7, p=0.000$), and ever been tested for HIV ($\chi^2=235.4, p=0.000$).

Table 2: Differentials in respondents' circumcision status for men in Zimbabwe by socio-demographic characteristics

Variable	N	Not circumcised	Circumcised	χ^2 (p-value)
Province				297.2 (P<0.000)
Manicaland	895	89.5	10.5	
Mashonaland Central	987	91.7	8.3	
Mashonaland East	790	89.7	10.3	
Mashonaland West	931	88.8	11.2	
Matabeleland North	745	80.8	19.2	
Matabeleland South	664	75.0	25.0	
Midlands	884	85.0	15.0	
Masvingo	783	83.5	16.5	
Harare	994	84.0	16.0	
Bulawayo	723	67.4	32.6	

Type of place of residence				
Urban	3456	80.2	19.8	70.1
Rural	4940	87.0	13.0	(P<0.000)
Age				
15-24	3441	79.1	20.9	118.6 (P<0.000)
25-34	2270	88.0	12.0	
35-44	1729	88.8	11.2	
45-54	956	11.5	10.7	
Marital status				
Never in union	3619	78.9	21.1	138.3 (P<0.000)
Married	4337	88.5	11.5	
Divorced/separated	440	85	15.0	
Religion				
Other religions	1762	85.6	14.4	24.9 (P<0.000)
Mainline Christians	2249	81.3	18.7	
Pentecostal	1272	83.2	16.8	
Apostolic sect	3113	85.9	14.1	
Level of Education				
No education & primary	1912	88.4	11.6	44.9 (P<0.000)
Secondary	5524	83.6	16.4	
Higher	960	79.2	20.8	
Wealth Index quantile				
Poor	2529	87.8	12.2	57.7 (P<0.000)
Middle	1480	86.6	13.4	
Rich	4387	81.3	18.7	
Ever been tested for HIV				
Yes	2889	79.8	20.2	235.4 (P<0.000)
No	5507	92.6	7.6	
Total	8396	84.2	15.8	

Source: 2015 Zimbabwe Demographic and Health Survey

Multivariate Analysis

In isolating the net effects of each independent factor on circumcision, the model was built based on the identified predictors explained by the bivariate analysis. In the model, all significant independent factors at the bivariate level were included, in which the dependent variable is, the experience of circumcision. These include province of residence, type of place of residence, marital status, religion, level of education, wealth index and ever been tested for HIV. Table 3 presents the results of the logistic model. The Hosmer-Lemeshow Goodness of fit test (H-L gof) shows the model is correctly specified with a p value insignificantly greater than 0.05 ($p > 0.600$). Men who resided from Manicaland, Mashonaland Central, Mashonaland East, Matabeleland North, Midlands, and Harare were less likely to be circumcised compared to those who resided in Bulawayo. Age was found to be a significant predictor of male circumcision, for instance, men aged 25-34 years were less likely to be circumcised compared to those aged 45-54 years (OR=0.667, 95% CI=0.528-0.843, $p < 0.001$). Men age 15-24 were more likely to be circumcised (OR = 1.28, CI=0.981-1.709, $p < 0.068$), those aged 35-44 were less likely (OR= 0.684, CI=0.538-0.870, $p < 0.002$) compared to those aged 45-54 years. Men who were never in a union were more likely to be circumcised compared to those who were divorced/ separated (OR=1.570, 95% CI= 1.138-2.167, $p < 0.006$). The respondents

who were never tested for HIV were less likely to get circumcised compared to those who were tested (OR= 0.227, 95% CI=0.192-0.269, $p < 0.000$). Men who had high knowledge scores were less likely to get circumcised compared to those who had low knowledge (OR= 0.760, CI=0.661-0.874, $p < 0.000$). Concerning religion, men who belonged to Other religions were more likely to get circumcised (OR=1.217, 95% CI=1.016-1.145, $p < 0.033$). Education was associated with

Table 3: Multivariate association between background characteristics and circumcision status in Zimbabwe, ZDHS2015

Variable	Odds Ratio (Exp(B))	95% (CI)
Province		
Bulawayo R		
Manicaland	0.321***	0.240-0.429
Mashonaland Central	0.266***	0.196-0.361
Mashonaland East	0.313***	0.230-0.424
Mashonaland West	0.318***	0.239-0.423
Matabeleland North	0.671**	0.510-0.882
Matabeleland South	0.890	0.682-1.162
Midlands	0.498***	0.380-0.651
Masvingo	0.573***	0.435-0.754
Harare	0.478***	0.478-0.373
Type of place of residence		
Urban R		
Rural	1.187	0.951-1.482
Age		
45-54 R		
15-24	1.295*	0.981-1.709
25-34	0.667**	0.528-0.843
35-44	0.684**	0.538-0.870
Marital status		
Divorced/separated R		
Never in union	1.570**	1.138-2.167
Married	0.773	0.579-1.033
Religion		
Apostolic sect R		
Other religions	1.217**	1.016-1.145
Mainline Christians	1.077	0.916-1.266
Pentecostal	1.030	0.848-1.252
Level of education		
Higher R		
No education and primary	0.730	0.565-0.934
Secondary	0.795**	0.654-0.966
Wealth index quantile		
Rich R		
Poor	1.021	0.803-1.298
Middle	0.993	0.773-1.277
Have you ever been tested		
Yes R		
No	0.227***	0.192-0.269
Knowledge about male circumcision		
Low knowledge score R		
High knowledge score	0.760***	0.661-0.874

Source: 2015 Zimbabwe Demographic and Health Survey

Note: R stands for reference category

circumcision status, for instance, those respondents who had attained secondary education were less likely to be circumcised (OR=0.795, CI=0.654-0.966, $p < 0.021$).

Discussion

The study aimed to investigate the factors associated with male circumcision status among men aged 15-54 years in Zimbabwe. Despite the evidence suggesting that VMMC offers protection against HIV and AIDS, circumcision rates are still very low in Zimbabwe. Only 15% were circumcised 5 years after Zimbabwe adopted MC as another HIV prevention strategy. Our study findings are consistent with other studies previously done in Zimbabwe (Chikutsa & Maharaj, 2015; Mangombe & Kalule-Sabiti, 2019). The low circumcision rate can be due to the socio-cultural background of most Zimbabwean men, circumcision is alien to them (Hove *et al.*, 2019; Montaña *et al.*, 2014; Shumba & Lubombo, 2017).

As for religion, the results showed that the respondents who belonged to the 'other' religion were more likely to be circumcised compared to the Apostolic Sect. Similar findings were reported within the Zimbabwean context (Gore *et al.*, 2014). The Apostolic Sect followers' beliefs and values associate MC with promiscuous men. In addition, the church doctrine is against its church members seeking any medical help from a health institution. The members who rely on western or traditional medicine are heavily condemned and viewed as lacking faith (Kenneth *et al.*, 2016). Therefore, these results indicate how church teachings tend to shape individual attitudes towards health-seeking behaviour (Agorastos *et al.*, 2014; Peprah *et al.*, 2018).

Our analysis showed that age influenced men's actual decision to be circumcised. The study established that those men aged 25-34 years were less likely to circumcise compared to those aged 45-54 years. Previous studies have shown contrary results, older men were less likely to circumcise compared to younger men (Mwiinga, 2020; Patel *et al.*, 2018). In the same study, younger men aged 15-24 years had higher odds to be circumcised compared to those aged 45-54 years. This could be given a two-fold explanation. First, young men easily adapt to innovations, unlike older men who turn to be rigid to change. Second, young men usually are easily influenced by peer pressure to conform to a group and fear rejection.

Contrary to the findings by Mangombe and Kalule-Sabiti (2019), where men with high knowledge about male circumcision were more likely to go for the procedure, the current study revealed that men with high knowledge about the procedure were less likely to go for circumcision. Therefore, being knowledgeable about the side effects of VMMC does not influence men to accept the procedure (Frisch *et al.*, 2011). The study revealed that men who tested for HIV were more likely to circumcise than those who had never tested for HIV. WHO/UNAIDS guidelines recommend HIV testing before performing medical circumcision (UNAIDS, 2008). Furthermore, it is not commended to circumcise HIV-positive men given the increased risk of passing HIV infection to female partners during the healing stage of the operation (Awad *et al.*, 2017; Prodger & Kaul, 2017).

Our findings show that the type of place of residence was a predictor factor in circumcision uptake. In this study, men from Bulawayo were more likely to circumcise compared to men from other provinces. The reason might be explained by three viewpoints, Bulawayo province is predominately an urban area, and the MC programme was concentrated in urban settings when it was launched. As a result, men who resided in urban areas are more exposed to male circumcision as HIV prevention messaging. Secondly, urbanites easily adapt to new

cultures due to intermixing with other cultural groups who take circumcision who are concentrated in cities. The role of the intermixing ethnic groups in influencing the uptake of circumcision has been documented in North West Tanzania (Nnko *et al.*, 2001). Considering the history of Bulawayo city and its out-migration history, most men migrate to South Africa and associate their cultural orientation with some circumcising ethnic groups found in that country.

Acceptability of male circumcision in Zimbabwe was associated with marital status, with men who have never been in a union more likely to be circumcised compared to those divorced/separated. On the other hand, some studies in sub-Saharan Africa have shown contrary results. For instance, in Kenya, union men received support for male circumcision from their partners (Lanham *et al.*, 2012). The high acceptability of male circumcision among men not in the union may be explained by what they perceive themselves as more vulnerable to HIV. In addition, this might be because there is no partner control so their decision to circumcise is purely individual. Those divorced/ separated might still have residual interference and legitimate expectations formed from the previous union. Thus, their previous relationship experiences form their naivety concerning the importance of VMMC as a prevention measure of HIV and sexually transmitted infections.

The level of education is a major factor that influences men's decision to circumcise. In this study, men with secondary education were less likely to circumcise in comparison to those with higher education. Contrary to this, other studies show that men with secondary education were more likely to circumcise (Gurman *et al.*, 2015). Probably educated men understand the benefits of circumcising more than those with no education or those with primary education.

Limitations

The strengths of our study included a relatively large sample size and a diverse population of respondents. However, the use of secondary data limited the scope of this study to variables within the dataset. Like most demographic surveys, the absence of qualitative data denies this analysis an in-depth understanding and explanation of the patterns observed in the quantitative analysis. Despite these limitations, the data provide important insights into which group of males should be targeted to increase the demand for VMMC.

Conclusion

In Zimbabwe, circumcision is not widespread, with only 15% of the respondents reporting that they were circumcised. This percentage included those that had undergone traditional MC. This estimate is low considering the vast sums of money spent on promoting VMMC services. Improved efforts are required to debunk or demystify some of the barriers that could be hindering men to go for circumcision. The results from the 2015 ZDHS would be used to inform the VMMC programme in 2022 and beyond. There is a need to dispel the misconceptions about male circumcision and promote the health benefits associated with VMMC.

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