



Factors associated with low uptake of safe male circumcision (SMC) and the intention not to undergo circumcision among men in Botswana

Mogomotsi Ntsabane¹ · Gobopamang Letamo¹ · Mpho Keetile¹

Received: 23 January 2023 / Accepted: 9 July 2023
© The Author(s) 2023

Abstract

Aim This paper investigates factors associated with low uptake of safe male circumcision (SMC) and the intention not to circumcise among men aged 15–64 years in Botswana.

Subject and methods Data were collected during the 2013 Botswana AIDS Impact Survey (BAIS IV). For analysis, a sample of 3154 men was used to assess the association between being uncircumcised/not intending to undergo circumcision and different factors using descriptive statistics and logistic regression analysis. Data analysis was conducted using SPSS version 27. Logistic regression analysis results are presented as odds ratios together with their confidence intervals. All comparisons were statistically significant at $p < 0.05$.

Results Results show that 25.1% of men reported that they were circumcised, while 50.5% did not intend to undergo circumcision. Multivariate analysis showed that several factors were significantly associated with being uncircumcised including age of 15–24 years (OR = 2.75, CI 1.82–4.19), residing in rural areas (OR = 1.31, CI 1.09–4.1.58), and having primary or less education (OR = 2.48, CI 1.87–3.30). Similarly, factors significantly associated with not intending to be circumcised included age of 34–44 years (OR = 1.60, CI 1.15–2.23), residing in urban areas (OR = 1.27, CI 1.02–1.58), and being married (OR = 1.61, CI 1.20–2.16). It was also observed that men who had not seen or heard of SMC in the past 4 weeks were 1.2 times more likely (OR = 1.27, CI 1.03–1.56) to report the intention not to undergo circumcision. On the other hand, men who indicated that they would not circumcise their male children under 18 years of age were 8.7 times more likely (OR = 8.70, CI 6.35–11.94) to report that they did not intend to circumcise.

Conclusion Results from the study show high acceptability but low uptake of SMC. Some individual behavioral factors influencing circumcision status and decision whether to undergo circumcision were identified. Targeted interventions, continuous education, and expansion of the SMC programme are recommended, especially for older men and those in rural areas.

Keywords Safe male circumcision · Factors · Botswana · HIV/AIDS

Background

Male circumcision (MC) is carried out for many reasons including cultural, medical, religious, and social reasons. Safe male circumcision (SMC), medical male circumcision (MMC), and voluntary medical male circumcision (VMMC) are some terms that refer to the permanent surgical removal of the foreskin for medical reasons. The prevalence of MC varies across the world, with Muslim countries having the highest prevalence, and southern African countries such as

Botswana and Angola having some of the lowest prevalence (Morris et al. 2014). Male circumcision has been recommended by the World Health Organization (WHO) as an add-on strategy to reduce the transmission of HIV after studies in Uganda and South Africa showed that circumcision was effective in reducing HIV infection by up to 60% (Chiringa et al. 2016). Mathematical modeling and cost-effective analysis were also done to support this recommendation (Tobian and Gray 2011).

Botswana is among the 14 southern and eastern African countries where MC was recommended. In Botswana, the SMC programme was launched in 2009 with the goal of 80% coverage by 2012 (Ministry of Health 2009). The SMC programme has been running in Botswana since then, and though some strides have been made (Keetile

✉ Mpho Keetile
mphokeet@yahoo.com

¹ Department of Population Studies, University of Botswana,
Private Bag 00705, Gaborone, Botswana

2020), there is still a gap between the target and the actual rate of circumcision (Katsi and Daniel 2015). The first case of HIV in Botswana was recorded in 1985, and the country has been severely hit by the HIV epidemic, with the number of cases increasing significantly since then (Hardon et al. 2006). According to the Botswana AIDS Impact Survey IV (BAIS IV) the prevalence of HIV in 2013 was 18.5%, and the unadjusted incidence rate was 2.61% (Botswana AIDS Impact Survey [BAIS] IV Report 2013). Moreover, according to the Joint United Nations Programme on HIV/AIDS (UNAIDS) country data for 2016, Botswana has an approximate HIV prevalence of 21.9% among adults aged 15–49 years (WHO 2016). Studies also estimate that there were 10,000 new HIV infections in 2016, and 4300 of those infections were among males aged 15 years and above (World Health Organization 2017). The number of deaths due to AIDS has been estimated to be 3900 annually, with males accounting for about 55% of all deaths associated with HIV (World Health Organization 2017).

Katsi and Daniel (2015) noted that “Botswana has been running safe male circumcision (SMC) since 2009 and has not yet met its target.” Similar findings were noted by Keetile and Bowelo (2016), where only a tenth of the target population for the strategy had been reached, leaving a large proportion of the population at a higher risk as compared to those who had been circumcised (WHO & UNAIDS 2010). According to WHO (2017), there were a total of 19,756 circumcisions performed in Botswana in 2017 and a further 20,209 circumcisions between 2008 and 2017, which is far below the national target of 80% (World Health Organization 2018). The number of males being circumcised falls very far from the intended number in Botswana despite the many efforts to promote SMC such as street-level promotions using crowd pullers and mall activations, targeted campaigns in schools and workplaces, 24-hour digital billboards, and the use of models during traffic surges to create VMMC hype (ACHAP 2020; Keetile 2020). Given the low rates of circumcision and the lack of intention among males to circumcise, this paper aimed to investigate factors associated with low uptake of SMC and the intention not to circumcise among men in Botswana. The paper also investigates reasons given by individuals for not intending to undergo circumcision. The decision not to be circumcised is personal and is influenced by many factors. The advantages of circumcision outweigh those of not doing so, but the rate of circumcision is still very low, making it difficult to reduce the number of new HIV infections and prompting speculation that there is a significant association between different factors and SMC. An understanding of low rates of circumcision and non-intention among men to undergo SMC will provide the opportunity for the government to come up with effective interventions.

Theoretical framework

This paper employs the theory of planned behaviour (TPB) by Ajzen (1991), which is an extension of the theory of reasoned action, to investigate factors associated with the low uptake of SMC and the intention not to circumcise among men in Botswana. The theory is based on an individual's intent to engage in a particular behaviour, in this case circumcision. According to Ajzen (1991), intentions are assumed to capture the motivational factors that influence a behaviour; they are indications of how hard people are willing to try and how much effort they are planning to exert to engage in a certain behaviour. As a general rule, the stronger the willingness and desire to engage in a particular behaviour, the greater the likelihood of achieving such behaviour (Ajzen 1991).

According to TPB, intent is based on three components, namely attitude towards behaviour, subjective norm, and perceived behavioural control. To predict an individual's likelihood of undergoing circumcision, knowledge of the individual's views of the procedure is needed. Furthermore, how an individual reacts to societal pressure and expectations, and thus subjective norms, plays a vital role in the decision not to circumcise. The extent to which an individual male resists the procedure is based on whether the individual believes he is in control of the decision to undergo the procedure. If individuals believe they are forced to undergo circumcision, they are more likely to resist (Ilo et al. 2018).

According to the model, external factors such as availability of funds, expertise, time, and support of others also influence the intent to engage in a behaviour (Ajzen 1991). Here, socio-demographic characteristics are taken to be these external factors that also play a role in the decision not to circumcise. As a result, the analyses in this paper use constructs of the theory of planned behaviour and reasoned action to investigate factors associated with low uptake of SMC and not intending to circumcise among men in Botswana.

Methods

Study design

This study used a quantitative cross-sectional analytical and non-experimental study design, as there was no manipulation of the independent variables: being uncircumcised and not intending to circumcise. This study uses data from the 2013 BAIS IV, which follows a series of surveys conducted every 5 years in Botswana by the National

AIDS and Health Promotion Agency (NAHPA), Statistics Botswana, and Ministry of Health.

Data collection methods and sampling

The BAIS IV survey was a cross-sectional population-based household survey employing quantitative methods and was carried out from January to April 2013. Data were collected for households and individuals using questionnaires written in English or Setswana. The information collected from the household questionnaire was used to identify individuals who were eligible to complete the individual questionnaire. For BAIS IV, the sampling frame was based on the 2011 Population and Housing Census (PHC), which comprised a list of the enumeration area (EA) together with the number of households. A stratified two-stage probability sample design was used for the selection of the BAIS IV sample. For this study, a total of 3809 men aged 15 to 64 years who had successfully completed the BAIS IV questionnaire were included for analyses.

Variable measurement

Dependent variables

The study used two dependent variables, circumcision status and the intent to circumcise. The circumcision status was derived from the question *are you circumcised*, with possible answers of *yes* coded as 1, *no* coded as 0, and *don't know* coded as 3. During analysis, the responses for *don't know* were filtered out because they showed no knowledge of circumcision status, and the variable was recoded as *yes* coded 0 and *no* coded 1 to allow for interpretation of uncircumcised men.

The intent to circumcise variable was derived from the question *do you intend to get circumcised in the next 12 months*, with possible answers *yes* coded 1, *no* coded 0, and *don't know* coded 3. The responses *don't know* were filtered out during analysis because this showed that respondents were undecided, and the variable was recoded as *yes* coded 0 or *no* coded 1 to allow for interpretation of men not intending to be circumcised.

Independent variables

Several demographic variables were used in this study and were recoded as follows. Age was transformed into 10-year age groups (15–24, 25–34, 35–44, 45–54, and 55–64). Place of residence was recoded as follows: *cities*, *towns*, and *urban villages* were recoded as *urban*, while *rural areas* were recoded as *rural*. Education was recoded as follows: *none*, *non-formal*, and *primary education* were recoded as *primary education*. *Secondary* and *senior secondary education* were recoded as *secondary education*. *Tertiary or higher*

remained as *higher education*. Employment status was recoded as follows: individuals who were employed in any form or sector were coded as *employed*, and those actively seeking employment coded as *unemployed*. Respondents not eligible for employment because of their age or disability and pensioners were coded as *not eligible for employment*. Marital status was recoded as follows: *married* and *separated* were recoded as *married*, whereas *never married*, *living together*, *divorced*, and *widowed* were recoded as *not married*.

Variables based on theory of reasoned action and planned behaviour

The theory of reasoned action proposes that there are three components at play to change behaviour: attitude towards the behaviour, subjective norm, and perceived behavioural control. Firstly, to measure attitudes towards the behaviour, the question asking whether participants had *heard or seen any information on safe male circumcision in the past 4 weeks*, with possible answers being *yes*, *no*, and *don't know*, was used as a proxy, because having information and knowledge of SMC would influence an individual's attitude towards circumcision. Secondly, to measure subjective norms, the question asking *should circumcised males stop using condoms*, with possible answers *yes*, *no* and *don't know*, was used as a proxy because, while using condoms should be the norm, there is some level of subjectivity. Lastly, to measure perceived behavioural control, the question asking *would you circumcise male children aged below 18 years* was used as a proxy, because deciding to circumcise children shows some form of control over the procedure.

Data analysis

Frequencies were run for all variables, and cross-tabulations between variables were calculated. Chi-square tests were used to check for the statistical significance of the relationships. Logistic regression for complex samples was used to measure the likelihood of being uncircumcised and not intending to circumcise, because data collection used a multi-stage sampling protocol. The analysis used logistic regression for Models I to IV. The Statistical Package for the Social Sciences (SPSS) was used for analysis.

Results

Select sample background characteristics

Table 1 shows the distribution of men in the sample by circumcision status and their intent towards

Table 1 Rate of circumcision and intent to circumcise

Variable	Number	Percent
Circumcised		
Yes	956	25.1
No	2853	74.9
Intend to circumcise		
Yes	1411	49.5
No	1442	50.5

circumcision. Almost three-quarters (74.9%) of men were uncircumcised, and half (50.5%) did not intend to circumcise.

Table 2 shows the distribution of men by socio-demographic characteristics and selected variables on SMC, specifically, whether they had heard or seen any information on SMC in the past 4 weeks, whether they would circumcise male children under 18 years of age, whether circumcised men should stop using condoms, and reasons for not intending to circumcise. Results show that around

Table 2 Sample socio-demographic and behavioural characteristics

Variable	Number	Percent (%)
Age		
15–24	926	29.4
25–34	934	29.6
35–44	656	20.8
45–54	387	12.3
55–64	251	8.0
Place of residence		
Urban	1995	63.3
Rural	1159	36.7
Education		
Primary or less	893	28.3
Secondary	1548	49.1
Higher	713	22.6
Employment status		
Employed	2075	65.8
Unemployed	422	13.4
Not eligible for employment	657	20.8
Religion		
Christianity	2514	79.7
Other religion	640	20.3
Marital status		
Married	611	19.4
Not married	2543	80.6
Heard or seen any information on safe male circumcision in the past 4 weeks		
Yes	2002	63.5
No	1152	36.5
Would circumcise male children under 18 years of age		
Yes	2611	82.7
No	543	17.3
A circumcised male should stop using condoms		
Yes	389	12.3
No	2765	87.7
Reasons for not intending to circumcise		
Pain	213	18.5
Fear of procedure	375	32.5
Culture	114	9.9
Fear of HIV testing	610	52.9

four-fifths (79.8%) of men were aged between 15 and 45 years, and almost two-thirds (63.3%) of men resided in urban centres. The majority of men had a secondary education (49.1%), and slightly less than two-thirds of men (65.8%) were employed. Four-fifths (80.6%) of men reported that they were not married. When considering circumcision, more than a third (36.5%) of men had not heard or seen any information on safe male circumcision in the past 4 weeks, and approximately one-sixth (17.3%) would not circumcise their children under 18 years of age. In addition, 12.3% of men believed that circumcised males

should stop using condoms. Table 2 also shows that more than half (52.9%) of men included fear of HIV testing and about a third (32.5%) included fear of the procedure as the major reasons for not intending to undergo circumcision.

Association between socio-demographic characteristics and being uncircumcised and not intending to circumcise

Table 3 shows the association between socio-demographic characteristics and select SMC characteristics (specifically,

Table 3 Association between socio-demographic characteristics and circumcision status

Variable	Percentages (%)	
	Uncircumcised	Circumcised
Age		
15–24	77.1	22.9
25–34	73.0	27.0
35–44	69.6	30.4
45–54	69.2	30.8
55–64	66.1	33.9
Chi-square = 19.85, $p=0.001$		
Place of residence		
Urban	71.4	28.6
Rural	80.2	19.8
Chi-square = 36.19, $p=0.000$		
Education		
Primary or less	81.7	18.3
Secondary	74.6	25.4
Higher	62.6	37.4
Chi-square = 92.36, $p=0.000$		
Employment status		
Employed	71.2	28.8
Unemployed	76.2	23.8
Not eligible for employment	81.0	19.0
Chi-square = 39.89, $p=0.000$		
Marital status		
Married	67.1	426
Not married	76.3	2405
Chi-square = 24.19, $p=0.000$		
Heard or seen any information on safe male circumcision in the past 4 weeks		
Yes	70.4	1547
No	78.4	969
Chi-square = 25.66, $p=0.000$		
Would circumcise male children under 18 years of age		
Yes	70.3	2061
No	90.2	770
Chi-square = 100.4, $p=0.000$		
A circumcised male should stop using condoms		
Yes	84.8	473
No	73.0	2358
Chi-square = 36.73, $p=0.000$		

having heard or seen any information on SMC in the past 4 weeks, whether they would circumcise male children under 18 years of age, belief that circumcised men should stop using condoms) and circumcision status. Analysis shows that age, education, employment status, and marital status were all significantly associated with being uncircumcised. Place of residence was only significantly associated with being uncircumcised. When considering age, the table illustrates that the number of uncircumcised men is greater in all age groups, and four-fifths (80.2%) of men residing in rural areas were uncircumcised.

Furthermore, the table demonstrates that a larger proportion of men with primary or less education (81.7%) than those with secondary education (74.6%) and higher education (62.6%) reported that they were uncircumcised. Results also show that a smaller proportion of employed men (71.2%) and unemployed men (76.2%) were uncircumcised compared with men not eligible for employment (81.0%). More than three-quarters (76.3%) of unmarried men and slightly more than two-thirds (67.1%) of married men reported that they were uncircumcised, as shown in Table 3. Furthermore, a significantly high proportion of men who had not seen or heard information on SMC in the past 4 weeks (78.4%) and men who had heard or seen information on SMC in the past 4 weeks (70.4%) reported that they were uncircumcised. Conversely, nine in ten men who were uncircumcised indicated that they would not circumcise their children under 18 years of age. About 85% of men who believed that circumcised men should stop using condoms were uncircumcised, while only 73.0% of men who did not believe that circumcised men should stop using condoms reported that they were uncircumcised.

Association between socio-demographic characteristics and intention regarding circumcision

Table 4 shows that the proportion of men not intending to circumcise increased with age, while almost an equal proportion of urban and rural residents did not intend to circumcise. A significantly higher proportion of men with higher education (57.3%) and employed men (54.7%) reported that they did not intend to circumcise. About two-thirds (65.1%) of married men did not intend to get circumcised. Less than half of men who had not seen or heard any information on SMC in the past 4 weeks (45.5%) and men who had seen or heard any information on SMC in the past 4 weeks (42.6%) did not intend to get circumcised. More than three quarters (76.9%) of men who said that they were not intending to circumcise reported that they would not circumcise their male children under 18 years of age, while 55% of men who believed circumcised men

should stop using condoms were not intending to get circumcised.

Association between not intending to circumcise and socio-demographic characteristics

Table 5 shows the association between not intending to circumcise and different socio-demographic factors and testing for HIV. The table shows that there is a significant association between age and not intending to circumcise; in fact, the odds of not intending to circumcise increase as age increases. The association between place of residence and not intending to circumcise was found not to be significant, whereas the relationship between level of education and not intending to circumcise was significant. Analysis also showed that employed men were more likely not to undergo circumcision. Similarly, married men were also more likely not to undergo circumcision. Men who had never tested for HIV were found to be more likely not to undergo circumcision.

Factors associated with men not intending to circumcise (gross and net models)

Table 6 illustrates Models I and II, which show the gross and net effect of select SMC variables (heard or seen any information on SMC in past 4 weeks, would circumcise male children under 18 years of age, and circumcised males should stop using condoms) and socio-demographic characteristics on intending not to circumcise. The table shows that when control variables were introduced in Model II, the likelihood of not intending to circumcise increased and remained significant. For instance, men who believed that circumcised males should stop using condoms were 1.2 times more likely to not intend to circumcise, but when control variables were introduced in the net model, the association diminished. Men in age groups 35–44 years (OR = 1.60, CI 1.15–2.28), 45–54 years (OR = 2.53, CI 1.66–3.85), and 55–64 years (OR = 2.56, CI 1.56–4.19) were more likely to intend not to circumcise when compared to men in the age group 15–24 years. Results also show that the intent not to circumcise increased with age. When considering the place of residence, men residing in urban areas (OR = 1.27, CI 1.02–1.57) were more likely to not intend to circumcise when compared to their counterparts, while married men (OR 1.61, CI = 1.20–2.16) were more likely to intend not to circumcise when compared with unmarried men.

Factors associated with non-circumcision

Table 7 shows Model III and Model IV, which indicate the gross and net effect of selected socio-demographic and behavioural variables on being uncircumcised. The

Table 4 Association between socio-demographic characteristics and not intending to circumcise

Variable	Percentages (%)	
	Not intending to circumcise	Intending to circumcise
Age		
15–24	31.5	68.5
25–34	46.6	53.4
35–44	50.1	49.9
45–54	63.1	36.9
55–64	68.6	31.4
Chi-square = 102.54, $p = 0.000$		
Place of residence		
Urban	44.6	55.4
Rural	45.5	54.5
Chi-square = 0.15, $p = 0.694$		
Education		
Primary or less	48.0	52.0
Secondary	38.3	61.7
Higher	57.3	42.7
Chi-square = 66.07, $p = 0.000$		
Employment status		
Employed	54.7	45.3
Unemployed	47.0	53.0
Not eligible for employment	45.2	54.8
Chi-square = 23.55, $p = 0.000$		
Marital status		
Married	65.1	34.9
Not married	41.4	58.6
Chi-square = 61.32, $p = 0.000$		
Heard or seen any information on safe male circumcision in the past 4 weeks		
Yes	42.6	51.4
No	45.5	54.5
Chi-square = 4.61, $p = 0.032$		
Would circumcise male children under 18 years of age		
Yes	34.0	66.0
No	76.9	23.1
Chi-square = 306.90, $p = 0.000$		
A circumcised male should stop using condoms		
Yes	55.3	44.7
No	43.1	56.9
Chi-square = 37.49, $p = 0.000$		

net effects model (Model IV) shows that after controlling for cofounders, age, place of residence, and education were significantly associated with being uncircumcised. Model III shows that men aged 15–24, 25–34, 35–44, and 45–55 years were 2.8 (OR = 2.76, CI 1.82–4.19), 2.3 (OR = 2.32, CI 1.57–3.43), 1.9 (OR = 1.94, CI 1.34–2.81), and 1.5 (OR = 1.48, CI 1.01–2.16) times more likely to be uncircumcised, respectively, when compared with men aged 55–64 years. It was also observed that men residing

in rural areas were 1.3 times more likely (OR = 1.31, CI 1.09–1.26) to be uncircumcised when compared with men residing in urban areas. Moreover, men with primary education or less and men with secondary education were 2.5 (OR = 2.48, CI 1.87–3.30) and 1.6 (OR = 1.65, CI 1.33–2.05) times more likely to be uncircumcised when compared to men with higher education. For behavioural variables, the odds of non-circumcision were significantly higher among men who had not heard or seen any

Table 5 Logistic regression coefficients of select socio-demographic characteristics on not intending to circumcise

Variable	Odds ratio	Exp (B)
Age		
15–24	1.000	
25–34	1.719***	(1.389–2.127)
35–44	1.969***	(1.551–2.499)
45–54	3.203***	(2.386–4.298)
55–64	3.997***	(2.771–5.766)
Place of residence		
Urban	0.970	(0.836–1.127)
Rural	1.000	
Education		
Primary or less	1.000	
Secondary	0.594***	(0.505–0.699)
Higher	1.285***	(1.030–1.604)
Employment status		
Employed	1.465***	(1.247–1.722)
Unemployed	1.077	(0.840–1.381)
Not eligible for employment	1.000	
Marital status		
Married	2.351***	(1.890–2.924)
Not married	1.000	
Have you ever tested for HIV, the virus that causes AIDS		
Yes	1.281***	(1.098–1.495)
No	1.000	

***Statistically significant at $p < 0.05$

information on SMC in the past 4 weeks (OR = 1.25, CI 1.04–1.51) compared to their counterparts.

Discussion

As circumcision is a one-time procedure and preventative measure, the paper also focused on those who were not circumcised and did not intend to do so. It was found that a significantly high proportion of men were uncircumcised and were also not intending to circumcise. Low levels of circumcision observed in this study could be explained in part by the fact that in Botswana, HIV testing is mandatory before one is eligible for circumcision. As a result, many men may be hesitant to test for HIV to undergo circumcision. Katsi and Daniel (2015) made a similar observation that mandatory HIV testing and counselling for SMC is a major barrier to MC.

Attitude towards behaviour, subjective norm, and perceived behavioural control were also individually significantly associated with not intending to circumcise.

However, it was found that after controlling for other factors, only attitude towards the procedure and perceived behavioural control were significantly associated with not intending to circumcise. For instance, we found that men who had heard of SMC in the past 4 weeks were less likely to not intend to circumcise. This shows that education regarding SMC promotes a positive attitude towards SMC. Similar findings were noted in studies by Mugwanya et al. (2010) and Zamawe and Kusamula (2015), who reported that men who had been exposed to SMC promotions were more likely to be circumcised.

After controlling for confounders, men who would circumcise male children under 18 years of age were less likely to intend not to circumcise. Similarly, Keetile and Bowelo (2016) found that men who expressed willingness to circumcise their male children were also likely to express willingness to get circumcised. On the other hand, the odds of not intending to circumcise increased as age increased, which is possibly because older men would not consider the protective benefits of SMC since most of them are not sexually active, especially elderly men. A similar finding was observed by Kripke et al. (2016) in a study conducted among 14 priority countries for circumcision, in which older men expressed unwillingness to undergo circumcision. However, it is a positive indication when men in younger age groups are more accepting towards SMC and are willing to get circumcised, since this will increase circumcision prevalence. Quite surprisingly, men who lived in urban areas were more likely to not intend to circumcise, which is quite indicative, since men in urban areas should have a greater understanding of health issues given their comparative access to media and HIV-related information.

It was found that the proportion of uncircumcised men was higher among men at younger ages (15–35 years). This may be explained by the generally high proportion of the young male population compared to their older adult counterparts, consistent with the fact that the majority of the population of Botswana is young, with 34.6% of the population aged 15–35 years (Statistics Botswana 2018). On the other hand, the likelihood of being uncircumcised was higher among rural residents, possibly because there are fewer health facilities, and circumcision services are less accessible in rural areas. Moreover, information reaches rural populations later, so rural residents would likely be lagging behind in putting into action new recommendations such as circumcision. This was also found to be true in a study by Makatjane et al. (2016) in Lesotho.

Men with primary education and men with secondary education were also more likely to be uncircumcised than men with tertiary education. A plausible explanation for this

Table 6 Logistic regression coefficients for the association between not intending to circumcise and selected socio-demographic and behavioural characteristics

Variable	Model I		Model II	
	Odds ratio	Exp (B)	Odds ratio	Exp (B)
Heard or seen any information on SMC in the past 4 weeks				
Yes	1.000		1.000	
No	1.130***	(0.946–1.350)	1.269***	(1.032–1.562)
Would circumcise male children under 18 years of age				
Yes	1.000		1.000	(6.348–11.937)
No	6.911***	(5.314–8.989)	8.705***	
A circumcised male should stop using condoms				
Yes	1.179***	(0.905–	1.150	(0.838–1.577)
No	1.000	1.535)	1.000	
Age				
15–24			1.000	
25–34			1.312	(0.984–1.751)
35–44			1.597***	(1.150–2.217)
45–54			2.527***	(1.661–3.846)
55–64			2.560***	(1.563–4.195)
Place of residence				
Urban			1.266***	(1.020–1.572)
Rural			1.000	
Education				
Primary or less			1.000	
Secondary			0.944	(0.720–1.238)
Higher			1.347	(0.973–1.866)
Employment status				
Employed			1.278	(0.954–1.713)
Unemployed			1.292	(0.909–1.837)
Not eligible for employment			1.000	
Marital status				
Married			1.608***	(1.196–2.161)
Not married			1.000	

***Statistically significant at $p < 0.005$

is that educated individuals have a greater understanding of the importance of healthy behaviours and therefore are more likely to engage in positive health-seeking behaviour. An earlier study by Keetile and Rakgoasi (2014) suggested that continued access to higher education can only improve the situation because education improves physical functioning and self-reported health, and it enhances a sense of personal control that encourages and enables a healthy lifestyle. A study by Jiang et al. (2013) also found that education level is a major determinant of circumcision status.

This study has some limitations. The use of secondary data limited the analysis to variables within the dataset. The dataset used did not have qualitative questions on circumcision, which

would have provided some depth in understanding the factors associated with being uncircumcised and not intending to circumcise. Despite these limitations, however, the study provides vital insights into factors associated with non-circumcision and not intending to circumcise among men in Botswana.

Conclusion

The SMC programme is pivotal in efforts to decrease HIV infections, as it is evident from the study that attitudes and perceived behavioural control influence decisions not to undergo circumcision. The results showed that people

Table 7 Logistic regression coefficients of the impact of select SMC and select socio-demographic characteristics on being uncircumcised

Variable	Model III		Model IV	
	Odds ratio	Exp (B)	Odds ratio	Exp (B)
Heard or seen any information on SMC in the past 4 weeks				
Yes	1.000		1.000	
No	1.416***	(1.195–1.678)	1.259***	(1.045–1.516)
Would circumcise male children under 18 years of age				
Yes	1.000		1.000	
No	4.115***	(2.983–5.676)	4.649***	(3.271–6.609)
A circumcised male should stop using condoms				
Yes	1.526***	(1.156–2.015)	1.309	(0.964–1.776)
No	1.000		1.000	
Age				
15–24			2.764**	(1.824–4.189)
25–34			2.316**	(1.562–3.434)
35–44			1.939***	(1.339–2.808)
45–54			1.477***	(1.010–2.159)
55–64			1.000	
Place of residence				
Urban			1.000	
Rural			1.311***	(1.089–1.579)
Education				
Primary or less			2.481***	(1.869–3.293)
Secondary			1.649***	(1.325–2.051)
Higher			1.000	
Employment status				
Employed				
Unemployed			1.084	(0.832–1.411)
Not eligible for employment			0.976	(0.775–1.460)
Marital status				
Married			1.098	(0.856–1.408)
Not married				

***Statistically significant at $p < 0.05$

who had heard or seen information on SMC in the past 4 weeks were less likely to be uncircumcised and less likely to intend not to circumcise. This suggests that more and regular information on SMC would promote positive attitudes towards circumcision and increase the take-up of the practice. Results from the study also suggest that if men believe and perceive that undergoing circumcision is their choice and that they have control over when and

where to undergo the procedure, they are more likely to embrace SMC. Findings from this study suggest the need for an enhanced and consolidated message on SMC as an HIV preventative measure. There is also a need for improved integration of SMC in HIV-related education with risk-reduction counselling. Programmes should also target men of older ages and address the changing attitudes and beliefs of men on SMC and HIV. Qualitative studies on this topic are needed as well to gain further insight into why men are uncircumcised and are not intending to get circumcised, and possibly a study on the role played by women in men's decisions not to get circumcised.

Acknowledgements The authors wish to thank the Department of Population Studies for providing resources to conduct the analysis of data for the study.

Authors' contributions MN conceived the study, performed the analysis, and wrote the first draft of the manuscript. GL and MK provided supervision, reviewed the manuscript and provided critical comments on its improvement. All authors read and approved the final manuscript.

Funding Open access funding provided by University of Botswana. This study used secondary data available from Statistics Botswana and therefore did not receive any funding.

Data availability Data for this study are available from the corresponding author at mphokeet@yahoo.com.

Declarations

Ethics approval We used secondary data for analysis in this study, and Statistics Botswana provided data to the Department of Population Studies for further analysis. As a result, permission was not needed. The study was cleared by the Human Research and Development Council (HRDC) in the Ministry of Health and Wellness, and therefore all ethical issues were handled by the Ministry of Health and Wellness at the time of the survey. All methods were carried out in accordance with relevant guidelines and regulations for health research.

Consent for publication Not applicable.

Consent to participate All respondents for the Botswana AIDS Impact Surveys agreed to participate in the study by signing the informed consent form.

Competing interests The authors declare that they have no competing interests.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

References

- ACHAP (2020) Country progress report - Botswana Global AIDS Monitoring. Gaborone, Botswana
- Ajzen I (1991) The Theory of Planned Behavior. *Organ Behav Hum Decis Process* 50:179–211
- Chiringa IO, Ramathuba DU, Mashau NS (2016) Factors contributing to the low uptake of medical male circumcision in Mutare Rural District, Zimbabwe. *Afr J Prim Health Care Fam Med* 8(2):e1–e6
- Hardon A et al (2006) From access to adherence : the challenges of antiretroviral treatment : studies from Botswana, Tanzania and Uganda 2006 / Anita Hardon ... [et al.]. World Health Organization, Geneva
- Ilo CI et al (2018) Factors Associated with Parental Intent not to Circumcise Daughters in Enugu State of Nigeria: An Application of the Theory of Planned Behavior. *Afr J Reprod Health* 22(1):29–37
- Jiang J et al (2013) Acceptance of male circumcision among male rural-to-urban migrants in western China. *AIDS Res Hum Retroviruses* 29(12):1582–1588
- Katisi M, Daniel M (2015) Safe male circumcision in Botswana: Tension between traditional practices and biomedical marketing. *Glob Public Health* 10(5–6):739–756
- Keetile M (2020) Voluntary medical safe male circumcision for HIV/AIDS prevention in Botswana: background, patterns, and determinants- circumcision and the community. *IntechOpen*. <https://doi.org/10.5772/intechopen.90916>
- Keetile M, Bowelo M (2016) (2016) Factors associated with acceptability of child circumcision in Botswana – a cross sectional survey. *BMC Public Health* 16(1):1053
- Keetile M, Rakgoasi S (2014) Male Circumcision; willingness to undergo safe male circumcision and HIV risk behaviors among men in Botswana. *J Afr Popul Stud* 28(3):1345–1361
- Kripke K et al (2016) Age targeting of voluntary medical male circumcision programs using the decision makers' program planning toolkit (DMPPT) 2.0. *PLoS One* 11(7):e0156909
- Makatjane TJ, Hlabana T, Letete EM (2016) Male circumcision and HIV in Lesotho: is the relationship real or spurious? Analysis of the 2009 demographic and health survey. DHS Working Papers No. 125. ICF International, Rockville, Maryland
- Ministry of Health (2009) Safe Male Circumcision Additional Strategy For Hiv Prevention A National Strategy. Gaborone
- Morris BJ, Bailis SA, Wiswell TE (2014) Circumcision rates in the United States: rising or falling? What effect might the new affirmative pediatric policy statement have? *Mayo Clin Proc* 89(5):677–686
- Mugwanya KK et al (2010) Knowledge and Attitudes About Male Circumcision for HIV-1 Prevention among Heterosexual HIV-1 Serodiscordant Partnerships in Kampala, Uganda. *AIDS Behav* 14(5):1190–1197
- Statistics Botswana (2018) Botswana Demographic Survey Report 2017. Gaborone. 39
- Tobian AAR, Gray RH (2011) The medical benefits of male circumcision. *JAMA* 306(13):1479–1480
- WHO (2016) Global AIDS Update 2016, United Nations: Geneva Switzerland
- WHO & UNAIDS (2010) Progress report in male circumcision scale-up: country implementation and research. https://www.unaids.org/sites/default/files/country/documents/botswana_2010_country_progress_report_en.pdf
- World Health Organization. Regional Office for Africa (2017) Male circumcision for HIV prevention — implementing the 2017–2021 framework for voluntary medical male circumcision. WHO meeting report. World Health Organization. Regional Office for Africa. <https://apps.who.int/iris/handle/10665/325174>
- World Health Organization (2018) WHO progress brief: voluntary medical male circumcision. Brazzaville
- Zamawe COF, Kusamula F (2015) What are the social and individual factors that are associated with undergoing male circumcision as an HIV prevention strategy? A mixed methods study in Malawi. *Int Health* 8(3):170–178

Publisher's note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.