



Safe Male Circumcision for HIV Prevention among Adolescents with Deafness in Uganda: Awareness, Prevalence and Implications for Policy and Programming

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Authors' contributions

This work was carried out in collaboration between both authors. Authors JPA and GKS made contributions to the conceptualisation and design of the work. Author JPA collected the data. Authors GKS and JPA analysed it and worked on the first manuscript draft. Both authors worked together to refine subsequent versions, read and approved the final manuscript.

Article Information

DOI: 10.9734/ISRR/2020/v9i130105

Editor(s):

(1) Kailash Gupta, Division of AIDS, NIAID, NIH, USA.

Reviewers:

(1) Hai Nguyen Duc, Pasteur Institute Ho Chi Minh City, Vietnam.

(2) Zhongzhan Zhang, Beijing University of Technology, China.

Complete Peer review History:<http://www.sdiarticle4.com/review-history/55011>

Original Research Article

Received 08 January 2020

Accepted 13 March 2020

Published 30 March 2020

ABSTRACT

Background: Safe Male Circumcision (SMC)¹ has been widely recommended by WHO as part of a comprehensive HIV prevention strategy. However, literature pertaining to SMC amongst adolescents with a disability, and the deaf community in particular, is almost non-existent. This study sought to establish SMC prevalence, knowledge, attitude and post circumcision behaviour among adolescents with deafness in Uganda.

Methods: The study was cross-sectional, used a mixed-methods approach and recruited 447 participants. 363 questionnaires were administered to adolescents of age 15 - 24 years (192 males

¹ This study was conducted between 2015-2016 when the commonly used term was Safe Male Circumcision (SMC) and not Voluntary Medical Male Circumcision (VMMC) as its popularity being packaged now. This manuscript has stuck to the originally used SMC acronym.

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and 171 females) from three study sites. We assessed socio-demographic variables, circumcision status, post circumcision behaviour, attitude and knowledge levels towards SMC. Qualitative data was also collected from 84 participants (m=46, f=38) using focus group discussions and key informant interviews. Quantitative data were analysed using Stata software while qualitative was thematically analysed.

Results: A total of 60.9% male adolescents with deafness self-reported to be circumcised. Both male and female participants reported SMC information to be highly inaccessible (84%). Only 27.8% study participants knew about the partial protective effect of SMC against HIV, 51.8% were uncertain, while 26% thought that SMC provided full protection. Both male and female respondents had a positive attitude towards SMC (68.3%) and females were more knowledgeable (50.3%) about the partial preventive effect of SMC against HIV transmission and timeframe for the resumption of sexual activity compared to males (30.2%). Linkages were noted between SMC, social networks and key sociodemographic characteristics like ethnicity, religion and education level.

Conclusion: Despite a 60.9% prevalence and general positive attitude towards SMC, study findings showed limited service access and substantial knowledge gaps in SMC efficacy, also related to high-risk behaviour after circumcision. This can largely be explained by limited targeting by HIV prevention programmes among this (deaf) category of adolescents, related barriers associated with vulnerability arising from their disability (deafness) and developmental stage (adolescence). Key actors in HIV prevention efforts should demonstrate cognizance of heightened risk among vulnerable adolescent categories through more inclusive interventions to address prevailing knowledge and service gaps.

Keywords: HIV prevention; adolescent health; safe male circumcision; voluntary medical male circumcision; SMC; VMMC; ASRH; HIV; disability.

ABBREVIATIONS

ABC	: Abstinence, Being faithful and Condom use
ADD	: Action on Disability and Development
AIDS	: Acquired Immunodeficiency Syndrome
DHO	: District Health Officer
FGDs	: Focus Group Discussions
HIV	: Human Immunodeficiency Virus
HMIS	: Health Management Information System
IEC	: Information, Education and Communication
KAP	: Knowledge, Attitudes and Practices
KII	: Key Informant Interview
MOE	: Ministry of Education
MOH	: Ministry of Health
NGO	: Non-government organization
NTVU	: National Television of Uganda
PEPFAR	: President's Emergency Plan for AIDS Relief
PIASCY	: Presidential Initiative on AIDS Strategy for Communication to Youth
PWDs	: Persons with Disabilities
SDS	: Strengthening Decentralization for Sustainability
SMC	: Safe Male Circumcision
TASO	: The AIDS Support Organization
UAC	: Uganda AIDS Commission
UAIS	: Uganda AIDS Indicator Survey
UBC	: Uganda Broadcasting Corporation
UBOS	: Uganda Bureau of Statistics
UCU	: Uganda Christian University
UNAIDS	: United Nations Joint AIDS Program
UNFPA	: United Nations Population Fund
UNICEF	: United Nations International Children's Education Fund
WHO	: World Health Organisation

1. INTRODUCTION

1.1 HIV/AIDS

HIV/AIDS continues to be a major global public health issue with more than 77.3 million people infected since the start of the epidemic. Approximately 36.9 million people were living with HIV at the end of 2017 [1] and although new HIV infections have been reduced since their peak in 1996, they are still unacceptably high at 1.8 million [2], with sub-Saharan Africa being disproportionately affected and accounting for more than 70% of the global burden [3].

In Uganda, an estimated 1.3 million people were living with HIV in 2017 [4]. The national average adult HIV prevalence reduced from 18.5% in 1992 to about 5% in 2000 due to; among other reasons, decentralized community response, strong political commitment and open multi-sectored approaches in combating the epidemic [5]. In 2004/05 the prevalence was 6.4% but dropped again to 5.9% in 2017 [6]. There were 50,000 new HIV infections in Uganda in 2017 mainly among adolescents and young people, women and girls, and key populations [7]. HIV prevalence is almost four times higher among young women aged 15 to 24 than young men of the same age [6]. Despite youth in Uganda representing the majority of new infections, there is limited knowledge about HIV prevention within this age group. In 2014, only 38.5% of young women and men aged 15-24 could correctly identify ways of preventing the sexual transmission of HIV and rejected major misconceptions about HIV transmission [2]. Currently, knowledge levels remain low at 44.8% among young men and 45.7% among young girls aged 15-24 [1]. A detailed breakdown of knowledge levels and behaviours among different youth categories is generally not available, as is their interface with the various HIV/AIDS prevention programmes.

1.2 Safe Male Circumcision

Globally, male circumcision is undertaken for religious, cultural, social and medical reasons [5]. However, in global HIV prevention effort the move is towards Voluntary Medical Male Circumcision (VMMC, previously SMC) based on the results of three randomized clinical trials in Kenya, South Africa and Uganda [8] which showed that SMC reduced the risk of HIV acquisition among medically circumcised men by

approximately 60%. Following this WHO and UNAIDS issued a recommendation in 2007 that male circumcision should be considered as part of a comprehensive HIV prevention package [9,10]. In 2016, Uganda's HIV prevalence stood at 4.5% among circumcised men and 6.7% among uncircumcised men [11].

Uganda launched its National SMC Policy in 2010, with a target goal of circumcising 80% (4.2 million people) men of age 15 - 49 years by 2015 [12]. About one in four (26%) men age 15-49 in Uganda were circumcised by 2011 [13] and in 2017, 847,633 male circumcisions were performed [1]. The presenting challenge with these statistics is that typically are not disaggregated further among different populations, for example, to indicate the proportions of adolescents with a disability and the extent of their involvement/participation. Since 2010, Uganda has continued to scale up provision of SMC services from 25% to 29.9% in 2015 [9] and 42.2% in 2019 according to the Ministry of Health. Available evidence, however [11] indicates that circumcised men tend to engage in increased risky sexual behaviour due to a false sense of security or protection known as 'risk compensation'.

1.3 HIV/AIDS, Adolescence and Disability

Deafness is among the many disabilities limiting people's functioning, globally. Hearing loss may be mild, moderate, severe or profound. 'Deaf' people mostly have profound hearing loss, which implies no hearing at all and often use sign language for communication. 5.3% of the world's population - 360 million people - has disabling hearing loss [11]. According to WHO [12], the prevalence of disabling hearing loss in sub-Saharan Africa stands at 6.8 million for children (1.9%), 17 million male adults (7.4%) and 13 million female adults (5.5%). In Uganda hearing impairment was the third common type of disability (17%), compared to visual impairment (25%) and (29%) for physical impairment [13].

There are few data on HIV prevalence among persons with disabilities [14]. Even more paucity is research on their experiences of sexuality, interface with existing HIV/AIDS services and the impact of these interventions. The few existing studies on the hearing impaired or deaf populations suggest infection levels equal to or higher than those of the rest of the community (14). Young people with disabilities experience additional barriers in using services, such as lack

of privacy, communication difficulties, negative attitudes from health staff, poverty and access difficulties [15]. Adolescents with disability are vulnerable to HIV/AIDS because they are marginalized, discriminated against, illiterate, poor, with generally low access to information about HIV/AIDS in their respective communities [16]. Most people with hearing impairment tend to have inadequate access to high-quality health messages, services, including sexual and reproductive health programmes such as HIV testing and safe male circumcision (SMC), now commonly called voluntary medical male circumcision (VMMC). For adolescents with deafness, the hearing impairment compounds their vulnerability to access health information and services; however, few studies have researched on the extent of this gap. It is against this backdrop that this study was conceived.

1.4 Study Objectives

The goal of this study was to establish the knowledge, attitudes and practices of adolescents with deafness towards SMC, its prevalence and associated behaviour. The specific objectives were:

- i. To determine the prevalence of SMC amongst male adolescents with deafness.
- ii. To assess the level of knowledge towards SMC as an HIV/AIDS prevention strategy among adolescents with deafness.
- iii. To describe the attitude and perceptions adolescents with deafness towards SMC.
- iv. To assess the post-circumcision sexual behaviour and practices amongst adolescents with deafness.

2. MATERIALS AND METHODS

2.1 Design and Study Site

The study was cross-sectional and mixed method, using both quantitative and qualitative approaches. The study was conducted in three different sites/districts located in different regions in Uganda, with intention to determine variations by region. The survey was conducted in three schools for the deaf in Uganda's Eastern, Northern and Central regions; Ngora (rural), Lira (peri-urban) and Wakiso (urban).

2.2 Participants

The primary study population comprised of male and female adolescents with deafness, age group 15-24 years. The secondary study

population comprised of selected resource persons including teachers, counsellors, parents, health workers and local leaders. The total number of study participants was 447, with the majority of them being adolescent boys and girls with deafness while the rest were key informants.

2.3 Sampling and Data Collection

The sample size for quantitative strand was 363 and qualitative 84 participants (28 from each study site). Kish and Leslie's formula (1965) was used with a 95% confidence interval, standard error of 5% and p value as follows:

$$\text{Sample size} = \frac{(z^2)(P(1-P))}{D^2}$$
$$\frac{(1.96)^2 (0.385(0.615))}{(0.05)^2}$$
$$= 363 \text{ participants}$$

Primary respondents were recruited from their schools. Only willing male and female respondents within the age group of 15 - 24 years were considered for participation in the study. The three schools were selected purposively because schools for the deaf are few and most of them concentrated in the Central Region of Uganda. The three schools were used to constitute three clusters of study participants using the exclusion criteria of age group 15-24 years. Lists of all eligible participants were obtained and the number of study participants from each cluster was computed as a proportion of the original sample size (363). Proportions were then subjected to stratification by gender. The original enrolment lists of eligible male and female participants from the three schools were then subjected to random sampling. For secondary respondents, selected key informants were interviewed from each of the study sites - including senior teachers, parents of children with deafness, local leaders and PWD representatives, health managers and SMC clinicians.

2.4 Data Management and Analysis

Research assistants were trained on key study aspects including ethics, data collection, checking and completing tools as well as reporting. Daily debrief sessions were conducted between the principal investigators and research assistants. The study team did not register any missing data. Qualitative data were transcribed,

coded and analyzed thematically while quantitative analysed using STATA. Logistic regression (bivariate and multivariate analysis) was also undertaken. Study findings are presented mostly in descriptive form, guided by study objectives.

This study was compliant to key ethical aspects including institutional permissions and clearance; participant confidentiality, anonymity, consent and assent.

Involving human participants, the conduct of this study was in compliance to both institutional and national standards as required by the Uganda National Council of Science and Technology. Ethical approval was obtained from the Uganda Christian University Research and Ethics committee. In addition to verbal consent and permission to conduct the study by the school administration, written informed consent and assent was also obtained. The three study sites were school settings (schools for the deaf) and they are boarding schools where children do not have contact with their parents or guardians during the school term; children also come from

different regions of Uganda to converge at these boarding schools for the deaf. As parental consent was impractical to obtain in these circumstances, consent was obtained from both the school administration as caretakers/ gatekeepers and the study participants (children) themselves.

3. RESULTS

3.1 Socio-demographic Characteristics of Respondents

The distribution of participants by study site stratified by gender is summarised in Figure 1; while a breakdown of other sociodemographic variables is presented in Table 1.

By proportion, 154 (42.4%) of the participants were from Wakiso, 150 (41.3%) were from Lira and 59 (16.3%) were from Ngora. These proportions were calculated basing on the original school enrolment data of eligible study participants (sampling frame) provided by school authorities.

Table 1. Social demographics of participants

Characteristic		Number	%
Age bracket	15 - 17	143	39.39
	18 - 20	190	52.34
	21 - 24	30	8.26
Gender	Male	192	52.89
	Female	171	47.11
Tribe	Langi/Acholi	163	44.9
	Itesot/K'jong	57	15.7
	Munyororo/Nkole/Toro	19	5.23
	Muganda	87	23.97
	Others	37	10.19
Education level	Primary	71	19.56
	O level	238	65.56
	A level	18	4.96
	Vocational	36	9.92
Religion	Protestant	125	34.44
	Catholic	174	47.93
	Moslem	34	9.37
	Others	30	8.26
Marital status	Married	9	2.48
	Never married	348	95.87
	Divorced/ Separated	2	0.55
	Cohabiting	4	1.1
Where do you spend most of your time when not at school	Village setting	228	62.81
	Trading center	23	6.34
	Town Setting	112	30.85

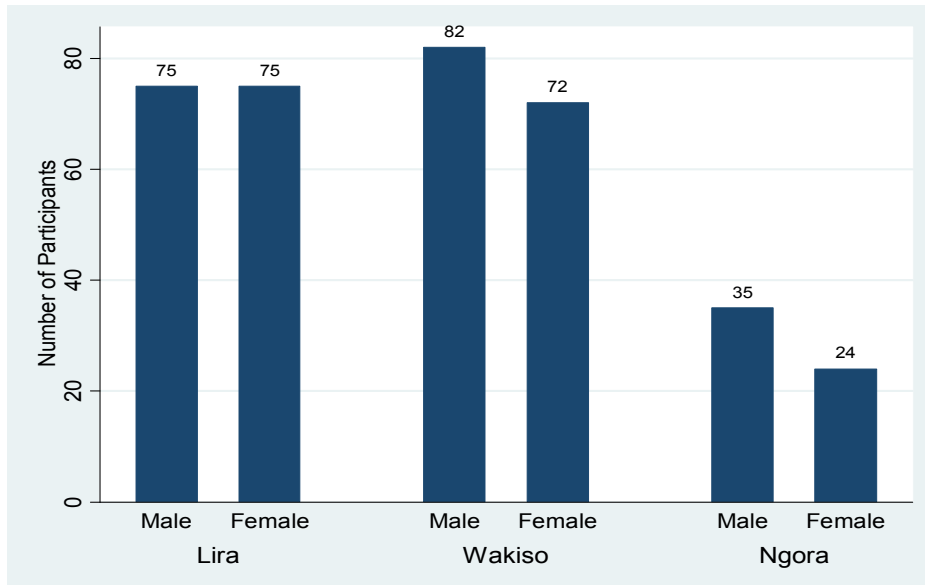


Fig. 1. Number of participants by site stratified by gender

3.2 Prevalence of Safe Male Circumcision

60.9% of the male participants in this study self-reported to be circumcised. Findings from qualitative data were also supportive of the quantitative figures as shown in the excerpt below:

Adolescents with deafness could be going for SMC, though there are no statistics to show, I usually meet some of them

(PWD Representative A)

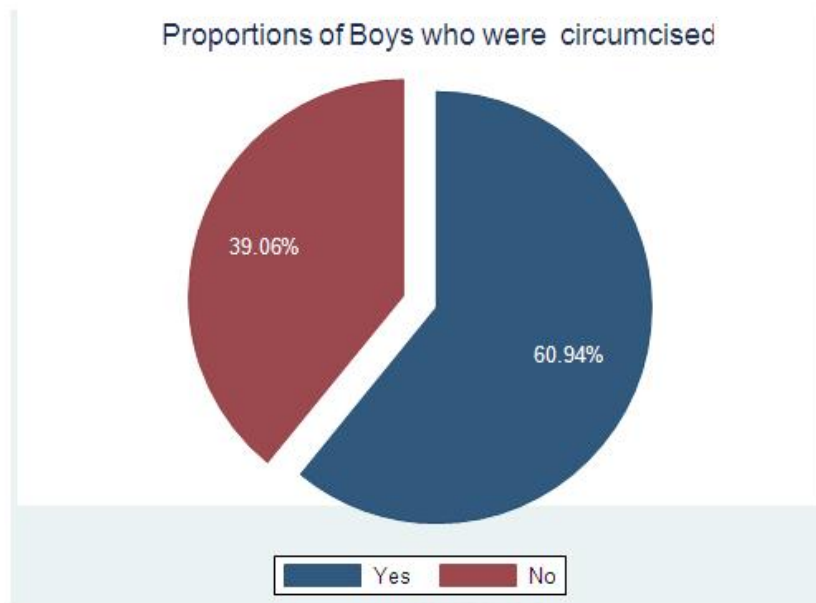


Fig. 2. Prevalence of SMC÷

Fig. 3 shows SMC prevalence by site:

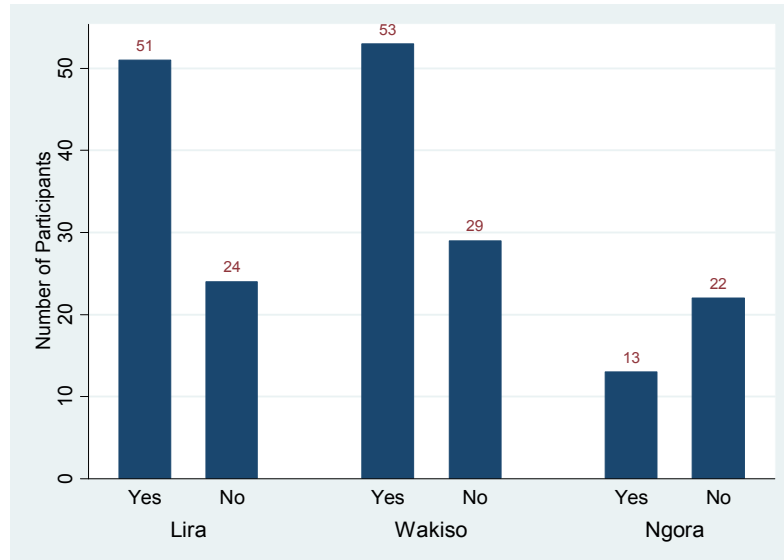


Fig. 3. Prevalence of SMC by site ID+

By proportion, Lira had the highest prevalence of SMC (68%), followed by Wakiso (64%) while Ngora had the least (38%) as indicated in Fig. 3.

Despite the relatively high (60.9%) prevalence, adolescent boys with deafness going for circumcision were still reported to be very few - almost none - when compared to the larger population:

I remember circumcising one boy who was deaf out of the three hundred I did between January and September

(SMC clinician)

Furthermore, there were concerns around the knowledge, involvement and consent of parents to these adolescents in the face of their growing awareness and autonomy of their sexuality. This

is made more complex by the fact that they are in boarding school and not living with their parents:

Some are going [for SMC], however, my worry is that some parents are not consulted. Like last year children in boarding were just circumcised while at school

(PWD Representative B)

3.3 Knowledge on Safe Male Circumcision, as an HIV/AIDS Prevention Strategy

Study findings showed that 66.4% of the participants had ever heard about SMC while 33.6% had never. Only 46.3% of the participants agreed that SMC was beneficial, while 27.3% disagreed and 26.5% were not sure, as shown in Table 2.

Table 2. Level of knowledge about safe male circumcision

Characteristic		Number	%
Have you ever heard about safe male circumcision	Yes	241	66.39
	No	122	33.61
Do you think safe male circumcision is beneficial	Yes	168	46.28
	No	99	27.27
	Not sure	96	26.45
Do you find it easy to access information about safe male circumcision	Yes	58	15.98
	No	305	84.02
It is easier to get HIV infection when a man is	Circumcised	58	15.98
	Un circumcised	194	53.44
	No difference	45	12.4
	Not sure	66	18.18

Table 3. Perceptions on safe male circumcision

Characteristic		Number	%
Safe male circumcision does not give any protection to men against HIV infection during sex (0%)	True	91	25.07
	False	93	25.62
	Not sure	179	49.31
Safe male circumcision gives partial protection to men against HIV infection during sex (60%)	True	101	27.82
	False	74	20.39
	Not sure	188	51.79
Safe male circumcision gives full protection to men against HIV infection during sex (100%)	True	95	26.17
	False	94	25.9
	Not sure	174	47.93

Study findings also showed that most of the participants were not sure of the level of prevention offered by SMC against HIV transmission. Only 27.8% of the participants were aware that SMC provides partial protection, while 51.8% were not sure as to whether SMC only provided partial protection. Likewise, 26.2% thought that SMC offers full protection against HIV, while 48% were not sure. 25% indicated that SMC did not offer any preventive effect against HIV and 49.3% were not sure whether SMC had zero preventive effect against HIV. Table 3 provides further details:

Beyond primary participants, the study key informants also had relatively low levels of knowledge on SMC. Most (66.6%) parents of male adolescents with deafness doubted SMC's partial protection against HIV transmission as shown in the excerpts below:

I have never been health educated on anything [about SMC]
(Female parent, Ngora)

I am not sure whether it can protect one fully or not
(Male parent, Wakiso)

This lack of knowledge among respondents was also confirmed by health workers engaged in SMC service delivery:

Adolescents with deafness cannot know about the partial protective effect of SMC and I really doubt whether they practice safe sex after being circumcised
(SMC Clinician)

However, other key informants like leaders for the disabled people's organizations reported that adolescents with deafness were aware of the partial preventive effect of SMC.

3.4 SMC Knowledge Stratified by Sociodemographic Characteristics

When socio-demographic characteristics were stratified by history of having ever heard about SMC, findings in Table 4 indicated that tribe and education level were significantly associated with one ever having heard about SMC ($p < 0.05$).

However, age and gender were less likely to be associated with one having ever heard about SMC ($p > 0.5$). Further findings from logistic regression models indicated that respondents from Ngora cluster were the least likely to have ever heard about SMC (ad OR = 0.07, $p = 0.015$) which were in agreement with the above as most Itesot/K'jong (40.4%) respondents were from Ngora.

Further stratification of socio-demographic characteristics indicated that religion was significantly associated with having ever heard about SMC (P-value < 0.05). Muslims were more likely (76%) to have heard about SMC than protestants (68%), Catholics (67%) and other religions (43%).

Participant's marital status and residential setting were less likely to be associated with one having ever heard about SMC (p -value > 0.05). More divorced/separated (100%) and married (88.9%) respondents had ever heard about SMC compared to the unmarried ones (66%). Similarly, slightly more town-based respondents (67.9%) had ever heard about SMC in comparison to their counterparts from rural-based settings (64.9%).

Results presented in Table 5. indicate that respondent's age, gender and tribe are all significantly associated with knowledge of SMC's partial protective effect against HIV infection ($p < 0.05$).

Table 4. Socio-demographic characteristics and SMC knowledge

Characteristic		Yes (%)	No (%)	p-value
Age bracket	15 - 17	87(60.84)	56(39.16)	0.196
	18 - 20	133(70.00)	56(30.00)	
	21 - 24	21(70.00)	9(30.00)	
Gender	Male	135(70.31)	57(29.69)	0.094
	Female	106(61.99)	65(38.01)	
Tribe	Langi/Acholi	126(77.30)	37(22.70)	< 0.0001
	Itesot/K'jong	23(40.35)	34(59.65)	
	Munyoro/Nkole/Toro	14(73.68)	5(26.32)	
	Muganda	47(54.02)	40(45.98)	
Education level	Others	31(83.78)	6(16.22)	0.011
	Primary	42(59.15)	29(40.85)	
	O level	167(70.17)	71(29.83)	
	A level	15(83.33)	3(16.67)	
Religion	Vocational	17(47.22)	19(52.78)	0.031
	Protestant	85(68.00)	40(32.00)	
	Catholic	117(67.24)	57(32.76)	
	Moslem	26(76.47)	8(23.53)	
Marital status	Others	13(43.33)	17(56.67)	0.121
	Married	8(88.89)	1(11.11)	
	Never married	230(66.09)	118(33.91)	
	Divorced/ Separated	2(100)	0(0.00)	
Where do you spend most of your time when not at school	Cohabiting	1(25.00)	3(75.00)	0.633
	Village setting	148(64.91)	80(35.09)	
	Trading centre	17(73.91)	6(26.09)	
	Town Setting	76(67.86)	36(32.14)	

Table 5. Socio-demographic characteristics and partial (60%) protection of SMC knowledge

Characteristic		True (%)	False (%)	Not Sure	p-value
Age bracket	15 - 17	34(23.78)	43(30.07)	66(46.15)	0.005
	18 - 20	60(31.58)	27(14.21)	103(54.21)	
	21 - 24	7(23.33)	4(13.3)	19(63.33)	
Gender	Male	73(38.02)	34(17.71)	85(44.27)	<0.0001
	Female	28(16.37)	40(23.39)	103(60.23)	
Tribe/Ethnicity	Langi/Acholi	36(22.09)	20(12.27)	107(65.64)	<0.0001
	Itesot/K'jong	13(22.81)	16(28.07)	28(49.12)	
	Munyoro/Nkole/Toro	7(36.84)	5(26.32)	7(36.84)	
	Muganda	32(36.78)	24(27.59)	31(35.63)	
Education level	Others	13(35.14)	9(24.32)	15(40.54)	0.17
	Primary	14(19.72)	15(21.13)	42(59.15)	
	O level	67(28.15)	53(22.27)	118(49.58)	
	A level	9(50.00)	2(11.11)	7(38.89)	
Religion	Vocational	11(30.56)	4(11.11)	21(58.33)	0.499
	Protestant	32(25.60)	24(19.20)	69(55.20)	
	Catholic	49(28.16)	33(18.97)	92(52.87)	
	Moslem	13(38.24)	9(26.47)	12(35.29)	
Marital status	Others	7(23.33)	8(26.67)	15(50.00)	0.483
	Married	3(33.33)	0(0.00)	6(66.67)	
	Never married	96(27.59)	73(20.98)	179(51.44)	
	Divorced/ Separated	0(0.00)	0(0.00)	2(100)	
Where do you spend most of your time when not at school	Cohabiting	2(50.00)	1(25.00)	1(25.00)	0.411
	Village setting	69(30.26)	44(19.30)	115(50.44)	
	Trading center	3(13.04)	7(30.43)	13(56.52)	
	Town Setting	29(25.89)	23(20.54)	60(53.57)	

Knowledge about the partial protective effect of SMC against HIV increased between the age group 15-20 years (23.8% - 31.6%) and dropped for the age range 21-24 years (23.3%). Boys were more than two times (38%) aware of the partial protective effect of SMC than girls (16.4%). Findings showed Baganda (36.8%) and Banyankole/Batoro/Banyoro (36.84%) being much more aware of the partial protective effect of SMC than the Iteso/Karimojong and Langi/Acholi (22%). However, further analysis under logistic regression indicated that there were no variations in the levels of knowledge regarding the partial preventive effect of SMC within the three study clusters based on the adjusted odds ratios for Wakiso (Adj OR = 1, p = 0.997) and Ngora (Adj OR = 0.2, p = 0.069). This was most likely premised on the unifying characteristic of deafness in all the three clusters.

Stratification of socio-demographic characteristics with knowledge about the partial preventive effect of SMC against HIV slightly differed. Education level, religious affiliation, marital status and residential setting were all less likely to be associated with the respondent's knowledge about the partial protective effect of SMC against HIV transmission (p > 0.05). There was a linear relationship between knowledge regarding the partial protective effect of SMC and education level. Muslims were more knowledgeable about the partial protective effect of SMC (38.3%) compared to Protestants (25.6%), Catholics (28.2%) and others (23.3%). Cohabiting (50%) and married (33.33%) respondents were more aware of the partial protective effect of SMC compared to those who had never been married (27.6%) and the divorced ones (0.0%). Rural based respondents were slightly more aware of the partial protective effect of SMC in comparison to those from town (25.9%).

Table 6. Attitudes towards safe male circumcision

Question		Number	%
16. Would you advise any uncircumcised male friend of yours to get circumcised?	Yes	248	68.32
	No	71	19.56
	Not sure	44	12.12
22. Who do you consider to be the most appropriate person to conduct circumcision?	Cultural expert	39	11.11
	Religious	57	16.24
	Health worker	255	72.65

3.5 Respondent's Attitude and Perception towards Safe Male Circumcision

The attitude of most (68.3) participants towards SMC was generally positive and many reported that they would gladly recommend the service to their friend. A majority (88.3%) of respondents believed that SMC advantages outweighed the disadvantages.

The good things about SMC outweigh the bad ones, because it promotes sexual enjoyment and reduces HIV transmission

(Male respondent, Lira)

SMC advantages outweigh the disadvantage, it removes dirt and protects one from being scared of AIDS

(Female respondent, Wakiso)

Similarly, age, gender and tribe were all significantly associated with peer influence

towards SMC (p < 0.05). Willingness to utilize peer influence in SMC practice increased between the age range 15-20 years (65.7% - 73.7%), and dropped beyond twenty years (46.7%). More boys (71.35%) were willing to exert peer influence towards SMC practice than their female counterparts (64.9%). From an ethnic perspective, the Langi/Acholi, were much more willing (81%) to apply peer influence towards SMC, compared to other tribes.

Comparative findings on the level of peer influence towards SMC in the three study clusters under logistic regression indicated that there were no variations based on the adjusted odds ratios for Ngora (Adj OR = 0.71, p = 0.737) and Wakiso (Adj OR = 1.01, p = 0.991) as shown in Table 7 .

Table 7. Socio-demographic characteristics and peer influence towards SMC

Characteristic		Yes (%)	No (%)	Not sure	p-value
Age bracket	15 - 17	94(65.73)	29(20.28)	20(13.99)	0.038
	18 - 20	140(73.68)	31(16.32)	19(10.00)	
	21 - 24	14(46.67)	11(36.67)	5(16.67)	
Gender	Male	137(71.35)	43(22.40)	12(6.25)	0.001
	Female	111(64.91)	28(16.37)	32(18.71)	
Tribe	Langi/Acholi	132(80.98)	17(10.43)	14(8.59)	<0.0001
	Itesot/K'jong	23(40.35)	26(45.61)	8(14.04)	
	Munyororo/Nkole/Toro	14(73.68)	3(15.79)	2(10.53)	
	Muganda	56(64.37)	15(17.24)	16(18.39)	
	Others	23(62.16)	10(27.03)	4(10.81)	

3.6 Post Circumcision Sexual Behavior/ Practices amongst Respondents

Socio-demographic characteristics were stratified with a timeframe for men to resume sexual activity post SMC; study findings found both gender and tribe to be significantly associated with the time frame for sexual resumption ($p < 0.05$). However, age was less likely associated with the time frame for sexual resumption, post SMC ($p > 0.05$). There was an inverse relationship between age and the right time frame for resuming sexual activity post SMC; and

while girls were more knowledgeable (50.3%) than boys (30.2%).

Results of further stratification of socio-demographic characteristics and time frame for men to resume sexual activity post SMC were quite different. All the characteristics of education level, religious affiliation, marital status and residential setting were less likely associated with the time frame for resumption of sexual activity among respondents ($p > 0.05$) as indicated below:

Table 8. Resuming sexual activity post SMC

Characteristic		Weeks			p-value
		One (%)	Three (%)	Six (%)	
Age bracket	15 - 17	37(25.87)	45(31.47)	61(42.66)	0.119
	18 - 20	50(26.32)	62(32.63)	78(41.05)	
	21 - 24	11(36.67)	14(46.67)	5(16.67)	
Gender	Male	55(28.65)	79(41.15)	58(30.21)	<0.0001
	Female	43(25.15)	42(24.56)	86(50.29)	
Tribe	Langi/Acholi	24(14.72)	49(30.06)	90(55.21)	<0.0001
	Itesot/K'jong	22(38.60)	14(24.56)	21(36.84)	
	Munyororo/Nkole/Toro	6(31.58)	11(57.89)	2(10.53)	
	Muganda	29(33.33)	36(41.38)	22(25.29)	
Education level	Primary	21(29.58)	17(23.94)	33(46.48)	0.087
	O level	57(23.95)	88(36.97)	93(39.08)	
	A level	8(44.44)	7(38.89)	3(16.67)	
	Vocational	12(33.33)	9(25.00)	15(41.67)	
Religion	Protestant	33(26.40)	43(34.40)	49(39.20)	0.324
	Catholic	44(25.29)	54(31.03)	76(43.68)	
	Moslem	10(29.41)	16(47.06)	8(23.53)	
	Others	11(36.67)	8(26.67)	11(36.67)	
Marital status	Married	4(44.44)	3(33.33)	2(22.22)	0.171
	Never married	90(25.86)	117(33.62)	141(40.52)	
	Divorced/ Separated	1(50.00)	1(50.00)	0(0.00)	
	Cohabiting	3(75.00)	0(0.00)	1(25.00)	
Where do you spend most of your time when not at school	Village setting	61(26.75)	74(32.46)	93(40.79)	0.924
	Trading centre	5(21.74)	8(34.78)	10(43.48)	
	Town Setting	32(28.57)	39(34.82)	41(36.61)	

3.7 Sexual Partners Post SMC

Tribe and gender were significantly associated with men's engagement of multiple sexual partners post SMC ($p < 0.05$), while age was less likely associated with men engaging multiple sexual partners post SMC ($p > 0.05$).

Table 9 stratifies socio-demographic characteristics of the respondents and men engaging multiple sexual partners, post SMC.

Table 9. Multiple sexual partners and SMC

Characteristic		True (%)	False (%)	Not sure (%)	p-value
Age bracket	15 - 17	37(25.87)	47(32.87)	59(41.26)	0.544
	18 - 20	52(27.37)	51(26.84)	87(45.79)	
	21 - 24	5(16.67)	9(30.00)	16(53.33)	
Gender	Male	65(33.85)	55(28.65)	72(37.50)	0.001
	Female	29(16.96)	52(30.41)	90(52.63)	
Tribe	Langi/Acholi	56(34.36)	22(13.50)	85(52.15)	<0.0001
	Itesot/K'jong	8(14.04)	31(54.39)	18(31.58)	
	Munyoro/Nkole/Toro	1(5.26)	9(47.37)	9(47.37)	
	Muganda	18(20.69)	32(36.78)	37(42.53)	
	Others	11(29.73)	13(35.14)	13(35.14)	

3.8 SMC and the “ABC” HIV Prevention Strategy

Stratification of socio-demographic characteristics of respondents and whether circumcised men should practice the ABC HIV prevention strategy indicated that only tribe had a significant association ($p < 0.05$). Gender and age were less likely to be associated with whether circumcised men needed to always use the ABC strategy of HIV prevention ($p > 0.05$) as shown below:

Awareness of the need to practice SMC in combination with other known HIV prevention methods increased between the age range 15-20 years (46.9% - 50%) and decreased to 46.7% beyond twenty years, while girls were slightly more aware (49.7%) compared to boys (47.4%). The Langi/Acholi were more aware (51.5%) of the fact that SMC was to be practised in combination with other HIV prevention methods than the rest of the tribes. There were no variations at cluster level in the level of awareness regarding the practice of SMC in combination with other known HIV prevention methods as indicated by the odds ratios in Ngora (OR = 1.04, $p = 0.878$) and Wakiso (OR = 0.98, $p = 0.92$).

Qualitative findings showed that adolescents with deafness were sexually active across the three study sites. Key informants from the schools pointed to school regulations as an effective

deterrent against sexual activity among adolescents:

They [adolescents with deafness] are highly active, especially the mature ones
(Teacher, School A)

Although some of them have control, most of them are highly active
(Teacher, School B)

Some of them tend to be moody, fearful and feeling isolated, but they would be highly active
(Teacher, School C)

3.9 Access to SMC Information and Services

In spite of this relatively “normal” or “high” sexual activity among adolescents with deafness pointed out by study participants, this study confirmed that they struggled with limited access to support and information on SMC, HIV and sexuality in general. The majority of study participants (84%) reported difficulty accessing information about SMC; this was also confirmed by some qualitative findings. Key informants reported that SMC awareness campaigns and IEC materials were not translated in to sign language, which limited access among adolescents with deafness:

SMC messages are not accessible to adolescents with deafness because they have not been tailored to their language

(District Health Manager, Study site A)

Study findings have confirmed the very wide gap between knowledge, access to and utilisation of SMC services among adolescent boys with deafness. For example, only 27.8% of this study's participants were knowledgeable and the majority (51.8%) uncertain about SMC's partial preventive effect against HIV transmission. Furthermore, their vulnerability is heightened by limited targeting resulting in the lack of appropriate and sufficient information responsive to their needs as adolescents with disability.

Table 10. SMC and "ABC" HIV prevention methods

Characteristic		Yes (%)	No (%)	Not Sure (%)	p-value
Age bracket	15 - 17	67(46.85)	46(32.17)	30(20.98)	0.977
	18 - 20	95(50.00)	56(29.47)	39(20.53)	
	21 - 24	14(46.67)	10(33.33)	6(20.00)	
Gender	Male	91(47.40)	61(31.77)	40(20.83)	0.897
	Female	85(49.71)	51(29.82)	35(20.47)	
Tribe	Langi/Acholi	84(51.53)	39(23.93)	40(24.54)	0.007
	Itesot/K'jong	24(42.11)	29(50.88)	4(7.02)	
	Munyoro/Nkole/Toro	8(42.11)	6(31.58)	5(26.32)	
	Muganda	39(44.83)	26(29.89)	22(25.29)	
	Others	21(56.76)	12(32.43)	4(10.81)	

4. DISCUSSION

In this study, although most (66%) participants had ever heard of SMC, a much higher proportion of 84% reported difficulties in accessing information about SMC. Key informant interviews provided some insight explaining this disconnect; that SMC awareness messages were not tailored towards the communication needs of adolescents with deafness, including the use of sign language and user-friendly BCC materials. The actual reasons for non-prioritization of adolescents with deafness during resource allocation in HIV prevention programs such as SMC are multi-faceted. They are largely associated with the scanty statistical data about the deaf population, rigid mindsets on associated cost implications and the false perception that the deaf community is not sexually active. This is in line with literature from elsewhere; for example HIV prevalence data from a Cameroonian study [17], contradicted the social prejudice that persons with deafness were sexually inactive.

The high level of uncertainty about the extent of prevention offered by SMC against HIV transmission – among adolescents and their parents/caretakers - is also a cause for concern, and further confirms what has been noted before in the literature. Studies conducted in other countries indicate a marked knowledge gap between deaf populations and HIV prevention strategies. A study on the epidemiology of

HIV/AIDS among adolescents in Nigeria [18] indicated that knowledge about HIV/AIDS was very low among many adolescents with hearing impairment, while Bat-Chava et al. [19] found that deaf sign language users were less knowledgeable about HIV/AIDS than oral deaf and hard of hearing participants. All participants reported difficulties in communicating with medical providers limiting their access to health information and proper medical care. Hanass-Hancock et al's [20] systematic review of literature on deafness and HIV/AIDS also showed that deaf people were vulnerable towards contracting HIV infection and also lacked access to HIV/AIDS information. Participants in this study who stated that SMC offered full protection against HIV transmission are at a higher risk of acquiring HIV, post circumcision; as does the bigger proportion (51.8%) of the participants who were in a state of uncertainty. This state of uncertainty implies that adolescents with deafness have inadequate factual knowledge about SMC as an HIV prevention strategy. This status quo is bound to compromise their assertiveness in negotiating for safer sexual practices which will, in return, compromise the quality of choices and decisions that these adolescents will make as far as their sexual behaviour/life is concerned, post circumcision. If unchecked this is bound to increase HIV prevalence of HIV while trouncing the cardinal objective of SMC as an HIV prevention strategy within this minority group and the entire population.

Study findings indicated that age, gender, marital status and residential setting had no statistically significant association with respondents' chances of having ever heard about SMC. However, chances of having ever heard about SMC were higher in boys compared to girls and equally increased slightly with age. This confirms what previous research (for example, 21) which showed that the likelihood for awareness of male circumcision for HIV prevention was increased for the male sex (N= 107, OR = 1.15, 95% CI 0.58 - 2.30). Study findings suggested practices of gender inequality in service delivery, including SMC related information, among adolescents with deafness. The female adolescents appeared to be caught up in a situation of double vulnerability within the community by their functional deficit in hearing as well as their gender dimension. Harmer's [21] study reported that women who are deaf encounter discrimination from their disability (deafness) and gender.

Married participants and those who had divorced had ever heard of SMC compared to those who had never married. This depicted a situation of sexual and reproductive health messages inclusive of SMC for HIV prevention being packaged, more accessible and user-friendly to couples/adults as than adolescents. That study participants who spent their holidays in trading centres and town settings had heard more about SMC compared to those in the village settings is a common pattern in terms of access to HIV/AIDS-related information and services in Uganda. It also explains why circumcision was more common in urban areas than in rural areas (37% versus 24%) in Uganda, [9]. Urban dwellers have more access and opportunities for information because most programmes and media used for disseminating HIV prevention methods are majorly concentrated and accessible in urban settings compared to rural settings. These findings are in line with Chava's [19] study on knowledge about HIV/AIDS, knowledge barrier and prevention among deaf and hard-of-hearing people. His results showed that participants living in urban areas and in sizeable deaf communities were more exposed to information about HIV/AIDS than their peers in rural areas or with less social networks.

The knowledge disparity across gender also needs to be put into context. The Sustainable Development Goal #5 emphasizes the need to "achieve gender equality and empowerment of all women and girls". Although SMC targets boys

directly rather than girls, from a public health perspective, girls ought to equally have high and levels of knowledge about SMC like any other HIV preventive method. Misconceptions about SMC as an HIV strategy among girls with deafness makes them more vulnerable towards sexual abuse by circumcised men or boys, staking them at an equally much more higher risk of being infected by HIV. Latest HIV/AIDS statistics show young girls to be four times more likely to contract HIV than their male counterparts [1]. Yousafzi et al's research [15] confirms this position and concludes that adolescents with disabilities were generally exposed to high risks of HIV infection and their likelihood of receiving advice and HIV/AIDS awareness education is limited by many reasons including poverty, communication difficulties, confidentiality gaps, limited confidence in negotiating safer sex due to low self-esteem, poor and ineffective quality of advice, vulnerability to abuse, negative attitudes and sexuality misconceptions towards them.

In spite of the communication challenges faced by adolescents with deafness in accessing SMC information, their attitude towards SMC was generally positive, open and above average (68.3%). Furthermore, findings indicated that age, gender and tribe were all significantly associated with respondent's willingness to influence their male friends to undergo circumcision. This positive attitude and need for information and services among a minority group is not surprising, considering that they are often overlooked, not targeted by programming and which generally presents a demand-supply deficit in HIV and other programmes [22]. It has also been confirmed in other areas; for example, in a study by Teopolina [23] where almost all of the respondents (93.6%) reflected a positive attitude towards the benefits of SMC.

5. STUDY LIMITATIONS

Cross-sectional studies present well-known challenges and this study is not an exception. Secondly, the study's primary participants were school-going deaf adolescents and from different regions of Uganda all converging in the same school(s). This presents some gaps in generalizability across the deaf community or the sexuality of adolescents with disability. Moreover, circumcision was self-reported; there might have been an element of the social desirability bias among study participants; as there could also be a possible exaggeration on access to (or lack of) services among this group.

6. CONCLUSION

Whereas this study found a reasonable proportion of adolescents with deafness having undergone SMC (60.9%) and a generally positive attitude (68.3%), it also clearly highlights substantial levels of uncertainty (51.8%) regarding SMC as an HIV prevention strategy among this vulnerable group within the population. The multiplier effect of uncertainty in knowledge levels was reflected in the post circumcision behavioural mindset of participants which mostly appeared to be influenced towards believing in the ideology of risk compensation as resultant merit of SMC.

The highly inaccessible SMC information (84%) was the justification for a smaller proportion of respondents with accurate knowledge on the partial preventive effect of SMC (27.8%), reasonable proportions of uncircumcised respondents (39.1%) with a negative attitude (31.7%) towards SMC and the generally limited understanding on associated risky sexual behaviour post SMC. In spite of KAP variations at socio-demographic level, there was less overall uniformity in the KAP of respondents towards SMC at the cluster level. In view of the highly inaccessible information about SMC, variations in knowledge levels about the HIV preventive effect of SMC coupled with differences in knowledge in regard to associated risky sexual behaviour post circumcision at socio-demographic level, this study findings were in agreement with those from a Nigerian study (15), which reflected significant differences ($p < 0.05$) in levels of understanding about certain aspects of how AIDS was spread, differences in available resources for access to accurate information among deaf members of the population.

This study strongly recommends inclusive interventions in HIV/AIDS prevention policy and programming for the deaf population, tailored to address their specific vulnerabilities. The focus will also need to be put on significant adults in their lives as well as continued information on the efficacy or partial protection SMC offers and the comprehensive strategy/combination prevention for HIV/AIDS. The most important issue will be rethinking the sexuality of marginalized and invisible groups in the population and integrating their needs as a strategy to achieve global and local HIV/AIDS prevention targets.

CONSENT

Authors declare that written informed consent was obtained from study participants and institutional gatekeepers (School Administration). A copy of the written consent is available for review by the Editorial office/Chief Editor/Editorial Board members of this journal.

ETHICAL APPROVAL

This study was conducted in compliance to institutional and national standards of Uganda National council of Science and Technology and Uganda Christian University Research and Ethics Committee which approved the study.

ACKNOWLEDGEMENT

The authors acknowledge the support of the students, administration and support staff of the three participating institutions: Ngora School for the Deaf in Ngora district, Eastern region; Nancy School for the Deaf in Lira district, Northern region and Wakiso Secondary School for the Deaf in Uganda's Central region.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
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