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Understanding male circumcision: insights from a peri-urban community in Maputo City, Mozambique

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Abstract

Background: Circumcision is a protective measure against sexually transmitted infections (STIs), reducing the risk of HIV infection. This study reported coverage of male circumcision and assessed the factors associated with male uncircumcision in a peri-urban area in Maputo City, Mozambique.

Methods: This cross-sectional study of the Health Demographic Surveillance System in the Polana Caniço neighborhood investigated the sociodemographic and behavioral factors associated with uncircumcised males aged 15–49 y from October 2019 to June 2021. Data were collected from an HIV risk factors questionnaire and descriptive analyses conducted comparing self-reported male circumcision status by sociodemographic factors and sexual behaviors. The association was assessed via χ^2 tests, and a multivariable logistic regression model was constructed. Adjusted ORs and 95% CIs were reported for factors associated with uncircumcised status.

Results: Of the 3481 males aged 15–49 y who responded to the questionnaire, 79.5% (2766) self-reported being circumcised. The percentage of uncircumcised men steadily increased with age, ranging from 12.4% (95) among males aged 15–19 y to 34.5% (148) of men aged 40–49 y. Men without education or with primary education, as well as those not practicing Islam, were 3–4

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Ethical approval: The HDSS-Polana Caniço protocol was reviewed and approved by the Mozambican National Health Bioethics for Health (Ref. 49/CNBS/2014) (see 45 C.F.R. part 46.101(c); 21 C.F.R. part 56). Voluntary, written informed consent was obtained from all study participants prior to conducting any interviews.

times more likely to be uncircumcised. Uncircumcised men were more likely to self-report an STI and a lack of condom use.

Conclusions: Being uncircumcised was associated with not using condoms and having STIs, highlighting the need to further emphasize combination HIV-prevention programs and regular HIV/STI screening. Targeting males with lower education and across religions can help reach those with lower coverage of this effective prevention intervention.

Keywords

HDSS; HIV/STI; male circumcision; Maputo; Mozambique; sociodemographic

Introduction

In 2019, one-half of all new HIV infections globally occurred in Eastern and Southern Africa,¹ and in 2021 it was estimated that 12.5% of the population in Mozambique was HIV positive.² Voluntary male medical circumcision (VMMC) can reduce the risk of acquiring HIV among heterosexual men by 60%, as well as decreasing the risk of HIV transmission to female partners.^{1,3} Since 2007, the WHO and the United Nations Joint Programme on HIV/AIDS (UNAIDS) have recommended VMMC, particularly in countries with a high HIV prevalence, as part of a combination HIV prevention package to prevent sexually acquired HIV in men.⁴

VMMC carries cultural importance in most African societies.^{4–7} Among certain ethnic groups, male circumcision is performed for cultural reasons, often as an initiation ritual and a rite of passage into manhood. Thus, community involvement before, during and after traditional male circumcision is strong.^{3,4,8} Consequently, to further increase the rate of VMMC and maintain community support, WHO/UNAIDS (2007) recommended that the sociocultural context of traditional male circumcision be promoted in collaboration with medical male circumcision programs.⁴

Based on recommendations by the WHO and UNAIDS, in 2012, the Ministry of Health of Mozambique approved the Strategic Plan for the Expansion of Circumcision. The plan, enacted from 2013 to 2017, established a goal of circumcising 2 million males aged 10–49 y in seven priority provinces with high HIV prevalence and low male circumcision rates, including Maputo City.⁹ Although the target was not achieved, community sensitization and the increased focus on VMMC resulted in the construction of 40 additional medical circumcision health centers, both fixed and mobile, and the circumcision of >1 million boys and men in 4 y.⁹

A 2015 national health survey found that 63% of males aged 15–49 y were circumcised in Mozambique, although the proportion differed by province, ranging from 95% in Niassa to 9% in Tete.¹ In the capital, Maputo City, nearly three-quarters of men (71%) were circumcised.¹ By 2020, national circumcision rates had increased to 73.3% among males aged 15–49 y and to 80.2% in Maputo City.²

Approximately 10 y since the implementation of the Strategic Plan, this study seeks to determine the coverage of male circumcision and the sociodemographic and behavioral determinants of uncircumcision in a peri-urban neighborhood in Maputo City, Mozambique. By providing insights into the remaining uncircumcised cohort, this study aims to contribute to public health policies with an emphasis on sexual health, especially HIV prevention.

Materials and Methods

Design and study setting

This cross-sectional study was conducted among males aged 15–49 y as part of the second surveillance round of a Health Demographic Surveillance System (HDSS)¹⁰ in the Polana Caniço neighborhood in Maputo City, Mozambique (Figure 1). Data collection occurred from October 2019 to June 2021. The baseline was implemented from 2017 to 2018 and collected sociodemographic data, followed by round one in 2018, which focused on women's health and family planning, then finally round two, for HIV risk factors and related data.

The Polana Caniço HDSS encompasses both the Polana Caniço A and Polana Caniço B neighborhoods, an area consisting of 125 city blocks and >82 254 inhabitants (according to the latest national census [2017]), and seeks to understand the demographic and epidemiological characteristics of a peri-urban population through household interviews. For the purposes of this study, peri-urban was defined as an area adjacent to an urban city, shaped by the urbanization of a former rural area.

Sampling and recruitment

To achieve the desired sample for the HDSS, 10 enumeration areas were randomly selected from each of the Polana Caniço A and Polana Caniço B neighborhoods, giving a total of 20 enumeration areas. Each family member aged 15–49 y, residing in the area for at least 3 mo, present at the time of the interview, and who provided voluntarily written consent, was invited to participate.

In total, 10 407 males were included in round two, after accounting for in and out migration, births, deaths and refusals (Figure 2). Interviews with consenting participants included an HIV risk factor questionnaire, which for men aged 15–49 y included questions about circumcision.

Data collection

Questionnaires were administered to gather data related to HIV and sexually transmitted infection (STI) risk factors, in addition to participants' sociodemographic information. Interviewers entered these data directly on tablets using the OpenHDS Mobile electronic system connected to ODK Collect. Data were downloaded to the HDSS central server, located in Polana Caniço Health Research and Training Center/Centro de Investigação e Treino em Saúde da Polana Caniço (CISPOC), a research center affiliated with the National Institute of Health in Mozambique. For quality assurance, staff checked the data

for consistency and completeness daily and verified responses with interviewers when necessary.

Data analysis

We conducted descriptive analyses comparing self-reported male circumcision status by sociodemographic factors and sexual behavior (age at first sexual intercourse, number of sexual partners in the last 3 mo, use of condoms during sexual intercourse in the last 3 mo, reasons for not using a condom during sexual intercourse, self-report of HIV and STI diagnosis). Wealth quintile was created using the HDSS methodology, in which quintiles were defined based on household appliance ownership, characteristics of the house's infrastructure, as well as ownership of communication, information and transportation methods.¹⁰

The association between categorical variables and uncircumcised status was assessed via χ^2 tests. To calculate adjusted ORs (aORs) and 95% CIs for factors associated with uncircumcised status, we first constructed a saturated multivariable logistic regression model. Variables were then removed in a stepwise manner until all remaining variables were associated with circumcision at the 0.05 significance level. All analyses were conducted using Stata version 14.1 (StataCorp LLC, College Station, Texas, United States).

Results

Sociodemographic data

Of the 3481 males aged 15–49 y who responded to the HIV risk questionnaire, 79.5% (2766) self-reported being circumcised. The percentage of uncircumcised men steadily increased with age, ranging from 12.4% (95) among males aged 15–19 y to 34.5% (148) among men aged 40–49 y (Table 1). Comparing levels of education, 42.1% (15) of men with no education and 33.1% (323) with primary education were uncircumcised, while only 15.4% (369) of men with secondary education or higher were uncircumcised. A small percentage of men practicing Islam were uncircumcised (7.6% [9]) in comparison with $\geq 20\%$ among those practicing another religion or with no religion. Within wealth quintiles, in general, the proportion of uncircumcised men decreased as wealth increased: 26.9% (137) of men in the lowest wealth quintile were uncircumcised, while 14.0% (113) of men in the highest wealth quintile were uncircumcised.

Factors related to circumcision

Of those circumcised, 62.7% (1735) were circumcised before the age of 15 y, with 45.4% (1257) citing disease prevention as their main motivation for circumcision (Table 2). A majority, 85.4% (2362) reported that the procedure was performed by a healthcare professional, and for three-quarters (75.7%, 2095) the procedure was performed at a healthcare facility or mobile health unit.

Sexual behaviors

A significant relationship was found between age at sexual de-but and circumcision (Table 3), with first sexual intercourse most frequently occurring during the age of 15–19 y,

80.5% (1771) of whom reported being circumcised. Of those who reported being sexually active, more men reported having one sexual partner in the last 3 mo, with 78.8% (1690) circumcised and 21.2% (454) uncircumcised, although the relationship between the number of sexual partners and circumcision was not found to be significant.

A larger proportion of men who did not use condoms during sexual intercourse within the last 3 mo were uncircumcised (27.6% [225]) compared with 19.1% (407) of men who used condoms.

Predictors of uncircumcised status

In multivariable analysis, age group, educational level, occupation, religion, economic status (wealth quantile), STI diagnosis, condom use and having a recent sexual partner were associated with being uncircumcised (Table 4). Compared with adolescents (age 15–19 y), older age groups were more likely to be uncircumcised (20–29 y, aOR 1.50 [95% CI 1.03 to 2.19]; 30–39 y, aOR 3.16 [95% CI 2.09 to 4.79]; 40–49 y, aOR 2.92 [95% CI 1.88 to 4.54]). Men without education (aOR 2.74 [95% CI 1.34 to 5.63]) or with primary education (aOR 2.03 [95% CI 1.67 to 2.46]) were more likely to be uncircumcised compared with men with secondary or higher education. Students were less likely to be uncircumcised (aOR 0.66 [95% CI 0.48 to 0.91]) than men in employment. Men practicing a religion other than Islam or with no religion were three to four times more likely to be uncircumcised. Compared with a very high wealth quintile, belonging to a very low (aOR 1.52 [95% CI 1.13 to 2.05]), low (aOR 1.36 [95% CI 1.01 to 1.83]) or medium (aOR 1.71 [95% CI 1.30 to 2.26]) wealth quintile was associated with not being circumcised. STI diagnosis (aOR 1.57 [95% CI 1.13 to 2.16]) and a lack of condom use (aOR 1.23 [95% CI 1.01 to 1.51]) were associated with being uncircumcised. Men without a sexual partner in the past month were more likely to be uncircumcised (aOR 1.37 [95% CI 1.00 to 1.88]).

Discussion

Our study determined that the majority of men, nearly 80%, living in a peri-urban setting in Maputo, Mozambique, and interviewed as part of the HIV risk factors assessment of the HDSS Polana Caniço, were circumcised. Compared with Maputo City in 2015, male circumcision in our survey is 11% higher, which is similar to a national increase from 59% in 2009 to 69% in 2015.¹ Consistent with the recent expansion of VMMC programs in Mozambique beginning in 2013, a greater proportion of young men aged 15–19 y were circumcised.¹¹ Furthermore, the percentage of circumcised men steadily decreased as age increased.

Both lower levels of education and belonging to lower wealth quintiles were significantly associated with being uncircumcised, suggesting that communications emphasizing the health benefits of circumcision were more successful in reaching those who completed all levels of schooling. Unlike our findings, the report from the National Circumcision Program did not find a link between circumcision and level of education.⁹ However, similar to our results, which detected a difference of 18% in circumcision status between those with a primary education level and a secondary or higher education, the report did observe a difference of 32% in circumcision status between primary and higher education levels.⁹

This similarity may reinforce the idea that circumcision sensitization programs reach adolescents attending school, particularly those who complete higher schooling levels. Strengthening appropriate messages regarding the benefits of male circumcision can help to close the gap among those with higher education levels who remain uncircumcised. Notably, in 2015, of men with a primary education level, 33% in HDSS Polana Caniço were uncircumcised compared with 42% nationally,¹¹ suggesting that the implementation of the Strategic Plan for Male Circumcision is reaching these subgroups, but at a slower rate than those with a higher level of education.

The vast majority of those who practice the religion of Islam in HDSS Polana Caniço were circumcised (92.5%), which was similar to national findings in 2015 (93%), 2011 (83%) and 2009 (88%).¹ Men practicing no religion or a religion other than Islam were three to four times more likely to be uncircumcised, indicating a strong need to prioritize other religious groups in VMMC campaigns. Additionally, considering that both Islamic religion and education were positively associated with circumcision, further investigation into the relationship between Islam and participants' education level may provide a valuable insight for effectively targeting groups with a lower circumcision prevalence. Most men in HDSS Polana Caniço reported being circumcised by a health professional (85%), which differs from national findings, where the majority of circumcisions were performed by a traditional medical practitioner/friend/family member (33%) and fewer by a health professional (27%).¹¹ Taking into consideration that Polana Caniço is a peri-urban neighborhood with urban influence, this difference could be partially explained by better access to health professionals in urban vs rural areas.¹¹

STI diagnosis (aOR 1.57 [95% CI 1.13 to 2.16]) and a lack of condom use (aOR 1.23 [95% CI 1.01 to 1.51]) were associated with being uncircumcised, highlighting the need for continued emphasis on protective sexual health behaviors, particularly the importance of condom use in conjunction with VMMC to prevent the spread of HIV and other STIs.² Interestingly, one of the main criticisms of the global VMMC program is that circumcised men may adopt riskier sexual behaviors;¹¹ however, this study found the opposite, suggesting a need for investigation into combination preventative health messaging within this community.

This study was subject to field limitations, including difficulties in accessing households during the rainy season and the unavailability of adults, especially during weekdays. Because of the nature of in-person interviews, the findings in this study may be subject to stigma, social desirability bias or recall bias, where men may not have correctly reported their circumcision status, sexual behaviors, or an HIV or STI diagnosis. Interviewers minimized stigma and social desirability bias by ensuring participants' privacy during the interview and the confidentiality of their responses. While wealth quartiles were analyzed to align with other research, this variable may not accurately identify those most at risk, as household commodities in peri-urban settings are more similar than in national settings, where urban–rural differences are greater. A particular strength of this study is the location of CISPOC within the Polana Caniço neighborhood, allowing the data collection team to flag data inconsistencies, verify questionnaires with interviewers and confirm answers with HDSS participants.

Conclusion

In Mozambique, the proportion of uncircumcised men is decreasing over time. Supported by findings that those who do not complete all levels of schooling are more likely to be uncircumcised, targeted interventions aimed at those unable to attend or complete schooling are needed to close the gap among those uncircumcised. As per our findings, of those circumcised, >60% were circumcised between the ages of 0 and 14 y, overlapping with primary school in Mozambique. Future public health interventions should therefore continue to direct preventative health messaging at children attending primary and secondary schools and their parents, to capture those at ages when circumcision is more likely to occur. It will also be necessary to increase the scope of outreach programs to include communities, targeting those with lower education levels. Both a history of STIs and a lack of condom use were associated with being uncircumcised. Because condom use and male circumcision are included in combination HIV and STI prevention programs, future HIV prevention programs may emphasize the benefits of both to further reduce the risk of HIV and STI transmission.

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Data availability:

Data are available from authors upon request: https://drive.google.com/drive/folders/10RAL6uRplRUaQPCptPch6tNf5YQSwbW?usp=drive_link.

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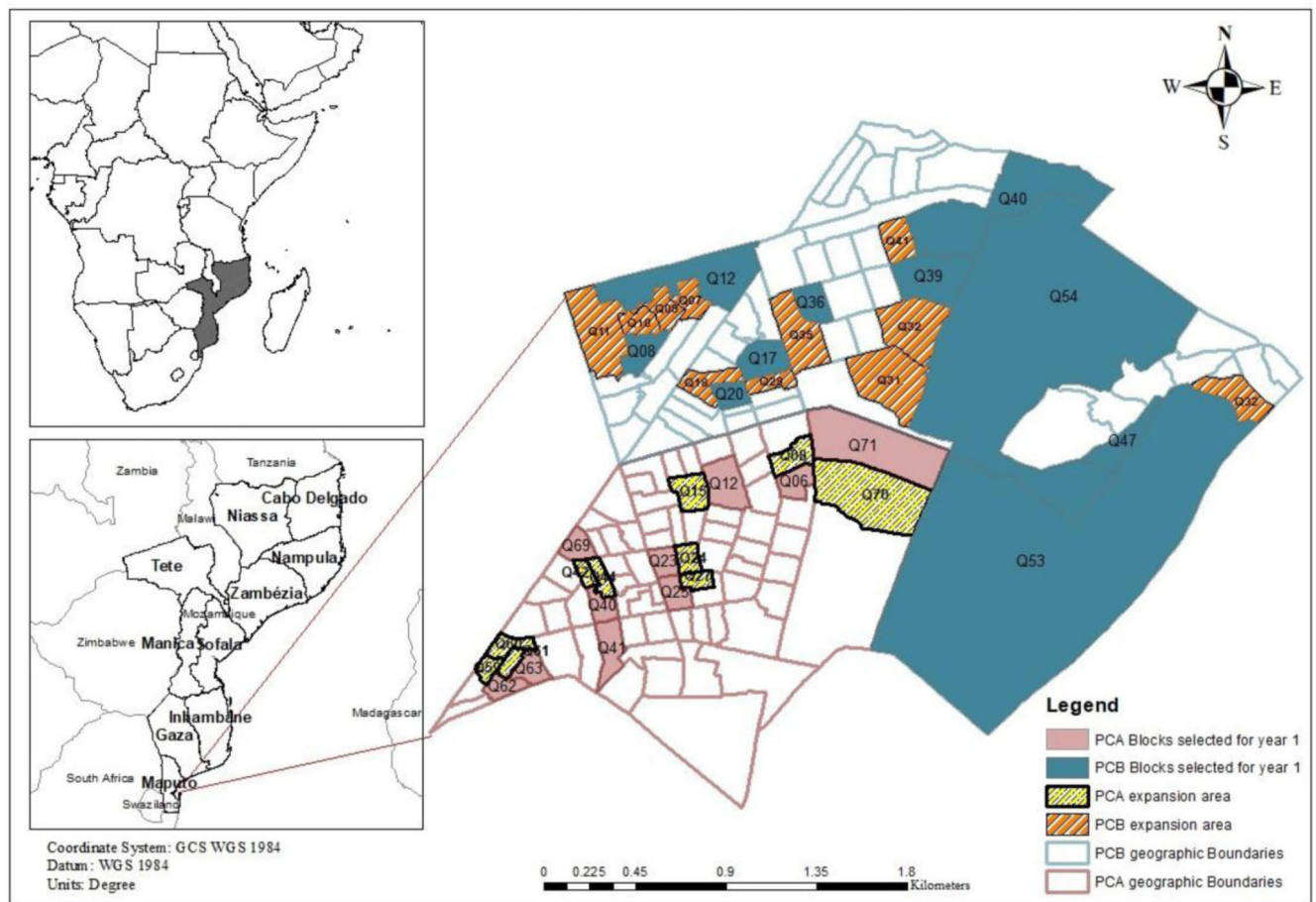


Figure 1. Polana Canico A (PCA) and Polana Canico B (PCB) neighborhood blocks selected for surveillance in the HDSS.

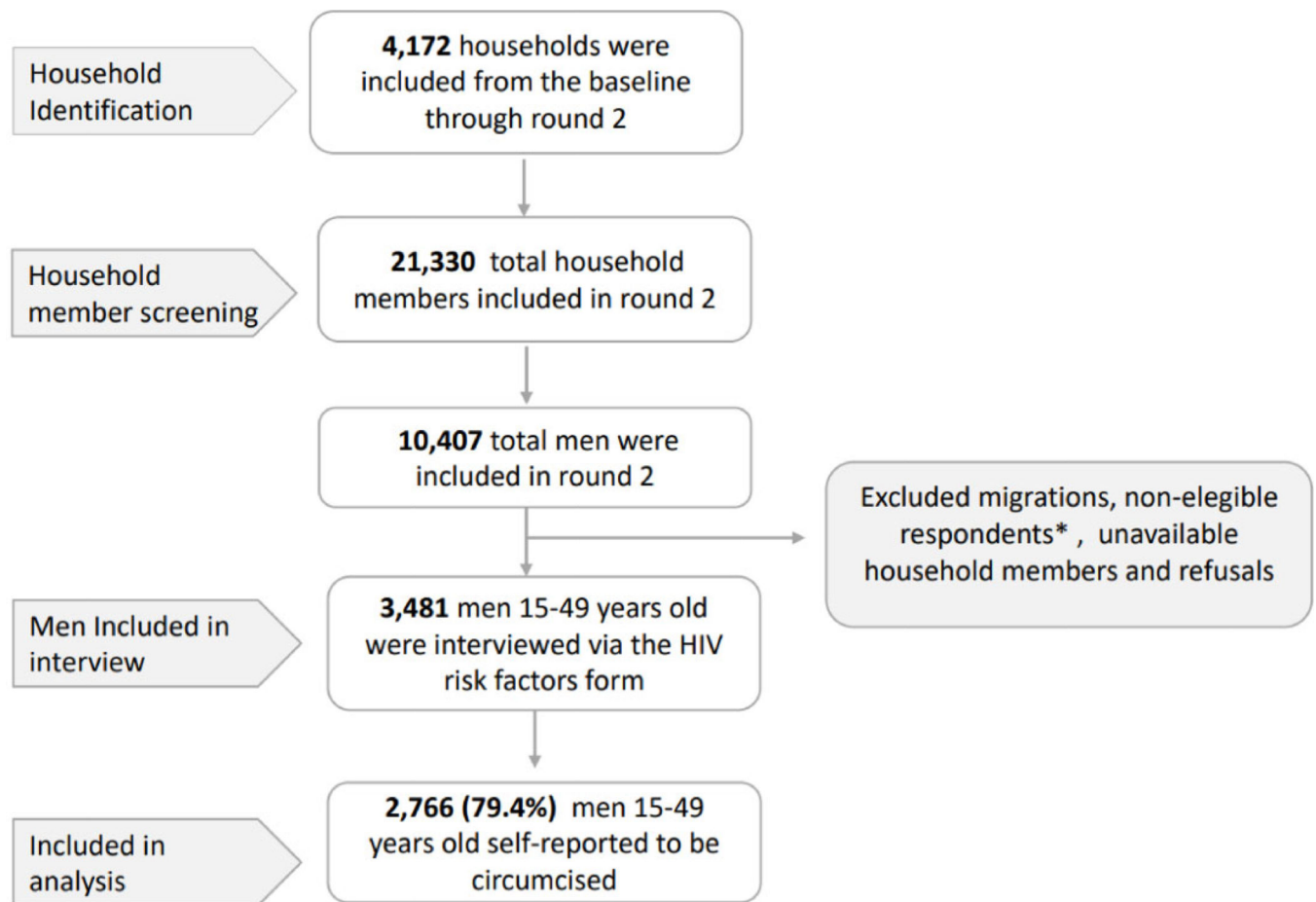


Figure 2.

Flowchart of the HDSS Polana Caniço sampling and recruitment process for households and household members for surveillance round 2. *People unavailable for the interview, people with mental incapacity to respond and adolescents aged 15–17 y whose legal guardian did not permit their inclusion.

Table 1. Sociodemographic characteristics of circumcised and uncircumcised males aged 15–49 y in the Polana Caniço neighborhood

	Male circumcision status					
	No		Yes		Total	
	n	%	n	%	N	%
Current age groups						
15–19 y	95	12.4	655	87.6	750	21.1
20–29 y	212	14.5	1222	85.5	1434	41.5
30–39 y	260	30.7	593	69.3	853	24.9
40–49 y	148	34.5	296	65.5	444	12.5
Total	715	20.5	2766	79.4	3481	100.0
Education level						
None	15	44.1	19	55.9	34	1.0
Primary	323	33.1	652	66.9	975	27.9
Secondary/higher	369	15.4	2033	84.6	2402	71.1
Total	707	20.7	2704	79.3	3411	100.0
Marital status						
Single	397	17.1	1921	82.9	2318	67.1
Married	32	23.5	104	76.5	136	3.7
Marital union *	276	27.5	729	72.5	1005	28.5
Divorced/widowed	10	45.4	12	54.5	22	0.70
Total	715	20.5	2766	79.5	3481	100.00
Occupation						
Unemployed	146	21.3	538	78.6	684	20.5
Employed	451	25.9	1290	74.1	1741	51.1
Student	109	11.4	847	88.6	956	28.3
Total	706	20.9	2675	79.1	3401	100.0
Religion						
Islamic	9	7.6	110	92.4	120	3.5
Zion	68	23.7	219	76.3	287	7.9
Catholic	113	20.8	430	79.2	543	15.5
Protestant	421	20.4	1645	79.6	2060	61.1

Male circumcision status							
	No		Yes		Total		
	n	%	n	%	N	%	
No religion/don't practice	97	24.1	306	75.9	408		12.0
Total	708	20.7	2710	79.3	3418		100.0
Wealth quintile							
Very low	137	26.9	373	73.1	510		14.7
Low	124	22.7	421	77.2	545		16.3
Medium	171	25.7	495	74.3	666		20.3
High	136	18.1	614	81.9	750		23.3
Very high	113	14.0	692	86	805		25.4
Total	681	20.8	2595	79.2	3276		100.0

* Live together but not legally married.

Table 2.

Factors related to circumcision among circumcised men aged 15–49 y in the Polana Canção neighborhood

	n	%
Who performed the circumcision		
Healthcare professional	2362	85.4
Traditional medicine practitioner	292	10.6
Other	84	3.0
Do not know	28	1.0
Total	2766	100.0
Where the circumcision occurred		
Healthcare facility/mobile health unit	2095	75.7
Home	539	19.5
Home of the traditional medicine practitioner	54	1.9
Matrona's house *	25	0.9
Do not know	32	1.2
Others	21	0.7
Total	2766	100.0
Age when circumcised		
0–9 y	623	22.5
10–14 y	1112	40.2
15–19 y	670	24.2
≥20 y	361	13.0
Total	2766	100.0
Main reason for circumcision		
Hygiene	626	22.6
Prevention of disease	1257	45.4
Cultural/religious	436	15.8
Improved sexual performance	28	1.01
Do not know	419	15.1
Total	2766	100.0

* A matrona is a respected woman in the community who assists with homebirth deliveries and may or may not be formally trained.

Table 3. Sexual behaviors and circumcision status among men aged 15–49 y in the Polana Caniço neighborhood

	Male circumcision status					
	No		Yes		Total	
	n	%	n	%	N	p
Age at first sexual intercourse						
10–14 y	68	20.8	247	79.2	315	
15–19 y	428	19.5	1771	80.5	2199	
>19 y	219	23.0	748	77	967	<0.001
Total	715	20.6	2766	79.4	3481	
Number of sexual partners in the last 3 mo (of those sexually active)						
0	65	21.1	245	78.9	310	
1	454	21.2	1690	78.8	2144	
2	79	19.7	325	80.3	404	
3	21	21.3	72	78.7	93	0.691
>3	96	18.0	434	81.9	530	
Total	715	20.6	2766	79.4	3481	
Use of condom during sexual intercourse in the last 3 mo						
No	225	27.1	591	72.9	816	
Yes	417	19.1	1805	80.9	2222	<0.001
Total	642	21.2	2396	78.8	3038	
Reasons for not using condom during sexual intercourse (of those who did not use)						
Allergy to condom	1	36.2	1	63.8	2	
Discomfort or pain	5	25.3	14	74.7	19	
Personal preference	111	28.3	275	71.7	386	
Partner preference	24	33.0	45	67.0	69	
Cultural or religious belief	2	63.8	2	36.2	4	
No condom available	1	19.5	5	80.5	6	
Use of other contraception methods	8	17.0	38	83.0	46	0.368
Unnecessary for being faithful to partner	51	28.1	125	71.9	176	
Other	22	21.2	86	78.8	108	
Total	225	27.1	591	72.9	816	

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Male circumcision status						
			Yes	%	No	p
			n		n	
HIV diagnosis (self-reported)						
No		578	19.3	2412	80.7	2990
Yes		137	27.9	354	72.1	491
Total		715	20.5	2766	79.5	3481
STI *diagnosis of in the last 12 mo (self-reported)						
No		577	20.5	2243	79.5	2820
Yes		65	29.8	153	70.2	218
		642	21.1	2396	78.9	3038

* Hospital diagnosis of syphilis, gonorrhea, chlamydia, HPV, genital herpes, hepatitis B or C.

Table 4.
Predictors of uncircumcised status among men aged 15–49 y in the Polana Caniço neighborhood

	Bivariable analysis		Multivariable analysis	
	OR	[95% CI]	aOR	[95% CI]
Age group				
15–19 y	1		1	
20–29 y	1.20	[0.92 to 1.55]	1.50 *	[1.03 to 2.19]
30–39 y	3.02 ***	[2.33 to 3.92]	3.16 ***	[2.09 to 4.79]
40–49 y	3.45 ***	[2.57 to 4.62]	2.92 ***	[1.88 to 4.54]
Marital status				
Single	1			
Married	1.49	[0.99 to 2.24]	NS	
Marital union	1.83 ***	[1.54 to 2.18]		
Separated or widowed	4.03 **	[1.73 to 9.40]		
Education level				
None	4.35 ***	[2.19 to 8.64]	2.74 **	[1.34 to 5.63]
Primary	2.73 ***	[2.29 to 3.25]	2.03 ***	[1.67 to 2.46]
Secondary/higher education	1		1	
Occupation				
Employed	1		1	
Unemployed	0.77 *	[0.62 to 0.96]	1.02	[0.80 to 1.29]
Student	0.37 ***	[0.29 to 0.46]	0.66 *	[0.48 to 0.91]
Religion				
Islamic	1		1	
Catholic/Protestant	3.15 **	[1.59 to 6.25]	3.91 ***	[1.94 to 7.89]
Zion	3.80 ***	[1.83 to 7.89]	4.47 ***	[2.11 to 9.49]
No religion/don't practice	3.87 ***	[1.89 to 7.93]	3.78 ***	[1.81 to 7.89]
Wealth quintile				
Very high	1		1	
High	1.36 *	[1.03 to 1.78]	1.18	[0.89 to 1.56]

Bivariable analysis			Multivariable analysis		
	OR	[95% CI]	aOR	[95% CI]	
Medium	2.12 ***	[1.62 to 2.76]	1.71 ***	[1.30 to 2.26]	
Low	1.80 ***	[1.36 to 2.39]	1.36 *	[1.01 to 1.83]	
Very low	2.25 ***	[1.70 to 2.97]	1.52 **	[1.13 to 2.05]	
HIV diagnosis in last 3 mo (self-reported)					
N	1		NS		
P	1.61 ***	[1.30 to 2.01]			
Hospital diagnosis of STI in the last 12 mo (self-reported)					
N	1		1		
Y	1.65 ***	[1.22 to 2.24]	1.57 **	[1.13 to 2.16]	
Condom use in sexual intercourse					
N	1.65 ***	[1.37 to 1.99]	1.23 *	[1.01 to 1.51]	
Y	1		1		
Number of sexual partners in the past month					
≥1	1		1		
None	0.99	[0.74 to 1.32]	1.37 *	[1.00 to 1.88]	

* p < 0.05;
** p < 0.01;
*** p < 0.001; NS, not significant in multivariable analysis.
The category 'missing' is not shown in the table.