HIV risk perception and changes in sexual behavior and sexual satisfaction following male circumcision among circumcised males and their female partners from a traditionally non-circumcising community in Kenya, 2012-2014

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Abstract

Introduction: The aim of this study was to determine HIV risk perception, sexual satisfaction and condom use among recently-circumcised sexually-active males and their female partners from a traditionally non-circumcising Kenyan community.

Methods: A longitudinal bio-behavioural survey using interviewer-administered structured questionnaires was conducted in Siaya County of Kenya between November 2012 and February 2014 among persons of both genders aged ≥13 years. Male respondents were characterized as 'recently circumcised' if they had been circumcised within the 2 years of the interview, 'previously circumcised' if prior to this and as 'uncircumcised'. Sexual satisfaction was measured on a 3-point likert scale ('satisfied', 'no opinion', 'dissatisfied'). Logistic regression analysis was carried out to compare self-reported characteristics of the survey respondents by their own (males) or their partners (females) circumcision status.

Results: Of 3,285 men interviewed, 1,001 (30%) were circumcised, of whom 247 (25%) were recently circumcised. Of 4,171 women interviewed, 976 (24%) had primary partners who were circumcised of whom 151 (15%) had 'recently circumcised' primary partners. Recently circumcised males were more likely to be younger, single and unemployed; similarly, their female partners were more likely to be younger, single and have attained above primary education (P < 0.05). Most of (≥ 90%) all men and women believed that circumcised men are less likely to get HIV infection and felt that both reducing the number of sex partners, and condom use with a partner with unknown HIV status were still necessary despite male circumcision (MC) being available in their community. Majority of males and females (> 90%) were pleased with their own or their partners recent circumcision, sexual performance and condom use.

Discussion and Conclusion: Messages to promote MC should incorporate information regarding preserved/enhanced sexual satisfaction, ease of condom use, and include women to promote MC, a one-time intervention, which is not associated with risk compensation.

Riassunto

Introduzione: L'obiettivo di questo studio è stato quello di esaminare la percezione del rischio di HIV, la soddisfazione sessuale e l'uso del preservativo tra i maschi sessualmente attivi recentemente circoncisi ed tra le loro partner in una comunità del Kenia dove non viene praticata tradizionalmente la circoncisione.

Metodi: Uno studio longitudinale biocomportamentale attraverso questionari strutturati somministrati da un intervistatore è stato condotto nella contea di Siaya in Kenia tra novembre 2012 e febbraio 2014 in persone di entrambi i sessi con ≥13 anni di età. I rispondenti maschi sono stati suddivisi in "recentemente circoncisi" se erano stati circoncisi entro 2 anni dall'intervista, "precedentemente circoncisi" se lo erano stati prima di 2 anni, o "non circoncisi". La soddisfazione sessuale è stata misurata con una scala Likert a 3 punti ("soddisfatto", "nessuna opinione", "non soddisfatti"). Un'analisi di regressione logistica è stata utilizzata per confrontare le caratteristiche riferite dai rispondenti dello studio sulla circoncisione propria (maschi) o dei loro partner (femmine).

Risultati: Dei 3.285 uomini intervistati, 1.001 (30%) erano stati circoncisi, di cui 247 (25%) di recente. Delle 4.171 donne intervistate, 976 (24%) avevano i loro partners principali che erano stati circoncisi, di cui 151 (15%) "recentemente circoncisi". I maschi recentemente circoncisi erano soprattutto giovani, single e disoccupati; allo stesso modo, vi erano maggiori probabilità che le loro partner fossero giovani, single e con educazione di tipo primario (P < 0.05). La maggior parte (≥ 90%) degli uomini e delle donne credevano che gli uomini circoncisi avessero meno possibilità di contrarre l'infezione da HIV e credevano che ridurre il numero dei partner sessuali e l'uso del preservativo con un partner il cui status di sieropositività non era conosciuto fossero ancora necessari nonostante la circoncisione maschile fosse disponibile nella loro comunità. La maggioranza di maschi e femmine (> 90%) era soddisfatta della recente circoncisione sia propria che dei loro partner, della performance sessuale e dell'uso del preservativo.

Discussione e Conclusione: Messaggi per promuovere la circoncisione maschile dovrebbero incorporare informazioni riguardanti il mantenimento/aumento della soddisfazione sessuale, la facilità nell'uso del preservativo ed includere le donne per promuovere la circoncisione maschile, un intervento unico, non associato alla compensazione del rischio.

TAKE-HOME MESSAGE

Messages to promote male circumcision (MC) in Kenya, especially among traditionally non-circumcising communities, should incorporate information regarding preserved/enhanced sexual satisfaction, ease of condom use, and include women so as they can also promote MC, a one-time intervention which is not associated with risk compensation.

INTRODUCTION

Introduction and scale up of male circumcision (MC) needs to take into consideration the local, socio-cultural, religious and traditional values to ensure community acceptability and integration of MC into existing systems. Careful assessments need to be conducted to scale up MC especially in traditionally non-circumcising communities [1]. This is because acceptability of MC may be influenced by perceived or actual effects of MC on sexual satisfaction and function [2]. In South Africa, men who were informed that MC is likely to increase sexual satisfaction for themselves, and their female partners, were 5 to 7 times more likely to undergo MC [3]. Understanding how MC affects perceived sexual pleasure of both the male and female partner is important in formulating public health messages to promote MC for HIV prevention [4]. Additionally, there are concerns that circumcised men may engage in more risky sexual behavior (e.g. engaging in unprotected sex with casual or multiple sex partners, due to the perception of 'increased protection from STI and HIV' following MC) [5]. Previous studies on male satisfaction after MC have been biased since they focused on males with medical indications for MC [6], or infants who are not able to give an account of sexual experiences before and after male circumcision or have had small sample sizes with short follow-up period [2]. Published studies have collected views from men who were either involved in a clinical trial [7] or from their partners [3], or from men drawn from cosmopolitan areas, or men who were not sexually active before and after male circumcision [8]. Previous works have not also shown the perceptions of sexually active circumcised persons from homogenous traditionally non-circumcising communities who voluntarily underwent MC during a voluntary medical male circumcision (VMMC) program roll out [2, 3, 6, 8]. We set out to determine the perceptions of sexually active men, from a traditionally non-circumcising community in rural Western Kenya, circumcised in adulthood at the beginning of a VMMC program roll-out, and female partners of similar men, with a view to provide information on expansion of VMMC services to policy makers.

METHODS

Study design and setting

The Kenya Medical Research Institute HIV Implementation Science and Services Branch (KEMRI HISS) has been conducting longitudinal bio-behavioural surveys nested within the Kenya Medical Research Institute's Centers for Disease Control and Prevention Research and Public Health Collaboration Health Demographic and Surveillance Area (KEMRI CDC's HDSA). So far two rounds of this survey have been conducted. The first was conducted between March 2011 and September 2012 and, the second between November 2012 and February 2014. KEMRI/CDC's HDSA covers a 700 sq km area, located in Siaya County, Western Kenya. The HDSA encompasses a population of approximately current 227,000 people living in 70,505 households; 61,707 are domiciled in Asembo, 78,874 live in Gem and 77,795 in Karemo. Approximately 50% of HDSS population is < 13 years of age. The population is culturally homogeneous; over 95% are members of the Luo tribe and live through subsistence farming and fishing. This survey was restricted to Gem only, an optimal community for assessing the effect of new interventions, since there had been minimal studies and intervention activities rolled out in this area. Detailed description of the study design and methodology is described by Burmen et al [9] and Odhiambo et al [10].

Study population

The study population consisted of all respondents in the second round of the survey, aged 13 years and older, residents (who had lived in the HDSA for at least 4 months) and non-residents (who did not meet the above criteria) of Gem, living in the randomly sampled compounds (multi-household residential units) who were willing to participate in the study

and had spent the night preceding the interview date in a sampled compound. The lower age limit of 13 years used was chosen as it represents the lower limit for eligibility of VMMC in Kenya, and reflects the age of onset of sexual maturity and, often, sexual debut [11,12]. We limited our analysis to the second round of the survey to reflect the most recent views at the time of results' dissemination. Kenya Medical Research Institute (KEMRI)/ US Centers for Disease Control and Prevention (CDC) Health and Demographic Surveillance System Area (KEMRI/CDC HDSS) provided a sampling frame from which a random sample of 4,000 compounds were selected through a community-based simple random approach.

Data collection

Structured questionnaires were administered in strict confidence by trained interviewers of the same gender, conversant with the local vernacular (*Dholuo*) and using netbooks. Data on sexual activity, sexual risk behavior and HIV prevention, care and treatment interventions were collected.

As regards satisfaction with MC, similar questions were posed to male respondents who had undergone MC in the two years preceding the interview and female respondents whose primary partners had undergone MC in the two years preceding the interview. As regards male circumcision, the followings questions were posed to both male and female participants; when they (male) or their primary partner (females) were circumcised, questions regarding HIV risk perception, beliefs about male circumcision, sexual frequency, experience and satisfaction before and after circumcision for themselves (male respondents) and their partners (female respondents), condom use before and after male circumcision, satisfaction with penile appearance and the way the procedure was conducted.

Sexual satisfaction was measured on a 5-point Likert scale (very satisfied, satisfied, neither satisfied nor dissatisfied, dissatisfied, and very dissatisfied). Proportions of respondents expressing different views, i.e. satisfied and dissatisfied, were determined by combining 'very satisfied' and 'satisfied' and combining 'dissatisfied' and 'very dissatisfied'; respondents that were 'neither satisfied nor dissatisfied' or 'did not answer the question' were excluded. The questions were adapted from the Kenya AIDS Indicator Survey which have been validated [13].

Measurement of covariates and outcomes

A male respondent was characterized as 're-cently circumcised' if he had undergone MC within 2 years preceding interview, 'previously circumcised' if he had undergone MC prior to this and as 'uncircumcised' if he had not undergone male circumcision. A person was considered sexually active if he or she reported having sex within the 12 months' period prior to the interview. These two criteria were chosen to limit recall bias for respondents (or their partners) that had undergone MC more than 2 years prior to the study period.

To assess the views about sexual satisfaction following MC, we limited our population to recently circumcised men who were in ongoing relationships, who had resumed sexual intercourse following MC after having felt that they had sufficiently healed from MC. To assess the perceived ease of condom use and condom use frequency following MC, we limited our population to men who had used condoms consistently with at least one sexual partner in the past three months. Similar criteria were applied to female partners of recently circumcised men.

Data analysis

Logistic regression was used to compare 're-cently circumcised' to uncircumcised men and, 'previously circumcised' men to uncircumcised men. All variables with p-value ≤ 0.2 in the univariate model were included in the multivariate mode. A p-value of < 0.05 was considered significant. Chi-square statistics and Fishers exact test were used to compare proportions of respondents expressing different views [14].

Ethical Considerations

Individual written informed consent for participation in this HIV bio-behavioral survey was obtained from all respondents prior to participation. Ethical approval was obtained from the Kenya Medical Research Institute (KEMRI) Ethical Review Committee KEMRI SSC 1801.

RESULTS

Participant selection

A total of 14,116 persons were interviewed of whom 5,626 (40%) were male. Among male participants, 3,285 (58%) met the criteria for inclusion in this analysis of whom 1,001 (30%) were circumcised. Among circumcised men, 247 (25%) had been circumcised within two years preceding the interview (Figure 1). Among female participants, 4,171 (49%) met the criteria for inclusion in this analysis of whom 976 (24%) had primary partners who were circumcised. Among women with primary partners who were circumcised, 151 (15%) had primary partners who had been circumcised within two years preceding the interview (Figure 1).

Characteristics of male participants

The majority of male participants were aged 25-44 years (42%), were married (71%), had primary or lower level of education (71%), were engaged in some form of employment (86%), had four or more lifetime sexual partners (57%) and had one sexual partner in the past 12 months (80%) and had lived in the study area for either more than 10 years or from birth (88%) (Table 1). Compared to uncircumcised men, recently circumcised men were more likely to be aged 13-24 years and 25-44 years in comparison with those aged 45 years and older (OR 16.6, 95% confidence internal [CI] 6.2 to 44.4 and OR 7.2, 95% CI 2.9 to 18.3, $P < 0.01$ respectively). They were also more likely not to be married compared to those who were married (OR 2.0, 95% CI 1.3 to 3.3; $P < 0.01$), and to be unemployed compared to those who were employed (OR

1.8, 95% CI 1.2 to 2.7, $P < 0.01$) and to have lived in the study area for less than 10 years compared to those who had lived in the study area for either more than 10 years or from birth (OR 2.0, 95% CI 1.3 to 3.1, $P < 0.01$) (Table 2).
Compared to uncircumcised men, previously circumcised men were more likely to be aged 13-24 years and 25-44 years compared to those aged 45 years and older (OR 1.7, 95% CI 1.2 to 2.4 and OR 1.3, 95% CI 0.9 to 1.7, $P = 0.02$ respectively) and to have attained above primary education compared to those with below primary level education (OR 1.6, 95% CI 1.3 to 2.0; $P < 0.01$) and to have lived in the study area for less than 10 years compared to those who had lived in the study area for either more than 10 years or from birth (OR 2.4, 95% CI 1.7 to 3.2, $P < 0.01$) (Table 2).

Characteristics of female participants

Majority of female participants were aged 25-44 years (54%), were married (86%), had primary or lower level of education (83%), were engaged in some form of employment (81%), had two lifetime sexual partners (34%) and had one sexual partner in the past 12 months (98%) and had lived in the study area either from birth or for at least 10 years (59%) (Table 3).
Compared to female partners of uncircumcised men, female partners of recently circumcised men were more likely to be aged 13-24 years and 25-44 years compared to those aged 45 years and older (OR 6.6, 95% CI 3.1 to 14.3 and OR 3.1, 95% CI 1.4 to 6.4, $P < 0.01$, respectively). They were also more likely not to be married compared to those who were married (OR 3.3, 95% CI 2.2 to 4.9, $P < 0.01$), and to have attained 'above primary' education compared to those with 'below primary' level education (OR 1.7, 95% CI 1.1 to 2.4, $P = 0.02$) (Table 4). Compared to female partners of uncircumcised men, female partners of recently circumcised men were more likely to be aged 13-24 years and 25-44 years compared to those aged 45 years and older (OR 1.8, 95% CI 1.3 to 2.3 and OR 1.4, 95% CI 1.1 to 1.8, $P < 0.01$ respectively).

They were also more likely not to be married compared to those who were married (OR 2.3, 95% CI 1.8 to 2.9, $P < 0.01$), to have attained 'above primary' education compared to those with 'below primary' level education (OR 1.4, 95% CI 1.1 to 1.8, $P < 0.01$), and to be unemployed compared to those who were employed (OR 1.4, 95% CI 1.1 to 1.8, $P < 0.01$) and to have lived in the study area for less than 10 years compared to those who had lived in the study area for either more than 10 years or from birth (OR 1.4, 95% CI 1.1 to 1.7, $P < 0.01$) (Table 4).

HIV risk perception

All respondents were asked about their own perception of HIV risk using several HIV risk scenarios in which VMMC was now available in their communities (Table 5).

HIV risk perception among men by circumcision status

Over 90% of all men interviewed believed that circumcised men are less likely to get HIV compared to uncircumcised men with a significantly higher proportion of all circumcised men believing that MC reduces the risk of HIV acquisition (95% vs. 91%, $P < 0.01$), respectively. All circumcised men were more likely to perceive themselves at reduced risk of HIV acquisition, because of MC availability in their community than uncircumcised men (36 % vs. 30%, $P < 0.01$). Only 2% and 1% of all men (regardless of circumcision status) felt that reducing the number of sex partners is unnecessary and condom use with a partner with unknown HIV status is less necessary because of MC availability in their community (Table 5).

HIV risk perception among women by circumcision status of their primary partners

Over 95% of all women interviewed believed that circumcised men are less likely to get HIV compared to uncircumcised men with similar proportions of female partners of all circumcised men and female partners of uncircumcised men believing that MC reduces the risk of HIV acquisition (96% vs. 95%, $P = 0.2$) respectively. Approximately one third of all women (regardless of the circumcision status of their primary partners) perceived themselves at reduced risk of HIV acquisition because of MC availability in their community. Only 1% and 1% of all women (irrespective of the circumcision status of their primary partners) felt that reducing the number of sex partners is unnecessary and condom use with a partner with unknown HIV status is less necessary because of MC availability in their community (Table 5).

Satisfaction following male circumcision among recently circumcised men and female partners of recently circumcised men with on-going relationships

A total of 211 (85%) recently circumcised men and 142 (94%) female partners of recently circumcised men were in on-going relationships. An equal proportion of males and females were pleased with their recent circumcision (100%) or with their partners' recent circumcision (99%) and with the penile appearance after male circumcision (99% of males vs. 97% of females) (Table 6). Data not shown in tables indicates that among women who had partners who were recently circumcised ($n = 151$), 149 answered questions on whether they would be telling their male or female friends the benefits of MC and recommending MC for their partners or husbands, 132 (88%) said they would.

Sexual pleasure following male circumcision among recently circumcised men and female partners of recently circumcised men with on-going relationships who had healed and had resumed sex post MC

Among recently circumcised men who felt they had healed from circumcision and had resumed sex post male circumcision ($n = 192$) and among female partners of recently circumcised men who reported their partners had healed from circumcision and they had resumed sex post male circumcision ($n = 111$), similar proportions of men and women

found sex as enjoyable or more enjoyable for themselves after circumcision (89% vs. 85% respectively), found sex as enjoyable or more enjoyable for their partners after circumcision (89% vs. 86%), were satisfied with their own (males) or their partners' (females) sexual performance (99% vs. 98%) and reported similar or increased frequency of sexual activity post MC (82% vs. 90%) (Table 6).

Condom use following male circumcision among recently circumcised men and female partners of recently circumcised men with on-going relationships

Among recently circumcised men who felt they had healed from circumcision and had resumed sex post male circumcision and used condoms consistently before MC with at least one sexual partner (*n* = 85) and among female partners of recently circumcised men who reported their partners had healed from

circumcision and they had resumed sex post male circumcision and reported that they had used condoms consistently before MC with at least one sexual partner (*n* = 16), similar proportions of men and women reported increased or similar condom use frequency post-MC (99% vs. 93%) and found it physically easier or just as easy to use condoms after male circumcision compared to before male circumcision (84% vs. 100%) (Table 6).

DISCUSSION

This is among the first studies describing sexual satisfaction and sexual behavior among sexually active men and female partners of sexually active men from a traditionally non-circumcising community who underwent voluntary male medical circumcision during a programmatic scale up. The study was conducted in a Health Demographic and Surveillance Area (HDSA) which provides
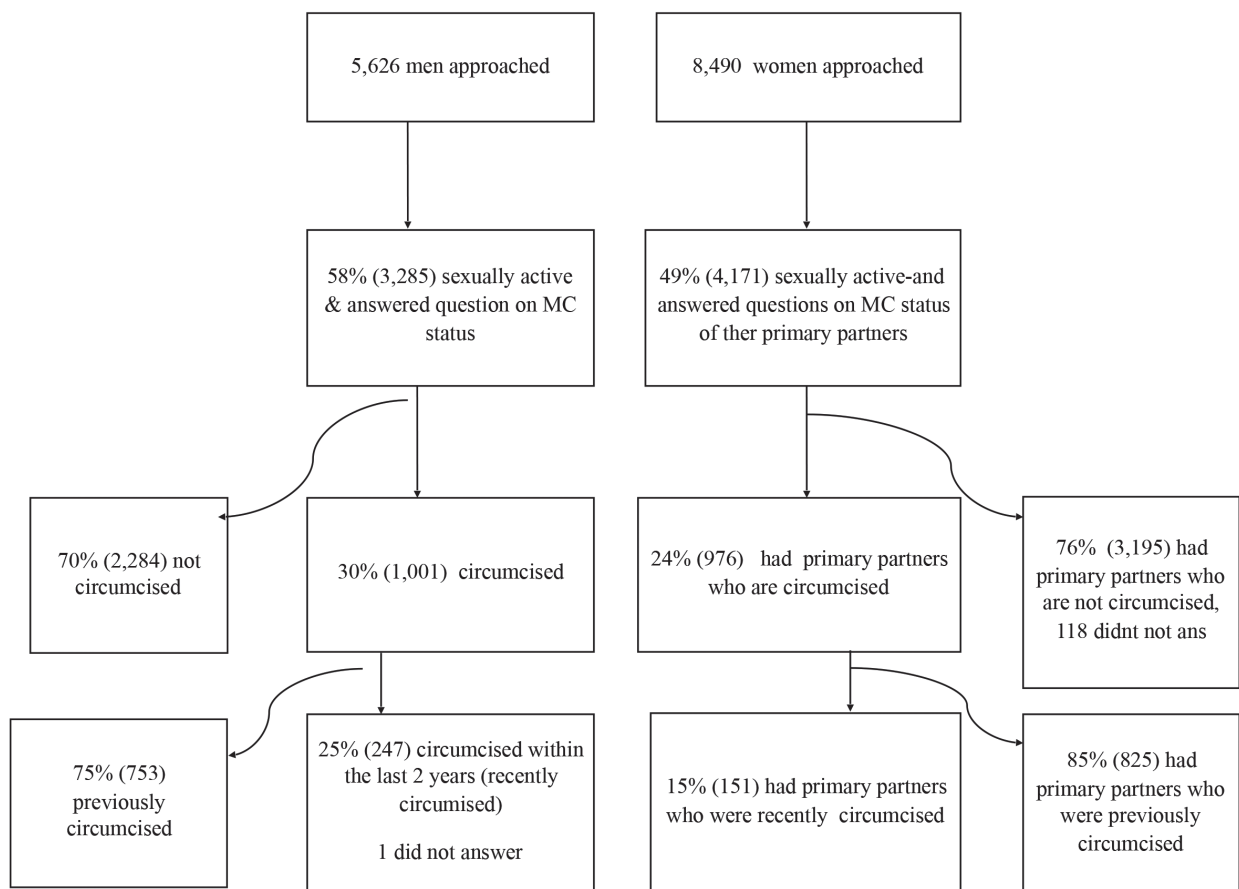

Figure 1. Male and Female Participant Selection by circumcision status (men) or circumcision status of their primary partners (women) in Gem, Siaya County, Western Kenya, 2012-2014.

Table 1. Demographic and Sexual Characteristic Male Respondents in Gem, Siaya County, Western Kenya, 2012-2014 (*n* = 3,284).

	Total N = 3,284	Recently MC men N = 247 (7%)	Previously circumcised men N = 753 (23%)	Uncircumcised men N = 2,284 (70%)
Demographic characteristics				
Age group	3,284	247	753	2,284
13-24	799 (24)	157 (20)	230 (29)	412 (51)
25-44	1,376 (42)	81 (6)	333 (24)	962 (70)
45+	1,109 (34)	9 (1)	190 (17)	910 (82)
Marital status	3,270	246	749	2,275
Not married	952 (29)	166 (18)	269 (28)	517 (54)
Married	2,318 (71)	80 (3)	480 (21)	1,758 (76)
Level of education	3,284	247	753	2,284
Primary and below	2,339 (71)	157 (7)	469 (20)	1,713 (73)
Above primary	945 (29)	90 (10)	284 (30)	571 (60)
Occupation	3,231	243	732	2,256
Employed	2,782 (86)	147 (5)	598 (22)	2,037 (73)
Unemployed	449 (14)	96 (21)	134 (30)	219 (49)
Sexual characteristics				
Lifetime no. of sexual partners	2,308	217	555	1,536
1	244 (11)	31 (13)	54 (22)	159 (65)
2	364 (16)	50 (14)	94 (26)	220 (60)
3	394 (17)	44 (11)	94 (24)	256 (65)
4+	1,306 (57)	92 (7)	313 (24)	901 (69)
No. of sexual partners in past 12 months	3,272	246	751	2275
1	2,628 (80)	189 (7)	572 (22)	1,867 (71)
2+	644 (20)	57 (9)	179 (28)	408 (63)
Lenght of stay in study area				
< 10 years	391 (12)	51 (13)	146 (37)	194 (50)
10+ years including from birth	2,893 (88)	196 (7)	607 (21)	2,090 (72)

Table 2. Factors associated with circumcision status by timing of circumcision among Male Respondents in Gem, Siaya County, Western Kenya, 2012-2014 (All male participants: n = 3,284).

	Recently circumcised men/uncircumcised men 247/2,531 (10%)*			Previously circumcised men/uncircumcised men 753/3,037 (25%)**		
	n/N(%)	OR (95% CI)	P value	n/N(%)	OR (95% CI)	P value
Demographic characteristics						
Age group						
13-24	157/569 (28)	15.9 (5.9-42.8)	<0.01	230/642 (36)	1.5 (1.1-2.3)	0.05
25-44	81/1,043 (7)	7.1 (2.8-17.9)		333/1,295 (26)	1.3 (0.9-1.6)	
45+	9/919 (1)	Ref		190/1,100 (17)	Ref	
Marital status						
Not married	166/683 (24)	1.9 (1.2-3.1)	<0.01	269/786 (34)	1.1 (0.8-1.6)	0.4
Married	80/1,838 (4)	Ref		480/2,238 (22)	Ref	
Level of education						
Primary and below	157/1,870 (8)	Ref	0.1	469/2,182 (22)	Ref	<0.01
Above primary	90/661 (14)	1.3 (0.9-1.9)		284/855 (33)	1.6 (1.3-2.0)	
Occupation						
Employed	147/2,184 (7)	Ref	<0.01	598/2,635 (23)	Ref	0.07
Unemployed	96/315 (31)	1.8 (1.2-2.7)		134/353 (38)	1.4 (0.9-1.9)	
Sexual characteristics						
Lifetime no. of sexual partners						
1	31/190 (16)	Ref	0.9	54/213 (25)	Ref	0.4
2	50/270 (19)	1.8 (1.0-3.3)		94/314 (30)	1.4 (0.9-2.2)	
3	44/300 (15)	1.6 (0.9-2.9)		94/350 (27)	1.3 (0.9-2.1)	
4+	92/993 (9)	1.4 (0.8-2.5)		313/1,214 (36)	1.4 (0.9-2.0)	
No. of sexual partners in past 12 months						
1	189/2,056 (9)	Ref	0.2	572/2,439 (24)	Ref	0.3
2+	57/465 (12)	1.0 (0.7-1.6)		179/587 (31)	1.1 (0.9-1.5)	
Lenght of stay in study area						
< 10 years	51/245 (21)	2.0 (1.3-3.1)	<0.01	146/340 (43)	2.4 (1.7-3.2)	<0.01
10+ years including from birth	196/2,286 (9)	Ref		607/2,697 (23)	Ref	

* Total includes recently circumcised men and uncircumcised men (247+2284) and excludes previously circumcised men
**Total includes previously circumcised men and uncircumcised men (753+2284) and excludes recently circumcised men

Table 3. Demographic and Sexual Characteristics of Female Respondents in Gem, Siaya County, Western Kenya, 2012-2014 (*n* = 4,171).

	Total *N*	Women with recently circumcised partners N = 151 (4%)	Women with previously circumcised partners N = 825 (20%)	Women with uncircumcised partners N = 3,195 (76%)
Demographic characteristics				
Age group	N = 4,171	N = 151	N = 825	N = 3,195
13-24	1,018 (24)	78 (52)	275 (33)	665 (21)
25-44	2,234 (54)	64 (42)	429 (52)	1,741 (54)
45+	919 (22)	9 (6)	121 (15)	789 (25)
Marital status	N = 4,166	N = 151	N = 823	N = 3,192
Not married	602 (14)	51 (9)	212 (35)	339 (56)
Married	3,564 (86)	100 (3)	611 (17)	2,853 (80)
Level of education	N = 4,171	N = 151	N = 825	N = 3,195
Below Primary	3,463 (83)	107 (3)	619 (18)	2,737 (79)
Above primary	708 (17)	44 (6)	206 (29)	458 (65)
Occupation	N = 4,154	N = 151	N = 818	N = 3,185
Employed	3,356 (81)	95 (3)	583 (17)	2,678 (80)
Unemployed	798 (19)	56 (7)	235 (29)	507 (64)
Sexual characteristics				
Lifetime no. of sexual partners	N = 3,775	N = 146	N = 765	N = 2,864
1	725 (19)	34 (5)	165 (22)	526 (73)
2	1,283 (34)	51 (4)	241 (19)	991 (77)
3	993 (26)	39 (4)	191 (19)	763 (77)
4+	774 (21)	22 (3)	168 (22)	584 (75)
No. of sexual partners in past 12 months	N = 4,167	N = 151	N = 823	N = 3,193
1	4,076 (98)	147 (4)	786 (19)	3,143 (77)
2+	91 (2)	4 (4)	37 (41)	50 (55)
Lenght of stay in study area	N = 4,170	N = 151	N = 824	N = 3,195
< 10 years	1,712 (41)	77 (5)	396 (23)	1,239 (72)
10+ years including from birth	2,458 (59)	74 (3)	428 (17)	1,956 (80)

Table 4. Factors associated with circumcision status of primary partners of female respondents by timing of circumcision status, Siaya County, Western Kenya, 2012-2014 (All women: *n* = 4,171).

	Women with recently circumcised partners / Women with uncircumcised partners 151/3,346 (5%) *			Women with recently circumcised partners / Women with uncircumcised partners 151/3,346 (5%) *		
	n/N(%)	OR (95% CI)	P value	n/N(%)	OR (95% CI)	P value
Demographic characteristics						
Age group						
13-24	78/743 (11)	5.8 (2.6-13.2)	<0.01	275/940 (29)	1.4 (1.0-1.9)	0.1
25-44	64/1,805 (4)	2.8 (1.3-6.1)		429/2,170 (20)	1.2 (0.9-1.6)	
45+	9/798 (1)	Ref		121/910 (13)	Ref	
Marital status						
Not married	51/390 (13)	3.5 (2.3-5.5)	<0.01	212/551 (38)	2.6 (2.0-3.3)	<0.01
Married	100/2,953 (3)	Ref		611/3,464 (18)	Ref	
Level of education						
Below Primary	107/2,844 (4)	Ref	0.02	619/3,356 (18)	Ref	<0.01
Above primary	44/502 (9)	1.6 (1.1-2.4)		206/664 (31)	1.6 (1.3-1.9)	
Occupation						
Employed	95/2,773 (3)	Ref	0.2	583/3,261 (18)	Ref	<0.01
Unemployed	56/563 (10)	1.3 (0.9-1.9)		235/742 (32)	1.4 (1.1-1.8)	
Sexual characteristics						
Lifetime no. of sexual partners						
1	34/560 (6)	Ref	0.8	165/691 (24)	Ref	0.6
2	51/1,042 (5)	1.2 (0.7-1.9)		241/1,232 (20)	0.9 (0.7-1.2)	
3	39/802 (5)	1.3 (0.7-2.1)		191/954 (20)	0.9 (0.7-1.2)	
4+	22/606 (4)	1.0 (0.6-1.9)		168/752 (22)	1.0 (0.9-1.4)	
No. of sexual partners in past 12 months						
1	147/3,290 (5)	Ref		786/3,929 (20)	Ref	0.07
2+	4/54 (7)	0.6 (0.2-2.1)	0.4	37/87 (43)	1.6 (0.9-2.61)	
Length of stay in study area						
< 10 years	77/1,316 (6)	1.2 (0.8-1.8)	0.4	396/1,635 (24)	1.4 (1.1-1.7)	<0.01
10+ years including from birth	74/2,030 (4)	Ref		428/2,384 (18)	Ref	

* Total includes women with recently circumcised partners and uncircumcised partners (151+3195) and excludes women with partners who were previously circumcised.
**Total includes women with previously circumcised partners and uncircumcised partners (825+3195) and excludes women with recently circumcised partners.

Table 5. Perceptions about HIV Risk among Circumcised and Uncircumcised Males (n = 3,284) and Female Partners of Circumcised and Uncircumcised Males (*n* = 4,171).

Attribute asked	All circumcised men (*N* = 1,000)	All uncircumcised men (*N* = 2,284)	P value	Female partners of all circumcised men (*N* = 976)	Female partners of uncircumcised men (*N* = 3,195)	P value
To believe that circumcised men are less likely to get HIV now that MC is available in the community	917/966 (95)	1,898/2,095 (91)	<0.01	897/934 (96)	2,787/2,931 (95)	0.2
To believe that personally they are at a lower risk of HIV now that MC is available in the community	355/982 (36)	645/2,166 (30)	<0.01	277/951 (29)	916/3,007 (31)	0.4
To believe that reducing number of sex partners is not necessary now that MC is available in the community	18/994 (2)	34/2,222 (2)	0.6	12/966 (1)	33/3,113 (1)	0.6
To believe that condom use with a partenr of unknown HIV status is not necessary now that MC is available in the community	8/997 (1)	25/2,205 (1)	0.4	9/967 (1)	41/3,111 (1)	0.3

Table 6. Sexual satisfaction and pleasure among sexually active recently circumcised men and women with recently circumcised sexual partners with on-going sexual relationships (males *n* = 209/247, 85%; females *n* = 139/151, 92%).

Perceptions	Males (N = 209)	Females (N = 139)	P value-
Overall satisfaction post-MC			
Pleased with their (males) or their partners (females) MC	209/209 (100)	138/139 (99)	0.2
Satisfied with the appearance of the penis post-MC	205/207 (99)	114/118 (97)	0.1
Sexual experience post MC¶			
Found sex as enjoyable or more enjoyable for themselves after MC	134/151 (89)	52/61 (85)	0.5
Found sex as enjoyable or more enjoyable for their partners after MC	113/127 (89)	49/57 (86)	0.6
Very satisfied or somewhat satisfied with their own (males) or their partners' (females) sexual performance	186/187 (99)	102/104 (98)	0.3
Had similar or increased frequency of sexual activity post MC	152/186 (82)	91/101 (90)	0.06
Condom use¥			
Condom use increased or remained the same post MC	80/81 (99)	13/14 (93)	0.2
Found it physically easier or just as easy to use condoms post MC	65/77 (84)	11/11 (100)	0.2

¶ Responses were limited to those who felt they had healed from MC or that their partners had healed from MC.
¥ Responses were limited to persons who used condoms consistently with one or all sexual partners.
Proportions indicated excluded those who refused to answer the questions or answered don't know to the questions or had no opinion.

unbiased comprehensive population-based data on a variety of health indicators and is thus a valuable platform for assessing population-level impact of health problems and interventions [10]. Circumcision rates reported in this community were also likely to be reliable since self-reported circumcision status community has a sensitivity of 96% and a specificity of 99% [7].

Five years after the VMMC scale up begun, only 30% of sexually active men were circumcised; majority of whom were circumcised before the VMMC programmatic roll out [15]. However, 70% of the sexually active men still remain uncircumcised. This means we are not reaching our target population who are 'high-risk sexually active men' (i.e., men who are older and are in a relationship or married) [16]. The VMMC program scale up was targeted for this community since traditionally, they do not circumcise [15]. As majority of the men who are undergoing MC are unemployed, older men who are employed and are breadwinners may be unable to take time off work to recover from MC. The provision of cash incentives for older men who are likely to be employed and therefore bread winners to cushion them during the recommended 6-week period taken off from work to heal from MC has been shown to promote MC uptake in Kenya [17]. There is a direct relationship between HIV risk perception and willingness to undergo MC. It is possible that older men in our evaluation may have perceived their risk of HIV to be lower and therefore may not have wanted to undergo MC. Similarly, those who were married may have also perceived themselves to be at a lower risk of HIV since they were in stable partnerships [18].

In this evaluation, majority of the respondents, both male and female did not perceive themselves at a lower risk of HIV due to the availability of MC in the community. Although assessments from cross-sectional surveys may not reflect a true change in behavior in the long term [14], in a longitudinal assessment of risk perception that compared circumcised males to uncircumcised from the same communi-

ty, the proportion of men reporting condom use increased following MC with a higher increase among circumcised men [19]. This could be attributed to health education that accompanies MC that may promote healthy behavioral choices and safer sexual behavior [20]. The HIV risk perception among men following MC differs from that seen in South Africa where circumcised males were more likely to have more than one sexual partner and engage in high-risk alcohol consumption [21]. The HIV risk perception among women contradicts findings from South Africa where women were more likely to forgo condom use with partners who were either HIV positive or of unknown status after having heard that MC reduces the risk of HIV acquisition [22]; similarly, young women who had heard of the protective benefits of MC were less likely to perceive themselves at risk of HIV [23]. This also contradicts findings from Tanzania where the health benefits of MC were overstated and respondents felt that women were directly protected against HIV and all risks of STI acquisition were decimated [24]. This acceptance of MC and knowledge on MC in Kenya could be attributed the government's early and continuous engagement since 2007 with community leaders/elders, politicians, youth, and women's groups [25].

The study illustrated that women were more likely to inform their male and female friends about MC. Women's preference for circumcised men can be used as an avenue to promote MC. This is important since women have an important role to play in men's health [26]. In the literature, motivator of undergoing MC included peer/partner influence [27]. Women's preference for circumcised males has been shown in published literature [28]. The Kenya's VMMC program has encouraged the involvement of women through encouraging couples testing, gender focused VMMC strategies and encouraging men to involve their female partners in the decision to undergone VMCC in its VMMC communication strategy [11].

Similar to a study conducted earlier in urban Kisumu, the majority of men who had un-

dergone MC did not report any sexual dysfunction, decrease in sexual satisfaction or sexual frequency [8]. This could be attributed to the perceived protection from HIV and Sexual Transmitted Infections [28]. This finding provides evidence to counter a possible barrier to MC, and the perception that MC might result in decreased sexual performance, satisfaction and/or frequency among target populations.

Our evaluation revealed that condom use did not decrease after VMMC implies that male circumcision will not promote risk compensatory behavior [19, 29]. This could be due to the fact that condom use and reduction in high-HIV risk behavior is offered as part of the VMMC package [11]. This could also be attributed to the ease in condom application after MC when compared to before MC. Prior to MC, men who participated in a VMMC study stated that condom application took too long and was less likely to slip or burst and they were therefore discouraged from using condoms [30]. As male circumcision does not confer 100% protection against HIV, it is imperative that circumcised men still employ other HIV prevention measures. In the literature, the highest reduction in HIV incidence at community level was afforded by combining both male circumcision and condom use [31].

Our findings were limited by the possibility of social desirability bias, because interviews were conducted in the middle of the VMMC scale-up when many men knew that VMMC was being promoted [24]. Our findings were also limited by recall bias, an inability to link responses from respondents to that of their primary partners and to probe further during interviews due to the structured nature of the questionnaire [14].

CONCLUSION

In conclusion, VMMC campaigns in traditionally non-circumcising rural are successfully reaching young men possibly before the onset of sexual debut; however, many older sexually active married men who are at risk of acquiring or transmitting HIV remain uncircumcised. VMMC had no effect on sexual performance among men who were sexually active before and after undergoing MC. It is laudable that there is no risk compensation following MC which would abate the gains intended by VMMC campaigns. Furthermore, VMMC in this community promoted condom use which would augment the combined HIV preventive effect of both VMMC and condom use.

We therefore recommend enhanced campaigns and incentives to promote VMMC among older married men. VMMC communication strategies should also include messages about the actual effect of VMMC on sexual performance from VMMC champions from the same community who underwent MC. Health messages to promote MC should incorporate information regarding preserved/enhanced sexual satisfaction and include women so as they can promote MC for their partners, sons and other men. As risk compensation is unlikely in this community, the potential benefits of MC should not be held back by concerns about possible risk compensation. Messaging should continue to promote the need for condom use even after VMMC which only accords partial protection from HIV acquisition.

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