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# Understanding partial protection and HIV risk and behavior following voluntary medical male circumcision rollout in Kenya

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## Abstract

**In the midst of scaling up voluntary medical male circumcision (VMMC) in Kenya, there is concern that men do not adequately understand that circumcision provides only partial protection against HIV. The study goal was to determine men's understanding of partial protection, perceptions of HIV risk before and after VMMC and use of protective measures following VMMC. In-depth interviews with 44 men aged 18–39 years recently circumcised or planning to undergo VMMC were conducted in two urban and rural districts in Nyanza Province, Kenya. Participants described partial protection as the need to continue using other HIV protective measures such as condoms, with numbers such as a '60 percent protection' or 'not 100 percent protection', and described how circumcision reduces HIV transmission such as reduced penile bruising or bleeding. Most said their HIV risk before VMMC was high and that VMMC would reduce their risk moderately. Participants demonstrated good understanding of partial protection and there was little suggestion of risk compensation following VMMC.**

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## Introduction

Results from three large randomized controlled trials in Kenya, Uganda and South Africa documented that medical circumcision substantially

reduced men's risk of acquiring HIV infection through vaginal intercourse by approximately 50–60% [1–3]. Men in the Kenya and Uganda trials who underwent extended follow-up exhibited sustained reductions in HIV incidence of 64% at 5.5 years in Kenya and 73% at 5 years in Uganda [4–6]. Following endorsement by the World Health Organization and the Joint United Nations Programme on HIV/AIDS [7], the government of Kenya adopted voluntary medical male circumcision (VMMC) as a key strategy for HIV prevention. Nyanza Province in western Kenya has been prioritized for VMMC rollout because of its high prevalence of heterosexually transmitted HIV infection (14.9%) and low prevalence of male circumcision (48%) [8, 9]. Although most ethnic groups in Kenya traditionally circumcise men and 85% of Kenya men are estimated to be circumcised [8], the Luo, the predominant ethnic group in Nyanza Province, do not traditionally circumcise. To date, the Kenya VMMC program has circumcised more than 600 000 men (A. Ochieng', personal communication), mostly in Nyanza Province.

VMMC reduces a man's risk of HIV through vaginal intercourse substantially but not completely. Counseling and strategic communications are key elements of Kenya's VMMC program and advise that VMMC provides only partial protection against HIV and therefore continued use of HIV protective measures is necessary [10]. The Communication Strategy for Voluntary Medical Male Circumcision in Kenya, for example, states that VMMC

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communications should emphasize (p. 18), “. . . that male circumcision reduces the risk of men acquiring HIV infection by 60 percent and that this protective effect is only partial as well as the fact that the procedure is additional but not a substitute for other proven HIV prevention methods.” [10] It is not clear, however, whether men currently undergoing medical circumcision understand the meaning of partial protection and intend to practice other HIV protective behaviors after VMMC.

Theories of health behavior such as the Health Belief Model, AIDS Risk Reduction Model and Extended Parallel Processing Model [11–13] posit that adoption or change in behavior starts with the perception that one is at risk of a harmful health outcome. Applied to VMMC, men are motivated to undergo VMMC, in large part, because they perceive themselves to be at risk of acquiring HIV and they further believe that being circumcised will reduce their HIV risk. Beliefs about the degree of HIV protection afforded by VMMC—termed response efficacy—may moderate changes in HIV risk perception after getting circumcised and thereby influence sexual behavior. For example, if a man understands that VMMC is only partially protective against HIV, he may be inclined to practice other HIV protective behaviors. Alternatively, if he thinks that male circumcision is 100% effective at preventing HIV, he may think that he is no longer at risk of HIV infection after VMMC and engage in risky or compensatory sexual behavior. Although there is no substantive evidence, there is apprehension that medically circumcised men will engage in riskier sexual behaviors because they erroneously believe that circumcision completely reduces their risk of HIV infection—a phenomenon termed risk compensation or behavioral disinhibition [14–16].

The potential for risk compensation among users of biomedical HIV prevention technologies is a major concern [14, 17, 18], particularly as VMMC as an HIV prevention strategy is scaled up across a variety of settings in sub-Saharan Africa [19]. Data from the three seminal medical circumcision trials in Africa have found limited evidence for risk compensation [1–3, 20–23]. However, participants in these research trials received the highest standards of

preventive care in a research trial setting, and these results may not generalize to VMMC scale-up in non-research settings [20, 24, 25]. Investigations of how target audiences understand partial protection and HIV risk, along with strategies for effective communication, are critical for successful implementation of new biomedical prevention technologies such as VMMC [26–29]. Some research has found that men and women in sub-Saharan Africa have high awareness of partial HIV protection from VMMC [30, 31], although the need to use protection following circumcision is not fully understood by everyone [28, 32, 33]. In this study, men recently medically circumcised or planning to undergo medical circumcision in Nyanza Province, Kenya, were targeted for in-depth interviews. The primary goals of this study were to examine men’s understanding of communications about partial HIV protection, use of HIV protective measures following VMMC and perceptions of HIV risk before and after medical circumcision in the context of VMMC rollout in Kenya.

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## Methods

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Study participants were recruited from two districts—Kisumu East and Siaya—in Nyanza Province, Kenya. Kisumu East is largely urban while Siaya is mostly rural. To reach men exposed to VMMC communications, participants were recruited with support from VMMC community mobilizers through district hospitals and dispensaries where VMMC services are available. Participants were purposively screened and recruited so that they were evenly split between Kisumu East and Siaya districts and younger men (18–24 years) and older men (25–39 years). Men who were circumcised within the last 6 months or planning to undergo circumcision within the next 3 months were eligible for participation.

Male data collectors who were fluent in both English and Dholuo conducted the in-depth interviews. Most interviews were conducted in Dholuo, the local language common in Nyanza Province. The in-depth interview guide—including both open- and close-ended questions—encompassed

questions about men's awareness that VMMC provides only partial protection from HIV, perceptions about the amount of HIV protection that VMMC provides and how men would describe partial protection to others and the meaning of partial protection. Circumcised participants were asked about use of HIV protective measures following VMMC and to rate their risk of HIV before and after VMMC; uncircumcised men were asked about their anticipated use of protective measures and risk of HIV after they are circumcised as well as their current estimation of HIV risk. Written informed consent for study participation was obtained from each participant prior to the interview, and the study protocol was approved by and conducted in full compliance with the Kenya Medical Research Institute Ethics Review Committee and the FHI 360 Protection of Human Subjects Committee.

Data collectors audio-recorded in-depth interviews and translated and transcribed them verbatim into English. Through a standard iterative process [34], a codebook was developed and used to structurally and thematically code the transcripts in QSR NVivo version 8 (QSR International, 2008), a qualitative data analysis software program. Two data analysts independently coded transcripts, and intercoder reliability was assessed twice using a percent agreement score [35]. Both times, the score was greater than 85%, and discrepant coding was resolved and the codebook updated following each reliability check and as new themes emerged. Code reports and summaries were generated and analysed to address the study objectives. Data were analysed separately by circumcision status and participant district.

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## Results

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### Demographics

A total of 44 men completed in-depth interviews in April and May 2011. By design, an equal number of participants were recruited from Kisumu East and Siaya districts and within younger and older age categories. In total, 28 circumcised men and 16 uncircumcised men were interviewed. On average, participants were 25 years old, ranging from 18 to

38 years. Approximately one-third ( $n = 17$ ) was married and one-third ( $n = 17$ ) reported employment. Just over half of the participants ( $n = 24$ ) had completed secondary school or higher. Participant demographics are presented in Table I.

### Awareness of partial protection

All participants had heard that VMMC provides partial protection from HIV. Men reported learning about VMMC and partial protection from VMMC counseling, radio broadcasts, circumcised and uncircumcised friends and peers, community education and outreach and at health facilities, including hospitals and HIV testing centers. Participants stated that health care providers and circumcised men had the best information on VMMC, and those were also the people they were most likely to believe and trust.

Participants were asked to specify by how much VMMC reduces a man's chances of getting HIV, through open- and close-ended questioning. In open-ended questions, most men reported a reduction between 50% and 60%. More circumcised men than uncircumcised men stated that VMMC reduced HIV risk by 60%, and circumcised men provided a narrower range of responses (from 40% to 75% reduction) than responses from uncircumcised men (from 15% to 100% percent reduction). Participants also were asked to rate the amount of reduction on a 4-point scale (not at all, a little, a moderate amount, a lot), with a 'moderate' reduction being indicated most frequently by both circumcised and uncircumcised men.

### Describing partial protection

To assess understanding of partial protection, participants were asked how they would explain to a male friend, wife, girlfriend or other sex partner that male circumcision provides partial protection from HIV. Analyses of responses to this question and other questions about the meaning of partial protection revealed five main strategies participants used to describe partial protection.

- (i) Most commonly, participants said partial protection means that circumcised men and their

**Table I.** Participant demographics

	Uncircumcised men ( <i>n</i> = 16)	Circumcised men ( <i>n</i> = 28)	All men ( <i>n</i> = 44)
Average age (range)	24 (19–34)	25 (18–38)	25 (18–38)
Age 18–24	9	13	22
Age 25–39	7	12	19
No response	0	3 <sup>a</sup>	3
Recruitment district			
Kisumu East	8	14	22
Siaya	8	14	22
Marital status			
Single	9	17	26
Married	6	11	17
Widowed	1	0	1
Employed			
Yes	9	8	17
No	7	17	24
No response	0	3	3
Education			
Primary school or less	8	11	19
Secondary school or higher	8	16	24
No response	0	0	1

<sup>a</sup>Three men did not provide their specific age, although one was recruited into the 18–24-year-old age category and two were recruited into the 25–39-year-old category.

sexual partners must continue using other HIV protective measures following VMMC. Condoms were cited most frequently, followed by being faithful to one sexual partner, reducing the number of sexual partners, remaining abstinent and HIV testing.

I can tell her that despite being circumcised, we must continue using a condom because MC [male circumcision] is not 100 percent. It only prevents 60 percent. Therefore for us to protect better, we must use a condom. [...] I can tell her that she must also be faithful to me, because if she has an affair outside marriage, she can still infect me even though I'm circumcised. (Circumcised man, Siaya, age 23)

- (ii) Participants frequently used percentages to describe partial protection, stating that circumcision is 'not 100 percent' protective against HIV, that circumcision reduces HIV risk 'by 60 percent' and that '40 percent [HIV risk] remains' after circumcision.

The fact that it provides 60 percent protection is not enough... if it would have been 100 percent, then it would have been an issue, but still there is 40 percent chance of getting infected with HIV. (Uncircumcised man, Siaya, age 23)

- (iii) Men also commonly mentioned that physical changes to the penis following circumcision were responsible for a decreased risk of HIV infection during sexual activity. These statements referred to the perceived mechanism of action by which VMMC decreases HIV risk. For example, they said that after circumcision the foreskin is no longer hiding germs and there is a reduction in penile bruising and bleeding after circumcision from sexual activity.

I would tell him that thing is true that the people who have been circumcised, now they have a small percentage of protecting [against] this disease during sex. This is because that outer skin was weak, and now it

has been removed. He is left with that inner one which is now stronger. (Uncircumcised man, Siaya, age 20)

- (iv) Some men used general phrases to refer to the partial HIV protection afforded by VMMC, including 'not fully protective', 'reduces the risk of HIV', provides 'some' or 'a little' protection and 'you can still get HIV'.
- (v) Finally, a few participants explained partial protection by comparing HIV risk among circumcised and uncircumcised men.

I would tell her that a person who is circumcised is different from the uncircumcised when it comes to contracting HIV [...] They differ because the person who is circumcised has a lower percent of getting the virus, while an uncircumcised man has a higher percent of getting the HIV virus. (Circumcised man, Kisumu East)

Circumcised men were better able to articulate the meaning of partial protection than uncircumcised men, and men from urban Kisumu East were more conversational about partial protection than men from rural Siaya district. Participants who were less conversational about partial protection did not have outright misconceptions but were less sure of what it means or how to articulate its meaning.

### **Reported use of HIV protective measures after circumcision**

When asked directly about using other HIV protective measures after VMMC, the large majority of participants said they needed to continue using other measures because circumcised men are only partially protected from HIV.

Most of the uncircumcised men reported that if they get circumcised, they will not change their behavior but instead they will continue the HIV preventive measures they use currently.

No I will not change [...] So that I may not get infected... because getting circumcised is not a certificate that you will not get infected. (Uncircumcised man, Siaya, age 23)

Why I will not change? Because I will love to maintain my HIV-negative status. (Uncircumcised man, Kisumu East, age 23)

Several uncircumcised participants specified that they would increase the number of protective measures they take following VMMC. A number of circumcised men noted that 'using condoms is now very easy' following circumcision, and some said they had increased their condom use as a result.

I plan to protect myself [by] having one sexual partner and also using a condom. (Uncircumcised man, Siaya, age 28)

I compare when I used to wear a condom it used to give me problems and could take time, and when it was taking time like that I could be irritated and continue without wearing it [...] I can say there is a big difference on my side because...now I can use a condom for long without it bursting or slipping out. (Circumcised man, Siaya, age 28)

Only a few men said they would decrease their HIV protective behaviors after VMMC. Circumcised men spoke about sex being more pleasurable following male circumcision; as a result, a few circumcised men indicated they have sex more often (with their current partners) or have added another partner. At least one circumcised man said that prior to VMMC, sex and condom use was painful, but following circumcision he has more sex partners but has also increased his condom use because he does not feel pain anymore.

Pleasure. Now sex is more sweet and enjoyable, so I said let me try another one again and even my former lady came back and I had sex with her. (Circumcised man, Kisumu East, age 27)

Since I got circumcised, I don't feel pain while having sex and I feel the urge to add more [partners]... I used to have sex without a condom because I was feeling pain... if I added a condom...but now I am using a condom because I no longer feel pain. (Circumcised man, Kisumu East, recruited into 18–24-year-old age group)

### HIV risk prior to circumcision

Participants were asked to estimate their own HIV risk and changes in risk following VMMC using three indicators: a general measure of change, a numeric scale and reasons for the risk estimate. Most men said their risk before VMMC was ‘high’, and the average risk score was 7.5 (out of 10, with 10 being very high risk). When asked why they chose their risk level, participants most often said it was because they had not been circumcised and therefore were vulnerable to HIV because ‘HIV could hide under the foreskin’ or the foreskin ‘is easily bruised’ and ‘breaks with ease’. Men also stated they were at high risk prior to circumcision because they were not using protection such as condoms, they had more than one sexual partner or they had not yet received counseling on how to protect themselves. In terms of high HIV risk prior to circumcision, participants said:

It’s high though I use condoms, but still it’s high. Why I think so, I can say that I am not yet circumcised and I have not had just one strict sexual partner. (Uncircumcised man, Kisumu East, age 22)

It was 100 percent. Because I had many girlfriends. Wearing a condom was also a problem, it wasn’t easy. Then during sex, I could succumb to injuries. [My HIV risk] was very high, I would place it at a 10. (Circumcised man, Siaya, age 23)

The few participants who said they were at moderate risk mentioned that sometimes they used condoms or that getting HIV ‘could happen by accident’. Only a couple of participants rated their HIV risk as low because they had no sexual partners or one sexual partner with whom they were faithful.

### HIV risk after circumcision

Participants estimated that VMMC would reduce their HIV risk by a moderate amount and gave an average risk score of 2.9 following VMMC—a reduction of 61.3% from the pre-VMMC average risk score of 7.5. Estimates of HIV risk did not vary by circumcision status or participant location.

A number of men used proportions to describe reduced risk:

Just by half as I had mentioned; it has not reduced so much, it has not increased by a lot, it is moderate. Because it does not mean that it provides full protection . . . but it puts you in the middle . . . it can be half the way it was before. (Circumcised man, Siaya, age 31)

Most commonly, men said their HIV risk would be reduced because they were less susceptible to HIV infection as a result of getting circumcised. Participants also attributed reduced risk to gaining knowledge from VMMC counseling on how to protect themselves from HIV and because they would continue to use other HIV protective measures after VMMC.

When I have sex, then I should have protected [sex]. But in case of rupture of the rubber, then having been circumcised, my chance of being infected can be low because of the removal of the foreskin. Now the HIV will not have a route of passage. (Uncircumcised man, Kisumu East, age 23)

I have received information from the VMMC I went for. The information says when you get circumcised it protects by 60 percent; therefore the remaining 40 percent has been left to us so that we can also see how to protect it by using things like condoms. [. . .] we are being told that MC does not mean that it reduces—it only reduces by 60 percent. (Circumcised man, Kisumu East, age 22)

It’s lower. Why I think this way is because one, I don’t have multiple partners. I’m faithful with the ones I have. Then, number two, the cut has made my risk of getting it go down. (Circumcised man, Siaya, age 38)

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## Discussion

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In this sample of men recently and planning to be circumcised under Kenya’s VMMC program, awareness of partial HIV protection was high.

All men reported that they had heard of partial protection, and most described partial protection in several different ways that reflected a sound understanding of the concept. Men estimated their HIV risk based on their circumcision status as well as use and nonuse of other HIV protective measures, and circumcised men often attributed their knowledge of partial protection and HIV risk to counseling they received during VMMC service delivery. Participants' sound understanding of partial protection and HIV risk led to stable or even increased use of HIV protective measures following VMMC rather than riskier sexual behavior among the large majority of participants. The study results highlight the importance of counseling occurring alongside medical circumcision not only to mitigate any risk compensation that might occur [15, 24, 36] but also to capitalize on the significant educational opportunity provided. Overall results indicate that current VMMC communications in Nyanza Province, Kenya, are effectively educating men about HIV risk and prevention.

Study participants evidenced a high degree of numeric literacy, especially circumcised men. Participants frequently spoke of a 60% reduced risk of HIV acquisition following medical circumcision of an individual man, which is the figure provided in VMMC communications materials and during VMMC counseling. The 60% figure is a population-level statistic that indicates the average reduction in HIV risk afforded to a group of medically circumcised men compared with a group of uncircumcised men; however, the risk to an individual man could be higher or lower depending on unique biological and behavioral factors [37]. Nevertheless, participants demonstrated a good understanding that 60% represents a moderate reduction in risk. Moreover, the 60% figure appears to be a powerful motivator for uptake of male circumcision, and the 40% figure describing the 'remaining' risk appears to motivate use of HIV protective measures after circumcision. In other words, 60% is enough to motivate men to get circumcised, and 40% is enough to motivate them to take other HIV protective actions. Although it may not be accurate at the individual level, this understanding of partial

protection appears to be effective for communication purposes.

A number of findings in this study mirror results from previous research. Other studies in sub-Saharan Africa similarly have obtained little evidence of risk compensatory behavior among medically circumcised men [1–3, 20, 22, 30, 38]. In addition, our findings about potential increases in HIV protective behaviors following medical circumcision were demonstrated among men in other investigations [23, 30, 36]. Interviews conducted with men in Swaziland revealed that, contrary to expectations, men reported engaging in fewer sexual risk behaviors following circumcision [36]. Interviews conducted with men in western Kenya documented no changes in behavior or increased HIV protective behaviors, including condom use and partner reduction, following circumcision [30]. Similar to our findings, some participants in these studies reported that condoms are easier to use following male circumcision, and this could be further highlighted in VMMC communications. Finally, suggestions that circumcised men may engage in more frequent sexual activity after medical circumcision because they experience increased sexual pleasure is similar to a few other studies and provides additional background for counseling at the time of VMMC [30, 36]. Given these similarities in findings across studies, a more nuanced, realistic and positive perspective on behavior change following medical circumcision is emerging.

Experts caution that biomedical prevention technologies like male circumcision should be promoted as part of a combination prevention package [39] so that a partially protective technology is not viewed as a stand-alone fully effective HIV prevention strategy but only one tool to be used in combination with other strategies [27]. Our results suggest that many men undergoing medical circumcision understand partial protection and make attributions about their own HIV risk that are based on their use or nonuse of multiple prevention technologies. For example, HIV risk was perceived as high prior to VMMC among participants in our study because they were not circumcised and typically did not use condoms consistently or had multiple sexual partners. Even when

perceived risk was reduced following VMMC, men understood that HIV risk is determined by multiple biomedical and behavioral factors. This understanding that multiple factors determine HIV risk—and that medical male circumcision is only one of many factors—may help to explain why decreases in HIV risk perception were not associated with reported increases in risky behavior that might be expected based on theories of risk compensation [14, 15].

This study had several limitations. The study sample was purposively selected from two areas of Nyanza Province, Kenya. In addition, one of the seminal male circumcision trials was conducted in Nyanza Province [2], and therefore study participants may have higher awareness of VMMC and partial HIV protection, compared with men in other communities. Furthermore, all study participants were recruited through settings where VMMC was offered, so it is likely that uncircumcised male participants were exposed to more information about VMMC than uncircumcised men who had no plans for circumcision. Therefore, the data collected may not be representative of all men in Nyanza Province, and the relevance of findings for VMMC scale-up in other communities is unknown. Furthermore, data were self-reported and thus are subject to bias from socially desirable reporting; this bias may have been most prominent when participants were asked about use of other HIV protective measures following VMMC. Nevertheless, this study provides important insights into men's attitudes about partial protection and HIV risk reduction associated with VMMC. Given that the study sample included circumcised and uncircumcised men who were reached through VMMC rollout in a countrywide program, these results provide an assessment of how partial protection may be communicated and understood in large-scale rollout of medical male circumcision programs.

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### Conflict of interest statement

None declared.

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