

## Quarterly Research Digest on Voluntary Medical Male Circumcision for HIV Prevention

Combination HIV prevention and HIV testing

Costs and costing

Enhancing uptake of VMMC

Epidemiological studies

Impact and coverage

Infant male circumcision

Safety and quality

Social and behavioural research

VMMC – general

Combination HIV prevention and HIV testing

1. Kuteesa, M. O., et al. **Acceptability and predictors of uptake of anti-retroviral pre-exposure prophylaxis (PrEP) among fishing communities in Uganda: a cross-sectional discrete choice experiment survey.** *AIDS Behav* 2019;23(10): 2674-2686.

We used a discrete choice experiment to assess the acceptability and potential uptake of HIV pre-exposure prophylaxis (PrEP) among 713 HIV-negative members of fishing communities in Uganda. Participants were asked to choose between oral pill, injection, implant, condoms, vaginal ring (women), and men circumcision. Product attributes were HIV prevention effectiveness, sexually transmitted infection (STI) prevention, contraception, waiting time, and secrecy of use. Data were analysed using mixed multinomial logit and latent class models. HIV prevention effectiveness was viewed as the most important attribute. Both genders preferred oral PrEP. Women least preferred the vaginal ring and men the implant. Condom use was predicted to decrease by one third among men, and not to change amongst women. Oral PrEP and other new prevention technologies are acceptable among fishing communities and may have substantial demand. Future work should explore utility of multiple product technologies that combine contraception with HIV and other STI prevention.

2. Mark, J., et al. **Male partner linkage to clinic-based services for sexually transmitted infections and human immunodeficiency virus services following couple home-based education and testing.** *Sex Transm Dis* 2019;46(11): 716-721.

**BACKGROUND:** Home-based human immunodeficiency virus (HIV) testing and education has increased HIV test uptake and access to health services among men. We

studied how a home-based antenatal intervention influenced male partner utilization of clinic-based HIV and sexually transmitted infection (STI) services, linkage to HIV care and medical circumcision.

**METHODS:** We conducted a secondary analysis within a randomized controlled trial of pregnant women attending antenatal care in Kenya. Women and their male partners received either a home-based couple intervention or an invitation letter for clinic-based couple HIV testing. The home-based intervention included education on STI symptoms, STI and HIV treatment and male circumcision for HIV prevention. Male self-reported outcomes were compared using relative risks at 6 months postpartum.

**RESULTS:** Among 525 women, we reached 487 (93%) of their male partners; 247 men in the intervention arm and 240 men in the control arm. Men who received the intervention were more likely to report an STI consultation (n = 47 vs. 16; relative risk, 1.59; 95% confidence interval, 1.33-1.89). Among 23 men with newly diagnosed HIV, linkage to HIV care was reported by 4 of 15 in the intervention (3 men had missing linkage data) and 3 of 5 men in the control arms (relative risk, 0.66; 95% confidence interval, 0.34-1.29). Although the intervention identified 3 times more men with new HIV infection, the study lacked power to find significant differences in linkage to HIV care. Few eligible men sought medical circumcision (4 of 72 intervention and 2 of 88 control).

**CONCLUSIONS:** Home-based couple education and testing increased STI consultations among male partners of pregnant women, but appeared insufficient to overcome the barriers involved in linkage to HIV care and medical circumcision.

## Costs and costing

1. Pineda-Antunez, C., et al. **Meta-analysis of average costs of HIV testing and counselling and voluntary medical male circumcision across thirteen countries.** *Afr J AIDS Res* 2019;18(4): 341-49.

Online at:

<https://www.tandfonline.com/doi/pdf/10.2989/16085906.2019.1679850?needAccess=true>

**OBJECTIVE:** Explore facility-level average costs per client of HIV testing and counselling (HTC) and voluntary medical male circumcision (VMMC) services in 13 countries.

**METHODS:** Through a literature search we identified studies that reported facility-level costs of HTC or VMMC programmes. We requested the primary data from authors and standardised the disparate data sources to make them comparable. We then conducted descriptive statistics and a meta-analysis to assess the cost variation among facilities. All costs were converted to 2017 US dollars (\$).

**RESULTS:** We gathered data from 14 studies across 13 countries and 772 facilities (552 HTC, 220 VMMC). The weighted average unit cost per client served was \$15 (95% CI 12, 18) for HTC and \$59 (95% CI 45, 74) for VMMC. On average, 38% of the mean unit cost for HTC corresponded to recurrent costs, 56% to personnel costs, and 6% to capital costs. For VMMC, 41% of the average unit cost corresponded to recurrent costs, 55% to personnel costs, and 4% to capital costs. We observed unit cost variation within and between countries, and lower costs in higher scale categories in all interventions.

### Enhancing uptake of VMMC

1. Galarraga, O., et al. **Conditional economic incentives to improve HIV prevention and treatment in low-income and middle-income countries.** *Lancet HIV* 2019;6(10): e705–e714.

New and innovative approaches are needed to improve the prevention, diagnosis, and treatment of HIV in low-income and middle-income countries. Several trials use conditional economic incentives (CEIs) to improve HIV outcomes. Most CEI interventions use a traditional economic theory approach, although some interventions incorporate behavioural economics, which combines traditional economics with insights from psychology. Incentive interventions that are appropriately implemented can increase HIV testing rates and voluntary male circumcision, and they can improve other HIV prevention and treatment outcomes in certain settings in the short term. More research is needed to uncover theory-based mechanisms that increase the duration of incentive effects and provide strategies for susceptible individuals, which will help to address common constraints and biases that can influence health-related decisions.

2. Engl, E., et al. **Identifying population segments for effective intervention design and targeting using unsupervised machine learning: an end-to-end guide.** *Gates Open Res* 2019;3:1503.

Online at: <https://gatesopenresearch.org/articles/3-1503/v2>

One-size-fits-all interventions that aim to change behavior are a missed opportunity to improve human health and well-being, as they do not target the different reasons that drive people's choices and behaviors. Psycho-behavioral segmentation is an approach to uncover such differences and enable the design of targeted interventions, but is rarely implemented at scale in global development. In part, this may be due to the many choices program designers and data scientists face, and the lack of available guidance through the process. Effective segmentation encompasses conceptualization and selection of the dimensions to segment on, which often requires the design of suitable qualitative and quantitative primary research. The choice of algorithm and its parameters also profoundly shape the resulting output and how useful the results are in the field. Analytical outputs are not self-explanatory and need to be subjectively

evaluated and described. Finally, segments can be prioritized and targeted with matching interventions via appropriate channels. Here, we provide an end-to-end overview of all the stages from planning, designing field-based research, analyzing, and implementing a psycho-behavioral segmentation solution. We illustrate the choices and critical steps along the way, and discuss a case study of segmentation for voluntary medical male circumcision that implemented the method described here. Though our examples mostly draw on health interventions in the developing world, the principles in this approach can be used in any context where understanding human heterogeneity in driving behavior change is valuable.

## Epidemiological studies

1. Kim, H., et al. **Geospatial assessment of the voluntary medical male circumcision programme in Tanzania, 2011-2016.** *BMJ Glob Health* 2019;4(6): e001922. Online at: <https://gh.bmj.com/content/4/6/e001922>

**INTRODUCTION:** Tanzania is one of the 14 priority countries in sub-Saharan Africa scaling up voluntary medical male circumcision (VMMC) for HIV prevention. In this study, we assessed the progress of VMMC by evaluating changes in the spatial structure of male circumcision (MC) prevalence and identifying age groups with low MC uptake.

**METHODS:** We use data from two waves of the Demographic and Health Survey (DHS) conducted in Tanzania in 2011-2012 and 2015-2016. MC incidence rate was estimated using a method developed to calculate incidence rates from two successive cross-sectional surveys. Continuous surface maps of MC prevalence were generated for both DHS waves and compared with identified areas with high MC prevalence changes and high density of uncircumcised males.

**RESULTS:** National MC prevalence in Tanzania increased from 73.5% in 2011-2012 to 80.0% in 2015-2016. The estimated national MC incidence rate was 4.6 circumcisions per 100 person-years (py). The lowest circumcision rate was observed in males aged 20-24 years, with 0.61 circumcisions per 100 py. An estimated 1 567 253 males aged 15-49 years residing in low-MC prevalence areas were uncircumcised in 2015-2016.

**CONCLUSION:** Tanzania has shown substantial progress in the implementation of VMMC. However, extensive spatial variation of MC prevalence still exists in the country, with some areas having an MC prevalence <60%. Here, we identified locations where VMMC needs to be intensified to reach the ~1.5 million uncircumcised males age 15-49 living in these low-MC areas, particularly for men aged 20-34.

2. Olesen, T.B., et al. **Male circumcision and the risk of gonorrhoea, syphilis, HIV and human papillomavirus among men in Tanzania.** *Int J STD AIDS* 2019;30(14): 1408-1416.

To examine the association between male circumcision and the risk of gonorrhoea, syphilis, HIV and high-risk (hr) human papillomavirus (HPV). We used data from a cross-sectional study conducted among 1902 men in Tanzania. Circumcision status was assessed at a clinical examination and history of gonorrhoea and syphilis was obtained from questionnaire data. Penile samples were tested for HPV using Hybrid Capture 2 and genotyped by the INNO-LiPA HPV Genotyping Extra test. Blood samples were tested for HIV. Using logistic regression the association between male circumcision and gonorrhoea, syphilis, HIV and hr HPV was assessed estimating odds ratios (ORs) and 95% confidence intervals (CIs). All analyses were adjusted for age and lifetime number of sexual partners. In the multivariable analysis, the odds of gonorrhoea were lower in circumcised men compared with uncircumcised men (OR = 0.52; 95% CI: 0.37–0.74). Likewise, the odds of HIV were considerably lower in circumcised men (OR = 0.42; 95% CI: 0.26–0.67). Furthermore, lower odds of hr HPV were seen in circumcised men compared with uncircumcised men, although not statistically significant (OR = 0.81; 95% CI: 0.56–1.17). Finally, the odds of HPV16 (OR = 0.48; 95% CI: 0.23–0.98) and multiple ( $\geq 2$ ) hr HPV types (OR = 0.71; 95% CI: 0.44–1.12) were lower in circumcised men than in uncircumcised men. Circumcised men have a significantly lower risk of gonorrhoea, HIV and HPV16, compared with uncircumcised men.

3. Ying, R., et al. **Spatial distribution and characteristics of HIV clusters in Ethiopia.** *Trop Med Int Health* 2019 Dec 6. [Epub ahead of print]  
Online at: <https://onlinelibrary.wiley.com/doi/full/10.1111/tmi.13356>

**OBJECTIVES:** Ethiopia's HIV prevalence has decreased by 75% in the past 20 years with the implementation of antiretroviral therapy, but HIV transmission continues in high-risk clusters. Identifying the spatial and temporal trends, and epidemiologic correlates, of these clusters can lead to targeted interventions.

**METHODS:** We used biomarker and survey data from the 2005, 2011, and 2016 Ethiopia Demographic and Health Surveys (DHS). The spatial-temporal distribution of HIV was estimated using the Kulldorff spatial scan statistic, a likelihood-based method for determining clustering. Significant clusters ( $p < 0.05$ ) were identified and compared based on HIV risk factors to non-cluster areas.

**RESULTS:** In 2005, 2011, and 2016, respectively, 219, 568, and 408 individuals tested positive for HIV. Four HIV clusters were identified, representing 17% of the total population and 43% of all HIV cases. The clusters were centered about Addis Ababa (1), Afar (2), Dire Dawa (3), and Gambella (4). Cluster 1 had higher rates of unsafe injections (4.9% vs. 2.2%,  $p < 0.001$ ) and transactional sex (6.0% vs. 1.6%,  $p < 0.001$ ) than non-cluster regions, but more male circumcision (98.5% vs. 91.3%,  $p < 0.001$ ). Cluster 2 had higher

levels of transactional sex (4.9% vs. 1.6%,  $p < 0.01$ ), but lower levels of unsafe injections (0.8% vs. 2.2%,  $p < 0.01$ ). Cluster 3 had fewer individuals with  $>1$  sexual partner (0% vs. 1.7%,  $p < 0.001$ ) and more male circumcision (100% vs. 91.3%,  $p < 0.001$ ). Cluster 4 had less male circumcision (59.1% vs. 91.3%,  $p < 0.01$ )

**CONCLUSIONS:** In Ethiopia, geographic HIV clusters are driven by different risk factors. Decreasing the HIV burden requires targeted interventions.

4. Kharsany, A.B.M., et al. **Trends in HIV prevention, treatment, and incidence in a hyperendemic area of KwaZulu-Natal, South Africa.** *JAMA Netw Open* 2019;2(11): e1914378.  
Online at: <https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2753789>

**IMPORTANCE:** In Africa, the persistently high HIV incidence rate among young women is the major obstacle to achieving the goal of epidemic control.

**OBJECTIVE:** To determine trends in coverage of HIV prevention and treatment programs and HIV incidence.

**DESIGN, SETTING, AND PARTICIPANTS:** This cohort study consisted of 2 sequential, community-based longitudinal studies performed in the Vulindlela and Greater Edendale area in KwaZulu-Natal, South Africa. Participants enrolled from June 11, 2014, to June 22, 2015 (2014 survey), with a single follow-up visit from June 24, 2016, to April 3, 2017 (2016 cohort), or enrolled from July 8, 2015, to June 7, 2016 (2015 survey), with a single follow-up visit from November 7, 2016, to August 30, 2017 (2017 cohort). Men and women aged 15 to 49 years were enrolled in the 2014 and 2015 surveys, and HIV-seronegative participants aged 15 to 35 years were followed up in the 2016 and 2017 cohorts. Analysis was conducted from January 1 through December 31, 2018.

**EXPOSURES:** HIV prevention and treatment programs in a real-world, nontrial setting.

**MAIN OUTCOMES AND MEASURES:** Trends in sex- and age-specific HIV incidence rates, condom use, voluntary medical male circumcision, knowledge of HIV-seropositive status, uptake of antiretroviral therapy, and viral suppression.

**RESULTS:** A total of 9812 participants (6265 women [63.9%]; median age, 27 years [interquartile range, 20-36 years]) from 11 289 households were enrolled in the 2014 survey, and 10 236 participants (6341 women [61.9%]; median age, 27 years [interquartile range, 20-36 years]) from 12 247 households were enrolled in the 2015 survey. Of these, 3536 of 4539 (annual retention rate of 86.7%) completed follow-up in the 2016 cohort, and 3907 of 5307 (annual retention rate of 81.4%) completed follow-up in the 2017 cohort. From 2014 to 2015, condom use with last sex partner decreased by 10% from 24.0% ( $n = 644$  of 3547) to 21.6% ( $n = 728$  of 3895;  $P = .12$ ) in men and by

17% from 19.6% (n = 1039 of 6265) to 16.2% (n = 871 of 6341; P = .002) in women. Voluntary medical male circumcision increased by 13% from 31.9% (1102 of 3547) to 36.1% (n = 1472 of 3895); P = .007) in men, and the proportion of women reporting that their partner was circumcised increased by 35% from 35.7% (n = 1695 of 4766) to 48.2% (n = 2519 of 5207; P < .001). Knowledge of HIV-seropositive status increased by 21% from 51.8% (n = 504 of 3547) to 62.9% (n = 570 of 3895; P < .001) in men and by 14% from 64.6% (n = 1833 of 6265) to 73.4% (n = 2182 of 6341; P < .001) in women. Use of antiretroviral therapy increased by 32% from 36.7% (n = 341 of 3547) to 48.6% (n = 432 of 3895; P < .001) in men and by 29% from 45.6% (n = 1251 of 6265) to 58.8% (n = 1743 of 6341; P < .001) in women; HIV viral suppression increased by 20% from 41.9% (n = 401 of 3547) to 50.3% (n = 456 of 3895; P = .005) in men and by 13% from 54.8% (n = 1547 of 6265) to 61.9% (n = 1828 of 6341; P < .001) in women. Incidence of HIV declined in women aged 15 to 19 years from 4.63 (95% CI, 3.29-6.52) to 2.74 (95% CI, 1.84-4.09) per 100 person-years (P = .04) but declined marginally or remained unchanged among men and women in other age groups.

**CONCLUSIONS AND RELEVANCE:** This study showed a significant decline in HIV incidence in young women; however, to further reduce HIV incidence, HIV prevention and treatment program coverage must be intensified and scaled up.

5. Garenne, M., et al. **Voluntary medical male circumcision in Zambia: expectations and observations.** *J Biosoc Sci* 2019 Oct 15:1-13. [Epub ahead of print]

The study analysed the HIV/AIDS situation in Zambia six years after the onset of mass campaigns of Voluntary Medical Male Circumcision (VMMC). The analysis was based on data from Demographic and Health Surveys (DHS) conducted in 2001, 2007 and 2013. Results show that HIV prevalence among men aged 15-29 (the target group for VMMC) did not decrease over the period, despite a decline in HIV prevalence among women of the same age group (most of their partners). Correlations between male circumcision and HIV prevalence were positive for a variety of socioeconomic groups (urban residence, province of residence, level of education, ethnicity). In a multivariate analysis, based on the 2013 DHS survey, circumcised men were found to have the same level of infection as uncircumcised men, after controlling for age, sexual behaviour and socioeconomic status. Lastly, circumcised men tended to have somewhat riskier sexual behaviour than uncircumcised men. This study, based on large representative samples of the Zambian population, questions the current strategy of mass circumcision campaigns in southern and eastern Africa.



6. Kufa, T., et al. et al. **Medical male circumcision and associations among sexually transmitted infections service attendees.** *AIDS Behav* 2019 Nov 13 [Epub ahead of print]

Medical male circumcision (MMC) is a proven intervention for preventing HIV acquisition among males. We describe the circumcision status, eligibility for MMC referral and associations with HIV positivity among symptomatic males attending sexually transmitted infections (STI) services. This study was a secondary analysis of cross-sectional data collected during sentinel surveillance for STI aetiologies. In the sentinel surveillance conducted at primary care facilities located in six South African provinces, an anonymous questionnaire was administered followed by collection of appropriate genital and blood specimens for laboratory testing including HIV, rapid plasma reagin (RPR) and HSV-2 serological testing. During analysis, multivariable logistic regression was used to determine association between prevalent HIV infection and male circumcision among males who were HSV-2 AND/OR RPR serology positive and among those who were negative. A total of 847 males were included in the analysis, among whom the median age was 28 years (IQR 24-32 years) with 26.3% aged < 25 years. Of these, 166 (19.6%) were medically circumcised, 350 (41.4%) traditionally circumcised while 324 (39%) were not circumcised. The yield of assessment for MMC referral was 27.7%. Overall HIV positivity was 23.1%. Compared to no circumcision, MMC had a statistically insignificant 62% lower odds of being HIV positive -among males who were HSV-2 and RPR negative- adjusted odds ratio [aOR] 0.38 [95% confidence interval (CI) 0.12-1.18],  $p = 0.094$ . Among those HSV-2 AND/OR RPR positive, MMC had a statistically insignificant 26% lower odds of being HIV positive- aOR 0.74 (95% CI 0.41-1.36),  $p = 0.334$ . In both groups HIV positivity increased with age but was positively associated with condom use at last sexual encounter [aOR 3.41 (95% CI 1.43-8.15)] and previous treatment for an STI syndrome [aOR 3.81 (95% CI 1.60-9.05)] among those HSV-2 and RPR negative. High HIV positivity and high yield of eligibility for MMC referral among males attending STI services points to the need for better integration of HIV prevention and treatment with STI care.

### Impact and coverage

1. Vandormael, A., et al. **Declines in HIV incidence among men and women in a South African population-based cohort.** *Nat Commun* 2019;10(1): 5482. Online at: <https://www.nature.com/articles/s41467-019-13473-y>.

Over the past decade, there has been a massive scale-up of primary and secondary prevention services to reduce the population-wide incidence of HIV. However, the impact of these services on HIV incidence has not been demonstrated using a prospectively followed, population-based cohort from South Africa-the country with the world's highest rate of new infections. To quantify HIV incidence trends in a



hyperendemic population, we tested a cohort of 22,239 uninfected participants over 92,877 person-years of observation. We report a 43% decline in the overall incidence rate between 2012 and 2017, from 4.0 to 2.3 seroconversion events per 100 person-years. Men experienced an earlier and larger incidence decline than women (59% vs. 37% reduction), which is consistent with male circumcision scale-up and higher levels of female antiretroviral therapy coverage. Additional efforts are needed to get more men onto consistent, suppressive treatment so that new HIV infections can be reduced among women.

2. Zhang, C., et al. **Predicting the long-term impact of voluntary medical male circumcision on HIV incidence among men who have sex with men in Beijing, China.** *AIDS Care* 2019 Oct 16: 1-11. [Epub ahead of print]

Using a deterministic compartmental modeling procedure to fit prevalence from 2005-2015, we projected new HIV cases during 2016-2026 under different coverage rates ranging from 0.0001 (at baseline) to 0.15 (an optimistic assumption) with simulations on varying transmission rates, model calibration to match historical data, and sensitivity analyses for different assumptions. Compared with the baseline ( $\lambda = 0.0001$ ), we found the new HIV cases would reduce with the increase of coverage rates of the voluntary medical male circumcision (VMMC) among men who have sex with men (MSM). The higher the coverage rate, the lower the new HIV incidence would be. As one of the first studies to model the potential impact of VMMC among MSM in China, our model suggested a modest to the significant public health impact of VMMC. Even at just 15% VMMC annual uptake rate, the reduction in new infections is substantial. Therefore, there is a strong need to determine the efficacy of VMMC among MSM, to improve the evidence base for its potential use among MSM in low circumcision settings. Only then can policymakers decide whether to incorporate VMMC into a package of HIV prevention interventions targeting MSM.

### Infant male circumcision

1. Malm- Buatsi, E., et al. **A qualitative study of parental preferences for postcircumcision care education.** *J Pediatr Urol* 2019 Oct 18. [Epub ahead of print]

**INTRODUCTION/BACKGROUND:** Although uncommon, complications associated with newborn male circumcision may require costly and emotionally upsetting surgical revisions. Improvements in parental education regarding postcircumcision care may reduce preventable complications; however, little is known about parents' preferences for education of this type.

**OBJECTIVE:** The authors sought to describe parents' preferences regarding the content and delivery of education on postcircumcision care as a first step toward improving parental education and ultimately reducing the need for surgical revisions.

**STUDY DESIGN:** The authors conducted a qualitative, descriptive study, collecting data from 14 parents during two separate focus group discussions. The authors applied thematic analysis techniques to analyze the transcribed content of both groups.

**RESULTS:** Parents indicated that postcircumcision care instructions should be detailed and include clear images and/or an actual demonstration of care processes. Despite being aware of the low likelihood of complications, parents expressed a preference for providers who took education seriously rather than those approaching it with a 'cavalier attitude.' There was widespread support for delivering education at a time that met each family's unique circumstances and needs.

**DISCUSSION:** Consistent with prior research, parents in this study identified gaps in understanding postprocedure care instructions. However, this study adds to the literature in highlighting the specific concerns and preferences of parents with regard to the content and delivery of postcircumcision care education. Based on these findings, the authors conclude that healthcare teams should ensure that parents have access to detailed instructions for postcircumcision care. Education of parents should occur at times when they are able to pay attention and should be supplemented with materials that they can easily access from home. Pediatric urologists can play a leading role in the development and dissemination of high-quality, family-centered educational materials to both parents and providers in other specialty areas that perform high volumes of newborn circumcision. Future research would benefit from larger, more diverse samples. In addition, future studies investigating the effect of parental education on potentially avoidable complications are needed to maximize clinical impact.

**CONCLUSION:** Parents readily provided detailed input into what they perceived as much-needed improvements in postcircumcision care education. Future research is needed to determine what effect, if any, such changes would have on the incidence of preventable complications, particularly those requiring surgical intervention.

## Safety and quality

1. Pintye, J., et al. **Early resumption of sex after voluntary medical male circumcision for HIV prevention within a programmatic delivery setting in Botswana.** *Int J STD AIDS* 2019;30(13): 1275-1283.

To maximize the public health benefits of voluntary medical male circumcision (VMMC) in real-world settings, sexual abstinence is recommended for six weeks following VMMC to ensure complete wound healing. We determined the frequency and predictors of early resumption of sex among a cohort of HIV-negative, sexually active men 18–49 years who underwent VMMC within a public-sector clinic in Botswana. Multivariate robust Poisson regression methods were used to identify predictors of having any sexual intercourse in the last six weeks since undergoing VMMC. In total, 433/519 (83%) men had data available on sexual activity at six weeks post-VMMC. Median age was 27 years,

57% had a higher than secondary education, 72% were employed, and 9% were married. Overall, 122/433 (28%) men had sexual intercourse within the six weeks since VMMC, of whom 36% reported inconsistent condom use. Compared to men  $\geq 34$  years, men aged  $< 30$  years (adjusted risk ratio [aRR] = 1.71, 95% CI 0.95–3.08) and men 30–34 years had a two-fold higher likelihood of resuming sexual activity early in multivariate analyses (aRR = 2.31, 95% CI 1.26–4.25, Wald  $p = 0.018$ ). Employed men were more likely to resume sexual activity early than unemployed men (aRR = 1.58, 95% CI 1.02–2.44,  $p = 0.039$ ). Additional interventions are needed to encourage abstinence until complete wound healing.

2. Brito, A., et al. **Need for improved detection of voluntary medical male circumcision adverse events in Mozambique: a mixed-methods assessment.** *BMC Health Serv Res* 2019;19(1): 855.  
Online at: <https://bmchealthservres.biomedcentral.com/articles/10.1186/s12913-019-4604-1>.

**BACKGROUND:** Adverse events (AE) resulting from voluntary medical male circumcision (VMMC) are commonly used to measure program quality. Mozambique's VMMC program data reports a combined moderate and severe AE rate of 0.2% through passive surveillance. With active surveillance, similar programs report AE rates ranging from 1.0 to 17.0%. The objective of this activity was to assess potential underreporting of AEs via the passive surveillance system in Mozambique.

**METHODS:** This mixed-methods assessment randomly selected one third (16) of all 46 VMMC clinics through stratified sampling, based on volume. A retrospective record review was conducted including patient clinical files, stock records of Amoxicillin/Clavulanic Acid (the choice antibiotic for VMMC-related infections), and clinic-level AE rates from the national database. Records from the month of April 21 to May 20, 2017 were analyzed to identify both reported and potentially unreported AEs. In addition, external, expert clinicians observed post-operative visits ( $n = 167$ ). Descriptive statistics were calculated, including difference between reported and identified AEs, an adjusted retrospective AE rate, and an observed prospective AE rate in each clinic.

**RESULTS:** A total of 5352 circumcisions were performed in the 16 clinics: 8 (0.15%) AEs were reported. Retrospective clinical record reviews identified 36 AEs (0.67%); AE severity or type was unknown. Using Amoxicillin/Clavulanic Acid dispensation as a proxy for VMMC-related infections, 39 additional AEs infections were identified, resulting in an adjusted AE rate of 1.4%, an 8.3 fold increase from the reported AE rate. Prospective, post-operative visit observations of 167 clients found 10 AEs (5.9%); infection was common and boys 10-14 years old represented 80% of AE clients.

**CONCLUSIONS:** Evidence suggests underreporting of AEs in the Mozambican VMMC program. Quality improvement efforts should be implemented in all VMMC sites to improve AE identification, documentation and prevention efforts.

3. Salas-Ortiz, A., et al. **The relationship between management practices and the efficiency and quality of voluntary medical male circumcision services in four African countries.** *PLoS One* 2019;14(10): e0222180.  
Online: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0222180>

**INTRODUCTION:** Given constrained funding for Human Immunodeficiency Virus (HIV) programs across Sub-Saharan Africa, delivering services efficiently is paramount. Voluntary medical male circumcision (VMMC) is a key intervention that can substantially reduce heterosexual transmission—the primary mode of transmission across the continent. There is limited research, however, on what factors may contribute to the efficient and high-quality execution of such programs.

**METHODS:** We analyzed a multi-country, multi-stage random sample of 108 health facilities providing VMMC services in sub-Saharan Africa in 2012 and 2013. The survey collected information on inputs, outputs, process quality and management practices from facilities providing VMMC services. We analyzed the relationship between management practices, quality (measured through provider vignettes) and efficiency (estimated through data envelopment analysis) using Generalized Linear Models and Mixed-effects Models. Applying multivariate regression models, we assessed the relationship between management indices and efficiency and quality of VMMC services.

**RESULTS:** Across countries, both efficiency and quality varied widely. After adjusting for type of facility, country and scale, performance-based funding was negatively correlated with efficiency  $-0.156$  ( $p < 0.05$ ). In our analysis, we did not find any significant relationships between quality and management practices.

**CONCLUSIONS:** No significant relationship was found between process quality and management practices across 108 VMMC facilities. This study is the first to analyze the potential relationships between management and service quality and efficiency among a sample of VMMC health facilities in sub-Saharan Africa and can potentially inform policy-relevant hypotheses to later test through prospective experimental studies.

4. Gilbertson, A., et al. **Voluntary medical male circumcision for HIV prevention among adolescents in Kenya: Unintended consequences of pursuing service-delivery targets.** *PLoS One* 2019;14(11): e0224548.

**INTRODUCTION:** Voluntary medical male circumcision (VMMC) provides significant reductions in the risk of female-to-male HIV transmission. Since 2007, VMMC has been a

key component of the United States President's Emergency Plan for AIDS Relief's (PEPFAR) strategy to mitigate the HIV epidemic in countries with high HIV prevalence and low circumcision rates. To ensure intended effects, PEPFAR sets ambitious annual circumcision targets and provides funding to implementation partners to deliver local VMMC services. In Kenya to date, 1.9 million males have been circumcised; in 2017, 60% of circumcisions were among 10-14-year-olds. We conducted a qualitative field study to learn more about VMMC program implementation in Kenya.

**METHODS AND RESULTS:** The study setting was a region in Kenya with high HIV prevalence and low male circumcision rates. From March 2017 through April 2018, we carried out in-depth interviews with 29 VMMC stakeholders, including "mobilizers", HIV counselors, clinical providers, schoolteachers, and policy professionals. Additionally, we undertook observation sessions at 14 VMMC clinics while services were provided and observed mobilization activities at 13 community venues including, two schools, four public marketplaces, two fishing villages, and five inland villages. Analysis of interview transcripts and observation field notes revealed multiple unintended consequences linked to the pursuit of targets. Ebbs and flows in the availability of school-age youths together with the drive to meet targets may result in increased burdens on clinics, long waits for care, potentially misleading mobilization practices, and deviations from the standard of care.

**CONCLUSION:** Our findings indicate shortcomings in the quality of procedures in VMMC programs in a low-resource setting, and more importantly, that the pursuit of ambitious public health targets may lead to compromised service delivery and protocol adherence. There is a need to develop improved or alternative systems to balance the goal of increasing service uptake with the responsible conduct of VMMC.

## Social and behavioural research

1. Nanteza, B.M., et al. **Enhancers and barriers to uptake of male circumcision services in Northern Uganda: a qualitative study.** *AIDS Care* 2019 Dec 4: 1–8. [Epub ahead of print]

Uganda adopted voluntary medical male circumcision (VMMC) in 2010, but uptake remains disproportionately low in the Northern region despite implementing several demand creation strategies. This study explored the socio-cultural and structural enhancers and barriers to uptake of VMMC services in Gulu, a district in Northern Uganda where uptake is lowest. In September 2016, we conducted 19 focus group discussions, 9 in-depth interviews, and 11 key informant interviews with 149 total participants. Data were collected and analyzed thematically using both inductive and deductive approaches, then framed in four levels of the social ecological model. Enhancers included adequate knowledge about VMMC services, being young and single, partner involvement, peer influence, perceived increased libido after circumcision, and availability of free and high-quality VMMC services. Barriers included sexual abstinence

during wound healing, penile appearance after circumcision, religion, culture, and misconceptions. Optimizing enhancers and addressing barriers could increase VMMC service uptake in northern Uganda.

2. Wiginton, J.M., et al. **Masculine gender norms, male circumcision, and men's engagement with health care in the Dominican Republic.** *Glob Public Health* 2019 Dec 24: 1-12. [Epub ahead of print]

Overall, adult men are less likely to seek and receive health care than women, but male circumcision for HIV prevention has been successful in engaging men in health services. The purpose of this paper is to examine the relationship between masculine norms and health care-seeking among men participating in a voluntary male medical circumcision (VMMC) programme in the Dominican Republic (DR). We employed a mixed methods approach integrating survey data collected 6-12 months post-circumcision (n = 293) and in-depth interviews with a sub-sample of these men (n = 30). In our qualitative analysis, we found that health care-seeking is connected to masculine norms among men in the DR, including the perceptions of medical facilities as feminine spaces. Participants' narratives demonstrate that male circumcision programmes may facilitate men overcoming masculinity-related barriers to health care engagement. In quantitative analysis, we found that being concerned about being perceived as masculine was associated with health care-seeking behaviour in the past five years, though this association was not retained in multivariable analyses. Findings indicate that male circumcision programmes can familiarise men with the healthcare system and masculinise health care-seeking and utilisation, easing associated discomfort.

### VMMC – general

1. Gray, C.M., et al. **Impact of chemokine C-C ligand 27, foreskin anatomy and sexually transmitted infections on HIV-1 target cell availability in adolescent South African males.** *Mucosal Immunol* 2020; 13(1): 118-127.  
Online at: <https://www.nature.com/articles/s41385-019-0209-6>

We compared outer and inner foreskin tissue from adolescent males undergoing medical male circumcision to better understand signals that increase HIV target cell availability in the foreskin. We measured chemokine gene expression and the impact of sexually transmitted infections (STIs) on the density and location of T and Langerhans cells. Chemokine C-C ligand 27 (CCL27) was expressed 6.94-fold higher in the inner foreskin when compared with the outer foreskin. We show that the density of CD4(+)CCR5(+) cells/mm<sup>2</sup> was higher in the epithelium of the inner foreskin, regardless of STI status, in parallel with higher CCL27 gene expression. In the presence of STIs, there were higher numbers of CD4(+)CCR5(+) cells/mm<sup>2</sup> cells in the sub-stratum of the outer and inner foreskin with concurrently higher number of CD207(+) Langerhans cells (LC) in both tissues, with the latter cells being closer to the keratin

surface of the outer FS in the presence of an STI. When we tested the ability of exogenous CCL27 to induce T-cell migration in foreskin tissue, CD4 + T cells were able to relocate to the inner foreskin epithelium in response. We provide novel insight into the impact CCL27 and STIs on immune and HIV-1 target cell changes in the foreskin.