

Quarterly Research Digest on Voluntary Medical Male Circumcision for HIV Prevention

1. Semo, B. W., et al. **Modifying the health system to maximize voluntary medical male circumcision uptake: a qualitative study in Botswana.** *HIV AIDS (Auckl)* 2018;10: 1-8.
Online at: <https://www.dovepress.com/modifying-the-health-system-to-maximize-voluntary-medical-male-circumc-peer-reviewed-article-HIV>

BACKGROUND: In 2007, the World Health Organization and the Joint United Nations Programme on HIV/AIDS endorsed voluntary medical male circumcision (VMMC) as an add-on HIV-prevention strategy. Similar to many other sub-Saharan countries, VMMC uptake in Botswana has been low; as of February 2016, only 42.7% of the program target had been achieved. Previous work has examined how individual-level factors, such as knowledge and attitudes, influence the uptake of VMMC. This paper examines how factors related to the health system can be leveraged to maximize uptake of circumcision services, with a focus on demand creation, access to services, and service delivery.

METHODS: Twenty-seven focus group discussions with 238 participants were conducted in four communities in Botswana among men (stratified by circumcision status and age), women (stratified by age), and community leaders. A semi-structured guide was used by a trained same-gender interviewer to facilitate discussions, which were audio recorded, transcribed, translated to English, and analyzed using an inductive analytic approach.

RESULTS: Participants felt demand creation activities utilizing age- and gender-appropriate mobilizers and community leaders were more effective than mass media campaigns. Participants felt improved access to VMMC clinics would facilitate service uptake, as would designated men's clinics with male-friendly providers for VMMC service delivery. Additionally, providing comprehensive pre-procedure counseling and education, outlining the benefits and disadvantages of the surgical procedure, and explaining the differences between the surgical and non-surgical procedures, were suggested by participants to increase understanding and uptake of VMMC.

CONCLUSION: Cultural acceptability of circumcision services can be improved by engaging age- and gender-appropriate community mobilizers. Involving influential community leaders, providing a forum for men to discuss health issues, and bringing services closer to people can increase VMMC utilization. Service delivery can be improved by communicating the pros and cons of the procedure to the clients for informed decision-making.

2. Adamson, P. C., et al. **A systems-based assessment of the PrePex device adverse events active surveillance system in Zimbabwe.** *PLoS One* 2017;12(12): e0190055.
Online at: <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0190055>

BACKGROUND: Voluntary Medical Male Circumcision (VMMC) is an effective method for HIV prevention and the World Health Organization (WHO) has recommended its expansion in 14 African countries with a high prevalence of HIV and low prevalence of male circumcision. The

WHO has recently pre-qualified the PrePex device, a non-surgical male circumcision device, which reduces procedure time, can increase acceptability of VMMC, and can expand the set of potential provider cadres. The PrePex device was introduced in Zimbabwe as a way to scale-up VMMC services in the country. With the rapid scale-up of the PrePex device, as well as other similar devices, a strong surveillance system to detect adverse events (AE) is needed to monitor the safety profile of these devices. We performed a systems-based evaluation of the PrePex device AE active surveillance system in Zimbabwe.

METHODS: The evaluation was based on the Centers for Disease Control and Prevention's Updated Guidelines for Evaluating Public Health Surveillance Systems. We adapted these guidelines to fit our local context. The evaluation incorporated the review of the standard operating procedures and surveillance system documents. Additionally, structured, in-person interviews were performed with key stakeholders who were users of the surveillance system at various levels. These key stakeholders were from the Ministry of Health, implementing partners, and health facilities in Harare.

RESULTS: Clients were requested to return to the facility for follow-up on days 7, 14 and 49 after placement of the device. In the event of a severe AE, a standard report was generated by the health facility and relayed to the Ministry of Health Child and Care and donor agencies through predefined channels within 24 hours of diagnosis. Clinic staff reported difficulties with the amount of documentation required to follow up with clients and to report AEs. The surveillance system's acceptability among users interviewed was high, and users were motivated to identify all possible AEs related to this device. The surveillance system was purely paper-based and both duplicate and discrepant reporting forms between sites were identified.

CONCLUSION: The PrePex AE active surveillance system was well accepted among participants in the health system. However, the amount of documentation which was required to follow-up with patients was a major barrier within the system, and might lead to decreased timeliness and quality of reporting. A passive surveillance system supported by electronic reporting would improve acceptance of the program.

3. Ledikwe, J. H., et al. **Early resumption of sexual activity following voluntary medical male circumcision in Botswana: a qualitative study.** *PLoS One* 2017;12(11): e0186831. Online at: <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0186831>

Unprotected sexual intercourse after undergoing voluntary medical male circumcision but prior to complete wound healing can lead to major adverse events including HIV acquisition. To better understand perceptions related to early resumption of sex prior to wound healing, 27 focus group discussions were conducted among 238 adult men, women, and community leaders in Botswana. Median age among all participants was 31 years of whom 60% were male and 51% were either employed and receiving salary or self-employed. Only 12% reported being currently married. Pain, not risk of HIV acquisition, was perceived as the main adverse consequence of early resumption of sex. In fact, no participant mentioned that early resumption of sex could lead to an increase in HIV risk. Demonstrating masculinity and virility, fear of losing female partners, and misperception about post-operative wound healing also played key roles in the decision to resume sex prior to complete wound healing. Findings from this study highlight a potentially widespread lack of awareness of the increased risk of HIV acquisition during the wound healing period. Strengthening post-operative counseling and identifying strategies to

discourage the early resumption of sex will be increasingly important as older men and HIV-positive men seek voluntary medical male circumcision services.

4. Manineng, C. M., et al. **Re-establishing safer medical-circumcision-integrated initiation ceremonies for HIV prevention in a rural setting in Papua New Guinea. A multi-method acceptability study.** *PLoS One* 2017;12(11): e0187577.
Online at: <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0187577>

BACKGROUND: Efforts to stem the spread of Human Immunodeficiency Virus (HIV) in Papua New Guinea (PNG) are hampered by multiple interrelated factors including limited health services, extreme diversities in culture and language and highly prevalent gender inequity, domestic violence and poverty. In the rural district of Yangoru-Saussia, a revival of previously ceased male initiation ceremonies (MICs) is being considered for a comprehensive approach to HIV prevention. In this study, we explore the local acceptability of this undertaking including replacing traditional penile cutting practices with medical male circumcision (MMC).

METHODS: A multi-method study comprising three phases. Phase one, focus group discussions with male elders to explore locally appropriate approaches to HIV prevention; Phase two, interviews and a cross-sectional survey with community men and women to assess views on MICs that include MMC for HIV prevention; Phase three, interviews with cultural leaders and a cross sectional survey to assess the acceptability of replacing traditional penile bleeding with MMC.

RESULTS: Cultural leaders expressed that re-establishing MICs was locally appropriate for HIV prevention given the focus on character building and cultural preservation. Most surveyed participants (81.5%) supported re-establishing MICs and 92.2% supported adapting MICs with MMC. Changes to penile bleeding emerged as a contentious and contested issue given its cultural significance in symbolizing initiates' transition from childhood to adulthood. Participants were concerned about potential clash with modern education, introduced religious beliefs and limited government support in leadership and funding.

CONCLUSIONS: Most people in this study in Yangoru-Saussia support re-establishing MICs and replacing traditional penile bleeding with MMC. This culturally-sensitive alignment of MMC (and HIV prevention) with revived MICs responds to a national health priority in PNG and acts as an example of providing culturally-sensitive male circumcision for HIV prevention recommended by WHO/UNAIDS. However, the implementation of this undertaking will require considerable effort, especially when modern pursuits in education and religion must be factored and when there is expectation for local authorities to lead and provide funding.

5. Meyer-Rath, G., et al. **Revealed willingness-to-pay versus standard cost-effectiveness thresholds: evidence from the South African HIV Investment Case.** *PLoS One* 2017;12(10): e0186496.
Online at: <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0186496>

BACKGROUND: The use of cost-effectiveness thresholds based on a country's income per capita has been criticized for not being relevant to decision making, in particular in middle-income countries such as South Africa. The recent South African HIV Investment Case produced an

alternative cost-effectiveness threshold for HIV prevention and treatment interventions based on estimates of life years saved and the country's committed HIV budget.

METHODS: We analysed the optimal mix of HIV interventions over a baseline of the current HIV programme under the committed HIV budget for 2016-2018. We calculated the incremental cost-effectiveness ratio (ICER) as cost per life-year saved (LYS) of 16 HIV prevention and treatment interventions over 20 years (2016-2035). We iteratively evaluated the most cost effective option (defined by an intervention and its coverage) over a rolling baseline to which the more cost effective options had already been added, thereby allowing for diminishing marginal returns to interventions. We constrained the list of interventions to those whose combined cost was affordable under the current HIV budget. Costs are presented from the government perspective, unadjusted for inflation and undiscounted, in 2016 USD.

RESULTS: The current HIV budget of about \$1.6 billion per year was sufficient to pay for the expansion of condom availability, medical male circumcision, universal treatment, and infant testing at 6 weeks to maximum coverage levels, while also implementing a social and behavior change mass media campaign with a message geared at increasing testing uptake and reducing the number of sexual partners. The combined ICER of this package of services was \$547/ LYS. The ICER of the next intervention that was above the affordability threshold was \$872/LYS.

CONCLUSIONS: The results of the South African HIV Investment Case point to an HIV cost-effectiveness threshold based on affordability under the current budget of \$547-872 per life year saved, a small fraction of the country's GDP per capita of about \$6,000.

6. Miiro, G., et al. **Soccer-based promotion of voluntary medical male circumcision: a mixed-methods feasibility study with secondary students in Uganda.** *PLoS One* 2017;12(10): e0185929.
Online at: <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0185929>

The Ugandan government is committed to scaling-up proven HIV prevention strategies including safe male circumcision, and innovative strategies are needed to increase circumcision uptake. The aim of this study was to assess the acceptability and feasibility of implementing a soccer-based intervention ("Make The Cut") among schoolboys in a peri-urban district of Uganda. The intervention was led by trained, recently circumcised "coaches" who facilitated a 60-minute session delivered in schools, including an interactive penalty shoot-out game using metaphors for HIV prevention, sharing of the coaches' circumcision story, group discussion and ongoing engagement from the coach to facilitate linkage to male circumcision. The study took place in four secondary schools in Entebbe sub-district, Uganda. Acceptability of safe male circumcision was assessed through a cross-sectional quantitative survey. The feasibility of implementing the intervention was assessed by piloting the intervention in one school, modifying it, and implementing the modified version in a second school. Perceptions of the intervention were assessed with in-depth interviews with participants. Of the 210 boys in the cross-sectional survey, 59% reported being circumcised. Findings showed high levels of knowledge and generally favourable perceptions of circumcision. The initial implementation of Make The Cut resulted in 6/58 uncircumcised boys (10.3%) becoming circumcised. Changes made included increasing engagement with parents and improved liaison with schools regarding the timing of the intervention. Following this, uptake improved to 18/69 (26.1%) in the second school. In-depth interviews highlighted the important role of family and peer support and the coach in

facilitating the decision to circumcise. This study showed that the modified Make The Cut intervention may be effective to increase uptake of safe male circumcision in this population. However, the intervention is time-intensive, and further work is needed to assess the cost-effectiveness of the intervention conducted at scale.

7. Odoyo-June, E., et al. **Predictors of voluntary medical male circumcision prevalence among men aged 25-39 years in Nyanza region, Kenya: results from the baseline survey of the TASCO study.** *PLoS One* 2017;12(10): e0185872.

Online at: <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0185872>

INTRODUCTION: Uptake of voluntary medical male circumcision (VMMC) as an intervention for prevention of HIV acquisition has been low among men aged ≥ 25 years in Nyanza region, western Kenya. We conducted a baseline survey of the prevalence and predictors of VMMC among men ages 25-39 years as part of the preparations for a cluster randomized controlled trial (cRCT) called the Target, Speed and Coverage (TASCO) Study. The TASCO Study aimed to assess the impact of two demand creation interventions-interpersonal communication (IPC) and dedicated service outlets (DSO), delivered separately and together (IPC + DSO)-on VMMC uptake.

METHODS: As part of the preparatory work for implementation of the cRCT to evaluate tailored interventions to improve uptake of VMMC, we conducted a survey of men aged 25-39 years from a traditionally non-circumcising Kenyan ethnic community within non-contiguous locations selected as study sites. We determined their circumcision status, estimated the baseline circumcision prevalence and assessed predictors of being circumcised using univariate and multivariate logistic regression.

RESULTS: A total of 5,639 men were enrolled of which 2,851 (50.6%) reported being circumcised. The odds of being circumcised were greater for men with secondary education (adjusted Odds Ratio (aOR) = 1.65; 95% CI: 1.45-1.86, $p < 0.001$), post-secondary education (aOR = 1.72; 95% CI: 1.44-2.06, $p < 0.001$), and those employed (aOR = 1.32; 95% CI: 1.18-1.47, $p < 0.001$). However, the odds were lower for men with a history of being married (currently married, divorced, separated, or widowed).

CONCLUSION: Among adult men in the rural Nyanza region of Kenya, men with post-primary education and employed were more likely to be circumcised. VMMC programs should focus on specific sub-groups of men, including those aged 25-39 years who are married, divorced/separated/ widowed, and of low socio-economic status (low education and unemployed).

8. Tshimanga, M., et al. **Safety and efficacy of the PrePex device in HIV-positive men: a single-arm study in Zimbabwe.** *PLoS One* 2017;12(12): e0189146.

Online at: <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0189146>

METHODS: We aimed to determine if the adverse event (AE) rate was non-inferior to an AE rate of 2%, a rate considered the global standard of MC safety.

STUDY PROCEDURES, AE definitions, and study staff were unchanged from previous PrePex Zimbabwe trials. After PrePex placement and removal, weekly visits assessed wound healing.

Men returned on Day 90. Safety was defined as occurrence of moderate and serious clinical AEs. Efficacy was defined as ability to reach the endpoint of complete circumcision.

RESULTS: Among 400 healthy, HIV-positive, consenting adults, median age was 40 years (IQR: 34, 46); 79.5% in WHO stage 2; median CD4 was 336.5c/mul (IQR: 232, 459); 337 (85%) on anti-retroviral therapy. Among 385 (96%) observed completely healed, median days to complete healing was 42 (IQR: 35-49). There was no association between time to healing and CD4 ($p = 0.66$). Four study-related severe AEs and no moderate AEs were reported: severe/moderate AE rate of 1.0% (95% CI: 0.27% to 2.5). This was non-inferior to 2% AEs ($p = 0.0003$). All AEs were device displacements resulting in surgical MC and, subsequently, complete healing.

CONCLUSION: Male circumcision among healthy, HIV-positive men using PrePex is safe and effective. Reducing the barrier of HIV testing while improving counseling for safer sex practices among all MC clients could increase MC uptake and avert more HIV infections.

9. Westercamp, N., et al. **Penile coital injuries in men decline after circumcision: results from a prospective study of recently circumcised and uncircumcised men in western Kenya.** *PLoS One* 2017;12(10): e0185917.

Online at: <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0185917>

BACKGROUND: Penile coital injuries are one of the suggested mechanisms behind the increased risk of HIV among uncircumcised men. We evaluated the prevalence and correlates of self-reported penile coital injuries in a longitudinal community-based cohort of young (18-24 years old), newly circumcised and uncircumcised men in Western Kenya.

METHODS: Self-reported penile coital injuries were assessed at baseline, 6, 12, 18 and 24 months of follow-up, and were defined as scratches, cuts or abrasions during sex, penile soreness during sex, and skin of the penis bleeding during sex. Associations between penile coital injuries, circumcision, sexual satisfaction, and other covariates were estimated with mixed effect models.

RESULTS: Between November 2008 and April 2010 3,186 participants were enrolled (1,588 into circumcision group and 1,598 as age-matched controls). Among 2,106 (66%) participants sexually active at baseline, 53% reported any penile injury, including 44% scratches, cuts or abrasions; 32% penile pain/soreness; and 22% penile bleeding. In multivariable modeling, risk was lower for circumcised men than uncircumcised men for scratches, cuts and abrasions (aOR = 0.39; 95% CI 0.34-0.44); penile pain/soreness (aOR = 0.58; 95% CI 0.51-0.65), penile bleeding (aOR = 0.53; 95% CI 0.46-0.62), and any penile coital injuries (aOR = 0.47; 95%CI 0.42-0.53). Other significant risk factors included increasing age, history of STIs and genital sores, and multiple sex partners, while condom use was protective. Coital injuries were significantly associated with lower levels of sexual satisfaction in longitudinal analyses (scratches, cuts or abrasions: aOR = 0.87, 95% CI: 0.76-0.98; penile pain/soreness: aOR = 0.82, 95% CI: 0.72-0.93; and penile bleeding: aOR = 0.65, 95% CI: 0.55-0.76).

CONCLUSIONS: Self-reported penile coital injuries were common and decreased significantly following circumcision. Improving sexual experience through the removal of a potential source of sexual discomfort may resonate with many men targeted for circumcision services. The role

of penile coital injuries in sexual satisfaction, HIV, HSV-2, and as a motivator for seeking circumcision services should be explored further.

10. Wirth, K. E., et al. **A prospective cohort study of safety and patient satisfaction of voluntary medical male circumcision in Botswana.** *PLoS One* 2017;12(11): e0185904.
Online at: <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0185904>

Randomized trials have shown that voluntary medical male circumcision (VMMC) significantly reduces the risk of HIV acquisition in men. However, the rate of complications associated with the surgical procedure varies from 0.7% to 37.4% in real-world settings. We assessed the frequency, type and severity of adverse events following VMMC among 427 adult men surgically circumcised in southeastern Botswana; 97% completed ≥ 1 follow-up visit within seven days post-circumcision. Thirty moderate AEs were observed in 28 men resulting in an overall AE rate of 6.7%. Patient satisfaction was high: $>95\%$ were very or somewhat satisfied with the procedure and subsequent follow-up care.

11. Mullinax, M., et al. **HIV-risk behaviors of men who perpetrate intimate partner violence in Rakai, Uganda.** *AIDS Educ Prev* 2017;29(6): 527-539.

Little is known about men who perpetrate IPV in communities also at risk for HIV infection. Using data from the Rakai Community Cohort Study (RCCS), five survey rounds were used ($n = 21,157$, observation from $n = 10,618$ men) to examine HIV risk and prevention behaviors among men who reported acts of violence against their wife/primary partner in the past 12 months. Overall, 10.4% men reported perpetrating physical violence and 17.3% perpetrating verbal violence, 3.1% reported sexual violence, 3.1% used violence to have sex with their wife/partner, and 1.1% used verbal coercion. Factors associated with IPV were: age 20-24 years, lower socio-economic status, being married, no male circumcision, drinking alcohol before sex, no consistent condom use, multiple sex partners in the past 12 months, multiple partners ever, and working in a bar. Protective HIV behaviors predicted fewer reports of perpetration and HIV-risk behaviors predicted more reports of perpetrating IPV.

12. Galarraga, O., et al. **HIV prevention costs and their predictors: evidence from the ORPHEA Project in Kenya.** *Health Policy Plan* 2017;32(10): 1407-1416.
Online at: <https://academic.oup.com/heapol/article/32/10/1407/4237470>

We estimate costs and their predictors for three HIV prevention interventions in Kenya: HIV testing and counselling (HTC), prevention of mother-to-child transmission (PMTCT) and voluntary medical male circumcision (VMMC). As part of the 'Optimizing the Response of Prevention: HIV Efficiency in Africa' (ORPHEA) project, we collected retrospective data from government and non-governmental health facilities for 2011-12. We used multi-stage sampling to determine a sample of health facilities by type, ownership, size and interventions offered totalling 144 sites in 78 health facilities in 33 districts across Kenya. Data sources included key informants, registers and time-motion observation methods. Total costs of production were computed using both quantity and unit price of each input. Average cost was estimated by dividing total cost per intervention by number of clients accessing the intervention. Multivariate regression methods were used to analyse predictors of log-transformed average costs. Average costs were \$7 and \$79 per HTC and PMTCT client tested, respectively; and \$66 per VMMC procedure. Results show evidence of economies of scale for PMTCT and VMMC: increasing the

number of clients per year by 100% was associated with cost reductions of 50% for PMTCT, and 45% for VMMC. Task shifting was associated with reduced costs for both PMTCT (59%) and VMMC (54%). Costs in hospitals were higher for PMTCT (56%) in comparison to non-hospitals. Facilities that performed testing based on risk factors as opposed to universal screening had higher HTC average costs (79%). Lower VMMC costs were associated with availability of male reproductive health services (59%) and presence of community advisory board (52%). Aside from increasing production scale, HIV prevention costs may be contained by using task shifting, non-hospital sites, service integration and community supervision.

13. Hines, J. Z., et al. **Scale-up of voluntary medical male circumcision services for HIV prevention - 12 countries in southern and eastern Africa, 2013-2016.** *MMWR Morb Mortal Wkly Rep* 2017;66(47): 1285-1290.
Online at: <https://www.cdc.gov/mmwr/volumes/66/wr/mm6647a2.htm>

Countries in Southern and Eastern Africa have the highest prevalence of human immunodeficiency virus (HIV) infection in the world; in 2015, 52% (approximately 19 million) of all persons living with HIV infection resided in these two regions. * Voluntary medical male circumcision (VMMC) reduces the risk for heterosexually acquired HIV infection among males by approximately 60% (1). As such, it is an essential component of the Joint United Nations Programme on HIV/AIDS (UNAIDS) strategy for ending acquired immunodeficiency syndrome (AIDS) by 2030 (2). Substantial progress toward achieving VMMC targets has been made in the 10 years since the World Health Organization (WHO) and UNAIDS recommended scale-up of VMMC for HIV prevention in 14 Southern and Eastern African countries with generalized HIV epidemics and low male circumcision prevalence (3). (dagger) This has been enabled in part by nearly \$2 billion in cumulative funding through the President's Emergency Plan for AIDS Relief (PEPFAR), administered through multiple U.S. governmental agencies, including CDC, which has supported nearly half of all PEPFAR-supported VMMCs to date. Approximately 14.5 million VMMCs were performed globally during 2008-2016, which represented 70% of the original target of 20.8 million VMMCs in males aged 15-49 years through 2016 (4). Despite falling short of the target, these VMMCs are projected to avert 500,000 HIV infections by the end of 2030 (4). However, UNAIDS has estimated an additional 27 million VMMCs need to be performed by 2021 to meet the Fast Track targets (2). This report updates a previous report covering the period 2010-2012, when VMMC implementing partners supported by CDC performed approximately 1 million VMMCs in nine countries (5). During 2013-2016, these implementing partners performed nearly 5 million VMMCs in 12 countries. Meeting the global target will require redoubling current efforts and introducing novel strategies that increase demand among subgroups of males who have historically been reluctant to undergo VMMC.

14. Sharma, S. C., et al. **Male circumcision for the prevention of HIV acquisition: a meta-analysis.** *BJU Int* 2017 December 12. [Epub ahead of print]
Online at:
<http://onlinelibrary.wiley.com/doi/10.1111/bju.14102/abstract;jsessionid=534D6CF5C3730AD0EF101B8BD49BA9E2.f02t02>

OBJECTIVES: To assess male circumcision for the prevention of HIV acquisition in heterosexual and homosexual men using all available data. Previous meta-analyses suggest that circumcision is effective at reducing the risk of HIV acquisition amongst heterosexual men but the effect amongst homosexual males remains under debate.

SUBJECTS AND METHODS: A systematic literature review was conducted searching for studies that assessed male circumcision as a method to prevent HIV acquisition in homosexual and/or heterosexual males. PubMed, Embase, Cochrane Central Register of Controlled Trials (CENTRAL) and ClinicalTrials.gov were searched in March 2017. Random effects model was employed to calculate a pooled relative risk (RR) and its associated 95% confidence interval (CI).

RESULTS: In total 49 studies were included in this meta-analysis. The overall pooled RR for both homosexual and heterosexual males was 0.58, 95% CI 0.48 to 0.70 suggesting that circumcision is associated with a reduction in HIV risk. Circumcision was found to be protective for both homosexual and heterosexual males (RR: 0.80, 95% CI 0.69 to 0.92 and 0.28, 95% CI 0.14 to 0.59 respectively). Heterosexual males have a greater relative risk reduction (72% compared to 20% for homosexual men). Significant heterogeneity between the studies was present ($\text{Chi}^2 = 1378.34$, $\text{df} = 48$; $I^2 = 97\%$).

CONCLUSION: This meta-analysis demonstrates that male circumcision is effective at reducing HIV risk for both heterosexual and homosexual males. This article is protected by copyright. All rights reserved.

15. Uzun Jacobson, E., et al. **Effects of reaching national goals on HIV incidence, by race and ethnicity, in the United States.** *J Public Health Manag Pract* 2017 Dec 27. [Epub ahead of print]

CONTEXT: Human immunodeficiency virus (HIV) incidence and prevalence in the United States are characterized by significant disparities by race/ethnicity. National HIV care goals, such as boosting to 90% the proportion of persons whose HIV is diagnosed and increasing to 80% the proportion of persons living with diagnosed HIV who are virally suppressed, will likely reduce HIV incidence, but their effects on HIV-related disparities are uncertain.

OBJECTIVE: We sought to understand by race/ethnicity how current HIV care varies, the level of effort required to achieve national HIV care goals, and the effects of reaching those goals on HIV incidence and disparities.

DESIGN: Using a dynamic model of HIV transmission, we identified 2016 progress along the HIV care continuum among blacks, Hispanics, and whites/others compared with national 2020 goals. We examined disparities over time.

SETTING: United States

PARTICIPANTS: Beginning in 2006, our dynamic compartmental model simulated the sexually active US population 13 to 64 years of age, which was stratified into 195 subpopulations by transmission group, sex, race/ethnicity, age, male circumcision status, and HIV risk level.

MAIN OUTCOME MEASURE: We compared HIV cumulative incidence from 2016 to 2020 when goals were reached compared with base case assumptions about progression along the HIV care continuum.

RESULTS: The 2016 proportion of persons with diagnosed HIV who were on treatment and virally suppressed was 50% among blacks, 56% among Hispanics, and 61% among whites/others,

compared with a national goal of 80%. When diagnosis, linkage, and viral suppression goals were reached in 2020, cumulative HIV incidence fell by 32% (uncertainty range: 18%-37%) for blacks, 25% (22%-31%) for Hispanics, and 25% (21%-28%) for whites/others. Disparity measures changed little.

CONCLUSIONS: Achieving national HIV care goals will require different levels of effort by race/ethnicity but likely will result in substantial declines in cumulative HIV incidence. HIV-related disparities in incidence and prevalence may be difficult to resolve.

16. Bochner, A. F., et al. **A cross-sectional analysis of *Trichomonas vaginalis* infection among heterosexual HIV-1 serodiscordant African couples.** *Sex Transm Infect* 2017;93(7): 520-529.

OBJECTIVES: *Trichomonas vaginalis* is the most prevalent curable STI worldwide and has been associated with adverse health outcomes and increased HIV-1 transmission risk. We conducted a cross-sectional analysis among couples to assess how characteristics of both individuals in sexual partnerships are associated with the prevalence of male and female *T. vaginalis* infection.

METHODS: African HIV-1 serodiscordant heterosexual couples were concurrently tested for trichomoniasis at enrolment into two clinical trials. *T. vaginalis* testing was by nucleic acid amplification or culture methods. Using Poisson regression with robust standard errors, we identified characteristics associated with trichomoniasis.

RESULTS: Among 7531 couples tested for trichomoniasis, 981 (13%) couples contained at least one infected partner. The prevalence was 11% (n=857) among women and 4% (n=319) among men, and most infected individuals did not experience signs or symptoms of *T. vaginalis*. Exploring concordance of *T. vaginalis* status within sexual partnerships, we observed that 61% (195/319) of *T. vaginalis*-positive men and 23% (195/857) of *T. vaginalis*-positive women had a concurrently infected partner. In multivariable analysis, having a *T. vaginalis*-positive partner was the strongest predictor of infection for women (relative risk (RR) 4.70, 95% CI 4.10 to 5.38) and men (RR 10.09, 95% CI 7.92 to 12.85). For women, having outside sex partners, gonorrhoea, and intermediate or high Nugent scores for bacterial vaginosis were associated with increased risk of trichomoniasis, whereas age 45 years and above, being married, having children and injectable contraceptive use were associated with reduced trichomoniasis risk. Additionally, women whose male partners were circumcised, had more education or earned income had lower risk of trichomoniasis.

CONCLUSIONS: We found that within African HIV-1 serodiscordant heterosexual couples, the prevalence of trichomoniasis was high among partners of *T. vaginalis*-infected individuals, suggesting that partner services could play an important role identifying additional cases and preventing reinfection. Our results also suggest that male circumcision may reduce the risk of male-to-female *T. vaginalis* transmission.

17. Grund, J. M., et al. **Association between male circumcision and women's biomedical health outcomes: a systematic review.** *Lancet Glob Health* 2017;5(11): e1113-e1122.
Online at: [http://www.thelancet.com/journals/langlo/article/PIIS2214-109X\(17\)30369-8/fulltext](http://www.thelancet.com/journals/langlo/article/PIIS2214-109X(17)30369-8/fulltext)

BACKGROUND: Male circumcision reduces men's risk of acquiring HIV and some sexually transmitted infections from heterosexual exposure, and is essential for HIV prevention in sub-

Saharan Africa. Studies have also investigated associations between male circumcision and risk of acquisition of HIV and sexually transmitted infections in women. We aimed to review all evidence on associations between male circumcision and women's health outcomes to benefit women's health programmes.

METHODS: In this systematic review we searched for peer-reviewed and grey literature publications reporting associations between male circumcision and women's health outcomes up to April 11, 2016. All biomedical (not psychological or social) outcomes in all study types were included. Searches were not restricted by year of publication, or to sub-Saharan Africa. Publications without primary data and not in English were excluded. We extracted data and assessed evidence on each outcome as high, medium, or low consistency on the basis of agreement between publications; outcomes found in fewer than three publications were indeterminate consistency.

FINDINGS: 60 publications were included in our assessment. High-consistency evidence was found for five outcomes, with male circumcision protecting against cervical cancer, cervical dysplasia, herpes simplex virus type 2, chlamydia, and syphilis. Medium-consistency evidence was found for male circumcision protecting against human papillomavirus and low-risk human papillomavirus. Although the evidence shows a protective association with HIV, it was categorised as low consistency, because one trial showed an increased risk to female partners of HIV-infected men resuming sex early after male circumcision. Seven outcomes including HIV had low-consistency evidence and six were indeterminate

INTERPRETATION: Scale-up of male circumcision in sub-Saharan Africa has public health implications for several outcomes in women. Evidence that female partners are at decreased risk of several diseases is highly consistent. Synergies between male circumcision and women's health programmes should be explored.

FUNDING: US Centers for Disease Control and Prevention and Jhpiego.

18. Zhou, B., et al. **Impact of educational interventions on acceptance and uptake of male circumcision in the general population of western China: a multicenter cohort study.** *Sci Rep* 2017;7(1): 14931.
Online at: <https://www.nature.com/articles/s41598-017-13995-9>

To compare different intervention models for promoting male circumcision (MC) to prevent HIV transmission in Western China. A total of 1690 male participants from multiple study sites were cluster randomly allocated to three-stage (Model A), two-stage (Model B), and one-stage (Model C) educational interventions. In all three interventions models, knowledge about MC significantly increased and the reported willingness to accept MC increased to 52.6% (255/485), 67.0% (353/527), and 45.5% (219/481) after intervention, respectively ($P < 0.05$). Rate of MC surgery uptake was highest (23.7%; 115/485) among those who received Model A intervention, compared to those who received Model B (17.1%; 90/527) or Model C (9.4%; 45/481) interventions ($P < 0.05$). Multivariable Cox regression analysis identified that Model A or Model B had twice the effect of Model C on MC uptake, with relative risks of 2.4 (95%CI, 1.5-3.8) and 2.2 (95%CI, 1.3-3.6), respectively. Model B was the most effective model for improving participants' willingness to accept MC, while Model A was most successful at increasing uptake

of MC surgery. Self-reported attitude towards MC uptake was not strongly correlated with actual behavior in this study focusing on the general male population in Western China.

19. Ansari, M. R., et al. **Voluntary medical male circumcision to prevent HIV in Tanah Papua, Indonesia: field trial to assess acceptability and feasibility.** *Curr HIV Res* 2017;15(5): 361-371.

BACKGROUND: Relatively little attention has been paid to the significant HIV prevention role that voluntary medical male circumcision (VMMC) can play in populations with moderate levels of HIV prevalence. One such location is Tanah Papua, Indonesia, which in 2013 had a general population having HIV prevalence of 2.3% concentrated among indigenous Papuans (2.9% prevalence), very few of whom are circumcised. This article reports the findings of an implementation research study assessing the acceptability and feasibility of introducing VMMC for HIV prevention.

METHODS: Following a situational assessment and socialization of targeted groups of men and key stakeholders, a single-arm, open-label, prospective cohort trial using the non-surgical PrePex(R) device was undertaken in four cities. Study participants were recruited via study-associated socialization events. Data were collected from clients prior to and following device insertion, and at several "check-up" points (2-, 21- and 42-days) using standardized case report forms. A random sample of circumcision clients from one city was surveyed six months' post-removal to assess the prevalence of compensatory sexual risk behaviours.

RESULTS: Demand for circumcision was weak in three of the cities, reflecting insufficient prior socialization and lingering concerns over religious appropriateness and safety issues. Despite no prior experience with PrePex (R), the pilot implementation yielded side-effect and adverse event rates that were unremarkable in comparison with sub-Saharan African countries, where PrePex (R) is widely used. No evidence of increased post-procedure sexual risk-taking was found.

CONCLUSION: The study findings point to both opportunity and significant challenges in introducing VMMC on a large scale in Tanah Papua, Indonesia. Although there were enough promising signs in the qualitative research and in the limited-scale implementation trial undertaken to remain optimistic as to the potential for VMMC to help contain HIV in Tanah Papua, much remains to be done to promote the benefits of VMMC and address lingering concerns as to safety and religious appropriateness. An acceleration of the pace of task-shifting from physicians to nurses will be needed in order for VMMC to be feasible for implementation on a large scale.

20. Cummings, B., et al. **Bisexual and bidirectional: assessing the potential for HIV bridging in Mozambique.** *AIDS Behav* 2017 Nov 29. [Epub ahead of print].

African men who have sex with men (MSM) frequently, and often concurrently, have female partners, raising concerns about HIV sexual bridging. We explored potential HIV transmission in Mozambique from and to female partners of MSM focusing on preferred anal sex role and circumcision status. Data collected in a respondent-driven sampling study of MSM in 2011 in Maputo and Beira. Men who had oral or anal sex with other men 12 months prior completed a questionnaire and consented for HIV testing. Statistical analysis explored demographic/risk characteristics and associations among circumcision status, anal sex with men, sexual positions during anal sex with men and vaginal or anal sex with women. We identified 326 MSM in

Maputo and 237 in Beira with both male and female partners 3 months before the study. Of these, 20.8% in Maputo and 36.0% in Beira had any receptive anal sex with men 12 months prior, including 895 unprotected sexual acts with males in Maputo and 692 in Beira. Uncircumcised and exclusively insertive males, 27.7% of the sample in Maputo and 33.6% in Beira, had the most unprotected sex with females: 1159 total acts in Maputo and 600 in Beira. Sexual bridging between MSM and women likely varies geographically and is probably bi-directional, occurring within a generalized epidemic where HIV prevalence is higher among reproductive-age women than MSM. Prevention strategies emphasizing correct and consistent condom use for all partners and circumcision for bisexual men should be considered.

21. Grabowski, M. K., et al. **HIV prevention efforts and incidence of HIV in Uganda.** *N Engl J Med* 2017;377(22): 2154-2166.
Online at: <http://www.nejm.org/doi/full/10.1056/NEJMoa1702150>

BACKGROUND: To assess the effect of a combination strategy for prevention of human immunodeficiency virus (HIV) on the incidence of HIV infection, we analyzed the association between the incidence of HIV and the scale-up of antiretroviral therapy (ART) and medical male circumcision in Rakai, Uganda. Changes in population-level viral-load suppression and sexual behaviors were also examined.

METHODS: Between 1999 and 2016, data were collected from 30 communities with the use of 12 surveys in the Rakai Community Cohort Study, an open, population-based cohort of persons 15 to 49 years of age. We assessed trends in the incidence of HIV on the basis of observed seroconversion data, participant-reported use of ART, participant-reported male circumcision, viral-load suppression, and sexual behaviors.

RESULTS: In total, 33,937 study participants contributed 103,011 person-visits. A total of 17,870 persons who were initially HIV-negative were followed for 94,427 person-years; among these persons, 931 seroconversions were observed. ART was introduced in 2004, and by 2016, ART coverage was 69% (72% among women vs. 61% among men, $P < 0.001$). HIV viral-load suppression among all HIV-positive persons increased from 42% in 2009 to 75% by 2016 ($P < 0.001$). Male circumcision coverage increased from 15% in 1999 to 59% by 2016 ($P < 0.001$). The percentage of adolescents 15 to 19 years of age who reported never having initiated sex (i.e., delayed sexual debut) increased from 30% in 1999 to 55% in 2016 ($P < 0.001$). By 2016, the mean incidence of HIV infection had declined by 42% relative to the period before 2006 (i.e., before the scale-up of the combination strategy for HIV prevention) - from 1.17 cases per 100 person-years to 0.66 cases per 100 person-years (adjusted incidence rate ratio, 0.58; 95% confidence interval [CI], 0.45 to 0.76); declines were greater among men (adjusted incidence rate ratio, 0.46; 95% CI, 0.29 to 0.73) than among women (adjusted incidence rate ratio, 0.68; 95% CI, 0.50 to 0.94).

CONCLUSIONS: In this longitudinal study, the incidence of HIV infection declined significantly with the scale-up of a combination strategy for HIV prevention, which provides empirical evidence that interventions for HIV prevention can have a population-level effect. However, additional efforts are needed to overcome disparities according to sex and to achieve greater reductions in the incidence of HIV infection. (Funded by the National Institute of Allergy and Infectious Diseases and others.)

22. Joseph Davey, D. L., et al. **HIV incidence and predictors of HIV acquisition from an outside partner in serodiscordant couples in Lusaka, Zambia.** *J Acquir Immune Defic Syndr* 2017;76(2): 123-131.
Online at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5597474/>

OBJECTIVE: Evaluate the incidence and predictors of HIV acquisition from outside partners in serodiscordant couples.

METHODS: Demographic, behavioral, and clinical exposures were measured quarterly in a cohort of serodiscordant cohabiting couples in Zambia from 1995 to 2012 (n = 3049). Genetic analysis classified incident infections as those acquired from the study partner (linked) or acquired from an outside partner (unlinked). Factors associated with time to unlinked HIV infection were evaluated using multivariable Cox proportional hazards regression stratified by sex.

RESULTS: There were 100 unlinked infections in couples followed for a median of 806 days. Forty-five infections occurred in women [1.85/100 couple-years; 95% confidence interval (CI): 1.35 to 2.47]. Risk of female unlinked infection (vs. nonseroconverting females) was associated with reporting being drunk weekly/daily vs. moderate/nondrinkers at baseline [adjusted hazard ratio (aHR) = 5.44; 95% CI: 1.03 to 28.73], genital ulcers (aHR = 6.09; 95% CI: 2.72 to 13.64), or genital inflammation (aHR = 11.92; 95% CI: 5.60 to 25.37) during follow-up adjusting for age, years cohabiting, income, contraceptive use, previous pregnancies, history of sexually transmitted infections, and condomless sex with study partner. Fifty-five infections occurred in men (1.82/100 couple-years; 95% CI: 1.37 to 2.37). Risk of male unlinked infection was associated with genital inflammation (aHR = 8.52; 95% CI: 3.82 to 19.03) or genital ulceration (aHR = 2.31; 95% CI: 2.05 to 8.89), reporting ≥ 1 outside sexual partner (aHR = 3.86; 95% CI: 0.98 to 15.17) during follow-up, and reporting being drunk weekly/daily vs. moderate/nondrinkers at baseline (aHR = 3.84; 95% CI: 1.28 to 11.55), controlling for age, income, circumcision status, and history of sexually transmitted infection.

CONCLUSIONS: Predictors of unlinked infection in serodiscordant relationships were alcohol use, genital inflammation, and ulceration. Causes of genital inflammation and ulceration should be screened for and treated in HIV-negative individuals. Counseling on risk of alcohol use and sex with outside partners should be discussed with couples where 1 or both are HIV-negative, including in counseling on use of pre-exposure prophylaxis to prevent HIV acquisition in the HIV-negative partner (when feasible and affordable).

23. Wall, K. M., et al. **Risk of heterosexual HIV transmission attributable to sexually transmitted infections and non-specific genital inflammation in Zambian discordant couples, 1994-2012.** *Int J Epidemiol* 2017;46(5): 1593-1606.
Online at: <https://academic.oup.com/ije/article/46/5/1593/3599311>

BACKGROUND: Studies have demonstrated the role of ulcerative and non-ulcerative sexually transmitted infections (STI) in HIV transmission/acquisition risk; less is understood about the role of non-specific inflammatory genital abnormalities.

METHODS: HIV-discordant heterosexual Zambian couples were enrolled into longitudinal follow-up (1994-2012). Multivariable models estimated the effect of genital ulcers and

inflammation in both partners on time-to-HIV transmission within the couple. Population-attributable fractions (PAFs) were calculated.

RESULTS: A total of 207 linked infections in women occurred over 2756 couple-years (7.5/100 CY) and 171 in men over 3216 CY (5.3/100 CY). Incident HIV among women was associated with a woman's non-STI genital inflammation (adjusted hazard ratio (aHR) = 1.55; PAF = 8%), bilateral inguinal adenopathy (BIA; aHR = 2.33; PAF = 8%), genital ulceration (aHR = 2.08; PAF = 7%) and the man's STI genital inflammation (aHR = 3.33; PAF = 5%), BIA (aHR = 3.35; PAF = 33%) and genital ulceration (aHR = 1.49; PAF = 9%). Infection among men was associated with a man's BIA (aHR = 4.11; PAF = 22%) and genital ulceration (aHR = 3.44; PAF = 15%) as well as with the woman's non-STI genital inflammation (aHR = 1.92; PAF = 13%) and BIA (aHR = 2.76; PAF = 14%). In HIV-M+F- couples, the man being uncircumcised. with foreskin smegma. was associated with the woman's seroconversion (aHR = 3.16) relative to being circumcised. In F+M- couples, uncircumcised men with BIA had an increased hazard of seroconversion (aHR = 13.03 with smegma and 4.95 without) relative to being circumcised. Self-reporting of symptoms was low for ulcerative and non-ulcerative STIs.

CONCLUSIONS: Our findings confirm the role of STIs and highlight the contribution of non-specific genital inflammation to both male-to-female and female-to-male HIV transmission/acquisition risk. Studies are needed to characterize pathogenesis of non-specific inflammation including inguinal adenopathy. A better understanding of genital practices could inform interventions.

24. Bales, A. M., et al. **Global health education for medical students: when learning objectives include research.** *J Surg Educ* 2017 Oct 6. [Epub ahead of print]

BACKGROUND: The Luke Commission, a provider of comprehensive mobile health outreach in rural Swaziland, focuses on human immunodeficiency virus testing and prevention, including the performance of over 100 circumcisions weekly. Educational objectives for medical student global health electives are essential. Learning research methodology while engaging in clinical activities reinforces curriculum goals. Medical care databases can produce clinically significant findings affecting international health policy. Engaging in academic research exponentially increased the educational value of student experiences during an international medical elective.

METHODS: Staff of the Luke Commission, a nongovernmental organization, collected and deidentified information from 1500 Swazi male patients undergoing circumcision from January through June of 2014. Medical students designed studies and analyzed these data to produce research projects on adverse event rates, pain perception, and penile malformations. Institutional review board approval was obtained from the home institution and accompanying senior surgical faculty provided mentorship.

RESULTS: First-year medical students enrolled in an international medical elective to explore resource availability, cultural awareness, health care provision, and developing world endemic diseases. While in country, students learned research methodology, collected data, and engaged in research projects. Following the trip, students presented posters at over 10 regional and national meetings. All 4 articles are accepted or under consideration for publication by major journals.

CONCLUSIONS: During international medical electives the combination of clinical experiences and access to databases from health aid organizations provides the foundation for productive medical student research. All participants benefit from the relationships formed by aid organizations, medical students, and patient populations. Global health research has many complexities, but through careful planning and cultural awareness, medical students can increase their research skills and contribute to the medical literature, bringing attention to and improving health care policies around the world. In sum, the educational experience of medical students is enhanced through the interaction of delivering patient care and completing clinical research studies.

25. Chang, L. W., et al. **Impact of a community health worker HIV treatment and prevention intervention in an HIV hotspot fishing community in Rakai, Uganda (mLAKE): study protocol for a randomized controlled trial.** *Trials* 2017;18(1): 494.
Online at: <https://trialsjournal.biomedcentral.com/articles/10.1186/s13063-017-2243-6>

BACKGROUND: Effective yet practical strategies are needed to increase engagement in HIV treatment and prevention services, particularly in high-HIV-prevalence hotspots. We designed a community-based intervention called "Health Scouts" to promote uptake and adherence to HIV services in a highly HIV-prevalent fishing community in Rakai, Uganda. Using a situated Information, Motivation, and Behavioral skills theory framework, the intervention consists of community health workers, called Health Scouts, who use motivational interviewing strategies and mobile health tools to promote engagement in HIV treatment and prevention services.

METHODS/DESIGN: The Health Scout intervention is being evaluated through a pragmatic, parallel, cluster-randomized controlled trial with an allocation ratio of 1:1. The study setting is a single high-HIV-prevalence fishing community in Rakai, Uganda divided into 40 contiguous neighborhood clusters each containing about 65 households. Twenty clusters received the Health Scout Intervention; 20 clusters received standard of care. The Health Scout intervention is delivered within the community at the household level, targeting all residents aged 15 years or older. The primary programmatic outcomes are self-reported HIV care, antiretroviral therapy, and male circumcision coverage; the primary biologic outcome is population-level HIV viremia prevalence. Follow-up is planned for about 3 years.

DISCUSSION: HIV treatment and prevention service engagement remains suboptimal in HIV hotspots. New, community-based implementation approaches are needed. If found to be effective in this trial, the Health Scout intervention may be an important component of a comprehensive HIV response. TRIAL

REGISTRATION: ClinicalTrials.gov, ID: NCT02556957 . Registered on 20 September 2015.

26. George, G., et al. **Factors associated with the take-up of voluntary medical male circumcision amongst learners in rural KwaZulu-Natal.** *Afr J AIDS Res* 2017;16(3): 251-256.
Online at: <http://www.tandfonline.com/doi/abs/10.2989/16085906.2017.1369441>

Voluntary medical male circumcision (VMMC) is an integral part of South Africa's HIV prevention programme. School-going males, in particular, are considered a cost-effective target population. However, ambitious policy targets have not been achieved due to the plateau in demand for VMMC. This study documents the factors influencing demand for VMMC amongst school-going

males. Data were collected from 750 learners (251 circumcised and 499 uncircumcised) from 42 secondary schools in KwaZulu-Natal, South Africa. There was a positive association between the perceived benefit of VMMC and the likelihood of undergoing circumcision (AOR: 1.41, $p = 0.01$). There was a negative association between self-efficacy to use condoms and likelihood of undergoing VMMC (AOR: 0.75, $p < 0.01$). Learners who perceived VMMC as having a number of health benefits, including reducing of the chances of contracting HIV and sexually transmitted infections (STIs), increasing penile hygiene and the belief that VMMC allows them to use condoms less frequently, were more likely to undergo VMMC. Of concern, learners who were confident in their ability to access condoms and to use a condom with their partner were less likely to undergo VMMC.