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Quarterly Research Digest on Voluntary Medical Male Circumcision for HIV Prevention

Cost and cost-effectiveness

1. Davis, S. M., et al. **Making voluntary medical male circumcision services sustainable: findings from Kenya's pilot models, baseline and year 1**. *PLoS One.* 2021;16(6): e0252725.

   Online at: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0252725.

   Voluntary medical male circumcision is a crucial HIV prevention program for men in sub-Saharan Africa. Kenya is one of the first countries to achieve high population coverage and seek to transition the program to a more sustainable structure designed to maintain coverage while making all aspects of service provision domestically owned and implemented. Using pre-defined metrics, we created and evaluated three models of circumcision service delivery (static, mobile and mixed) to identify which had potential for sustaining high circumcision coverage among 10-14-year-olds group, a historically high-demand and accessible age group, at the lowest possible cost. We implemented each model in two distinct geographic areas, one in Siaya and the other in Migori county, and assessed multiple aspects of each model's sustainability. These included numerical achievements against targets designed to reach 80% coverage over two years; quantitative expenditure outcomes including unit expenditure plus its primary drivers; and qualitative community perception of program quality and sustainability based on Likert scale. Outcome values at baseline were compared with those for year one of model implementation using bivariate linear regression, unpaired t-tests and Wilcoxon rank tests as appropriate. Across models, numerical target achievement ranged from 45-140%, with the mixed models performing best in both counties. Unit expenditures varied from approximately $57 in both countries at baseline to $44-$124 in year 1, with the lowest values in the mixed and static models. Mean key informant perception scores generally rose significantly from baseline to year 1, with a notable

drop in the area of community engagement. Consistently low scores were in the aspects of domestic financing for service provision. Sustainability-focused circumcision service delivery models can successfully achieve target volumes at lower unit expenditures than existing models, but strategies for domestic financing remain a crucial challenge to address for long-term maintenance of the program.

2. Marais, L., et al. **Targeting for male medical circumcision: profiles from two South African cities [abstract].** *AIDS Care.* 2021;33(4):448-52.

   Online at: https://www.ncbi.nlm.nih.gov/pubmed/32070119.

   Male circumcision is considered by some to be an acceptable global approach to reduce HIV infections. Consequently, many governments in sub-Saharan Africa run voluntary male circumcision programmes. South Africa also provides male circumcision for free at state clinics and hospitals. Very little is known about the men who use this service. This study uses data from Cape Town, a sample of 1194 in 2016, and from Mangaung, a sample of 277 in 2017 and 2018, to fill this gap. The study finds that age targeting is inadequate, risk targeting is absent, and religious and cultural factors have a negative effect on the cost-efficiency of the service in the long run.

Enhancing uptake of VMMC

1. Nzamwita, P., et al. **Factors associated with low uptake of voluntary medical male circumcision as HIV-prevention strategy among men aged 18-49 years from Nyanza District, Rwanda**. *HIV AIDS (Auckl).* 2021;3:377-88.

   Online at: https://www.dovepress.com/factors-associated-with-low-uptake-of-voluntary-medical-male-circumcis-peer-reviewed-fulltext-article-HIV.

   BACKGROUND: Voluntary medical male circumcision (VMMC) is an effective biomedical intervention against HIV in developed and developing countries. However, there is low uptake of VMMC due to various factors, which hinders achievement of health-policy goals to increase uptake. Numerous campaigns offering the procedure free of charge exist in developing countries, but such initiatives seem to bear little fruit in attracting men to these services. This study assessed risk factors associated with the low uptake of VMMC among men in Nyanza district, Southern Province, Rwanda.

   METHODS: A cross-sectional study was conducted among adult males in Nyanza. A total of 438 men participated in individual interviews. Bivariate and multivariate logistic regression models were used with 95% confidence intervals and p</=0.05 was taken as statistically significant.

   RESULTS: Our results indicated that a low update of VMMC was highly prevalent (35.8%). A majority (84.7%) of participants had heard about VMMC, its complications, advantages in preventing penile cancer, sexually transmitted infections, and HIV,

condom use after circumcision, abstinence for 6 weeks after circumcision, and improving penile hygiene. Religion and education were significant factors in low uptake. Catholics were less likely to undergo VMMC than Muslims (OR 7.19, 95% CI 1.742-29.659; p=0.01). Those of other faiths were less likely to undergo VMMC than Muslims (OR 6.035, 95% CI 1.731-21.039; p=0.005). Participants with secondary education were less likely to undergo VMMC than those with primary education only (OR 1.4, 95% CI 0.74-2.64; p=0.03). Having no formal education decreased the odds of being uncircumcised (OR 0.37, 95% CI 0.14-0.977; p=0.045) when compared to those with primary education.

CONCLUSION: Uptake of VMMC remains low in Nyanza, but most men had sufficient knowledge about it. Education, religion, and marital status were major factors in the low uptake. Programs targeting peer influences and parents need to be prioritized.

2. Nnaji, C. A., et al. **Implementation research approaches to promoting universal health coverage in Africa: a scoping review**. *BMC Health Serv Res.* 2021;21(1):414.

   Online at: https://bmchealthservres.biomedcentral.com/articles/10.1186/s12913-021-06449-6.

   BACKGROUND: Implementation research has emerged as part of evidence-based decision-making efforts to plug current gaps in the translation of research evidence into health policy and practice. While there has been a growing number of initiatives promoting the uptake of implementation research in Africa, its role and effectiveness remain unclear, particularly in the context of universal health coverage (UHC). Hence, this scoping review aimed to identify and characterise the use of implementation research initiatives for assessing UHC-related interventions or programmes in Africa.

   METHODS: The review protocol was developed based on the methodological framework proposed by Arksey and O'Malley, as enhanced by the Joanna Briggs Institute. The review is reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR). MEDLINE, Scopus and the Cochrane Library were searched. The search also included a hand search of relevant grey literature and reference lists. Literature sources involving the application of implementation research in the context of UHC in Africa were eligible for inclusion.

   RESULTS: The database search yielded 2153 records. We identified 12 additional records from hand search of reference lists. After the removal of duplicates, we had 2051 unique records, of which 26 studies were included in the review. Implementation research was used within ten distinct UHC-related contexts, including HIV; maternal and child health; voluntary male medical circumcision; healthcare financing; immunisation; healthcare data quality; malaria diagnosis; primary healthcare quality improvement; surgery and typhoid fever control. The consolidated framework for implementation

research (CFIR) was the most frequently used framework. Qualitative and mixed-methods study designs were the commonest methods used. Implementation research was mostly used to guide post-implementation evaluation of health programmes and the contextualisation of findings to improve future implementation outcomes. The most commonly reported contextual facilitators were political support, funding, sustained collaboration and effective programme leadership. Reported barriers included inadequate human and other resources; lack of incentives; perception of implement-tation as additional work burden; and socio-cultural barriers.

CONCLUSIONS: This review demonstrates that implementation research can be used to achieve UHC-related outcomes in Africa. It has identified important facilitators and barriers to the use of implementation research for promoting UHC in the region.

3. Campbell, B. R., et al. **Mobile device usage by gender among high-risk HIV individuals in a rural, resource-limited setting**. *Telemed J E Health.* 2021;27(6):615-24.

   Online at: https://www.liebertpub.com/doi/10.1089/tmj.2020.0218?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%20%200pubmed.

   BACKGROUND: Mobile health (mHealth) is a promising tool to deliver healthcare interventions to underserved populations. We characterized the use of mobile devices in rural KwaZulu-Natal, South Africa to tailor mHealth interventions for people living with HIV and at risk for acquiring HIV in the middle-income country.

   METHODS: We surveyed participants in community settings and offered free HIV counseling and testing. Participants self-reported their gender, age, relationship, and employment status, receipt of monthly grant, condomless sex frequency, and circumcision status (if male). Outcomes included cell phone and smartphone ownership, private data access, health information seeking, and willingness to receive healthcare messages. We performed multivariable logistic regression to assess the relationship between demographic factors and outcomes.

   RESULTS: Although only 10% of the 788 individuals surveyed used the phone to seek health information, 93% of cell phone owners were willing to receive healthcare messages. Being young, female, employed, and in a relationship were associated with cell phone ownership. Smartphone owners were more likely to be young, female, and employed. Participants reporting condomless sex or lack of circumcision were significantly less likely to have private data access or to purchase data.

   CONCLUSIONS: mHealth interventions should be feasible in rural KwaZulu-Natal, though differ by gender. As women are more likely to own smartphones, smartphone-based mHealth interventions specifically geared to prevent the acquisition of or to support the

care of HIV in young women in KwaZulu-Natal may be feasible. mHealth interventions encouraging condom use and medical male circumcision should consider the use of nonsmartphone short message service and be attuned to mobile data limitations-especially when targeting men.

Impact and coverage

1. Sharma, A. L., et al. **Circumcision as an intervening strategy against HIV acquisition in the male genital tract**. *Pathogens.* 2021;10(7):806.

   Online at: https://www.mdpi.com/2076-0817/10/7/806/htm.

   Unsafe sex with HIV-infected individuals remains a major route for HIV transmission, and protective strategies, such as the distribution of free condoms and pre-or post-prophylaxis medication, have failed to control the spread of HIV, particularly in resource-limited settings and high HIV prevalence areas. An additional key strategy for HIV prevention is voluntary male circumcision (MC). International health organizations (e.g., the World Health Organization, UNAIDS) have recommended this strategy on a larger scale, however, there is a general lack of public understanding about how MC effectively protects against HIV infection. This review aims to discuss the acquisition of HIV through the male genital tract and explain how and why circumcised men are more protected from HIV infection during sexual activity than uncircumcised men who are at higher risk of HIV acquisition.

2. Iyemosolo, B. M., et al. **A comparison of the prevalence of sexually transmitted infections among circumcised and uncircumcised adult males in Rustenburg, South Africa: a cross-sectional study**. *BMC Public Health.* 2021;21(1):656.

   Online at: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-10509-1.

   BACKGROUND: South Africa has a persistent burden of sexually transmitted infections (STIs). Male circumcision has been shown to be effective in preventing HIV and STIs, but data are scarce on the protective effect of circumcision in high-risk populations such as migrant miners. The objective of this study was to assess the effect of medical and traditional circumcision on the prevalence of STIs after adjusting for other risk factors in Rustenburg, a mining town in North West Province, South Africa.

   METHODS: This cross-sectional study used baseline data collected from a cohort study. Adult males in a mining town were assessed for STIs (gonorrhea, chlamydia, and trichomoniasis) using syndromic assessment. Data on circumcision status and other risk factors for STI syndromes were collected using an interviewer-administered questionnaire. The following symptoms were assessed; penile discharge, painful urination, dyspareunia or penile sores. These symptoms indicate sexually transmitted infection in general since laboratory tests were not performed. Multivariable log

binomial regression was used to assess the independent effect of circumcision on STI presence after adjusting for confounders.

RESULTS: A total of 339 participants with a median age of 25 years (IQR 22-29) were included in the study, of whom 116 (34.2%) were circumcised. The overall STIs prevalence was 27.4% (95% CI 22.8 to 32.6%) and was lower in the circumcised participants compared with those who were uncircumcised (15.5% vs 33.6%, respectively, $p < 0.001$). Both medical (OR 0.57, 95% CI 0.34-0.95, $p = 0.030$) and traditional circumcision (OR 0.34, 95% CI 0.13-0.86, $p = 0.022$) were strongly associated with a lower risk of STIs after adjustment for employment and condom use.

CONCLUSION: In this high-risk population in a mining town in South Africa, with a relatively high prevalence of STIs, and where one third of males are circumcised, both medical and traditional circumcision appear to be protective against STIs.

3. **Erratum to: Voluntary medical male circumcision proves robust for mitigating heterosexual human immunodeficiency virus infection**. *Clin Infect Dis.* 2021 Jun 14;ciab383. Online ahead of print.

   Online at: https://academic.oup.com/cid/advance-article/doi/10.1093/cid/ciab383/6298474.

4. Punjani, N., et al. **Genitourinary infections related to circumcision and the potential impact on male infertility**. *World J Mens Health.* 2021 May 18. Online ahead of print.

   Online at: https://wjmh.org/DOIx.php?id=10.5534/wjmh.210043.

   Male circumcision (MC) is one of the oldest surgical procedures still completed today. Medical indications for MC include phimosis, recurrent balanitis, cosmesis, and infection prevention. In this review, we mainly focus on the role of MC in the prevention of human immunodeficiency virus, human papillomavirus, herpes simplex virus, gonorrhea, chlamydia, chancroid, and syphilis, and the subsequent impact of these genitourinary infections on male fertility. Overall, many compelling data support that MC may play an essential role in both genitourinary infection prevention and male fertility.

5. Smith, J. S., et al. **Male circumcision reduces penile HPV incidence and persistence: a randomized controlled trial in Kenya (abstract)**. *Cancer Epidemiol Biomarkers Prev.* 2021;30(6):1139-48.

   Online at: https://www.ncbi.nlm.nih.gov/pubmed/33972367.

   BACKGROUND: Male circumcision reduces the risk of human immunodeficiency virus infection in men. We assessed the effect of male circumcision on the incidence and natural history of human papillomavirus (HPV) in a randomized clinical trial in Kisumu, Kenya.

METHODS: Sexually active, 18- to 24-year-old men provided penile exfoliated cells for HPV DNA testing every 6 months for 2 years. HPV DNA was detected via GP5+/6+ PCR in glans/coronal sulcus and in shaft samples. HPV incidence and persistence were assessed by intent-to-treat analyses.

RESULTS: A total of 2,193 men participated (1,096 randomized to circumcision; 1,097 controls). HPV prevalence was 50% at baseline for both groups and dropped to 23.7% at 24 months in the circumcision group, and 41.0% in control group. Incident infection of any HPV type over 24 months was lower among men in the circumcision group than in the control group [HR = 0.61; 95% confidence interval (CI), 0.52-0.72]. Clearance rate of any HPV infection over 24 months was higher in the circumcision group than in the control group (HR = 1.87; 95% CI, 1.49-2.34). Lower HPV point-prevalence, lower HPV incidence, and higher HPV clearance in the circumcision group were observed in glans but not in shaft samples.

CONCLUSION: Male circumcision reduced the risk of HPV acquisition and reinfection, and increased HPV clearance in the glans.

IMPACT: Providing voluntary, safe, and affordable male circumcision should help reduce HPV infections in men, and consequently, HPV-associated disease in their partners.

Safety

1. Victor, O., et al. **Adverse event trends within a large-scale, routine, voluntary medical male circumcision program in Zimbabwe, 2014 to 2019**. *J Acquir Immune Defic Syndr* 2021 Jun 22. Online ahead of print.

   Online at: https://journals.lww.com/jaids/Abstract/9000/Adverse_event_trends_within_a_large_scale,.95851.aspx.

   BACKGROUND: Between 2008 and 2020, over 22.6 million male circumcision (MCs) were performed among males >/=10 years in 15 priority countries of East and Southern Africa. Few studies from routine MC programs operating at scale describe trends of adverse events (AEs) or AE rates over time.

   SETTING: Routine program data from a large MC program in Zimbabwe.

   METHODS: Chi-square compared characteristics of patients with AEs. Univariable and multivariable logistic models examined factors associated with AE severity. Cochran-Armitage trend tests compared AE rate trends by year (2014-2019), age, and MC method (2017-2019).

RESULTS: From 2014-2019, 469,000 males were circumcised; 38%, 27% and 35% among individuals aged 10-14; 15-19; and >/=20 years, respectively. Most MCs (95%) used surgical (dorsal slit or forceps guided) methods; 5% were device-based (PrePex). AEs were reported among 632 (0.13%) MCs; 0.05% were severe. From 2015 to 2019, overall AE rates declined from 34/10,000 to 5/10,000 (p-value <0.001). Severe AE rates also decreased over this period from 12/10,000 to 2/10,000 (p-value <0.001). AE rates among younger clients, ages 10-14 (18/10,000) were higher than among older age men (9/10,000) ages >/=20 years (p<0.001); however, there was no significant association between age and AE severity.

CONCLUSION: AE rates each year and over time were lower than the WHO acceptable maximum (2% AEs). ZAZIC quality assurance activities ensured guideline adherence, mentored clinicians to MC competency, promoted quality client education and counseling, and improved AE reporting over time. Decreases in AE rates are likely attributed to safety gains and increasing provider experience.

Social and behavioral research

1. Yuan, T., et al. **Acceptability of male circumcision for HIV prevention among men who have sex with men in China: a short report [abstract]** *AIDS Care.* 2021 Apr 26; 1-8. Online ahead of print.

   Online at: https://www.ncbi.nlm.nih.gov/pubmed/33908841.

   Recent evidence shows that circumcision is associated with lower HIV prevalence among MSM. We assessed the acceptability of circumcision for preventing HIV and that of Shang Ring circumcision (SRC) among men who have sex with men (MSM) in China. 538 adult MSM were recruited from six cities in China between January and March 2019. Participants were surveyed by an online, self-administered questionnaire. The acceptability of circumcision was assessed before and after the potential protective effect of circumcision against HIV was informed, and subsequently men's willingness to undergo SRC was assessed. The level of circumcision was 16.4%. Of 450 uncircumcised MSM, their willingness to be circumcised in the following six months increased significantly from 32.2% to 55.6% after the information session. Three quarters of men who were willing to undergo circumcision accepted SRC. MSM who perceived that circumcision could maintain genital hygiene were more likely to accept circumcision after the information session, whereas those who regarded circumcision as an embarrassing surgery were disinclined to be circumcised. The low circumcision rate, along with its high acceptability in Chinese MSM, suggests a great potential benefit of circumcision intervention if proved effective. SRC might be a popular circumcision procedure in this population.

2. Serwadda, D. M., et al. **Does medical male circumcision result in sexual risk compensation in Africa?** *Lancet Glob Health.* 2021;9(7): e883-e884.

   Online at: https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(21)00177-7/fulltext.

3. Gao, Y., et al. **Association between medical male circumcision and HIV risk compensation among heterosexual men: a systematic review and meta-analysis**. *Lancet Glob Health.* 2021;9(7): e932-e941.

   Online at: https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(21)00102-9/fulltext.

BACKGROUND: Medical male circumcision (MMC) reduces HIV infection among heterosexual men. There are concerns MMC might prompt higher-risk sexual behaviours because of lower self-perceived risk of HIV infection. We reviewed the published literature to examine associations between MMC and both condom use and number of sex partners among heterosexual men. M

METHODS: In this systematic review and meta-analysis, we searched PubMed, Embase, and the Cochrane Library for studies published before Nov 15, 2020. Interventional and observational studies were included if they contained original quantitative data describing the association between MMC and condom use or number of sex partners among heterosexual men. We excluded data from men whose circumcisions were ritual or religious and data from men who have sex with men. We extracted odds ratios (ORs) and 95% CIs for the associations between MMC and condomless sex and MMC and multiple sex partners directly from the publications if available, selecting adjusted ORs when provided; when necessary, we calculated ORs and 95% CIs using original study data provided in the publication. We used the Mantel-Haenszel random effects model to calculate pooled ORs and 95% CIs.

FINDINGS: Our search yielded 3035 results, of which 471 were duplicates and 2537 did not meet the inclusion criteria. From the remaining 27 eligible studies, we identified 99 292 men from 31 independent population samples. 24 studies were done in Africa. We found no statistically significant associations between MMC and condomless sex (OR 0.91, 95% CI 0.80-1.05; k=30; I(2)=88.7%) or multiple sex partners (1.02, 0.88-1.18; k=27; I(2)=90.1%). No associations between MMC and condomless sex or multiple sexual partners were found in any subgroup analyses by study design, income of country, age, recruitment setting, circumcision assessment, circumcision prevalence, and risk of publication bias.

INTERPRETATION: The promotion of circumcision as an HIV preventive measure does not appear to increase higher-risk sexual behaviours in heterosexual men. Ongoing

sexual health education should be maintained as a vital component of effective MMC programmes.

FUNDING: National Science and Technology Major Project of China, the Fundamental Research Funds for the Central Universities, and the Shenzhen Science and Technology Innovation Commission Basic Research Program.

4. Chetty-Makkan, C. M., et al. **High risk sexual behaviours associated with traditional beliefs about gender roles among men interested in medical male circumcision in South Africa**. *AIDS Res Ther.* 2021;18(1):33.

   Online at: https://aidsrestherapy.biomedcentral.com/articles/10.1186/s12981-021-00359-7.

   BACKGROUND: Beliefs about gender roles and high-risk sexual behaviours underlie the human immunodeficiency virus (HIV) epidemic in South Africa. Yet, there is limited information on the relationships between beliefs about gender roles and risky sexual behaviours. Few studies have explored the association between beliefs about gender roles, high risk sexual behaviour, and health-seeking behaviour among men.

   METHODS: We investigated associations between gender beliefs (dichotomised as traditional or progressive) and high-risk sexual behaviour among South African men presenting for medical male circumcision (Apr 2014 to Nov 2015).

   RESULTS: Of 2792 enrolled men, 47.4% reported traditional gender beliefs. Participant ages ranged between 18-46 years (median age 26 years; interquartile range, 21-31 years). Most participants had at least one sex partner over the last 12 months (68.2%). Younger men (18-24 years old vs. 25-46 years old) (odds ratio [OR], 1.5 [95% confidence interval (CI) 1.0-2.0]), those with multiple partners ([OR], 1.5 (CI) 1.3-1.8]) and participants unsure of their last partner's HIV status (OR, 1.4 [95% CI 1.1-1.7]) were more likely to have traditional beliefs on gender roles.

   CONCLUSION: Young men with traditional beliefs on gender roles may be more likely to engage in high-risk sexual behaviour and could be good candidates for HIV prevention programmes. N = 206 (max 350)

   TRIAL REGISTRATION: Name of registry: Clinicaltrials.gov; Trial registration number: NCT02352961; Date of registration: 30 January 2015 "Retrospectively registered"; URL of trial registry record: https://www.clinicaltrials.gov/.

5. Magadi, M., et al. **Understanding ethnic variations in HIV prevalence in Kenya: the role of cultural practices [abstract]** *Cult Health Sex.* 2021;23(6):822-39.

   Online at: https://www.ncbi.nlm.nih.gov/pubmed/32364024.

   Patterns of HIV prevalence in Kenya suggest that areas where various cultural practices are prevalent bear a disproportionate burden of HIV. This paper examines (i) the contextual effects of cultural practices (polygyny, male circumcision) and related sexual behaviour factors on HIV prevalence and (ii) the extent to which specific cultural practices in a community/county might explain existing ethnic variations in HIV prevalence in Kenya. The analysis applies multilevel logistic regression to data from the 2012/13 Kenya AIDS Indicator Survey. The results reveal striking ethnic variations in HIV prevalence in Kenya. The prevalence of polygyny in a community is positively associated with HIV prevalence, while a higher level of male circumcision in a county is protective for both men and women. The effects of these factors are stronger for men than women at both individual and contextual (community/county) levels. These cultural practices and associated risk factors partly explain existing ethnic differences in HIV prevalence in Kenya, but there remain significant ethnic variations that are not explained by these cultural practices or related sexual behaviour factors. These call for stronger empirical evidence to offer stronger theoretical explanations and inform effective policy and practice to address HIV epidemic in adversely affected communities in Kenya and similar settings in sub-Saharan Africa.