Costing Male Circumcision in Swaziland and Implications for the Cost-effectiveness of Circumcision as an HIV Intervention

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ACKNOWLEDGMENTS

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EXECUTIVE SUMMARY

Background

Clinical trials have now confirmed the efficacy of male circumcision (MC) in reducing female-to-male HIV transmission. Some cost data have been reported (ranging between US$25 and US$69) and these cost data also formed the basis of a cost-effectiveness analysis. It is unclear, however, what exactly is included in the costing studies and hence whether these costs are directly comparable. For example, often, indirect costs are not fully reflected; donations (especially clinicians' time) are not costed; and variation by provider type and level of health facility is not considered. It is anticipated that this cost analysis will provide a more detailed examination of the costs of male circumcision and inform a sounder basis for an assessment of the cost-effectiveness of MC and planning for implementation of MC in Swaziland. This analysis is part of a larger study titled the "Costing Male Circumcision in Lesotho, Swaziland, and Zambia: Implications for Cost-Effectiveness of Circumcision as an HIV Intervention." The larger study has two major components: (1) costing MC and (2) modeling the impact of MC on the HIV epidemic.

The purpose of the analysis in Swaziland was to (1) understand the social, cultural, and policy context of male circumcision; (2) assess the cost of providing adult MC in a resource-constrained setting; and (3) evaluate the implications of scaling up MC for the cost-effectiveness of MC and for the health system (e.g., resource mobilization and health system capacity).

Design/Methodology

Qualitative Analysis
Seventeen key informant interviews were conducted with healthcare providers, government officers, representatives of donors and nongovernmental organizations, and traditional leaders to better understand current norms, perceptions, and attitudes around clinical male circumcision. Two data collection instruments were specifically designed for this study: one for service providers and one for policymakers and other stakeholders. Extensive notes were taken, but the interviews were not recorded. When necessary, one interviewer served as a translator. The interview teams immediately analyzed the responses and made additional notes. No formal coding system or software was used.

Cost Analysis
The cost analysis is further divided into two components: (1) defining the intervention (reviewing existing literature and protocols and conducting key informant interviews with current and potential providers of circumcision); and (2) costing adult male circumcision (collecting direct and indirect cost data—financial, human resources, drugs, supplies, and equipment costs—from providers). An ingredients approach to costing was followed, whereby all the inputs were listed and their contribution to the overall cost was then quantified. Multiple countries and providers (private, government, nongovernmental, missionary) were considered, allowing for standardization, comparison, and validation. The unit costs were adjusted for the probability of and cost associated with complications. Although generally viewed as part of a comprehensive MC package of services,[4] some MC services were not routinely implemented (e.g., pre- and post-circumcision behavioral counseling and HIV testing and training). The costs of these activities were taken from existing service programs that might be unrelated to MC, such as counseling and testing.

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[4] There is no formal agreement on what constitutes a *comprehensive package of MC services*, but for the purposes of this study, it was assumed to contain the following elements: communications, pre-and post behavioral counseling, surgical procedure with post-surgical follow-up, counseling with or without testing, and training.

Epidemiologic Modeling

The impact of male circumcision on the number of new HIV infections was estimated using a computer simulation model, Spectrum. The model replicated the dynamics of the HIV epidemic in Swaziland by dividing the population into various risk groups: those not sexually active, those with a single sexual partner, those with more than one sexual partner, and sex workers and their clients. The model is initialized with demographic data from the latest population census, epidemiological data from antenatal care (ANC) surveillance, and behavioral data from the Demographic Health Survey (DHS). The model is first fit to the historical epidemic in Swaziland and then used to project the expected number of new HIV infections in the future, with no change in MC levels. The impact of an expanded program of male circumcision was then examined by assuming that the percent of men circumcised would increase to just above 50 percent by 2015 and then remain at this level beyond 2015. Based on recent MC studies, this study assumes male circumcision reduces the probability of male infections by 60 percent. The study assumes no impact on male-to-female transmission. The difference in the number of new infections between the base projection and the MC program projection represents the reduction in the number of new infections due to scaling up male circumcision.

Results

Qualitative Analysis

Male circumcision is not considered a cultural practice in Swaziland. Many Swazi men, however, acknowledge that it was practiced until the late 1800s, when it was stopped because the lengthy initiation school process and healing time decreased the availability of young men for military service and slowed the induction of recruits into the royal army. Interestingly, over the last five to six years, the number of circumcisions performed in public and private clinics has started to rise. Generally, respondents reported that men have many different motivations for seeking male circumcision, including improved hygiene, broader health benefits, and greater sexual pleasure. Respondents also reported awareness of the MC trials in South Africa, Uganda, and Kenya.

The majority of respondents interviewed in this study seemed eager to see male circumcision added to the range of potential HIV prevention, or more broadly, reproductive health strategies. Some respondents offered specific recommendations on what should be offered in the MC "package"—most emphasized comprehensive HIV prevention education and condom use. A respondent from the Swaziland National AIDS Program argued that, "It would be better to frame male circumcision as a sexual and reproductive health issue to avoid risky behaviors and to accentuate the range of benefits." Interviewees indicated that public perceptions of male circumcision are generally positive, making it likely that people would use MC services if they were more widely available. However, some expressed concern about the possibility that men might overestimate the protective effect of male circumcision and engage in riskier sexual behavior, believing that they were fully protected from HIV infection—commonly known as behavioral "disinhibition" or risk compensation.

When the respondents were asked about potential scale-up for male circumcision, it was generally well understood that the health system in Swaziland is already overstretched. Task shifting was offered as a potential solution, given that current demands on the health system across Southern Africa have already led to significant de facto task shifting. There was general consensus that nurses should perform MC, but current policies would need to be amended to allow such as shift.

The challenge of MC scale-up goes beyond who performs it, as policymakers must also consider how the service is delivered. Various service delivery models were discussed with interviewees, but two models featured more prominently: mobile services using a team of specialized circumcision surgeons and "circumcision weekends."

Costing and Modeling

Uncomplicated circumcisions usually require four visits: an initial visit for the pre-surgical examination and information and education; a second visit for the surgical procedure; and two follow-up visits at 2-3 and 7 days post-surgery. A fifth visit at 21 days post-surgery is recommended but seldom occurs in uncomplicated cases. Adult MC is done under local anesthesia. Antibiotics are not routinely prescribed by providers. Dressings are generally not reapplied at the first post-operative visit (although this was not the case in Lesotho and some providers in Zambia).

The unit cost of a comprehensive package of MC services was estimated at U$51.30 (E376) (weighted for the cost of complications). The largest share of this amount was surgical costs (78.6%), followed by communications (14.5%), testing (3.6%), and pre-and post-operative counseling (3.3%). Note that this excludes training, community mobilization and policy analysis and formulation costs. Based on the cost analysis, the epidemiological impact and cost effectiveness of scaling up MC among males (ages 15–49) to 57.5 percent coverage (i.e., to reduce the number of uncircumcised men by half) between 2008 and 2020 were projected for Swaziland. It was estimated that one HIV infection will be averted for every 4.1 circumcisions performed and that the cost per infection averted is US$176 (E1,290). Relative to other prevention interventions, MC is potentially a cost-effective intervention. The cost-effectiveness analysis depends on several factors: (1) the period over which the cost- effectiveness analysis is estimated and (2) the pace of scaling up. These findings are largely because MC is a one-time intervention and because there are direct and indirect effects associated with MC. The benefits of male circumcision are therefore multiplicative over time.

How sensitive are the cost-effectiveness results to assumptions about behavioral responses to MC? The impact of changes in condom use on cost per infection averted showed that the results are relatively insensitive to small to moderate reductions. For example, the impact of male circumcision would be less than shown here if those who are circumcised adopt riskier behaviors because they think they are protected by the circumcision. A 25 percent reduction in condom use among those who are circumcised would reduce the impact by about 17 percent in Swaziland. As the qualitative analysis also reveals, these results underscore the critical importance of (1) locating the surgical provision of MC within a comprehensive set of services that includes behavior change communications and pre- and post-operative counseling; and (2) locating MC services within a broader set of effective prevention interventions.

The scaling up requires approximately 14,644 male circumcisions in 2008, increasing to a high of 18,305 in 2015—implying an average annual number of 11,297 circumcisions or a daily average of 47 circumcisions for the next 10 years to achieve and maintain 57.5 percent coverage. Over the period 2008–2020, on average, 4.5 surgical nurses and 6.1 physicians have to be dedicated full time to male circumcision. According to the World Health Organization, there are 171 physicians in the public and private health system of Swaziland, implying that 4 percent of all doctors will be required to reach this relatively modest scale-up target. The cumulative total resources needed for scaling up MC between 2008 and 2020 is US$6.6 million (E48.3 million). The average annual cost is US$506,061 (E3.7 million). As expected, the surgical procedure accounts for the overwhelming share of the total costs (78.6%), followed by communications (14.5%) (see Figure 6). As mentioned before, training, community mobilization, and policy analysis and formulation costs are not included in this estimate.

Conclusion

Qualitative Analysis

There is a high level of knowledge among respondents and growing awareness among the general public about the benefits of male circumcision for HIV prevention. At a time when few prevention strategies are making any significant impact on HIV incidence, most respondents seem eager to have male circumcision added to the repertoire of HIV prevention and/or reproductive health strategies. There was broad recognition, however, that further research is needed to better understand the prevalence of MC, the role

of the traditional sector and the private sector, and how current policies should be modified to indicate who can perform the procedure and where MC should be "housed."

There is widespread support for integrating male circumcision into other reproductive health services, including HIV testing, condom promotion, and education to address issues around behavioral "disinhibition" as well gender equality. Most respondents noted that people have different reasons for getting circumcised, so it should fall under a broader context than HIV/AIDS.

Many respondents emphasized the need to enlist nurses, traditional healers, and nongovernmental organizations in the male circumcision effort—if the process is left only to doctors, rapid rollout will be a challenge. New service delivery methods are needed and civil society should be actively engaged in MC scale-up efforts. Respondents noted that many issues could be addressed through greater advocacy efforts: expanded coverage, better training of MC providers, and incentives to increase and retain providers.

Costing and Modeling

The analysis has shown that MC can be a cost-effective intervention when compared to the relative cost effectiveness of other prevention interventions. There are several factors that influence the potential benefits. The pace of scaling up matters and the benefits from scaling up are not only multiplicative but also long lasting. In addition, it is important to provide the surgical procedure within a comprehensive set of services that includes behavior change communications and pre- and post-operative counseling and, equally important, to provide MC services within a broader set of effective prevention interventions.

The analysis also showed that the implications to the health system are not trivial. The intention is not to suggest that vast increases in service delivery capacity (in terms of surgical facilities or surgical staff) are necessarily needed in Swaziland. Rather, it is recommended that some innovative ways be identified to involve all providers of clinical services. One issue to consider is that public and private provision of MC can be complementary and should not be viewed as mutually exclusive. However, mechanisms should be devised to align practices among private providers with the recommended approaches (routine use of general anesthesia; routine prescription of antibiotics), allowing for standardization of the procedure across all health institutions in the country. The positive externalities associated with MC have been established and lay the basis for justifying public subsidization. However, the specific provider payment methods need to be decided on (e.g., fee-for-service; capitation approaches), as well as the mechanisms of reimbursement (voucher mechanisms, contracting, etc.). The health service, financial, and human resource implications are significant but not insurmountable; taking them into account will be important in ensuring that the benefits of this important public health intervention are realized as soon as possible by the people of Swaziland.

Based on consultations with various stakeholders, alternate scenarios can be modeled to assess the affordability and feasibility (in terms of human resource requirements) of various policy targets set for MC in Swaziland. The scenarios will likely inform resource mobilization and allocation for MC as an HIV intervention.

INTRODUCTION

Clinical trials have now confirmed the efficacy of male circumcision (MC) in reducing female-to-male HIV transmission. Some cost data have been reported (ranging between US$25 and US$69), and these cost data also formed the basis of a cost-effectiveness analysis.[5] It is unclear, however, what exactly is included in the costing studies and hence whether these costs are directly comparable. For example, often, indirect costs are not fully reflected; donations (especially clinicians' time) are not costed; variation by provider type and level of health facility is not considered; the particular surgical procedure used and the scale of service delivery is unclear. It is anticipated that this cost analysis will provide a more detailed examination of the costs of MC and might inform a sounder basis for an assessment of the cost-effectiveness of MC. This analysis is part of a larger study with two major components: (1) costing MC, and (2) modeling the impact of MC on the HIV epidemic.

The purpose of this analysis was to (1) understand the social, cultural, and policy context of male circumcision in Swaziland; (2) assess the cost of providing adult MC in resource-constrained settings such as Swaziland; and (3) to evaluate the implications of scaling up MC in Swaziland for the cost-effectiveness of MC and for the health system (e.g., resource mobilization and health system capacity).

METHODOLOGY

Qualitative Analysis

Seventeen key informant interviews were conducted with healthcare providers, government officers, representatives of donors and nongovernmental organizations, and traditional leaders to better understand current norms, perceptions, and attitudes around clinical male circumcision (see Table 1 for participating organizations). Two data collection instruments were designed for this study: one for service providers and one for policymakers and stakeholders (see Appendices F and G). The questionnaires covered the following topic areas:
- How male circumcision procedures are currently carried out
- Attitudes toward male circumcision
- Current norms and protocols being used to implement MC
- Capacity of the health system to scale up MC
- The role of the traditional sector in expanding coverage

Table 1. List of Organizations Included in Key Informant Interviews

Participating Organizations
Coordinating Assembly of Nongovernmental Organisations (CANGO)
Department of Urology, Mbabane Government Hospital
Family Life Association of Swaziland (FLAS)
Good Shepherd Hospital
HIV Parliamentary Committee
Mbabane Clinic (Private)
Medisun Clinic

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[5] Kahn, J.G., E. Marseille, and B. Auvert. 2006. "Cost-Effectiveness of Male Circumcision for HIV Prevention in a South African Setting." *PLoS Medicine* 3(12).

Ministry of Health, Swaziland National AIDS Programme (SNAP)
MoHSW Health Education Unit
National Emergency Response Council on HIV/AIDS (NERCHA), Task Force on MC
Private physician RFM, Nazarene, Manzini
SMO Mbabane Government Hospital
Swazi Network of People Living with HIV/AIDS (SWANEPHA)
Swaziland National Council
Traditional Healers Organisation
United States Government, President's Emergency Plan for AIDS Relief Program

Extensive notes were taken, but the interviews were not recorded. When necessary, one interviewer served as a translator. The interview teams immediately analyzed the responses and made additional notes. No formal coding system or software was used.

Costing and Modeling

A detailed cost analysis of a subset of hospitals where circumcision is performed in Swaziland was undertaken. The details of the costing model and data collection tool are provided in Appendix A and B. The data collection instrument was designed specifically for this study, and the Ministry of Health and Social Welfare (MoHSW) can replicate the tool at a later stage to better understand the functioning and key determinants of costs as circumcision is implemented or scaled up.

Costing Approach

Standard costing methods were applied. The cost data were collected retrospectively through interviews with clinical and administrative staff at health facilities and various officers in the MoHSW and nongovernmental facilities providing MC services. An ingredients approach was used, whereby all the inputs were listed and their contribution to the overall cost was then quantified. The approach allows us to assess whether the costs of the chosen data collection sites can indeed be generalized by making explicit the specific elements of the service that are included in the cost analysis. For example, if a certain cost category is specific to the sites studied, then that item's contribution to the overall unit cost can be removed. This cannot be done if the total program expenditure is merely divided by outputs. This approach is also useful for planning purposes, as it allows planners to add or remove certain elements of the intervention based on the MC guidelines that may be adopted in Swaziland.

Method of estimation. The theory behind this estimation is from standard economics theory where total cost (C_t) in year, t, equals price (P) multiplied by the quantity (Q_t) of circumcisions in any given year, t. The aim of this part of the analysis was to estimate the unit cost, P_j. Unit cost of MC, P_j, was estimated as:

$$C_j = c_j^{direct} + \sigma * c_j^{indirect}$$

$$c_j^{direct} = \sum_{h,j} c_{h,j}$$

$$c_j^{indirect} = \sum_{l,j} c_{l,j}$$

Where: $c_{k,j}$ = direct cost per person served at provider, j, for h=1 (staff), 2 (drugs), 3 (supplies), etc.
$c_{l,j}$ = indirect cost per person served at provider, j, for l=1 (facility equipment), 2 (facility utilities), 3 (facility supervision), etc.
σ = share of facility services devoted to MC
Providers (j) considered are j=1 (government), 2 (NGO), 3 (missionary)

Direct and indirect costs of MC with complications were also estimated. Unit cost of uncomplicated MCs were weighted by the cost of MC complications and the probability of each complication occurring.

$$C_j^* = pr(uncomplicated\ MC) * C_j^{uncomplicated}$$

$$+ pr(complication_k) * C_j^{complication_k}$$

$$TC_{j,y} = C_j * Q_{j,y}$$

$$TC = \sum_{j,y}\left[\frac{TC_{j,y}}{(1+r)^a}\right]$$

Where: r = real discount rate[6]

a = number of years into the future

In the larger study, multiple countries were considered, allowing for standardization, comparison, and validation. The choice of the countries was guided by the two factors that according to Williams and others (2006)[7] were predictors of a large potential benefit from scaling up MC, namely, high HIV prevalence and low to moderate MC prevalence.

Currency. The cost data is presented in local currency as well in U.S. dollars, using an exchange rate at the time of data collection (January 2007) (US$1 = 7.32 Emalangeni).

Scale. Scale differences may also influence the estimated unit cost. The scale at which MC is implemented at the various sites are of a similar order or magnitude, allowing for comparison of the cost data.

Indirect costs. The table in Appendix C shows some of the broad categories of costs that were considered. In the costing methodology, goods that have a life of more than one year are treated as capital costs. Financial cost analysis involves estimating the average annual cost of each capital item in terms of simple "straight line" depreciation—the most common form of depreciation.[8] As the table shows, indirect costs also included recurrent costs, such as personnel and non-personnel costs.

Steps in the unit cost estimation. Steps in the analysis included (1) describe the intervention, (2) identify inputs, (3) quantify inputs, (4) collect cost information, (5) assign monetary values, (6) calculate total cost, (7) quantify outputs, and (8) calculate unit cost.

Defining the intervention. Currently, circumcision is not implemented primarily as an HIV prevention intervention; and, therefore, in most instances, not all of the elements of a comprehensive MC package of services were routinely provided. The costing study, however, not only considered the surgical intervention but also the services not currently part of circumcision (information and education, counseling with or without testing, training, etc.); this was done to ensure that the information could be used to inform planning for the implementation of a comprehensive package of MC services. Indirect methods were used to get cost data on the non-surgical elements of comprehensive circumcision services. For example, the cost of counseling with or without testing was obtained from voluntary counseling and testing (VCT) programs. In summary, the costing study takes into account the following components shown in Table 2:

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[6] A discount rate of 3 percent was used. This is within the range of 3–5 percent recommended in the World Health Organization Guide to Cost-Effectiveness Analysis.

[7] Williams, B.G., J.O. Lloyd-Smith, E. Gouws, Hankins, C., Getz W.M., J. Hargrove, I. De Zoysa, C. Dye, and B. Auvert. 2006. "The Potential Impact of Male Circumcision on HIV in Sub-Saharan Africa." *PLoS Medicine* 3(7).

[8] Depreciation reflects the loss of value of a capital good over time and involves dividing the cost of the item by its useful life or, stated alternatively, by multiplying the cost by the depreciation factor.

Table 2. Surgical Direct and Indirect Costs and Non-surgical Components

Surgical Procedure	
Direct Costs	**Indirect Costs**
Staff	Management and supervision staff
Drugs	Support staff
Consumable supplies	Infrastructure
Non-consumable supplies	Equipment
	Vehicles
	Maintenance
	Utilities
Non-surgical components	
Counseling	
Testing	
Communications	
Training (not included in all the analyses)	

This study focused on the cost of circumcision in adolescent and adult males. Circumcision at birth or in young boys has very different cost implications. For example, circumcision in young boys has to be performed under general anesthesia and the costs are much higher. On the other hand, neonatal circumcision is a lower cost procedure, as the surgical procedure is much simpler and less time consuming, no suturing is required, and minimal post-operative follow-up is needed. Implementation of neonatal circumcision will, however, require additional training.

The analysis allows for variation in circumcision practices and patient management. The purpose of this study was not to estimate the costs of various surgical techniques. Instead, the various clinical practices are made explicit and costed accordingly (e.g., whether there is routine use of antibiotic prescriptions; whether there is routine use of general anesthesia, etc.)—all of which have important cost implications.

The analysis was undertaken from the perspective of service providers (i.e., not from households or consumers). The implication is that expenses incurred by patients are not included in the analysis (e.g., travel costs, opportunity cost of travel time, opportunity cost of post-operative healing time, etc.). However, this does not mean that the costs facing patients are not taken into account. Data were collected on the out-of-pocket expenses that patients incur for the services from various provider types.

For the surgical intervention, the inputs were quantified from booking to discharge of the patient and all follow-up visits. The inputs included all staff that are involved (clinical, non-clinical staff); time spent by each staff member; salary and non-salary benefits for staff members; and drugs and supplies by type, quantity, and associated costs. In addition to these direct costs, indirect costs were also included, such as facility operating costs (e.g., electricity, maintenance); facility administrative costs (e.g., superintendent, accountant); and facility equipment costs (e.g., autoclaves, refrigerators, vehicles).

Selection of facilities. Cost data was collected from public facilities operated by the MoHSW and nongovernmental facilities. Data were collected from four facilities identified by the MoHSW: two public hospitals operated by the MoHSW (in Mbabane and the Good Shepherd Hospital) and one operated by the Family Life Association of Swaziland (FLAS) and one operated by the Raleigh Fitkin Memorial (RFM) in Manzini.

Epidemiologic Modeling

Male circumcision has been shown by three randomized control trials to be effective in protecting men from HIV infection. The rate of infection among men circumcised in the trials was about 60 percent lower than the rate among men who were not circumcised. The actual impact in Swaziland will depend on many factors, including the rate of scale up of circumcision services, the prioritization of target groups in the early stages of the intervention, and the dynamics of the epidemic. To estimate the impact that might be expected in Swaziland, a computer simulation model, Spectrum, was applied to replicate the historical epidemic pattern and demonstrate the effects of increasing the level of male circumcision.

The model simulates the adult population between the ages of 15 and 49 (which accounts for about 85–90% of all adult HIV infections). It is implemented as a module within the Spectrum suite of policy models developed and maintained by the POLICY Project and now the USAID | Health Policy Initiative. Full details, including the model equations, are provided in the Spectrum user's manual.

The population is divided into male and female populations but is not further stratified by age within the 15–49 age group. New entrants to the model are those people reaching 15 years of age. When they initiate sexual activity, they are placed into one of five risk groups: low-risk heterosexuals (those faithful to a single partner), medium-risk heterosexuals (those with multiple partners), high-risk heterosexuals (sex workers and their clients), men who have sex with men (MSM), and injecting drug users (IDUs). People may leave any of the higher risk groups by adopting low-risk behavior.

Every person entering the model population is assumed to be HIV negative and to remain uninfected while not sexually active. The sexually active and IDU populations are at risk of infection each year. The probability of becoming infected depends on characteristics associated with that individual as well as his or her sexual partners. For sexual transmission, these factors include number of partners, number of acts per partner, condom use, presence of other sexually transmitted infections (STIs), use of antiretroviral therapy (ART), stage of infection, and male circumcision.

Most contact is assumed to be with partners in the same risk group. However, for low-risk groups, contact with other risk groups is a major source of new infection. Therefore, calculations for the low-risk population take into account that some individuals who are faithful to their partners will still be at risk because they have partners who engage in riskier behavior.

A person newly infected with HIV is in the Primary Infection Stage and remains in this category for six months. People in this stage are more infectious than those in other stages. An infected person passes out of the Primary Infection Stage to enter the Asymptomatic Stage, where he/she remains for approximately six years and has a low level of infectiousness. An infected person then moves to the Symptomatic Infection Stage, where he/she remains for about two more years, before dying from an AIDS-related illness. Infectiousness is elevated for people in the Symptomatic Infection Stage. People are considered to be eligible for ART during this stage. If they receive ART, then their rate of progression to death is reduced.

The probability of becoming infected is modified by male circumcision and other factors. For the analysis described here, it was assumed that MC reduces the probability of female-to-male transmission of HIV per sexual contact by 60 percent and that there is no effect on the probability of male-to-female transmission. A study is underway in Uganda to test whether male circumcision also reduces male-to-female transmission.

Data for the model are taken from a number of sources. Demographic data are primarily from the United Nations Population Division, HIV prevalence information is from HIV surveillance, and behavioral data was obtained from existing reports and studies.

Unit Cost Estimation

Table 3 summarizes the key results of the inputs into the surgical procedure across four facilities. Generally, four visits are required. The first visit is for initial examination and booking of the surgical procedure. The patient is usually seen by a doctor for 5–10 minutes and a nurse for 5–10 minutes. The nurse and doctor mainly provide information regarding the surgical procedure, healing, potential complications, or adverse events. While behavioral counseling is not routinely provided, some behavioral counseling was provided at one NGO facility. The waiting time between the first and second visit varied between 1 week and 8 weeks and appeared to be constrained by competing surgical needs rather than differences in demand. The second visit involves the doctor, nurse, and nurse's assistant. These staff categories may be named differently in some facilities; for example, the nurse may be called the scrub nurse or surgical nurse. The nursing assistant may also be called the circulating nurse. The time input in minutes for each staffing category is shown in Table 3. The third visit usually happens 2–3 days after the surgical procedure. The patient is usually seen by a doctor and this visit takes 5–8 minutes of the time of a doctor and 5–10 minutes of a nurse's time. The fourth visit is usually 7 days post-surgery and takes about five minutes of a nurse's time. Although a fifth visit at 21 days post-surgery is recommended to the patient, patients with uncomplicated circumcision rarely return for this visit.

Table 3. Summary of Key Results

Facility	1	2	3	4
Facility type	Hospital	Hospital	Hospital	Health Center
Ownership	MoHSW	MoHSW	NGO/Mission	NGO
Cost to patient	U$4.84 (E35)	U$8.30 (E60)	U$4.84 (E35)	US$41.49 (E300)
Visit #1 (Initial visit, examination, booking)				
Staff time (minutes)				
Doctor	10	10	10	0
Nurse	10	10	10	8
Counselor	0	0	0	28
Waiting time	2 weeks	1 week	8 weeks	1 week
Visit #2 (surgical procedure)				
Staff time (minutes)				
Doctor	18	53	39	50
Nurse	18	53	39	50
Nurse Assistant	18	33	20	33
Nurse Anesthetist	0	0	0	0
Anesthesia	Local anesthesia	Local anesthesia	Local anesthesia	Local anesthesia
Antibiotics	None	None	None	None
Analgesics	Paracetamol	Paracetamol	Paracetamol	Paracetamol
Visit #3 (post-surgery follow-up; +2–3 days)				
Staff time (minutes)				
Doctor	15	15	15	0
Nurse	0	0	0	15
Dressing	Dressing not re-applied	Dressing re-applied	Dressing re-applied	Dressing not re-applied
Visit #4 (post-surgery follow-up; +7 days)				
Staff time (minutes)				
Nurse	5	5	5	5

Variation in Services

Some of the most notable variations among the provider types were (1) the type of anesthesia used, (2) whether antibiotics were routinely prescribed, and (3) whether a surgical dressing was applied after the third visit (at 2–3 days post-surgery).

Type of anesthesia. Generally non-private providers (i.e., public and NGO) use local anesthesia, whereas private providers routinely use general anesthesia. General anesthesia substantially adds to the costs of the procedure because the time of an anesthetist (for the duration of the surgery) has to be included in the costs, as well as the cost of anesthesia; the cost of an overnight stay before the surgery; and recovery time after the procedure, which might include a second overnight stay. In addition, fasting is required, and if the time of the surgery is delayed, the patient will require an intravenous line and glucose. Because of the elective nature of circumcision, the surgery is sometimes delayed or even postponed if there are more urgent surgical procedures.

Prescription of antibiotics. In Swaziland, antibiotics were not routinely prescribed in the non-private sector. This was also the case in Zambia, but not in Lesotho.

Surgical dressing after the first post-operative visit. As mentioned, the first post-operative visit takes place 2–3 days following the surgery.

Direct and Indirect Costs

The breakdown of the direct and indirect costs associated with an uncomplicated MC is shown in Figure 1. The direct costs include the cost of consumable supplies (34.7%), non-consumable supplies[9] (0.6%) and staff costs (46.2%). The indirect costs include maintenance and utility costs (7.0%), capital costs (4.0%), management and supervision costs and support staff costs (7.6%). The largest contributors to the overall costs were staff and consumable supplies.

Figure 1. Breakdown of Cost of Circumcision

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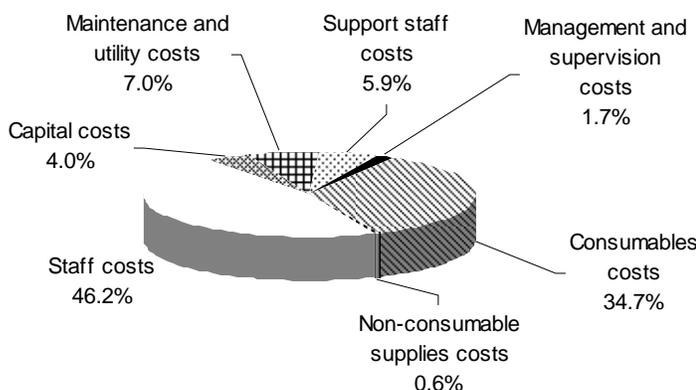
[9] The results reported here include the costs of investment in surgical equipment needed for performing circumcision. These instruments comprise what are known as surgical trays and emergency trays in hospitals. Appendix E shows the specific instruments that make up these trays.

Complications and Related Costs

Post-operative complications are relatively infrequent occurrences, occurring in approximately 7 percent of circumcisions in the facilities studied. Mild to moderate pain is generally not viewed as a complication, and analgesics are routinely prescribed as part of the procedure. The most common post-operative complications[10] are hemorrhage and/or hematoma (2% of circumcisions) and sepsis (5% of circumcisions). These are complications of moderate severity, and no cases of the other adverse events with long-term consequences described in the literature[11]—such as excessive skin removal, problems with urination, or problems with appearance—were reported. Hemorrhage and/or hematoma are the most resource intensive complications, as they require anesthesia, re-opening of the surgical wound, and ligation of each bleeding vessel individually. Hemorrhage is usually detected shortly after surgery and sometimes even before the patient is discharged. Hematoma results from internal bleeding and commonly involves swelling; the patient usually returns within the first day after the surgery. The other complication, sepsis, is usually detected at the first post-operative visit (2 days after surgery).

The two most common complications were costed (hemorrhage and sepsis). These are reflected in an adjusted unit cost weighted for the additional cost of complications and the probability of each complication occurring. Figure 2 shows a breakdown of unit costs of MC without complication, unit costs if a complication arises, and the adjusted (weighted) unit cost. The unit cost of MC complicated by hemorrhage is 57.1 percent higher than an uncomplicated MC. For MC complicated by sepsis, the cost is 14.1 percent higher. Because of the relative infrequent occurrence of these complications, the unit cost weighted by the frequency of complications is only 1.9 percent or US$0.74 (E5.4) higher than a circumcision without any complication. The most important sources of the difference are the cost of consumable supplies and staff costs.

Figure 2. Comparison of the Breakdown of Adjusted and Unadjusted Unit Costs of Surgical Procedure

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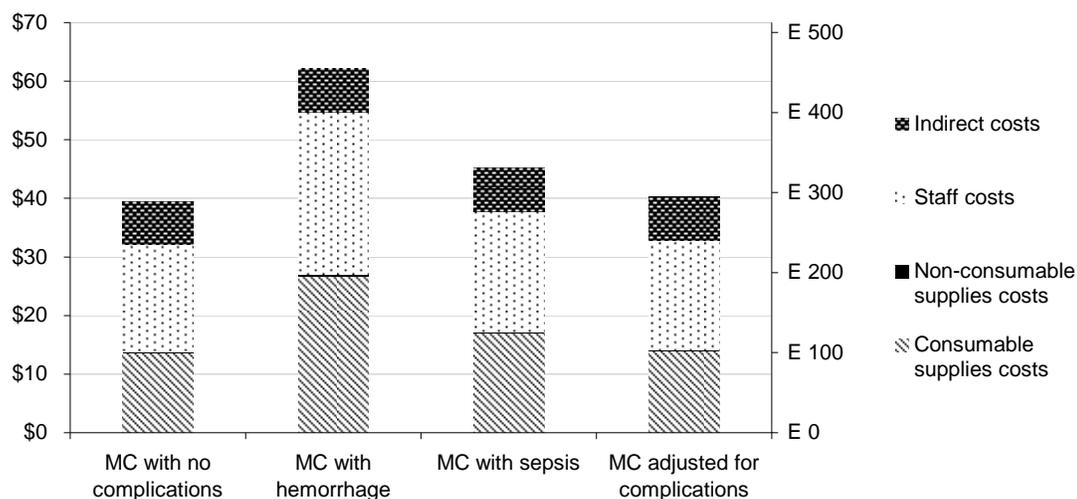
[10] Note this is not a comprehensive survey of the complications associated with MC in Swaziland. These figures are merely used to apply probability weights to the cost data collected. A more detailed assessment of MC complications has been conducted for Swaziland, and the rate of MC complications was lower. The differences may be due to differences in definitions and the period over which the complications were studied.

[11] UNAIDS, WHO, London School of Hygiene and Tropical Medicine. Draft 2007. Male circumcision: Global Trends and Determinants of Prevalence, Safety, and Acceptability.

The results presented here show the inputs and associated costs of circumcision as it is currently implemented in Swaziland. There are important omissions that are routinely included as part of a complete MC package of services (e.g., communications, testing, pre- and post-circumcision information and education, and behavioral counseling and training). As mentioned in the description of the methodology, the costs for the additional interventions (pre- and post-circumcision behavioral counseling and HIV testing) were taken from existing programs that offer these services but might be unrelated to MC. The assumptions that underpin the estimation of these costs are shown in Appendix D.

In the comprehensive package of MC services, pre- and post-circumcision behavioral counseling, HIV testing, and communications collectively add 27.3 percent to the cost of the surgical procedure. The unit cost of a comprehensive package of MC services was estimated at US$51.30 (E376). Communications account for the largest share of this additional cost. Training costs were also estimated according to the assumptions listed in Appendix D, but these costs have not been included in Figure 1 and Figure 2. This is largely because training needs are dependent on the human resource requirements and do not necessarily have to be repeated annually, and additional consultation is needed to agree on training needs. Other excluded costs are policy formulation and community mobilization costs.

SCALING UP CIRCUMCISION

The future uptake and rate of scale-up of MC is not known. However, to inform planning processes, the results of the qualitative interviews and scenario modeling are presented. The validity of the model was tested by matching the projected prevalence with observed HIV prevalence (from sentinel surveillance surveys). Appendix A includes a more detailed explanation of the model. The epidemiology model was linked to the AIDS Impact Module of Spectrum in order to make the HIV and AIDS projections for Swaziland.

Based on the interviews conducted in Swaziland, many respondents emphasized the need to enlist nurses, traditional healers, and nongovernmental organizations in the male circumcision scale-up effort—if the procedure is provided only by doctors, rapid rollout and scale-up will be a challenge. A representative from the Swazi National AIDS Program reported, "I think it would be important to involve the nurses. There are very few doctors. You'll see by the [waiting] lines. We should train the nurses that have been trained in surgery. As for the issue of the funding, government can subsidize it. Talking with the Parliamentary Committee and the National Task Force on MC is the right way to go." In addition, a physician working in a church hospital thought nurses could easily perform the procedure, but they would need an incentive or increase in pay to match their additional responsibilities: "We would need to train nurses from the clinics with a salary increase incentive because there aren't enough doctors. It does not require medical school training. It's really easy." He added, "Task shifting would need to be supported by changes in policies," which are currently unclear about who can perform the procedure.

Many respondents reported a lack of social movements in Swaziland capable of advocating to the government for policy changes like those suggested above. However, respondents stated, "There is no civil society presence to advocate for policy reform—we lack those skills to do consistent advocacy. We would benefit from capacity building in this area, although it's not clear who would coordinate it." Advocacy played a key role in expanding antiretroviral drug coverage in Southern Africa, and it is likely to be equally important to MC implementation and scale-up.

Impact and Cost-Effectiveness of Scaling up MC

According to the baseline epidemiologic model, the cumulative number of new infections over the period 2008–2020, given the current level of behavior, will be 373,836, or on average 28,757 annually. Table 4 presents the results of the analysis if MC were scaled up to reach 57.5 percent of all males between the

ages of 15 and 49.[12] It is projected that, cumulatively, over the period 2008–2020, 36,514 new infections will be averted. This translates into an average number of 2,809 infections averted annually or 10 percent of new infections relative to the baseline projection. The implication is that, on average, over the period 2008–2020, for every 4.1 circumcisions 1 new HIV infection will be averted. Using the cost per MC (US$51.30; E376) from the cost analysis, the discounted cost per infection averted is estimated at US$176 (E1,290).

Table 4. Impact and Cost-effectiveness of Scaling up MC (2008–2020)

	Projection Period: 2008–2020	
	Cumulative	Average Annual
Number of infections averted	36,514	2,809
Percentage of infections averted relative to baseline	10%	
MCs per infection averted		4.1
Cost per infection averted*		US$176 (E1,290)

discounted

How does this compare with the cost effectiveness of other prevention interventions? Table 5 shows the results from literature on the cost effectiveness of prevention interventions and suggests that at a cost per infection averted of US$176 (E1,290), MC is a highly cost-effective intervention.

Table 5. Cost per HIV Infection Averted for Selected HIV Interventions from the Literature[13]

Intervention	Cost per Infection Averted	
Condom distribution	US$10–2,188	E73-E16,016
VCT	US$393–482	E2,877-E3,528
Prevention of mother-to-child transmission (PMTCT)	US$20–2,198	E146-E16,089
STI treatment	US$271–514	E1,984-E3,762
School-based education	US$7,288–13,326	E53,348-E97,546
Male circumcision	US$181[14]	E1,319

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[12] This is a preliminary scenario and will be finalized in consultation with the MoHSW to arrive at the most useful scenarios for planning the implementation of MC in Swaziland.

[13] Creese A, K. Floyd, A. Alban, and L. Guinness. 2002. "Cost-effectiveness of HIV/AIDS Interventions in Africa: A Systematic Review of the Evidence." *Lancet* 2002 (359):1635–43.

[14] Kahn, J.G., E. Marseille, and B. Auvert. 2006. "Cost-Effectiveness of Male Circumcision for HIV Prevention in a South African Setting." *PLoS Medicine* 3(12).
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Pace of Scale-Up

The preceding analysis assumed a linear scale-up to reach the target coverage of 57.5 percent in 2015. What if the pace of scaling up moves slower or faster than a linear scale-up, as illustrated in Figure 3? Table 6 shows the impact of various patterns of scale-up relative to the linear scale-up. If MC scale-up occurred at a slower pace, the average annual number of MCs over the period 2008–2020 would be similar, but the number of infections averted would be much less (-14.5%) relative to the linear scale-up. If, however, scale-up occurred at a faster pace, as illustrated in Figure 3, the average annual number of MCs needed would again be similar, but the number of infections averted would be higher (13.7%) relative to the linear scale-up. As expected, the number of MCs needed to avert one HIV infection is lower for the faster scale-up, and the cost per infection averted is lower by 8.2 percent relative to the linear scale-up and by approximately 20 percentage points relative to the slow scale-up (see Table 6). The reason for these findings relates to the indirect effects associated with MC and the resultant multiplicative impact of MC illustrated in Figure 4.

Table 6. Impact of Various Pace of Scaling up MC (2008–2020)

	Linear scale-up	Slower scale-up	Faster scale-up
	2008–2020	**% difference with linear scale-up**	
Average annual number of MCs	11,297	-1.2%	+1.3%
Average annual number of infections averted	2,809	-14.5%	+13.7%
MC per infection averted	4.0	+12.1%	-8.2%
Cost per infection averted*	US$176 (E1,290)		

discounted

Figure 3. Alternate Patterns of Scaling Up MC

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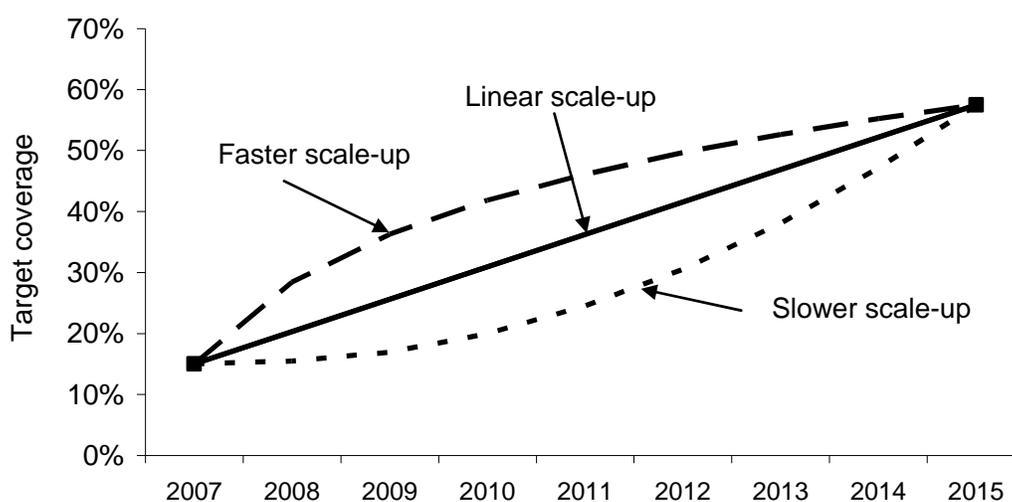
Multiplicative Impact of MC

Figure 4 presented by Smith and others (2007)[15] shows the direct and indirect effects associated with MC. The direct effect is the benefit that accrues to a circumcised male and has been the subject of MC clinical trials. The various indirect effects are determined by epidemiological dynamics. First-, second-, and third-hand indirect effects are illustrated in Figure 4. Because of the protective effect of circumcision, fewer circumcised men will become infected over time. The secondary result is that female sexual partners of these circumcised men are less likely to become infected. This is the first-hand indirect effect. The second-hand indirect effect comes about because these women are less likely to infect other males, whether the men are circumcised or not. Following on the second-hand indirect effect, uninfected women are also less likely to be infected, resulting in the third-hand indirect effect.[16]

Figure 4. Indirect Effects Associated with MC
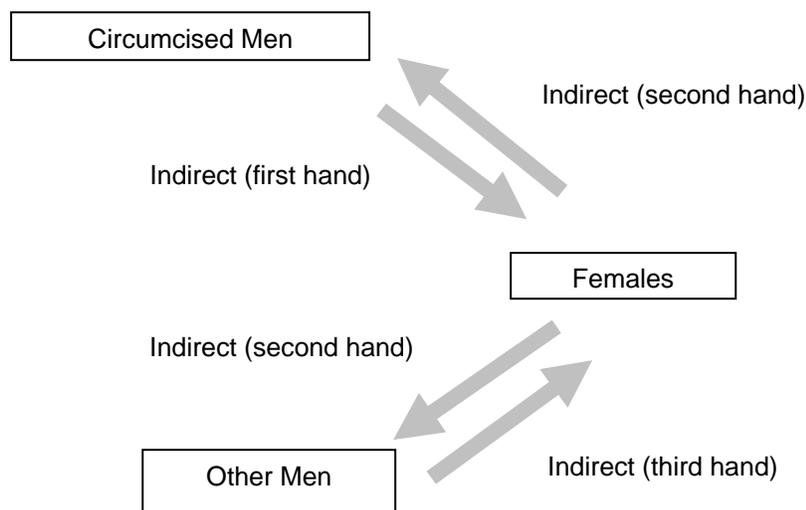
Note that not all the benefits implied in the cost-effectiveness results will be realized within the first few years of implementation. Figure 5 shows the annual estimates of the cost per infection averted of MC, starting at a high of US$1,661 (E12,159) per infection averted in 2008 and decreasing to US$35 (E256) per infection averted in 2020. This result is derived from the fact that the percent of new infections averted due to scaling up MC is initially only 1.5 percent in 2008 but increases to 13.0 percent in 2020.

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[15] Smith J., T. Hallett, S. Gregson, B. Lopman, K. Desai, M. Boily, G. Garnett. 2007. "Understanding the Impact of Male Circumcision as an Intervention." Presentation at HIV Implementers' Conference, Kigali, June 2007. London: Department of Infectious Disease Epidemiology, Imperial College.

[16] This discussion focuses exclusively on the effects on HIV transmission. However, there are other indirect effects, such as reduced incidence of human papillomavirus (HPV) and cervical cancer in female partners of circumcised males, that have not been considered here.

Figure 5. Estimates of Cost per Infection Averted by Year
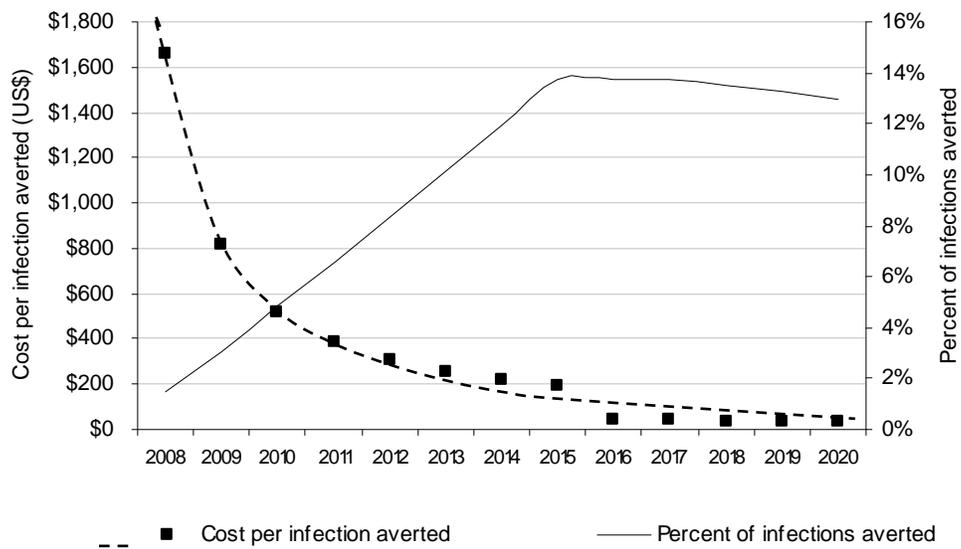
Implications to the Health System

Although Swaziland has an MC task force that focuses on issues of scale-up, all respondents interviewed expressed doubt about the ability of the health system to respond to the increased demand for male circumcision. In Swaziland, less than one-quarter of those in need are receiving antiretroviral therapy for AIDS.[17] Human resources are a big challenge in Swaziland, and creative solutions must be implemented so that the health system is not further overburdened. Task shifting, innovative service delivery, increased participation of the private sector, and additional training featured as key themes to addressing human resource constraints.

Demands placed on the health system across Southern Africa have already led to significant de facto task shifting. This has included delegating tasks to nurses that were previously the exclusive domain of doctors. In addition, growing numbers of community volunteers are involved in HIV testing, counseling, and palliative care. With a health system as stretched and short staffed as that in Swaziland, task shifting offers only some potential for male circumcision scale-up. Although nurses could learn the skills needed for male circumcision, there are too few nurses even available. All respondents emphasized this issue but also felt task shifting could facilitate MC rollout. Community volunteers and traditional healers could relieve nurses of some burden by providing non-clinical type services. However, this would require major shifts in individual attitudes as well as government policies.

The challenge of MC scale-up goes beyond who performs it, as policymakers must also consider how the service is delivered. Various service delivery models were discussed with interviewees, but two models featured more prominently: mobile services using a team of specialized circumcision surgeons and "circumcision weekends." One doctor described a recent "Circumcision Saturday" as a possible solution to the human resources challenge: "The existing workload at the public hospitals makes it impossible to add a substantial number of surgical procedures to the normal working schedule. In a recent experiment, a weekend was set aside at Mbabane Government Hospital for MC operations only. The experiment showed excellent potential for achieving large numbers. It is clear, however, that doctors and nurses will

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[17] Joint United Nations Program on HIV/AIDS (UNAIDS). 2006. Report on the Global AIDS Epidemic 2006. Geneva: UNAIDS.

have to sacrifice their free time to make such a plan work. The experiment also showed that this is no problem at all, as long as they are remunerated properly for their efforts." The respondent further articulated, "Despite all this, it seems clear that there may not be enough doctors in Swaziland to set up and maintain a full time MC service. This problem could be solved in several ways: by using not only doctors but paramedical personnel as well (realizing such a move would have legal aspects and training aspects) and by importing foreign doctors on short-term contracts to do MC only."

There was general consensus that additional training is needed on MC. According to one prominent physician, "In January of this year a rapid assessment was conducted among Swaziland's doctors, in which nearly half of them participated. One of the salient points that came out of this assessment was that more than 50 percent of the doctors stated they were in need of more training in circumcision techniques."

The private sector (commercial and nongovernmental) has also experienced an increase in demand for male circumcision. The private sector can play a role in national efforts to scale up MC by reducing the public sector burden to respond to the growing demand. Although cost of services can pose a limitation for potential clients in the private sector, government subsidies offer a mechanism to address issues around affordability so that MC service delivery can be expanded.

Table 7 shows some of the health service implications of scaling up MC among adult males (15–49 years old). This scenario assumes that 15 percent of males are effectively circumcised (i.e., circumcised with sufficient removal of foreskin to afford the protective effect found in the clinical trials). The projection furthermore aims to achieve coverage of 57.5 percent of adult males by 2015. A linear scale-up is assumed. The proportion of HIV-positive men is not factored into this scenario because the MC protocols drafted to date (for example, the protocol proposed by WHO) do not specify the requirement of an HIV-negative status for MC eligibility. Because male circumcision is a one-time procedure, the number of MCs that need to be performed in a particular year is the difference between coverage estimates for that year and the previous. The number of circumcised males that exit the age group and number of uncircumcised males that enter the age group are also taken into account. Using this approach, it is estimated that scaling up requires approximately 14,644 MCs in 2008, increasing to a high of 18,305 in 2015—implying that an average annual number of 11,297 circumcisions or a daily average of 47 circumcisions for the next 10 years to achieve and maintain a 57.5 percent coverage.

Table 7. Health Service Implications

	2008–2020 Cumulative	2008–2020 Average Annual
# of new circumcisions needed	150,320	11,297
# of circumcisions per month		941
# of circumcisions per week		235
# of circumcisions per day		47

Table 8 shows the estimated number of full-time equivalents (FTEs) per staffing category needed to achieve 57.5 percent coverage. Over the period 2008–2020, on average, 4.5 surgical nurses and 6.1 physicians annually have to be dedicated full-time to male circumcision. According to the World Health Organization,[18] there are 171 physicians in the public and private health system of Swaziland, implying that 4 percent of all doctors will be have to be dedicated full-time to MC to reach this relatively modest scale-up target.

Table 8. Human Resource Implications

Staff FTEs needed	2008–2020 Average Annual
Counselor	2.8
Surgical Nurse	4.5
Nurse assistant	2.5
Physician	6.1
Lab technician	1.0

Figure 6 shows the resource implications of MC scale-up by functional cost breakdown (surgery, counseling, and testing). The cumulative total resources needed for scaling up MC between 2008 and 2020 is US$6.6 million (E48.3 million). The average annual cost is US$506,061 (E3.7 million). As expected, the surgical procedure accounts for the largest share of the total costs (78.6%), followed by communications (14.5%). As mentioned before, training, community mobilization, and policy analysis and formulation costs are not included in this estimate.

Figure 6. Cost Implications of Scaling up MC to 57.5 Percent Coverage (functional breakdown)

2008-2020:
Cumulative cost: US$6.6 million (E48.2 million)
Average annual cost: US$506,061 (E3.7 million)

Cost of surgical procedure 78.6%

Cost of counseling 3.3%

Cost of testing 3.6%

Cost of communications 14.5%

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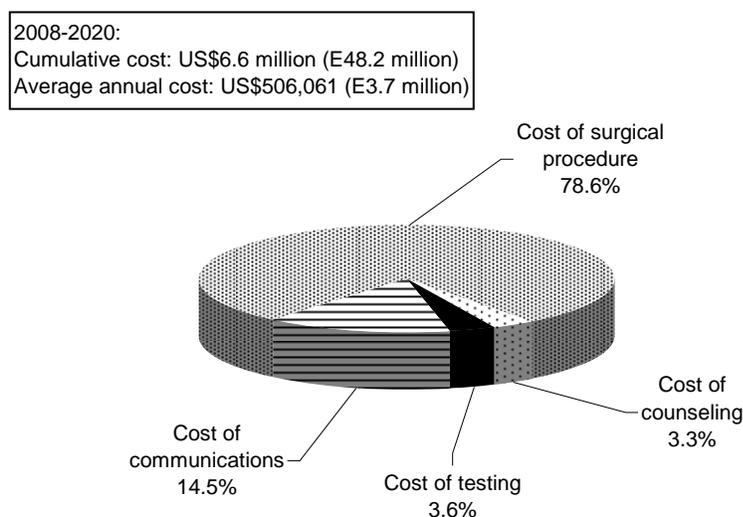
[18] World Health Organization (WHO). 2006. *World Health Report 2006: Working Together for Health*. Geneva: WHO.

Behavioral Responses to MC

How sensitive are the cost-effectiveness results to assumptions about behavioral responses to MC? Risk compensation (also known as disinhibition by epidemiologists or moral hazard in economics) refers to the increase in risky sexual behavior in circumcised males due to a decrease in perceived risk. The impact of changes in condom use on cost per infection averted showed that the results are relatively insensitive to small to moderate reductions. For example, the impact of male circumcision would be less than shown here if circumcised men adopt riskier behaviors because they think they are protected by the circumcision. A 25 percent reduction in condom use among those who are circumcised would reduce the impact by about 17 percent in Swaziland. These results underscore the critical importance of (1) locating the surgical provision of MC within a comprehensive set of services that includes behavior change communications and pre- and post-operative counseling and (2) locating MC services within a broader set of effective prevention interventions.

Qualitative interviews further reinforced the above points. Some respondents expressed concern about the possibility that men might overestimate the protective effect of male circumcision and engage in riskier sexual behavior, believing that they were fully protected from HIV infection. According to the majority of respondents, one way of addressing this issue is to have male circumcision added to the range of potential HIV prevention, or more broadly, reproductive health strategies. Some respondents offered specific recommendations on what should be offered as the MC "package." Most emphasized comprehensive HIV prevention education and condom use. A respondent from the Swaziland National AIDS Program argued that, "It would be better to frame male circumcision as a sexual and reproductive health issue to avoid risky behaviors and to accentuate the range of benefits."

Sustainability

MC is a one-time intervention, and as discussed, the benefits are not only multiplicative but also long lasting. One key driver of the annual costs estimated is the circumcision of 15 year olds as they enter the 15–49-year-old age group. While neonatal circumcision was not the focus of this analysis, it is widely acknowledged that neonatal MC is a lower cost procedure for various reasons—the surgical procedure is much simpler and less time consuming, no suturing is required, and minimal post-operative follow-up is needed. Implementation of neonatal circumcision will, however, require additional training. Simultaneous scaling up of adult and neonatal MC offers an opportunity for long-term cost savings and sustainability of the gains in preventing HIV; reduced numbers of adult MCs would be needed 15 years from now, i.e., beyond 2023.

Limitations

Some limitations of this study are worth noting.

- The cost analysis of the non-surgical elements of comprehensive MC services (e.g., counseling, communications, testing, etc.) was not as extensive as the analysis of the surgical procedure. However, the analysis of the non-surgical elements may be refined as a more detailed approach to implementation becomes clear.

- The analysis only considered the impact of MC on reducing HIV transmission and the number of HIV infections averted. It is, however, increasingly being realized that the scaling up of MC offers an opportunity to improve the delivery of male reproductive health services. A similar analysis of the costs and benefits of MC within the context of a comprehensive package of male reproductive health services might be useful.

- Participant selection was a limitation to the qualitative study, as all interviewees were chosen based on a referral process and had participated in prior UNAIDS meetings exploring MC implementation. Community members and civil society organizations were not included the study. In addition, sample

size was also small *(n=17)*; combined, participant selection and the size of the sample may have led to some bias in the study findings.

CONCLUSION

Qualitative Analysis

There is a high level of knowledge among respondents and growing awareness among the general public about the benefits of male circumcision for HIV prevention. At a time when few prevention strategies are making any significant impact on HIV incidence, the majority of respondents seem eager to have male circumcision added to the repertoire of HIV prevention and/or reproductive health strategies. There was broad recognition, however, that further research is needed to better understand the prevalence of MC, the role of the traditional sector and the private sector, and how current policies should be modified to indicate who performs the procedure and where MC should be "housed."

There is widespread support for integrating male circumcision into other reproductive health services, including HIV testing, condom promotion, and education to address issues around behavioral "disinhibition" as well as gender equality. Most respondents noted that people have different reasons for getting circumcised, so it should fall under a broader context than HIV/AIDS.

Many respondents emphasized the need to enlist nurses, traditional healers, and nongovernmental organizations in the male circumcision effort—if the process is left only to doctors, rapid rollout will be a challenge. New service delivery methods are needed and civil society should be actively engaged in MC scale-up efforts. Respondents noted that many issues should be addressed through greater advocacy efforts: expanded coverage, better training of MC providers, and incentives to increase and retain providers.

Through various discussions with policymakers, government officers, representatives of donors and the private and nongovernmental sectors, the following recommendations emerged as ways to address challenges to MC implementation and scale-up.

- **Conduct further research** to better understand the prevalence of MC and the relative importance and role of public and private health providers, including traditional healers, in MC implementation and scale-up.

- **Provide training in standardized and accepted methods and technologies**. The knowledge and skills of those performing the procedure are often inadequate. MC providers in Swaziland (both public health officials and traditional healers) will likely need more training, especially once protocols are standardized and adopted.

- **Complement MC with HIV prevention education, gender awareness education, and other reproductive health services.** Male circumcision should not be isolated from HIV prevention and other health services. Framing MC within a broader context can help limit the procedure from being stigmatized. Furthermore, male circumcision should be accompanied by HIV counseling, education, and condom promotion to help address issues of "disinhibition."

- **Modify existing policies/guidelines to expand provider choice so that MC procedures can be offered by a cadre of health staff, beyond physicians.** Nurses, traditional healers and other medical personnel can all have a role in MC service delivery. By engaging this cadre of professionals, a greater number of clients can be reached to respond to the growing demand. Nurses, like doctors, are currently overstretched, but eliciting the assistance of community

members in undertaking some of the jobs that nurses carry out, such as voluntary counseling and testing for HIV or community outreach, may help free up nurses' time to perform circumcisions. New models of service delivery will likely be required, including mobile circumcision teams and possibly "circumcision weekends."

- **Support evidenced-based advocacy efforts.** Several respondents emphasized the need to advocate to their governments for expanding and scaling up MC services. Capacity building in the area would also be needed.

- **Ensure close collaboration between public health service providers and traditional healers and leaders.** High-level support may be required to encourage traditional healers to become involved in circumcision scale-up; for example, both public health and traditional practitioners are likely to be more responsive if the King of Swaziland advocates for male circumcision.

- **Involve the traditional sector in developing and communicating messages around MC, HIV prevention, and reproductive health.**

Costing and Modeling

Male circumcision can be a cost-effective intervention when compared with the relative cost-effectiveness of other prevention interventions. Several factors influence the potential benefits. The analysis showed that the pace of scaling up matters and that the benefits from scaling up are not only multiplicative but also long lasting. The analysis also illustrated the importance of locating the surgical provision of MC within a comprehensive set of services that includes behavior change communications and pre- and post-operative counseling and, equally important, locating MC services within a broader set of effective prevention interventions.

The human and financial resource implications of scaling up MC are significant. The intention is not to suggest that vast increases in service delivery capacity (in terms of surgical facilities or surgical staff) are necessarily needed in Swaziland. Rather, it is recommended that some innovative ways be identified to involve all providers of clinical services. One issue to consider is that public and private provision of MC can be complementary and should not be viewed as mutually exclusive. However, mechanisms should be devised to align practices among private providers with the recommended approaches (routine use of general anesthesia, routine prescription of antibiotics). The positive externalities associated with MC have been established and lay the basis for justifying public subsidization. However, the specific provider payment methods need to be decided on (e.g., fee-for-service, capitation approaches), as well as the mechanisms of reimbursement (voucher mechanisms, contracting, etc.). The health service, financial, and human resource implications are significant but not insurmountable; taking them into account will be important in ensuring that the benefits of this public health intervention are realized as soon as possible by the people of Swaziland.

Based on consultations with various stakeholders, alternate scenarios can be modeled to assess the affordability and feasibility (in terms of human resource requirements) of various policy targets set for MC in Swaziland. The scenarios will likely inform resource mobilization and allocation for MC as an HIV intervention.

APPENDIX A. EPIDEMIOLOGY MODELING

The analysis used the Spectrum suite of policy models. The various components of Spectrum make it uniquely suited to address the policy questions raised in this study. The *HIV transmission model* is a deterministic model that reveals the key processes or risk factors that give rise to the sexual and intravenous transmission of HIV.[19] The model divides the population into multiple risk groups or compartments, reflecting the heterogeneity in sexual activity (frequency of sex, number of sexual partners, anal sex between males, etc.) and allows for movement (mixing) between the risk compartments. The model is fundamentally based on the Weinstein equation,[20] takes into account heterosexual and homosexual transmission, and is applied to the various risk groups. Example factors that the model takes into account are

- Changes in risk behaviors over time to reflect the impact of prevention interventions;
- Various levels of probability of infection based on the presence of ulcerative and non-ulcerative STIs; and
- Various probabilities of HIV transmission based on the stage of infection (primary infection, asymptomatic, symptomatic) of the HIV-positive individual.

The key variables used for the transmission model are

$$P(Infection)_{r,s,c} = 1 - \left\{ p_r \sum_{s,c} w_{s,c} \left[1 - q_{g,s,c}(1 - f_r e)g\right]^{n_r} + (1 - p_{rp}) \right\}^{m_r}$$

r = risk group
s = STI status
c = circumcision status
p = HIV prevalence in partner
q = probability of HIV transmission by partner combination, STI status, and male circumcision status
f = condom use
e = condom efficiency
g = multiplier based on the distribution of infected population by stage of infection
n = number of contacts per sexual partner
m = number of sexual partners

The transmission probabilities used in the model represent the best estimate based on the literature. These values are periodically reviewed and updated to ensure that they reflect the most recent literature. These values are stated explicitly and are also used in sensitivity analyses.

Although not all the factors considered by the model are directly affected by male circumcision (e.g., transmission between male sexual partners), it is essential to comprehensively and accurately model the HIV epidemic in each country before looking at the impact of circumcision.

International agencies involved with setting guidelines and norms (WHO, UNAIDS, etc.) have stressed the need to view male circumcision as part of a comprehensive prevention strategy (i.e., that the biologically based interventions should be complementary to the behaviorally based interventions). The methodology proposed here is uniquely suited to analyze the impact of male circumcision alongside other HIV interventions.

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[19] While not discussed here, other forms of transmission are reflected in the model. The model treats intravenous transmission similar to the way sexual transmission model is treated here. The model also takes into account other forms of HIV transmission (mother-to-child transmission and infected blood products).

[20] Weinstein, M.C., J.D. Graham, J.E. Siegel, and H.V. Fineberg. 1989. "Cost-Effectiveness Analysis of AIDS Prevention Programs: Concepts, Complications, and Illustrations." In Turner, C.F., H.G. Miller, and L.E. Moses (eds.). *Confronting AIDS: Sexual Behavior and Intravenous Drug Use* 1989:471–499. Washington, DC: National Academy Press.

APPENDIX B. DATA COLLECTION INSTRUMENT

FACILITIES DATA COLLECTION FORM

Name of Facility: _____

District: _____

Local currency

Exchange rate

Type of Facility: ☐ Health Post   ☐ Health Centre   ☐ Hospital

Facility Ownership: ☐ Private NGO   ☐ Private Commercial   ☐ Public

Average Number of Clients
at this Facility per Months: ☐

Average Number of Male
Circumcision
Contacts at this Facility per Month: ☐

Name and Location of Nearest Health
Centre (for Health Posts only):   _____

Distance from Facility: ☐

Name and Location of Nearest
Hospital:
_____

Distance from Facility: ☐

I. STAFFING, EQUIPMENT, AND MAINTENANCE

A. CLINICAL STAFF

Number of Full-Time Employees

	Number of full-time employees	Annual salary (including benefits)	% of time spent on male circumcision	Notes
Auxiliary/Attendant				
Nurse/Midwife				
General Physician				
Surgeon				
Paediatrician				
Anaesthetist				
Lab Technician				
Counselor				

B. SUPPORT STAFF

Number of Full-Time Employees (*entire facility*, not only for male circumcision)

	Number of full-time employees	Annual salary (including benefits)	Notes
Guard			
Housekeeping			
Reception			
Records			
Supply Clerk			
Maintenance			
Mgmt Officer			
Driver			
Food Preparer			

C. EQUIPMENT

Equipment for *Entire Facility*

	Number of items at facility	Amortization period	Estimated construction/purchasing price	Notes
Operating theatre				
Anaesthesia equipment				
Laboratory				
Sterilizer				
Refrigerators				

Portable refrigerators/cooling boxes				
Furniture/beds				
Overall facility/structure				

D. EMERGENCY TRANSPORTATION VEHICLES

Equipment for *Entire Facility*

	Number of iltems at facility	Amortization period	Estimated purchasing price	% of time used for transportation of male circumcision complications (estimated)	Notes
Bicycle					
Motorcycle					
Jeep					
Ambulance					

E. MAINTENANCE AND UTILITY COSTS

Equipment for *Entire Facility*

	Annual cost	Notes
Building maintenance		
Utilities Cost		
Emergency Vehicle Maintenance		

II. CIRCUMCISION PROCEDURE, INCLUDING COUNSELING & TESTING

A. GENERAL

☐ Provided here   ☐ Not provided here, referred to: _____

1. Average number of MC clients each month: ☐

2. How many visits does an MC client have on average to obtain both counselling and testing and the procedure? ☐

3. Is informed consent obtained (risks/benefits of procedure, other ways to reduce risk of HIV infection)? ☐

B. DRUGS, SUPPLIES, AND CONSUMABLES

4. What supplies are used? Are there any other drugs/supplies they receive? *(Write in)*

Drug or Supply	% of MC clients receiving this drug/supply	Number	Unit cost	Notes
Sutures				
Needles				
Bandages				
Analgesic				
Gloves				
Antiseptic				
Gentian violet/sterile marker pen				

5. What percentage undergo a physical exam? ☐

C. LAB TESTS

Skip if there are no lab facilities:
6. What percentage of MC clients receive the following lab tests during their circumcision visits?

Lab Tests	% of MC clients receiving this test	Number	Unit Cost	Notes
RPR Syphilis				
HIV				

D. STOCK-OUTS

7. Have you experienced stock-outs, or difficulties with obtaining supplies, with any of the supplies listed above? If yes, how often?

E. CLINICAL STAFF TIME

8. Who provides counselling prior to the circumcision procedure at the facility? How long does the average visit last? Who provides circumcision at the facility? How long does the average visit last?

Pre-surgical visit	No. of minutes spent with client
Counselor	
Nurse/Midwife	
General Physician	
Surgeon	
Auxiliary/Attendant	
Anaesthetist	
Lab Technician	
Other	

Surgical Visit	No. of minutes spent with client
Counselor	
Nurse/Midwife	
General Physician	
Surgeon	
Auxiliary/Attendant	
Anaesthetist	
Lab Technician	
Other	

F. COMMENTS

III. POST-CIRCUMCISION CARE—NORMAL

A. GENERAL

☐ Provided here ☐ Not provided here, referred to: _____

1. Average number of post-MC clients each month: [____] 2. How many post-care visits does an MC client have on average? [____]

3. What is included as part of post-circumcision care?

B. DRUGS, SUPPLIES, AND CONSUMABLES

4. What supplies are used? Are there any other drugs they receive? *(Write in)*

Drug or Supply	% of MC clients receiving this drug/supply	Number	Unit cost	Notes

5. What percentage undergo a physical exam? [____] 6. Are gloves used? [____] Yes [____] No

C. LAB TESTS

Skip if there are no lab facilities:
7. What percentage of MC clients receives the following lab tests during their follow-up visits?

Lab Tests	% of MC clients receiving this test	Number	Unit cost	Notes

III. POST-CIRCUMCISION CARE—NORMAL (Page 2)

D. CLINICAL STAFF TIME

8. Who provides post-circumcision care at the facility? How long does the average visit last?

Post-surgical visit #1	No. of minutes spent with client
Counselor	
Nurse/Midwife	
General Physician	
Surgeon	
Auxiliary/Attendant	
Anaesthetist	
Lab Technician	
Other	

Post-surgical visit #2	No. of minutes spent with client
Counselor	
Nurse/Midwife	
General Physician	
Surgeon	
Auxiliary/Attendant	
Anaesthetist	
Lab Technician	
Other	

Post-surgical visit #3	No. of minutes spent with client
Counselor	
Nurse/Midwife	
General Physician	
Surgeon	
Auxiliary/Attendant	
Anaesthetist	
Lab Technician	
Other	

E. COMMENTS

IV. POST-CIRCUMCISION CARE—COMPLICATIONS

A. GENERAL

☐ Provided here ☐ Not provided here, referred to: _____

1. Average number of post-MC clients requiring management of complications each month: ☐

2. How many post-care visits does an MC client with complications have on average? ☐

3. In your opinion, what percentage of patients do you think return to the facility for treatment of complications?

4. What percentage of patients do you treat for MC-related complications who did not receive the procedure at this facility?

B. DRUGS, SUPPLIES, AND CLINICAL STAFF TIME

4. What percentage of MC clients experience **infection**? ☐

5. What drugs and supplies are used to treat this complication? *(Write in)*

Drug or Supply	% of MC clients receiving this drug/supply	Number	Unit cost	Notes

6. Who provides care for this complication at the facility? How long does the average visit last?

Visit #1 for the complication	No. of minutes spent with client
Counselor	
Nurse/Midwife	
General Physician	
Surgeon	
Auxiliary/Attendant	
Anaesthetist	
Lab Technician	
Other	

Visit #2 for the complication	No. of minutes spent with client
Counselor	
Nurse/Midwife	
General Physician	
Surgeon	
Auxiliary/Attendant	
Anaesthetist	
Lab Technician	
Other	

Visit #3 for the complication	No. of minutes spent with client
Counselor	
Nurse/Midwife	
General Physician	
Surgeon	
Auxiliary/Attendant	
Anaesthetist	
Lab Technician	
Other	

7. What percentage of MC clients experience **<u>excessive bleeding</u>**? [ ]

8. What drugs and supplies are used to treat this complication? *(Write in)*

Drug or Supply	% of MC clients receiving this drug/supply	Number	Unit cost	Notes

9. Who provides care for this complication at the facility? How long does the average visit last?

Visit #1 for the complication	No. of minutes spent with client	Visit #2 for the complication	No. of minutes spent with client	Visit #3 for the complication	No. of minutes spent with client
Counselor		Counselor		Counselor	
Nurse/Midwife		Nurse/Midwife		Nurse/Midwife	
General Physician		General Physician		General Physician	
Surgeon		Surgeon		Surgeon	
Auxiliary/Attendant		Auxiliary/Attendant		Auxiliary/Attendant	
Anaesthetist		Anaesthetist		Anaesthetist	
Lab Technician		Lab Technician		Lab Technician	
Other		Other		Other	

10. What percentage of MC clients experience **<u>excessive pain</u>**? [ ]

11. What drugs and supplies are used to treat this complication? *(Write in)*

Drug or Supply	% of MC clients receiving this drug/supply	Number	Unit cost	Notes

12. What **other complication** do MC clients experience? (*Write in*)

13. What percentage of MC clients experiences this complication?

14. What drugs and supplies are used to treat this complication? *(Write in)*

Drug or Supply	% of MC clients receiving this drug/supply	Number	Unit cost	Notes

15. Who provides care for this complication at the facility? How long does the average visit last?

Visit #1 for the complication	No. of minutes spent with client
Counselor	
Nurse/Midwife	
General Physician	
Surgeon	
Auxiliary/Attendant	
Anaesthetist	
Lab Technician	
Other	

Visit #2 for the complication	No. of minutes spent with client
Counselor	
Nurse/Midwife	
General Physician	
Surgeon	
Auxiliary/Attendant	
Anaesthetist	
Lab Technician	
Other	

Visit #3 for the complication	No. of minutes spent with client
Counselor	
Nurse/Midwife	
General Physician	
Surgeon	
Auxiliary/Attendant	
Anaesthetist	
Lab Technician	
Other	

16. What **other complication** do MC clients experience? (*Write in*)

17. What percentage of MC clients experiences this complication?

18. What drugs and supplies are used to treat this complication? *(Write in)*

Drug or Supply	% of MC clients receiving this drug/supply	Number	Unit cost	Notes

19. Who provides care for this complication at the facility? How long does the average visit last?

Visit #1 for the complication	No. of minutes spent with client		Visit #2 for the complication	No. of minutes spent with client		Visit #3 for the complication	No. of minutes spent with client
Counselor			Counselor			Counselor	
Nurse/Midwife			Nurse/Midwife			Nurse/Midwife	
General Physician			General Physician			General Physician	
Surgeon			Surgeon			Surgeon	
Auxiliary/Attendant			Auxiliary/Attendant			Auxiliary/Attendant	
Anaesthetist			Anaesthetist			Anaesthetist	
Lab Technician			Lab Technician			Lab Technician	
Other			Other			Other	

C. LAB TESTS

Skip if there are no lab facilities:
20. Do MC clients with complications receive any lab tests?

Lab Tests	% of MC clients receiving this test	Number	Unit cost	Notes

D. COMMENTS

APPENDIX C. EXAMPLES OF INDIRECT COSTS

Capital costs	
Equipment	**Other**
Autoclave	Beds
Dental equipment	Office furniture
Examination & surgery equipment	Generator and incinerator
Physiotherapy equipment	Pharmacy equipment
Recurrent costs	
Personnel	**Non-personnel**
Management	Building maintenance cost
District hospital administrator	Utilities cost
Health inspector	Emergency vehicle maintenance
Asst Health inspector	
Support staff	
Senior pharmacy technician	
Pharmacy technician	
Lat technologist	
Assistant HR officer	
Technical officer	
Senior health assistant	
Health assistant	
Radiographic assistant	
Lab assistant	
Driver	
Accountant	

APPENDIX D. ASSUMPTIONS USED FOR UNIT COST ESTIMATION OF COMPREHENSIVE PACKAGE OF SERVICES

Communications				

Counseling				
	Pre-Circumcision	*Circumcision*	*Post-Circumcision*	*Circumcision Follow-up*
Time spent by counselor (minutes)	20	10	10	10

Testing	
	Data Inputs
Commodity costs	
ELISA test	$2.34
Rapid test	$2.46
Share of tests that are Rapid Tests	80%
subtotal	$2.43
Laboratory technician costs	
Staff time per test (minutes)	10
Cost of staff time per test	$1.26
Share of MC clients tested	50%
Contribution to Unit Cost (unweighted)	$3.69
Contribution to Unit Cost	$1.85
Lab technician staff time per test (minutes)	10

Training	
Training of surgical staff	
Number of training days (doctors)	1
Number of training days (nurses)	2
Number of doctors trained	20
Number of nurses trained	40
Number of staff days (doctors)	20
Number of staff days (nurses)	80
Cost of workshop	
Cost per person per training day	$68
Number of training days	100
Subtotal	$6,831
Cost of staff time	
Hours of doctors time	160
Hours of nurses time	640
Cost of doctors staff time	$1,476

Cost of nurses staff time	$4,841
Total	$13,147
Training of counselors	
Number of training days (counselors)	3
Number of counselors trained	50
Number of staff days (counselors)	150
Cost of workshop	
Cost per person per training day	$68.31
Number of training days	150
Subtotal	$10,246
Cost of staff time	
Hours of counselors time	1,200
Cost of counselors staff time	$2,447
Total	$12,693
Total Annual Training Costs	**$25,840**
Total Annual Training Costs (excl staff costs)	**$17,076**

APPENDIX E. EQUIPMENT REQUIREMENTS

Circumcision Surgical Tray	Quantity	Unit cost ($)
Gallipot	1	8.05
Sponge holding forceps 18cm	1	69.75
Bistouri scalpel blade holder #4	1	14.80
Straight mosquito artery forceps small	2	13.40
Curved mosquito artery forceps small	2	13.40
ForcepsN/H mayo hager 14–16cm	1	19.50
XAdson fine non-toothed dissecting forceps	1	16.00
Surgical scissors BL ST	1	15.40
Mayo scissors	1	24.60
Dissecting tray and lid	0	123.75
Emergency Tray	Quantity	Unit cost ($)
Solu Cortef 100mg/2ml	1	27.34
Adrenaline 1mg/2ml	1	15.50
Atropine 1mg/ml	1	18.90
Diazepam 10mg/2ml	1	23.00
IV canula (Jelo radiopaque) 18 guage	1	12.20
Solution administration set	1	25.00
Sodium Chloride 0.9% 1L	1	9.60
Velcro tourniquets	1	10.65

Source: Dr. Adam Groeneveld, Ministry of Health and Social Welfare, Mbabane, Swaziland.

APPENDIX F. QUALITATIVE QUESTIONNAIRE FOR STAKEHOLDERS

Background

The USAID│Health Policy Initiative has hired several consultants to conduct a series of interviews in Lesotho, Swaziland, and Zambia.

The purpose of these interviews is to determine the recommended processes (target population, protocols including recruitment, pre- and post-counseling, and surgical procedure and follow-up) and the associated cost and impact of providing male circumcision (MC) in the three southern Africa countries.

The information is intended to help the United States Government and its country partners prepare to support MC programs should current research projects in Uganda and Kenya support the findings from South Africa—which reveal significant benefits in reducing the number of HIV infections.

In addition, this information could support any efforts to create demand for these MC programs.

Interview Questions

General Information

- Date:
- Name:
- Institution:
- Position/Title:

Male Circumcision Procedures

1. How do you define MC? Is this the same definition used for traditional circumcision procedures outside of health service delivery sites?

2. What do you think an MC intervention should include? In other words, what services/interventions should constitute the full MC intervention?

3. How widely is male circumcision currently performed?

4. Have you seen an increase in demand for MC due to increased attention to the potential link between MC and a reduction in the number of HIV infections?
   a) If so, who is seeking MC services? What age, socioeconomic group, etc? What do you think explains their interest in receiving MC services? What reasons are clients offering for seeking MC?
   b) If so, where are men trying to access circumcision services?

Circumcision and Other Health Services

5. What role do you see for MC as a potential HIV prevention strategy?

6. How do you think informed consent should be established for MC?
   a) For adult men?
   b) For minors?
   c) From parents for infants?

7. There is some concern about MC leading to disinhibition. In other words, there is concern that if people believe circumcision offers some protective effect against HIV infection, then they might develop a false sense of security and engage in riskier behavior.
   a) What would you propose doing to address disinhibition?
   b) What messages might discourage men from having multiple sexual partners?
   c) What messages might encourage men to continue using condoms?

8. Pre- and post-surgery counseling has been proposed as a way of reducing disinhibition. What is your opinion on this? What should pre- and post-surgery counseling include?
   a) Is pre- and post-surgery counseling viable?
   b) What sorts of training would be required?

9. Which staff would be most appropriate to do the pre and post counseling?
   a) What training would they need?
   b) Who would provide this training?

Attitudes toward MC

10. What do you see as the potential health benefits to MC?

11. What do you think people in general see as the potential health benefits to MC?

12. How do you think MC is perceived by men in the general population?

13. How do you think MC is perceived by women?

14. How would you describe the attitudes of key stakeholders within government toward MC? Are there any sensitivities that need to be addressed to support a scale-up of MC services?

15. How would you describe the attitudes of key stakeholders within civil society toward MC? Are there any sensitivities that need to be addressed to support a scale-up of MC services?

16. How would you describe the attitudes of key stakeholders within the donor community (United Nations, U.S. Agency for International Development, bilaterals, etc.) toward MC? Are there any sensitivities that need to be addressed to support a scale-up of MC services?

17. What do you think the attitude of other service providers is toward MC? Are there any sensitivities that need to be addressed to support a scale-up of MC services?

18. If further research supports MC as a major HIV prevention strategy, what might serve as barriers to MC scale-up in your area/country?

Circumcision and Training

19. What training, if any, have you had related to MC?

20. Do you have any thoughts on what training would be needed to support a scale-up of MC provision? Describe as fully as possible the training intervention/s.

21. Do you have any thoughts on who should be trained and on what?

22. Do you have any thoughts on who should provide this training?

Scale-up of MC Services

23. What would need to happen to bring about a significant scale-up of MC in your country?
    a) What changes might be necessary?
    b) What policies would need to be put in place?
    c) What kinds of community education?

24. Which institutions and organizations should play a role in supporting a scale-up?

25. What sorts of public health messages might reduce disinhibition and encourage risk reduction?

Circumcision and Culture

26. There are variations in what constitutes circumcision. In some places, circumcision might traditionally be regarded as a cut in the foreskin, whereas in other places, circumcision is the removal of the foreskin. What constitutes circumcision for men here?

27. Who traditionally performs circumcision here?

28. What role do you see for traditional healers, traditional surgeons, and traditional circumcision attendants?

Other Considerations

APPENDIX G. QUALITATIVE QUESTIONNAIRE FOR MC PROVIDERS

Background

The USAID│Health Policy Initiative has hired several consultants to conduct a series of interviews in Lesotho, Swaziland, and Zambia.

The purpose of these interviews is to determine the recommended processes (target population, protocols including recruitment, pre- and post-counseling, and surgical procedure and follow-up) and the associated cost and impact of providing male circumcision (MC) in the three southern Africa countries.

The information is intended to help the United States Government and its country partners prepare to support MC programs should current research projects in Uganda and Kenya support the findings from South Africa—which reveal significant benefits in reducing the number of HIV infections.

In addition, this information could support any efforts to create demand for these MC programs.

Interview Questions

General Information

- Date:
- Name:
- Institution:
- Position/Title:

Male Circumcision Procedures

1. Do you perform male circumcision?

2. If so, for how long have you been performing MC procedures?

3. How do you define MC? Is this the same definition used for traditional circumcision procedures outside of health service delivery sites?

4. Please describe the procedure you use: Do you use any anaesthetic? Do you provide or suggest any pain management after the procedure? What do you advise patients to do post-operatively? What procedure/s do you use?

5. What does the MC intervention consist of? In other words, what services/interventions constitute the full MC intervention?

6. How widely performed is male circumcision?

7. How is informed consent established?
   a) For adult men?
   b) For minors?
   c) From parents for infants?

8. Have you seen an increase in demand for MC due to increased attention to the potential link between MC and a reduction in the number of HIV infections?

a) If so, who is seeking MC services? What age, socioeconomic group, etc? What do you think explains their interest in receiving MC services? What reasons are clients offering for seeking MC?

b) If so, where are men trying to access circumcision services? Are you aware of men seeking to pay for circumcision? Are they seeking the services from public clinics?

9. Are you able to access the necessary equipment and consumables you need to perform the MC intervention?

Attitudes toward MC

10. What do you see as the potential health benefits to MC? What do you see as the potential risks involved in MC?

11. What do you think people see as the potential health benefits to MC?

12. How do you think MC is perceived by men in the general population?

13. How do you think MC is perceived by women?

14. How would you describe the attitudes of key stakeholders within government toward MC? Are there any sensitivities that need to be addressed to support a scale-up of MC services? Do you see any barriers to a scale-up that you could describe?

15. How would you describe the attitudes of key stakeholders within civil society toward MC? Are there any sensitivities that need to be addressed to support a scale-up of MC services? Do you see any barriers to a scale-up that you could describe?

16. How would you describe the attitudes of key stakeholders within the donor community (United Nations, U.S. Agency for International Development, bilaterals, etc.) toward MC? Are there any sensitivities that need to be addressed to support a scale-up of MC services? Do you see any barriers to a scale-up that you could describe?

17. What do you think the attitude of other service providers is toward MC? Are there any sensitivities that need to be addressed to support a scale-up of MC services? Do you see any barriers to a scale-up that you could describe?

Circumcision and Other Health Services

18. Do you provide any other HIV services to men accessing MC?
a) If so, what?
b) If not, why not?

19. What role do you see for MC as a potential HIV prevention strategy?

20. There is some concern about MC leading to greater risk taking or disinhibition. In other words, there is concern that if people believe circumcision offers some protective effect against HIV infection, then they might engage in riskier behavior. What would you propose doing to address disinhibition?

21. Pre- and post-surgery counseling has been proposed as a way of reducing disinhibition. What is your opinion on this?

a) Is pre- and post-surgery counseling viable?

22. Which staff would be most appropriate to do the pre and post counseling?
    a) What training would they need?
    b) Who would provide this training?

Circumcision and Training

23. What training have you had related to MC?

24. What training would be needed to support a scale-up of MC provision? Describe as fully as possible the training intervention/s.

25. Who should be trained and on what?

26. Who should provide this training?

27. What would it cost to provide the necessary training?

Scale Up of MC Services

28. What clinical procedure/intervention lends itself best to scale-up?

29. What would need to happen to bring about a significant scale-up of MC in your practice/clinic/country?
    a) What changes might be necessary?
    b) What policies would need to be put in place?
    c) What kinds of community education?

30. Which institutions and organizations should play a role in supporting a scale-up?

31. What sorts of public health messages might reduce disinhibition and encourage risk reduction?

Circumcision and Culture

32. There are variations in what constitutes circumcision. In some places, circumcision might traditionally be regarded as a cut in the foreskin, whereas in other places, circumcision is the removal of the foreskin. What constitutes circumcision for men here?

33. Who traditionally performs circumcision here?

34. What role do you see for traditional healers, traditional surgeons, and traditional circumcision attendants?

35. What role can traditional healers play in reducing disinhibition and/or risk-taking behavior— either at circumcision school or more generally?

36. What role can traditional leaders play in reducing disinhibition and/or risk-taking behavior?

37. Are there any messages given during traditional circumcision that might contribute to risk taking?

Other Considerations