World Bank Global HIV/AIDS Program

HIV/AIDS M&E - *Getting Results*

These reports describe activities, challenges and lessons learned during the Global AIDS Monitoring and Evaluation Team's (GAMET) work with countries and other partners.

Male Circumcision: Evidence and Implications

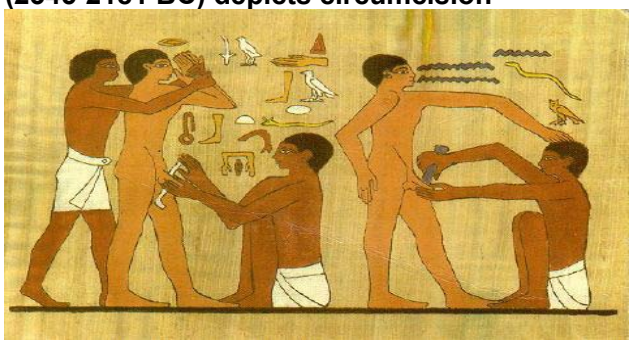
David Wilson and Joy de Beyer

This report summarizes the evidence linking male circumcision and HIV infection, and assesses the implications for HIV prevention programs. The practical implications are especially pertinent in countries with very high HIV prevalence and low circumcision rates – including South Africa, Botswana, Lesotho, Swaziland and Namibia.[1]

New evidence on an old procedure

Could the oldest and most common surgical procedure – male circumcision – help turn the tide of HIV infection in high-prevalence countries?

Figure 1: Tomb art from Egypt's 6th Dynasty (2345-2181 BC) depicts circumcision



Source: Badawy 1978

An association between HIV and the absence of male circumcision has been noted since the late 1980s, but skeptics argued that it was entangled with behavior, religion, culture and geography. Now three randomized prospective intervention trials have generated additional strong evidence showing that circumcised men are at much lower risk of HIV infection. This paper reviews the results of these trials, and other evidence, and considers the implications.

[1] This paper is based on a talk given by David Wilson on February 8, 2006 at the World Bank, Washington DC., and updated in August 2008 with help from Daniel Halperin. We are grateful to Catherine Hankins, Charles Wiysonge and Timothy Farley for their review comments.

Overview of the evidence

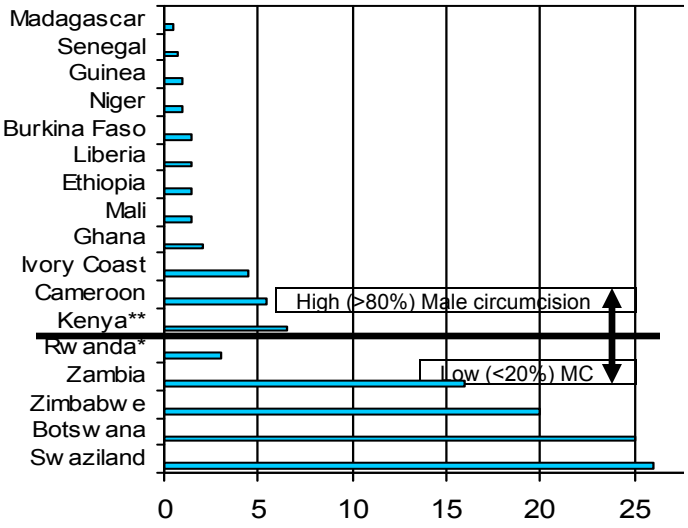
Ecological evidence – the geography of circumcision and HIV

Many ecological studies show the clear geographical correlation of high HIV prevalence and areas where male circumcision is rare. A multi-site study found that male circumcision was a strong predictor of variations in Africa's HIV epidemic (Auvert et al 2001). The pattern is illustrated in the 1996 map in Figure 2, where the "AIDS belt" of areas with very high HIV prevalence rates within the red border coincides closely with areas where circumcision is rare. (More recent data which extend into southern Africa, confirm and strengthen the pattern.) Population-based prevalence data from surveys that include men confirm this pattern for Africa (Figure 3). There is a similar pattern in Asia - no Asian country with widespread male circumcision has a significant sexual HIV epidemic (Figure 4).

Figure 2: Africa: regions where most men are uncircumcised, and where HIV prevalence is high

Source: Caldwell & Caldwell 1996

Figure 3: Male circumcision and population-based HIV prevalence in Africa

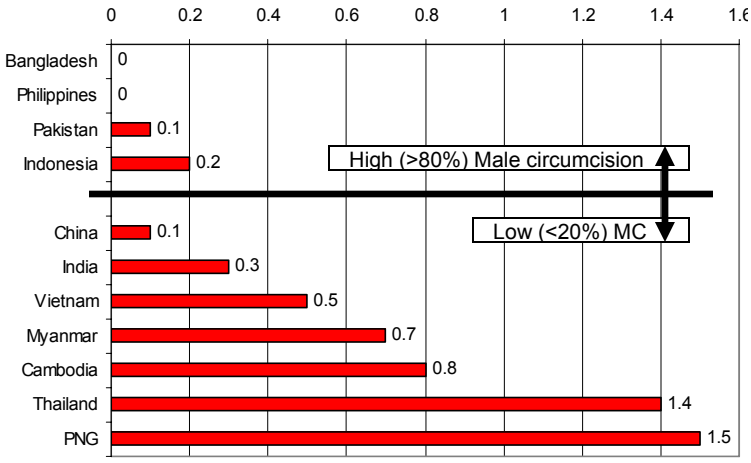


Notes: * very few men in Rwanda report multiple sexual partners (5%) compared to other African countries.

**HIV prevalence in Kisumu area, where most men are uncircumcised, is much higher than in rest of Kenya.

Sources: ORC/MACRO, and DHS Survey data

Figure 4: Male circumcision and national HIV prevalence estimates in Asia

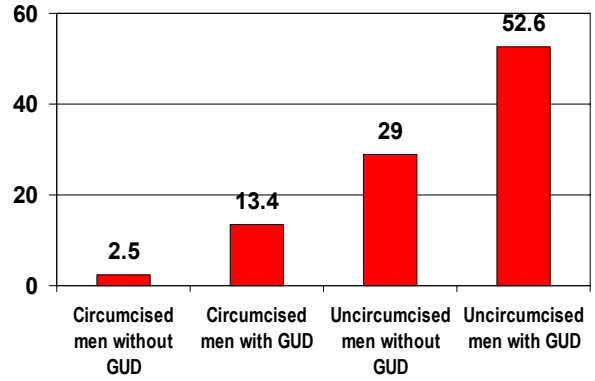


Source: UNAIDS 2008

Epidemiological evidence

Epidemiological data from many countries show a consistent, clear pattern (cross-sectional and prospective observational data). For example, in India, HIV prevalence is seven-fold higher among uncircumcised men (Mehendale et al. 1996). In Uganda, among male partners of HIV-positive women in regular sexual relationships, 40 of 137 (29%) uncircumcised men and not one of 50 (0%) circumcised men sero-converted over a four year period (Gray et al. 2000). A similarly strong association between circumcision status and sero-conversion was found among Nairobi male STI clients after sex with sero-positive sex workers (Cameron et al. 1989). Figure 5 shows that 2.5% of circumcised men without genital ulcer disease (GUD, mostly chancroid and syphilis) became infected, compared to over 50% of uncircumcised men with GUD. The middle bars show that not being circumcised played an even larger role than GUD in potentiating infection.

Figure 5: Sero-conversion in Nairobi STI clients after sex with HIV+ sex worker

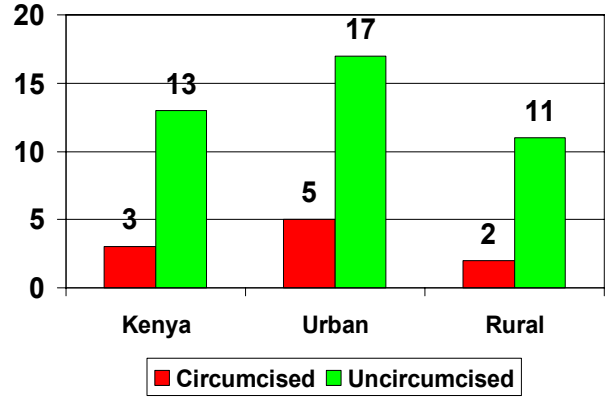


Note: GUD = genital ulcer disease (mostly chancroid / syphilis)

Source: Cameron et al. 1989

The 2004 population-based Kenya DHS+[2] found a 4-fold higher HIV prevalence rate among uncircumcised men than circumcised men (Figure 6). Adjusting for relevant differences in sexual behavior widens the gap even more – HIV prevalence is 11-fold higher among uncircumcised men. In Nyanza, the one province where most men are not circumcised, HIV rates were twice as high as elsewhere in Kenya, and within Nyanza, 21% of uncircumcised men and 2% of circumcised men are HIV-positive – ten fold higher.

Figure 6: Male circumcision and HIV prevalence in Kenya



Source: Kenya Government and ORC/MACRO 2004

[2] Demographic and Health Surveys use a standardized survey instrument in many countries. The "DHS+" surveys carry out HIV testing, in addition to interviewing men and women about their behaviors and beliefs. Details on the DHS are available at http://www.measuredhs.com

With improved measurement of HIV, particularly the use of population based data instead of antenatal data, the association with circumcision has become clearer. Cameroon is a case in point. The HIV rate of 11.8% estimated in 2002 from antenatal data in Cameroon was considerably higher than the 5.5% rate seen in the 2004 population based survey. Cameroon had previously been thought to be a major exception to the pattern of much lower HIV prevalence in countries with high rates of circumcision. Newer, more accurate HIV estimates from population-based surveys show that Cameroon's epidemic is far below the levels that might have been expected given the unusually high levels of risky sexual behavior reported in Cameroon's DHS, and the maturity of its epidemic.

In Ethiopia, where male circumcision is also widely practiced, 2005 HIV prevalence estimates based on DHS population-based data are much lower (1.4%) than estimates based on ANC data for the same year (3.4%). A large difference between antenatal and population based HIV data was seen also in the Eastern Cape of South Africa, where circumcision is more common than other parts of the country, and women (whose sexual partners come from other regions as well) have similar HIV rates to the rest of the country, but men have amongst the lowest HIV rates in the country. HIV data from antenatal sites cover women only, so it is not surprising that they miss associations with male circumcision.

Two other data weaknesses complicate analysis of the effect of male circumcision on HIV infection: (1) where missing data make it impossible to disentangle the effect of factors such as ethnicity or religion that are correlated with circumcision; and (2) if self-reporting gives inaccurate measures of circumcision prevalence. For example, in Lesotho, "circumcision" refers to traditional coming-of-age rituals which tend not to include removal of much foreskin (UNAIDS/WHO/LSHTM 2007).

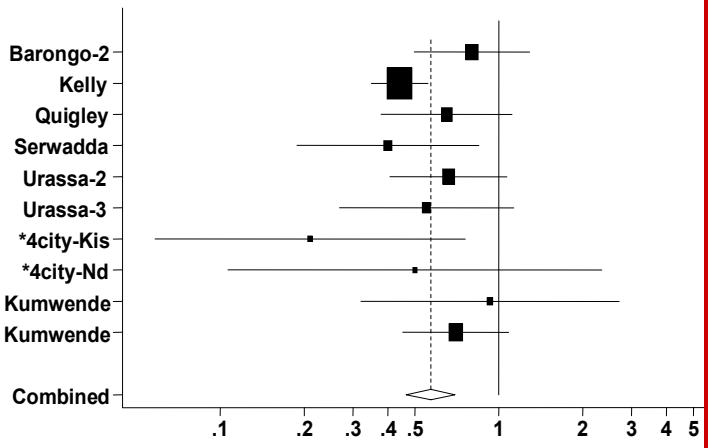
Meta-analytic evidence

Meta-analysis of 38 (mainly African) studies (including many of those cited above), found that circumcised men were less than half as likely to contract HIV (Weiss 2002). The protective effect appears to be even stronger for higher risk men: a sub-analysis of 16 studies of higher risk men found that circumcised men were 70% less likely to contract HIV (relative risk of 0.3). In Figure 7 and 8, the position of the squares indicates the actual value, the size of the squares indicates sample size, and the horizontal lines show the confidence interval.)

Biological evidence

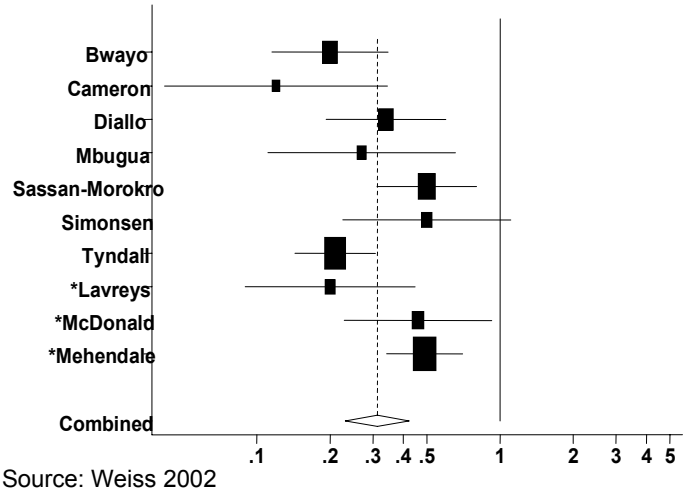
There are plausible biological explanations for a protective effect. Circumcision removes the foreskin and Langerhans cells on its underside, which are specific target cells for the virus. It causes keratinization (hardening) of the skin surface, and promotes more rapid drying which reduces the likelihood of bacterial sexual infections (like chancroid), which in turn reduces the risk of acquisition of HIV (Szabo and Short 2000). The soft mucosal surface of the inner foreskin is highly receptive to the virus; researchers at the University of Chicago found it difficult to infect specimens of outer foreskin tissue with HIV, whereas inner foreskin tissue absorbed HIV readily - up to 9 times more easily than even cervical mucosal tissue (Patterson 2002).

Figure 7: Adjusted risk ratios in population studies



Source: Weiss 2002

Figure 8: Adjusted risk ratios in high risk groups



Source: Weiss 2002

Randomized trial evidence

Three randomized prospective trials in South Africa, Uganda and Kenya, in areas where circumcision is not widely practiced, set out to test whether and to what extent a circumcision intervention might have a protective effect. Collectively, they enrolled over eleven thousand (mostly young) men (Table 1). The men, all of whom wanted to be circumcised, were randomly assigned either to a control group (that was to remain uncircumcised for the duration of the study), or to an

intervention group who were circumcised by doctors trained for the study. All three studies were stopped early when interim analysis showed such a large protective effect that it was deemed unethical to continue.

The study results are remarkable. In South Africa, the men were followed for an average of 18 months, amounting to a total of 4,693 person-years of follow-up. Table 2 shows the dramatic differences in the number of new infections during each follow-up period, comparing the intervention group and control group. The unadjusted relative risk in the intervention group compared to the control group was 0.4, which means that 60% of potential new infections were prevented. Controlling for behavioral factors -- including condom use, health-seeking behavior, and risky sexual behavior -- marginally changes the protection effect from 60% to 61%.[3]

The 60% protective effect is per "intent-to-treat" – that is, if study participants were circumcised (or not) according to their random assignment to the intervention (or control) group. The protective effect is 76% when the data are analyzed "per protocol" – comparing men who were actually circumcised with those who were not. The difference is due to "crossovers" – men who were randomized to the control group but who chose to be circumcised independently of the trial; and men who were randomly assigned to the intervention group but were not circumcised as planned (10.3% of participants). Shelton (2006) notes that the "true biologic effect" is seen in "per protocol" analysis.

Very similar levels of protection were found in the Uganda and Kenya studies (Bailey et al. 2007, Gray et al 2007), making these findings even more powerful. Continued follow-up of the Kenya study cohort over three-and-a-half years finds that the protective effect has persisted and even increased to about 65% (Bailey et al 2008).

Benefits, costs, complications and acceptability

Strong as these results are, Koopman and Longini point out that randomized trials do not measure the population effect of the intervention. They estimate intervention efficacy in the study sample, that is, they examine transmission among the men in the trial, but do not study the effect on their sexual partners, or on the partners of those partners, and so on. Small differences in transmission risk can translate into much larger population effects, magnifying the effect on the epidemic. Modeling can estimate the size of this effect,

.

Table 1: Features of three male circumcision (MC) intervention trials

	South Africa (Orange Farm, Gauteng)	Uganda (Rakai)	Kenya (Kisumu)
Community Features			
Population	Semi-urban	Rural	Urban
Community MC rate	20%	16% (most Muslim)	10%
Annual HIV incidence	1.7%	1.8%	1.8%
Study Features			
Age	18-24	15-49	18-24
Final Number	3,274	4,996	2,784
Enrollment completed	February 2004	July 2005	Sept 2005
Study completion date (all were stopped early)	April 2005	Dec 2006	Dec 2006

Source: Auvert et al. 2005, Krieger et al. 2005

Table 2: HIV incidence in intervention and control groups, South Africa

	M0–M3	M4–M12	M12–M21	Total
Intervention (*n*=1546/1446)[a]	2	7	11	20
Control (*n*=1582/1431)[a]	9	15	25	49
TOTAL	11	22	36	69

Notes: a/ Of the 3274 enrolled participants, 146 had tested HIV+ at enrollment and were excluded from the statistical analysis.

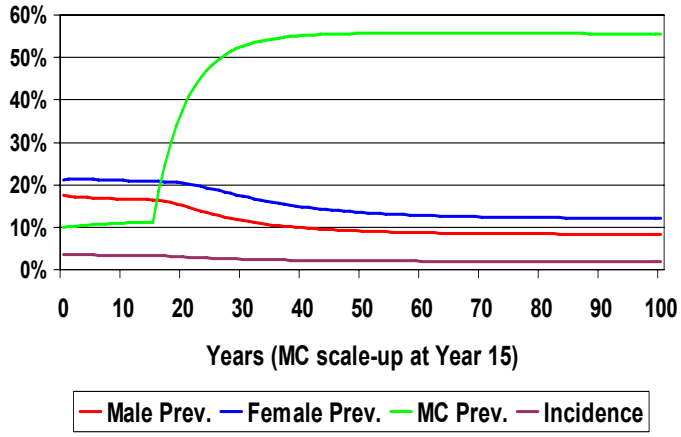
n= number at enrollment/number at end of study. The differences are the people lost to follow-up during the study; these losses were low for a population-based study.

Source: Auvert et al. 2005

[3] Unadjusted RR: 0.4 (95%, CI: 0.24–0.68); p=0.00013, a protective effect of 60% (95% CI: 32%–76%), (Auvert et al. 2005), using "intent to treat" analysis that compares results between the two groups as randomized (regardless of compliance).

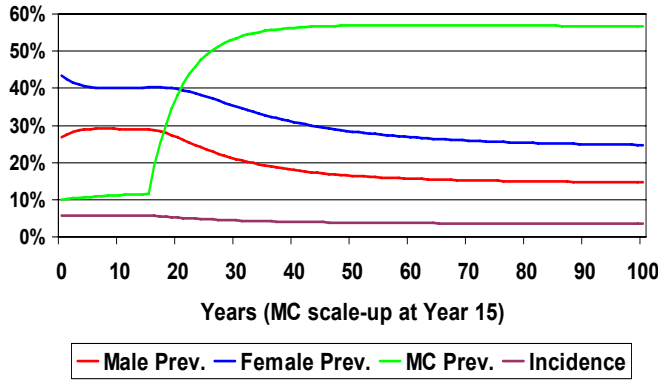
as in Figures 9 and 10. If just half of uncircumcised men in Kenya and Botswana were to be circumcised, and making a very conservative assumption that this would make them one third as likely to become infected, overall prevalence could be halved over three decades.

Figure 9: Modeled implications in Nyanza, Kenya, assuming 50% MC uptake over 10 years, RR = 0.33



Source: Nagelkerke and Moses, 2005, personal communication

Figure 10: Modeled implications in Botswana assuming 50% MC uptake over 10 years, RR= 0.33



Source: Nagelkerke and Moses, 2005, personal communication

Other benefits of male circumcision

In addition to protecting against HIV, circumcision also reduces other sexually transmitted infections (STI), including chancroid (which causes painful ulcers), syphilis, balanitis (infected foreskin), phimosis (inability to retract the foreskin), penile cancer and cervical cancer in female partners. The evidence varies in strength; for example, a new meta-review finds strong evidence for a reduced risk of chancroid and syphilis, less association between herpes and circumcision (Weiss et al. 2006, Drain et al 2006).

Complications of circumcision

The complications that can arise from circumcision – especially if performed under unhygienic conditions – are: infection, excessive bleeding, excessive pain, too much skin removed, anesthetic complications, penile damage or amputation, cosmetic complications, erectile dysfunction, psycho-behavioral complications, HIV infection from non-sterilized instruments, and possible death if appropriate treatment of complications is not provided. However, serious complications are very rare. Complications were reported by fewer than 4 percent of participants in the South Africa and Kenya trials, most were not long-lasting (Table 4). No serious or permanent complications were reported by any of the 5,000 men circumcised in the three trials (Weiss et al. 2008).

Table 3: Complications from circumcision in two studies

Type of Complication	Orange Farm, South Africa	Kisumu, Kenya
Pain	13 (0.82%)	
Swelling or hematoma	10 (0.63%)	
Excessive bleeding	9 (0.57%)	4 (0.8%)
Problems with appearance	9 (0.57%)	
Other	5 (0.32%)	
Damage to penis	4 (0.25%)	
Insufficient skin removed	4 (0.25%)	
Infection	3 (0.19%)	7 (1.3%)
Delayed wound healing	2 (0.13%)	4 (0.8%)
Anesthetic complications	1 (0.07%)	
Excessive swelling		1 (0.2%)
Erectile dysfunction		1 (0.2%)
TOTAL	60 (3.8%)	17 (3.5%)

Sources: Auvert et al, 2005 (South Africa); Krieger et al, 2005 (Kenya)

Cost

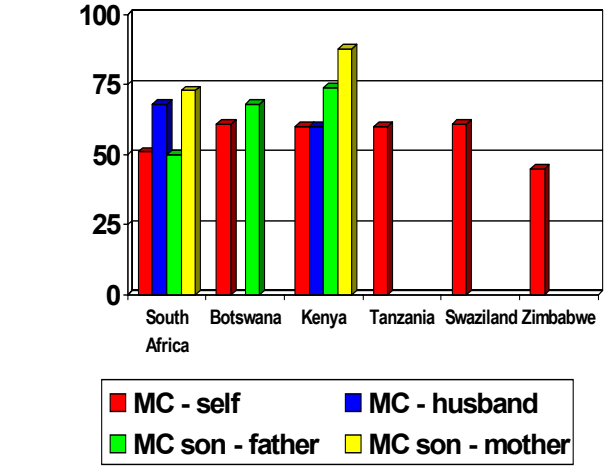
Circumcision in medical facilities is estimated to cost about US$30-60 per procedure in Africa, and neonatal MC about one third this cost (Auvert et al 2008). A lower estimate of $25 included $8 for medical expendables (sutures and needle, gauze, bandaging, analgesics), $7 for surgical preparation (preparing the room, cleaning linens, sterilizing instruments), and $10 in overheads (physician's fee, maintenance of room and equipment, utilities) (Bailey et al, 2006, personal communication). Modeling studies find MC to be cost-effective and cost-saving, at $100 - $900 per affection averted given medium-to-high prevalence, and depending on the incidence estimate and time horizon used (Martin et al 2007). More rapid take-up would increase cost-effectiveness even more.

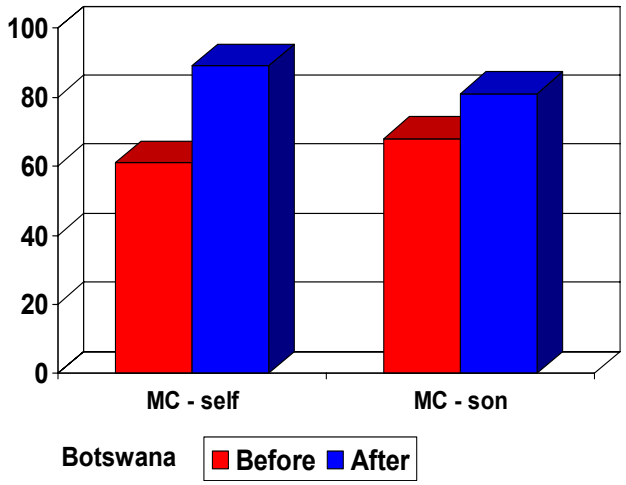
Acceptability

Twelve published studies and two unpublished manuscripts found reasonable acceptability of circumcision in Botswana, Kenya, Malawi, South Africa,

Swaziland, Tanzania, Uganda, Zambia and Zimbabwe, ranging from 29-80% (mean 60%). Men were asked whether they would choose circumcision for themselves and their sons, and women were asked about acceptability for their husbands and sons. In Botswana, a one-hour information session increased acceptance rates from around 60% to around 80% (lower panel of Figure 11).

Figure 11: Percent who would accept male circumcision





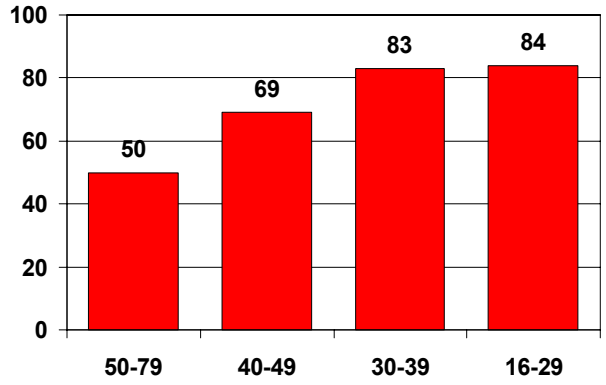
Sources: Bailey et al 2002, Halperin et al 2005, Kebaabetswe et al 2003, Nnko et al, 2001

Is cultural change possible?

Globally, about 35% of men are circumcised, but circumcision is rare in Europe, Latin America, East Asia, India, China and Southern Africa. Several of the most severely HIV-affected countries – Swaziland, Botswana, Lesotho and South Africa – practiced male circumcision widely in living memory, but the practice waned with urbanization and westernization. Promoting it now would be returning to traditional culture, not introducing an unfamiliar practice. Some countries with no tradition of male circumcision have adopted it quickly and widely.

For example, in South Korea, circumcision had been very rare, but became increasingly common from the 1950s, largely due to US medical influences, and reached over 70% relatively quickly. The rapid uptake is evident in the age-cohort data in Figure 12.

Figure 12: Male circumcision in South Korea, by age



Source: Kim, Lee and Pang, 1999

What are the practical implications of the data?

An indicator of the epidemic potential

Perhaps the least controversial implication of the data is that male circumcision is an important tool for understanding the epidemic, its potential, and the implications for HIV responses. Many of the social factors that originally were expected to predict infection have not proved reliable. But the evidence on circumcision has held up, and grown stronger. The data suggest that countries (or areas) with high rates of male circumcision are unlikely to have generalized sexual epidemics. As Figure 4 showed, many highly circumcising Asian countries have limited sexual epidemics – including Central Asian Republics, Afghanistan, Pakistan, Bangladesh, Indonesia (outside Papua) and Philippines. However, injecting drug use may fuel HIV transmission, greatly amplifying epidemic potential. This makes effective IDU programs imperative to curtail the potential for sexual epidemics.

Information

We owe people accurate factual information and the best scientific evidence we have. So health communications should include information on the protective effects of circumcision. The results of the South Africa, Kenya and Uganda studies have been widely publicized in the region and discussed by leaders, parliamentarians, health workers, the press and general public. Many prominent people have made strong statements promoting circumcision, (see box on next page) although there are also more cautious and contrary voices.

Recent Supportive Statements by Southern African Leaders and Health Professionals

"All male children should be circumcised. To show my seriousness, I have taken all my sons for circumcision." (MP Marwick Khumalo, Lobamba, Swaziland)

"I have seen people dying left and right, and leaving children. To take good care of my children, let me undergo the procedure." (Hospital Administrator Dr Dlamini, Swaziland)

Pharmacist, Lungile Maziya, Swaziland scheduled circumcisions for her husband and all four of her sons, aged 6 to 15. Only her 15-year-old balked. She said she told him, "My boy, when you're 18, you'll really thank me for this."

"Everyone wants to have it done. Not one person has called to say it's 'un-Swazi." (Prominent physician and health show host Dr Themba Ntiwani, Swaziland)

Sources: Timberg 2005.

Responding to growing demand for services

There are indications of increasing demand for male circumcision in traditionally non-circumcising societies in Southern Africa. At the University Teaching Hospital in Zambia, demand grew from 1 to 15 per month, with a three month waiting list, within a year of the South Africa study results being reported. Demand at one private Swaziland hospital (the Mbabane Clinic) rose from less than 1 per month to over 100 per month (personal communication Mark Mills, 2007). Growing demand creates an obligation on governments and the international community to support safe, affordable, surgical procedures, counseling and post-operative care. In response, on 27 January, 2006, Swaziland offered circumcision training to physicians and nurses and over 60 attended. Moreover (as an anecdotal indication of demand), there were so many volunteers to be demonstration and practice patients during the training session, that a hundred men had to be turned away.

Should male circumcision be promoted for HIV prevention in the most affected countries?

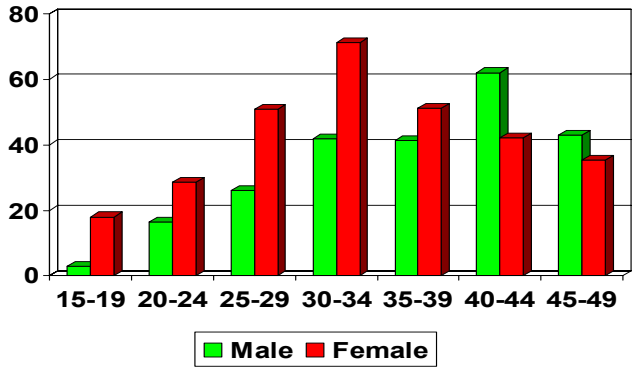
This is the most urgent and complex question raised by the new data. Note that this question is posed for the most affected countries where transmission is mainly through heterosexual sex, and **not** for countries with low general population prevalence (especially where transmission is driven mainly by injecting drug use), where the costs and complications of circumcision might easily outweigh the benefits. UNAIDS and WHO's position, developed in consultation with international experts through careful review and discussion of the results of the 3 randomized controlled trials and other evidence is that:

> "Countries with hyperendemic and generalized HIV epidemics and low prevalence of male circumcision should…progressively expand access to safe male circumcision services... (and) should consider scaling up access to male circumcision services as a priority for adolescents, young men, and as indicated by the local epidemiology and other considerations, older men at particularly high risk of HIV.
>
> Since neonatal circumcision is a less complicated and risky procedure than circumcision performed in young boys, adolescents or adults, such countries should consider how to promote neonatal circumcision in a safe, culturally acceptable and sustainable manner.
>
> Countries with other HIV epidemic situations should carefully consider the potential impact that promoting male circumcision and expanding safe circumcision services will have on their HIV epidemic." (UNAIDS/WHO March 2007)

WHO/UNAIDS and other agencies have developed guidelines on how to implement safe, voluntary MC services. The UNAIDS website offers Guidelines on communications, and human rights, ethical and legal issues, as well as useful informational materials. These were developed as part of a systematic UN Work Plan on Male Circumcision to help countries improve the safety of their circumcision practices, and support discussions and decisions about whether and how to include male circumcision as part of combination HIV prevention programs. The Work Plan included assessments, acceptability and impact studies, cost analyses; training health care workers; assessing regulatory and licensing issues, etc. (Hankins, C, personal communication).

There is urgency to act on a potentially effective prevention intervention in the most affected countries where the epidemic continues to rage, despite all efforts. For example, Figure 13 shows staggeringly high population prevalence rates in some groups from the most recent household survey in Botswana's second-largest city – above 70% among women in their early thirties, and more than half of all women aged 15-45 (BAIS, 2005).

Figure 13: Population-based HIV prevalence in Francistown, Botswana, 2005



Sources: BAIS, 2005

These rates are higher than were ever thought likely or possible. MC is a once-off, highly effective procedure that has high cultural acceptability and provides a high level of lasting protection. It also offers the opportunity to combine the procedure with information on behavior change to protect against HIV, HIV testing and counseling, STI screening and treatment, and condom provision (Wamai et al 2008). Irrespective of the extent to which the international AIDS community actively promotes circumcision, we should be ready to respond quickly if countries ask for help in incorporating circumcision in their national response.

Infant circumcision

One option would be to promote routine circumcision of infants – perhaps as part of antenatal care and packaged with programs to prevent mother-to-child transmission (PMTCT) – in the most affected countries. Botswana in fact took a policy decision to offer male circumcision as a routine part of antenatal care at all health facilities some years ago. This has not been implemented yet, although recently the government announced plans to scale up circumcision services generally. Initial steps in scaling up are to plan and then begin training, and putting in place the facilities, staff and equipment needed. In Southern Africa, medical circumcision at infancy would have the additional advantage of reducing complications – often including several deaths – that result from traditional circumcision rites in adolescence. But the major benefits of infant circumcision in preventing HIV infections would take more than 20 years to begin to be realized.

Adult circumcision

Whether it is justified and feasible to promote and offer adult circumcision for HIV prevention in the most affected countries has become less controversial, with the strong results of the three randomized clinical trials, continued high incidence in the most affected countries, and disappointing progress in vaccine and microbicide development and herpes treatment. In 2000, Malcolm Potts published a rough (conservative) estimate in *Lancet* that existing circumcision rates had prevented about 8 million infections in 15 African and Asian countries alone. This is a compelling case for its explicit use within prevention programs. At the protective effect indicated in meta-analysis, every 15 to 60 circumcisions could prevent one case of HIV infection (Quinn, 2006).

> "How many HIV infections have been prevented by male circumcision? HIV…in (circumcising) west Africa clusters is between 1% and 5%. In comparison, the predominately non-circumcising east and southern African nations have rates approaching 25%. Let us assume … male circumcision accounts for about half the disparity in heterosexual HIV rates … It can be estimated that if male circumcision had not been a widespread practice, HIV frequency would have reached at least 10% in ... west African countries. This estimate suggests that about 6 million additional adults would now be infected in the region. A similarly conservative estimate of the impact in the four south and southeast Asian countries with a high male circumcision rate would be that … an additional 2 million adults would now be infected in these four Asian countries. Hence, it is possible that 8 million or more adult HIV infections have been prevented by male circumcision in 15 African and Asian countries." (M.Potts, Lancet 2000; 355:926)

There are three caveats.

- First, the procedure must be done by well-trained personnel, under hygienic conditions, with adequate follow-up. There is much to be done to plan and prepare. In countries where serious complications and even deaths from circumcision done under poor conditions occur regularly, there would be strong benefits to involving health care professionals. (This would not preclude working with traditional circumcision practitioners and traditional healers.) One could consider special programs to circumcise adult men, bringing in trained personnel from other countries to provide additional capacity for a limited period. Later, much less in-country capacity would be needed to circumcise newborns and sustain high circumcision rates.
- Second, in the healing period, which lasts up to one month (2-3 weeks is the norm), sexually active men may be at a higher risk of HIV infection, and this risk should not be underestimated. Men need to be well-informed about the risks and the precautions they should take.
- Third, there is concern that some increase in risky behavior ("disinhibition" or "risk compensation") may take place because of the perceived reduction of risk. Circumcision does not provide full protection and could reduce protection in men who, for example, decrease their condom use or engage in other riskier behavior. However, the three large trials showed no evidence of risk compensation (Wamai et al 2008). In the Orange Farm trial in South Africa, the men in the intervention group did not differ from the men in the control group in their number of sexual partners or condom use. They did engage in sex more frequently, but frequency of sex is not a risk factor by itself. Nor was there any evidence of risk compensation in a recent Kenyan study of a "real world" community clinic setting (Agot et al 2006). None-the-less, an increase in risky behavior remains a concern – disinhibition has been noted with condom use, negative HIV test results, ARV therapy and post-exposure prophylaxis. It remains a possibility to be taken into account with circumcision, as with other interventions. It is certainly not a reason to reject circumcision as an intervention. In fact, circumcision offers an excellent opportunity to

counsel and inform young adult men who are an important target group for prevention, and who are often difficult to reach with one-on-one interventions. Effective counseling of men who choose to be circumcised might even result in less risky behavior that could enhance the strong protective effect of MC.

Reaching youth

In addition to offering circumcision through health facilities; schools and youth centers could also be used as outreach points. This would enable young men to be reached before they become sexually active, to realise benefits quickly, without the long time lag if the focus were on infants only.

Gender

Circumcision has been compared to a vaccine that would be 60% effective, except that there is a gender bias, since it is an intervention that can be directly offered only to men. This is not such a concern in universally circumcising countries, where male circumcision protects women almost equally, since it appears to suppress most sexual HIV transmission. But in partially circumcising countries, women may be exposed to non-circumcised partners. Partial uptake of male circumcision may reduce overall HIV transmission, but widen disparities between male and female HIV rates in the short-to medium term. To the extent that male circumcision reduces the risk that an infected man will transmit the virus through sex, the gender disparity would be reduced. Although preliminary results from Uganda gave some indication of possible reduced transmission risk, more recent data has been inconclusive.

Conclusion

Analysis and debate – especially on the implications of the evidence for HIV prevention programs – is important and welcome. But the evidence is now much stronger and more rigorous than for perhaps any other prevention intervention. With the accumulated evidence reviewed above, and results from the first trial, Bertran Auvert's view was that "*MC provides a degree of protection against acquiring HIV infection equivalence to … a vaccine of high efficacy…(and) should be regarded as an important public health intervention for preventing the spread of HIV. MC could be incorporated rapidly into the national plans of countries where most males are not circumcised and where the spread of HIV is mainly heterosexual.*" In 2006 it seemed to him that the international community was *"waiting for a vaccine. They're not interested in a cut from some scissors."* But results from vaccine trials and of HIV prevention trials of other medical interventions including microbicides, diaphrams and herpes treatment have been disappointing. This, with the extraordinarily strong results of the South Africa, Kenya and Uganda circumcision trials, and the continued high HIV incidence in many countries in sub-Saharan Africa surely make the case for "urgent and decisive leadership… to start implementing effective programs for safe, voluntary MC and reproductive health in high HIV-prevalence regions". This is the conclusion of a recent editorial letter signed by 48 leading researchers, practitioners and policy makers (Wamai, Weiss et al, 2008).

A number of major funders, including the US government (PEPFAR), UNICEF and the Bill and Melinda Gates Foundation have begun to fund MC programs in selected African countries. In discussing this review of the evidence in 2006, there was consensus among a group of World Bank staff that the Bank must be ready to respond if countries ask for help in being able to offer male circumcision. Male circumcision's strong protective effect and low cost make its "cost per infection averted" far below the cost of providing antiretroviral treatment even for a short time, let alone for a lifetime. At a cost of around $25 per procedure, and if every 15-60 procedures were to prevent one new infection (Quinn, 2006) circumcision would be extremely cost effective -- in the range of $375 to $1500 per infection averted. Even at higher cost of $30-60 per procedure, with reasonable assumptions about uptake and protective effect, the cost per infection averted would be in the range $100-900 (Martin et al 2007).

There is a strong argument for being ready to support voluntary male circumcision programs in South Africa, Swaziland,[4] Lesotho, Botswana and Namibia, where the epidemic is largely sexually transmitted, prevalence rates are high and male circumcision is low, the numbers of people are manageable and health services likely to be able to handle the demand. Beginning in a few, mostly small countries would allow the initial programs to be done well, with careful evaluation.

[4] The UNICEF office in Swaziland was supporting efforts there as early as 2006.

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Updated, August 2008