

UNAIDS/WHO/SACEMA Consultation

Modelling the Impact of Male Circumcision on HIV Transmission

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1- Broad issues discussed

1. **Key Questions:** What are the key questions that modelling can help us to answer?
2. **Policy:** How can modelling the impact of male circumcision (MC) assist in decision making about policy and programme planning for HIV prevention services?
3. **Data:** What data are currently available and what new data are needed?
4. **Approaches:** What kinds of models can we use to answer what kind of questions?

2- Overarching questions

1. What is the potential impact of rolling out MC programming in sub-Saharan Africa (SSA)? How much does it depend on the speed at which MC services are rolled out; the MC prevalence level before and after roll-out (numbers of additional circumcisions performed and
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- coverage achieved); the countries in which it is done; the underlying dynamics of the HIV epidemic in various settings; the sub-populations that might initially be targeted.
2. What are the costs and cost-effectiveness of MC in sub-Saharan Africa.
 3. From an epidemiological perspective, what is the most useful age range to have the biggest impact on the epidemic (context specific as it depends on the peak incidence): neonatal, pre-pubescent, pubescent, 18–24 years old, all males, before or after sexual debut.
 4. Effects of targeting by occupation or potential impact i.e. super spreaders, mineworkers, truck drivers, high HIV prevalence communities, low MC prevalence communities.....
 5. Synergies with other HIV prevention services including male and female condom distribution, behavioural change programmes, HIV testing and counselling, STI treatment, empowering women, poverty reduction.....
 6. How can models used to estimate the potential impact of rolling out MC programmes apply to the modelling of other interventions, i.e. supporting refinement or further development of modelling methods?

3- Specific questions to be answered

1. What are the benefits of MC to women? To what extent do the benefits for women depend on the age of men and women? HIV prevalence in SSA is already higher in women than in men. What does MC do to this differential impact of HIV?
2. What are the possible synergies between HIV, HSV-2 and MC given that MC appears to have only a small impact on HSV-2 (OR \approx 0.8–0.9) but the association between HSV-2 and HIV is very strong?
3. How much of the variability in HIV prevalence in sub-Saharan Africa can be explained by differences in male circumcision practices and prevalence?
4. What role do sexual networks play in determining steady state HIV prevalence and what is the relative impact of MC (and other interventions) in different network contexts?
5. What are the cultural determinants of current MC practices and how might these affect uptake of services?
6. How acceptable is MC in different communities and how likely will it be that males will access services if these are made available? Who will accept (differential uptake?) and in what environment will they accept? How does this vary among urban, peri-urban and rural communities? What differences can be anticipated by country?
7. What is needed to provide MC as a routinely offered service (methods, infrastructure, training, medical personnel) and how would this vary by population: migrant workers, men in STI clinics, truck drivers, adolescents in youth friendly services, newborns.....?

8. What service models are most acceptable and cost effective: vertical programmes, settings that focus more broadly on male sexual and reproductive health, other settings (e.g. MTCT+ -)?
9. What is the current incidence of side effects/adverse events by provider type and setting? How can these be minimised and at what cost?
10. What would be the relative benefit of first concentrating on core groups or 'super-spreaders' in any planned roll-out?
11. Why does MC appear to be most protective in the highly exposed?
12. MC can involve removing different amounts of the foreskin. How important is this in reducing transmission? Is there a direct linear correlation between extent of remaining Langerhans cells and HIV acquisition risk?
13. Can further analysis be done on the Orange Farm data in order to better understand other important determinants of transmission?
14. What role could be played by women in encouraging men to be circumcised?
15. Could male to female transmission be further explored by asking women in antenatal clinics (ANC) if their partners are circumcised?
16. What information currently exists on the validity of self-report and partners' reports of circumcision status?
17. Can we infer sexual mixing patterns from Demographic and Health Survey (DHS) data on number of sexual partners and obtain better data on the age at circumcision? Can we analyse female partner HIV status by male partner circumcision status?
18. How much behavioural disinhibition may occur following adult male circumcision? What prevention methods are most effective in preventing it?
19. How often does resumption of sex before wound healing occur and to what extent can increased susceptibility be demonstrated by higher HIV incidence in those who do resume sexual activity early?

4- Models

1. **Statistical models** identify correlates of infection; areas in which interventions might be most effective.
2. **Analytical models** provide insight and reveal the underlying general principles but details or complexity are captured with difficulty.
3. **Dynamical (compartmental) simulations** can capture the dynamics of complex systems but generally describe overall behaviour of groups. Can they assess impact taking into account heterogeneity: assortative mixing, different sub-populations, unconnected networks.

4. **Micro-simulation models or agent based models** capture individual behaviour and individuals interacting; stochastic extinction and inherent variability (e.g. skewed distribution of infectiousness). They are easy to programme but require substantial computing time and resources. Micro-simulation can be done in various ways: individuals can be followed (singly) through an epidemiological landscape; entire populations of individuals can be simulated.
5. **Networks and graph theory** explore the importance of the structure of sexual networks on transmission of infection and ways to control it. They have a potential to capture the 'middle ground' between population level macro-effects and individual level micro-effects.
6. **Combination approaches** use compartmental models for sub-Saharan Africa overall but microsimulation models for other settings such as Kenya where more data are available.

5- Economic issues

1. Differentiate between total resources required, cost effectiveness analysis (allows comparison with other prevention interventions), cost utility analysis (comparison with other health interventions), benefit-cost analysis (comparison with other cost-effective interventions).
2. Identify costs to individuals, families, communities, governments. Are these affordable?
3. Determine which other programmes are competing for the same money, human resources and/or facilities?
4. Cost of different models of service delivery: providers (doctors, nurses, health workers), training costs, supervision and monitoring costs, circumcision procedure, number of follow up visits.
5. Start up and roll out costs: marginal costs with increasing coverage (lower or higher as more difficult-to-reach populations are served)
6. Costs of recruitment by method used and factors that would influence effectiveness: age, targeting specific groups, etc.
7. Potential synergies with other services: STI treatment; HIV testing and counselling; sensitisation /socialisation programmes for young men on violence against women, gender relations; behavioural counselling and peer support.
8. Need to consider infections averted and costs over time since benefits and costs may not occur in the same year (time of procedure, times of infection averted, time would have started on antiretroviral treatment).
9. Need to take into account multiplier effects if increased protection effects in women.

6- Data needs

1. MC prevalence by geographical location, age, ethnic group.
2. Impact of MC on male to female transmission: data from Uganda trial (Gates financed).
3. Current costs for male circumcision in different countries by provider and procedure.
4. Safety issues: incidence of adverse events by provider, setting, etc.
5. Feasibility: what proportion of uncircumcised males could be circumcised in 5 years by country? Current male circumcision prevalence, number of providers (role of traditional circumcision), potential for scale-up.
6. What changes (training, licensing, regulatory, supply chain management, etc.) are needed to make current practices safer?
7. By what methods can MC be promoted most effectively?
8. What is the potential for training health workers other than doctors to provide MC services?
9. Practical issues around scaling-up MC in urban, peri-urban and rural areas and in communities living in formal and informal housing.
10. Empirical data on the impact of population level roll-out of MC services in one or more communities.

7- Policy considerations

1. There is no dichotomy between science/complexity of models and messages to policy makers. Models need to be as rich and informative as possible and messages need to be clear, readily understood and concise.
2. Policy analysis needs to include competing interventions (alone or in conjunction) to assess opportunity costs and weigh competing priorities.

8- Actions and next steps

1. Ensure that available DHS data are fully analysed and interpreted.
2. Investigate more fully the extent of problems concerning self-reported MC status and explore the accuracy of female partner reports of the circumcision status of their male partners.
3. Formulate modelling questions that can be answered now using available data.
4. Ensure that current modelling work is informed by these discussions.
5. Share approaches and ideas; take steps to provide rapid access to new data as they emerge.

6. Begin to develop more specific models to be applied either nationally or to particular communities where relevant data may already be available.
7. Present findings from the meeting to the UNAIDS Reference Group on Estimates, Modelling and Projections in December 2005.
8. Present modelling results to relevant meetings convened in 2006 under the framework of the United Nations Male Circumcision Work Plan.

9- Participants

Co-chairs:

Catherine HANKINS

Chief Scientific Adviser and Associate Director
Human Rights, Gender and Best Practice
Policy, Evidence and Partnerships
UNAIDS

Brian WILLIAMS

Senior Epidemiologist
Tuberculosis Monitoring & Evaluation
Stop TB Department
WHO

Participants:

Bertran AUVERT

INSERM U687
France

Nico NAGELKERKE

Professor of Biostatistics
United Arab Emirates University, UAE

Robert BAILEY

Professor of Epidemiology
School of Public Health
University of Illinois at Chicago
USA

John STOVER

Senior Fellow
Futures Group
USA

Ruanne BARNABAS

Cancer Epidemiology Unit
University of Oxford
UK

Helen WEISS

Senior Lecturer in Medical Statistics & Epidemiology
London School of Hygiene & Tropical Medicine
London UK

Wayne GETZ

University of California at Berkeley, Dept ESPM
USA

Daniel WESTREICH

Graduate Student MSPH
UNC-Chapel Hill Department of Epidemiology
USA

Ronald GRAY

Professor of Reproductive Epidemiology
Johns Hopkins University
USA

Richard WHITE

Lecturer in Infectious Disease Modelling
London School of Hygiene & Tropical Medicine
UK

John HARGROVE

ZVITAMBO Project
Harare, Zimbabwe

Michael WOLFSON

Assistant Chief Statistician, Analysis and Development
Statistics Canada
Canada

Ekkehard KOPP

South African Centre for Epidemiological
Modelling & Analysis (SACEMA)
South Africa

UN System participants

UNAIDS

Anindya CHATTERJEE
Senior Adviser, Prevention & Public Policy
Prevention, Care and Impact Mitigation, Policy, Evidence and Partnerships

Robert GREENER
Economics Adviser
Epidemic and Impact Monitoring
Policy, Evidence and Partnerships

Karen STANECKI
Senior Adviser, Demographic & Related Data
Epidemic and Impact Monitoring
Policy, Evidence and Partnerships

UNICEF

David ALNWICK
Regional Adviser, HIV/AIDS
UNICEF Eastern and Southern Africa Regional Office (ESARO)

WHO

Isabelle DE ZOYSA
Senior Adviser for HIV/AIDS
Office of the Assistant Director-General
Family & Community Health

Tim FARLEY
Coordinator
Controlling Sexually Transmitted and Reproductive Tract Infections,
Department of Reproductive Health and Research

Jeremy LAUER
Costs, Effectiveness, Expenditure and Priority Setting,
Health Systems Financing Evidence and Information for Policy
World Health Organisation

George SCHMID
Medical Officer
Department of HIV/AIDS