Does the provision of VMMC services for the next 5 years continue to represent a cost-effective use of HIV programme resources in Sub-Saharan Africa?

Results from five models.

Loveleen Bansi-Matharu (University College London, UK)
Modelling groups

- EMOD\(^1\) – South Africa
- HIV Synthesis\(^1\) – Setting scenarios across SSA
- Goals-ASM\(^2\) – South Africa, Malawi, Zimbabwe (+ 9 other countries)
- Optima\(^2\) – Malawi, South Africa, Zimbabwe
- Thembisa\(^2\) – South Africa

\(^1\) Individual based stochastic, \(^2\) Compartmental
Question of interest

• Does the provision of VMMC services for the next 5 years continue to represent a cost-effective use of HIV programme resources in Sub-Saharan Africa?
  • No further VMMC
  • VMMCs continue at current rates for 5 years
• Results considered over time horizon of 50 years (focus on 50 years as health benefits of intervention are realized over long time periods; 20 years also considered)
Model alignment

- All models aligned on the following:
  - Cost of VMMC, US $90
  - 3% discounting of DALYs
  - % of all people living with HIV who are on ART remains constant from 2021

- Various survey data were used to inform initial VMMC rates and all models factored in background rates of traditional circumcision
Baseline outputs (2021): Incidence/100 p-yrs

The HIV Modelling Consortium
Baseline outputs (2021): % of HIV+ people with viral load <1000 copies/mL

The HIV Modelling Consortium
Baseline outputs (2021): % of men circumcised aged 15-49
South Africa – Cost-effectiveness plane across 50 year time horizon

The HIV Modelling Consortium

South Africa

DALYs averted per year

Mean difference in total costs across 50 year time horizon

(Millions US $ per year)

No further VMMC

Optima

Thembisa

Goals-ASM

EMOD
South Africa – Conclusions

- Across a 50 year time horizon, all models showed DALYs averted and costs saved with continuation of VMMC for 5 years
  - Continuation of VMMC for 5 years cost-saving in South Africa
Malawi – Cost-effectiveness plane across 50 year time horizon

Mean difference in total costs across 50 year time horizon (Millions US $ per year)

DALYs averted per year

Optima

No further VMMC

Goals-ASM
Malawi – Conclusions

• Across a 50 year time horizon, all models showed DALYs averted and costs saved with continuation of VMMC for 5 years

→ Continuation of VMMC for 5 years cost-saving in Malawi
Zimbabwe – Cost-effectiveness plane across 50 year time horizon

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No further VMMC

Optima

ICER=$616

Goals-ASM

Mean difference in total costs across 50 year time horizon
(Millions US $ per year)
Zimbabwe – Conclusions

• Differences in cost-effectiveness between Goals and Optima likely driven by differences in future incidence projected by the two models

• DALYs averted according to both models, but differences in costs across 50 years slightly higher with Optima

  → VMMC cost-saving according to Goals but not quite cost-effective according to Optima at the US $500 threshold
HIV Synthesis – Cost-effectiveness plane across 50 year time horizon

DALYs averted per year

Mean difference in total costs across 50 year time horizon (Millions US $ per year)

No further VMMC

HIV Synthesis

The HIV Modelling Consortium
HIV Synthesis Conclusions

- Considering the median setting scenario, across a 50 year time horizon, DALYs were averted, and costs were saved with continuation of VMMC for 5 years.

→ Continuation of VMMC for 5 years cost-saving across setting scenarios.
## HIV Synthesis – relationship between incidence and cost-effectiveness (100 scenarios)

<table>
<thead>
<tr>
<th>Incidence in 2021/100 person years</th>
<th>Percent of scenarios in which VMMC is cost effective</th>
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- Incidence estimates from PHIAs 2016: Malawi: 0.37/100py, Zimbabwe: 0.42/100py
### HIV Synthesis – relationship between incidence and cost-effectiveness (100 scenarios)

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- VMMC remains cost-effective even in setting scenarios with incidence below 0.2/100 person years
- This increases to >90% when incidence is >1/100 person years (this threshold to be further defined with new model runs with further lowered stochastic effects)
Effect of varying assumptions

- Assuming 20% lower ART coverage in 2041, VMMC was found to be more cost effective in all settings.
- Assuming a lower cost of VMMC ($60), VMMC was found to be cost effective in all settings by all models.
- Assuming a higher cost of VMMC ($120), VMMC was found to be cost-effective in South Africa and Malawi by all models, though results for Zimbabwe were mixed.
Summary: VMMC is cost effective over a 50-year time horizon

- South Africa: All models found continuation of VMMC to be cost-saving.
- Malawi: All models found continuation of VMMC to be cost-saving.
- Zimbabwe: Results were mixed. Continuation of VMMC was cost-saving according to Goals-ASM and nearing cost-effectiveness according to Optima.
- Across a range of setting scenarios which mimic countries and regions in sub-Saharan Africa, cost-effectiveness of VMMC was dependent on HIV incidence. Even in setting scenarios with low HIV incidence, there was over a 75% chance of being cost-effective (HIV Synthesis).
Conclusions

- In all HIV incidence settings, VMMC has a strong likelihood of being cost-effective.
Thank-you
Zimbabwe – future incidence prediction (assuming continuation of VMMC for 5 years)