Cost and cost-effectiveness of the PopART intervention: Data from HPTN 071 (PopART)

Katharina Hauck, on behalf of the PopART team
Background

• Close integration of epidemiological model and cost-effectiveness analysis (CEA)
• Two projection scenarios
• Health system perspective
• Ancillary studies for economic impact and patient perspective
• Extensive uncertainty analyses around key parameters
Background

• Costs
  – CHiPs intervention, HIV testing & treatment and VMMC in all PopART facilities
  – Extensive data collection over the study period
  – Time-and-motion study to disentangle costs of CHiPs activities
  – Secondary data sources for some cost items

• Benefits
  – Infections averted as projected by the epidemiological model
  – Disability-adjusted life-years (DALYs) averted
  – DALYs to assess PopART’s impact on both mortality and morbidity
## Projection Scenarios

<table>
<thead>
<tr>
<th>Intervention scenario</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PopART continued</td>
<td>PopART implemented 2014-2030 in intervention communities; counterfactual simulation of standard-of-care</td>
</tr>
<tr>
<td>PopART discontinued (actual trial)</td>
<td>PopART implemented 2014-2017 in intervention communities and then discontinued; counterfactual simulation of standard-of-care; impacts projected until 2030</td>
</tr>
</tbody>
</table>
## Results: Yearly CHiPs intervention costs per person

<table>
<thead>
<tr>
<th>Costs of PopART continued 2014 – 2030</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zambia</td>
<td>US$ 5.10 - US$ 6.80</td>
</tr>
<tr>
<td>South Africa</td>
<td>US$ 6.40 - US$ 8.20</td>
</tr>
</tbody>
</table>

Notes: Lower and upper bounds of the range are yearly minimum and maximum estimates over the 16 year projection horizon; costs are per person aged 14+ living in the intervention communities.
## Selected findings from time-and-motion study

<table>
<thead>
<tr>
<th>CHiPs time spent per person</th>
<th>Country</th>
<th>Average time in minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV-positive test result</td>
<td>Zambia</td>
<td>112</td>
</tr>
<tr>
<td></td>
<td>South Africa</td>
<td>85</td>
</tr>
<tr>
<td>HIV-negative test result</td>
<td>Zambia</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>South Africa</td>
<td>52</td>
</tr>
</tbody>
</table>
Total annual costs of HIV care (standard-of-care)

Zambia

South Africa
Total annual costs of ‘PopART continued’

Zambia

South Africa
## Total cumulative costs of ‘PopART continued’

<table>
<thead>
<tr>
<th></th>
<th>Zambia</th>
<th>South Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total incremental cost (over 16 years)</td>
<td>$52.8mn</td>
<td>$34.5mn</td>
</tr>
<tr>
<td>Average Annual Population</td>
<td>0.4mn</td>
<td>0.2mn</td>
</tr>
</tbody>
</table>

Note: these are the additional costs in addition to standard-of-care; costs of the PopART continued scenario over 16 years.
Cumulative costs by category for ‘PopART continued’

Zambia

South Africa

Cost (US$ million)

Cost (US$ million)

Intervention

Counterfactual

Intervention

Counterfactual

CHiPs Intervention

ART

CD4 testing

Facility testing

No ART

VMMC

End of Life Care
## Results: Cost-effectiveness

<table>
<thead>
<tr>
<th>Country</th>
<th>Intervention scenario</th>
<th>Outcome averted</th>
<th>ICER range (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zambia</td>
<td>PopART continued 2014-30</td>
<td>Infections</td>
<td>1,427 - 2,673</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DALYs</td>
<td>465 - 847</td>
</tr>
<tr>
<td></td>
<td>PopART discontinued (actual trial 2014-17)</td>
<td>Infections</td>
<td>835 - 1,811</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DALYs</td>
<td>196 - 392</td>
</tr>
<tr>
<td>South Africa</td>
<td>PopART continued 2014-30</td>
<td>Infections</td>
<td>2,324 - 4,712</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DALYs</td>
<td>503 - 922</td>
</tr>
<tr>
<td></td>
<td>PopART discontinued (actual trial 2014-17)</td>
<td>Infections</td>
<td>1,493 - 3,700</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DALYs</td>
<td>233 - 513</td>
</tr>
</tbody>
</table>
Conclusions

• PopART is likely to be cost-effective in both countries
• But PopART intervention is not cost-saving to the healthcare systems
• Consider affordability when multiplying by population sizes
• Explore alternative implementation scenarios
• Projections rest on many assumptions
  – Parameters assumed constant over the projection horizons
  – Technological innovation, unpredictable population dynamics and behaviour change
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