HIV Resource Allocation using the Goals Model

John Stover
Adebiyi Adesina, Lori Bollinger, Rudolph Chandler, Eline Korenromp, Guy Mahiane, Carel Pretorius, Rachel Sanders, Peter Stegman, Michel Tcheunche, Yu Teng

Improving Efficiency in Health
Washington, D.C. 3 February 2016
Purpose of the Goals Model

To improve resource allocation for HIV/AIDS programs

• What is the impact of scaling up prevention and treatment programs?
• How much funding is required to reach the our goals?
• What is the effect of alternate allocation patterns?
• What can we achieve with the available funding?

Note: Goals was designed as a planning tool not and optimization tool
Spectrum Modules

AIM

STI

Goals

Resource Needs

RAPID

DemProj

FamPlan

Child Survival & Safe Motherhood

Tuberculosis

OneHealth

NCDs
Goals Model

Pop Group
- Faithful couples
- Casual partnerships
- Sex workers/clients
- MSM
- PWID

Behavior
- # partners
- Acts/partner
- Condom use
- Age at 1st sex
- Needle sharing

Type of Transmission
- Sex
- Needle
- Blood
- MTCT

Probability of Transmission

New HIV Infections

Coverage Effectiveness

National HIV/AIDS Programs
- Policy / regulations
- Strategic direction
- Funding

Behavior Change
- Outreach, Education
- Communication
- Community mobilization
- Cash transfers

Biomedical
- Condoms
- VMMC
- ART
- PMTCT
- PrEP
- Vaccines

Program Enablers
- Communications
- Management
- Procurement
- Research, M&E

Treatment
Summary of Effects of Outreach to FSW on Condom Use
Critical Enablers and Development Synergies

- HTC
- Mass media
- Community mobilization
- School-based programs
- Outreach to youth out-of-school
- Workplace prevention

- Social protection
- Prevention of gender-based violence
- Health services
- Human rights

- Communications
- Management
- Procurement
- Distribution
- Research
- M&E

- Poverty reduction
- Legal reform
- Gender equality
Goals Model Applications

Main users
- National program planners: NACP, Health Ministry
- International organizations: UNAIDS, WHO (CHOICE)
- Funders: Global Fund, PEPFAR, BM Gates Foundation
- Researchers
Costing

• Sources of Information on Unit Costs
  • Unit cost data base developed by Avenir Health and LSHTM
  • Expert working group on costs of care and treatment
  • Investment Case analyses
  • PEPFAR expenditure analyses

• Economies of scale
  • SW, MSM, PWID, transgenders, C&T, PMTCT

• Country validation workshops for population sizes, unit costs, current coverage
  • Africa, Caribbean, LA, Asia
Unit Costs

- Lack of good data is a major problem
- Most unit costs are average costs
- Typically use real costs
- Economies of *national* scale included for key population interventions based on size distribution of facilities/programs
- Special considerations for certain interventions
- Cost by component for ART, PMTCT, VMMC
## Key Output Indicators

<table>
<thead>
<tr>
<th>Outputs</th>
<th>Impact</th>
<th>Investment Ratios</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Number of people reached by intervention</td>
<td>• Infections averted</td>
<td>• Net discounted cost</td>
</tr>
<tr>
<td>• Total costs by intervention</td>
<td>• Deaths averted</td>
<td>• Per infection averted</td>
</tr>
<tr>
<td></td>
<td>• QALYs gained</td>
<td>• Per death averted</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Per DALY/QALY</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Compare to benchmarks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Treatment savings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Productivity gains</td>
</tr>
</tbody>
</table>
Questions about resource allocation

Donor-Dependent Countries
• What is the cost and impact of achieving full coverage?
• How much will it cost to achieve our goals?
• Is the NSP cost-effective?
• What are the broader economic and societal consequences of the NSP?

Self-Financing Countries
• Which approaches will be the most cost-effective?
• What can be done with available resources?
Approaches to Resource Allocation

• Resource needs to achieve ‘full coverage’
• Cost-effectiveness of individual interventions with direct impact
• Scenario analysis of alternatives coverage targets
• Analysis of resource needs by intervention
  • Where are most of the funds going?
  • Does spending match contribution to HIV burden?
Cost-effectiveness by Intervention

Impact and Cost-Effectiveness by Intervention

- MSM
- Com. Mob.
- Youth: out-of-school
- HCT
- CSW
- STI Tx
- Workplace
- Condoms
- PMTCT
- MC
Cost-effectiveness by Intervention
Uganda IC: Explore Impact of Individual Interventions
Explore Scenario Combinations: Uganda

New Infections 2014-2025 by Scenario

- Med_ART+Med_HTC+Med_Condoms+Low+PMTCT
- T&T+High_HTC+High_Condoms
- High_ART+High_HTC+High_Condoms
- Med_ART_High_HTC+High_Condoms
- T&T+Med_HTC+High_Condoms
- High_ART+Med_HTC+High_Condoms
- Med_ART+Med_HTC+High_Condoms
- T&T+High_HTC_Med_Condoms
- High_ART+High_HTC_Med_Condoms
- Med_ART+High_HTC_Med_Condoms
- T&T+Med_HTC+Med_Condoms
- High_ART+Med_HTC_Med_Condoms
- Med_ART+Med_HTC+Med_Condoms
- Base

[Graph showing infection rates for different scenarios]
## Uganda IC: Final Scenarios

<table>
<thead>
<tr>
<th></th>
<th>Base</th>
<th>Medium</th>
<th>High</th>
<th>T&amp;T</th>
<th>Feasible Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMC</td>
<td>30%</td>
<td>60%</td>
<td>60%</td>
<td>60%</td>
<td>80%</td>
</tr>
<tr>
<td>PMTCT</td>
<td>70%</td>
<td>95%</td>
<td>95%</td>
<td>95%</td>
<td>95%</td>
</tr>
<tr>
<td>Condoms</td>
<td>35%</td>
<td>60%</td>
<td>60%</td>
<td>60%</td>
<td>75%</td>
</tr>
<tr>
<td>HTC</td>
<td>25%</td>
<td>35%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>Partner reduction</td>
<td>0%</td>
<td>9%</td>
<td>9%</td>
<td>9%</td>
<td>24%</td>
</tr>
<tr>
<td>ART</td>
<td>43%</td>
<td>70%</td>
<td>90%</td>
<td>90%</td>
<td>80%</td>
</tr>
<tr>
<td>ART eligibility</td>
<td>CD4&lt;500, PW, HIV+/TB+, SDC, children&lt;15</td>
<td>Base + SW, MSM FF</td>
<td>Base + SW, MSM FF</td>
<td>All PLHIV</td>
<td>Base + SW, MSM FF</td>
</tr>
</tbody>
</table>

Key: PW = pregnant women, SDC = serodiscordant couples, SW = female sex workers, MSM = men who have sex with men, FF = fisher folk
Resources Required by Intervention

New Infections by Risk Group (2012)

Low risk
Med risk
High risk
MSM
PWID
Cost-Effectiveness by Scenario (2014-2030)

Infections averted, QALYs saved and costs are discounted at 3% per year.
Cost-Effectiveness Frontier

The cost-effectiveness frontier, shown in the dashed line, represents the most-cost effective scenario for any level of additional cost (shown on the x-axis).

The Strategic and ART scenarios cost more than the Optimal but do not provide additional impact.

The NMSF scenario provides the greatest impact but the incremental cost-effectiveness (shown by the slope of the line from the Optimal scenario) is less than the increase from the Base to the Optimal scenario.
Debating Priority Outcomes

<table>
<thead>
<tr>
<th>Needs</th>
<th>Equal</th>
<th>Prevention Priority</th>
<th>Treatment Priority</th>
<th>Mitigation Priority</th>
<th>Priority Prevention</th>
<th>New Infections</th>
</tr>
</thead>
<tbody>
<tr>
<td>$250</td>
<td></td>
<td>$200</td>
<td>$150</td>
<td>$100</td>
<td>$50</td>
<td>$0</td>
</tr>
<tr>
<td>90%</td>
<td>64%</td>
<td>61%</td>
<td>90%</td>
<td>62%</td>
<td>65%</td>
<td>ART coverage</td>
</tr>
<tr>
<td>100%</td>
<td>71%</td>
<td>68%</td>
<td>43%</td>
<td>100%</td>
<td>72%</td>
<td>OVC coverage</td>
</tr>
</tbody>
</table>

 Millions of US$

- Support
- Mitigation
- Treatment
- Prevention

New Infections

-91%
-21%
-51%
+30%
-18%
-51%

New Infections

90%
64%
61%
90%
62%
65%
ART coverage

100%
71%
68%
43%
100%
72%
OVC coverage

- New Infections
- Percentages of ART and OVC coverage
- Comparisons of New Infections
- Financial implications of different approaches
Focus on Key Populations: Mauritius

**Scenario Space**

<table>
<thead>
<tr>
<th>Intervention</th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
<th>S5</th>
<th>S6</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW outreach</td>
<td>20</td>
<td>35</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>SW ART</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>70</td>
<td>25</td>
</tr>
<tr>
<td>MSM outreach</td>
<td>15</td>
<td>35</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>20</td>
</tr>
<tr>
<td>MSM ART</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>70</td>
<td>20</td>
</tr>
<tr>
<td>PWID outreach</td>
<td>20</td>
<td>40</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>NSEP</td>
<td>30</td>
<td>40</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>OST</td>
<td>60</td>
<td>63</td>
<td>66</td>
<td>66</td>
<td>66</td>
<td>66</td>
</tr>
<tr>
<td>PWID ART</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>70</td>
<td>56</td>
</tr>
<tr>
<td>ART T&amp;T</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>80</td>
</tr>
<tr>
<td>BC and enablers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Why do we typically use scenario-based approach rather than formal optimization?

• Unit cost data are weak
• Cost-effectiveness not the only consideration for resource allocation
• AIDS budgets usually include many items for which the effects on incidence or death are unknown
  • Critical enablers
  • Mitigation
  • Program support
  • Development synergies (education, health care, social services)
• Need to integrate into larger health system costs and effects
Geographic Prioritization
Optimizing Programs to Regional Epidemics

- Can include regional variations in epidemic level and composition.
- Often difficult to get regional-specific unit costs.
Additional Tools

• DMPPT 2.0 Model
  • For analyzing VMMC targets by age group

• DREAMS Model
  • For analyzing cost and impact of programs for young women and girls
Spectrum and Goals are freely available for download from our website at:


Goals is a stand-alone Windows-based program that does not require any other software to run.

It includes built-in data sets for about 40 countries.