



HIV Modelling Consortium

Summary of aims, objectives, and work packages

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Aim & objectives of the HIV Modelling Consortium

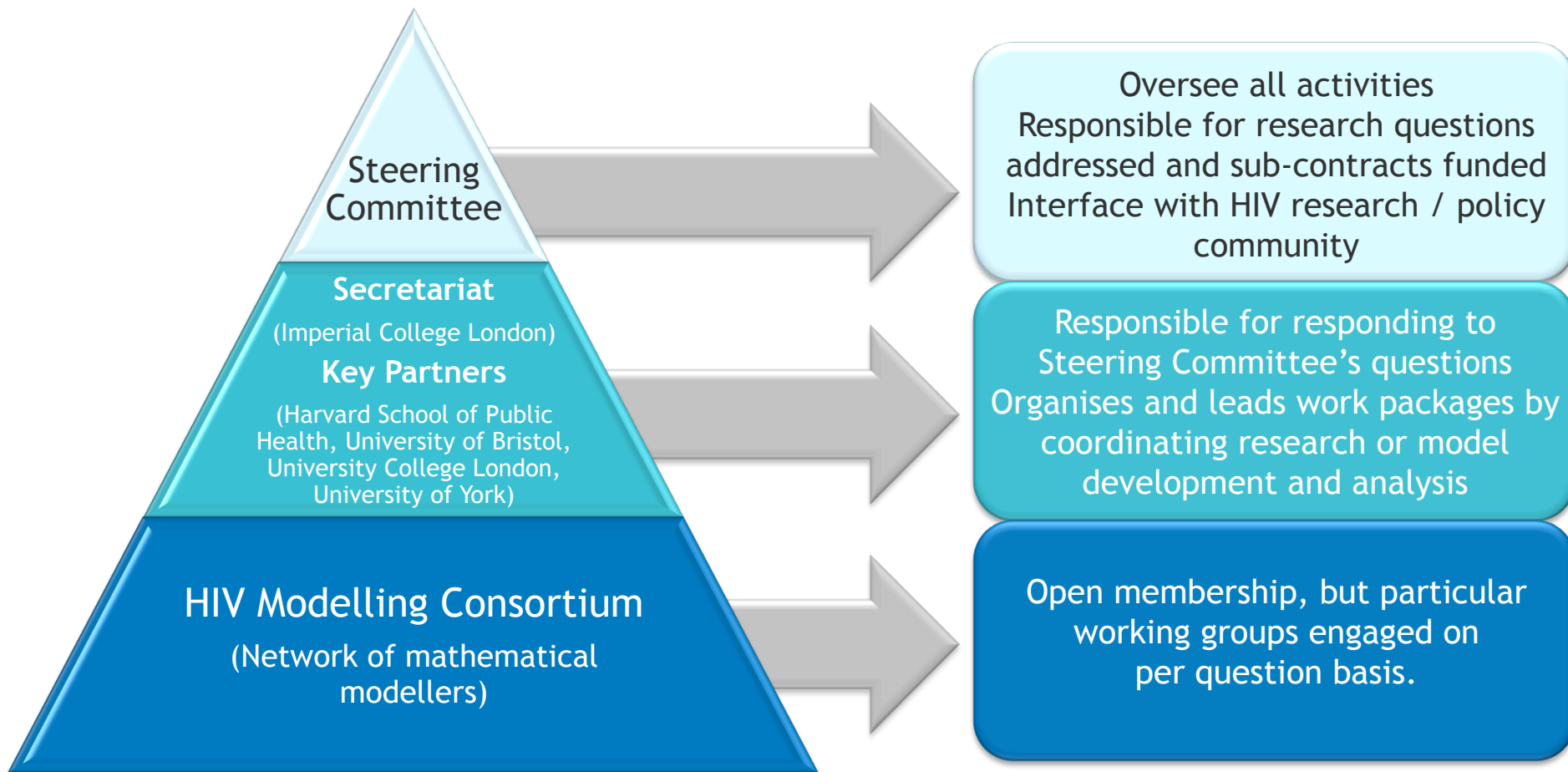
The HIV Modelling Consortium aims to improve scientific support for decision-making through the co-ordination of a wide-range of research activities in mathematical modelling of the HIV epidemic

- Identify questions that demand mathematical modelling input;
- Identifying new modelling results that may require further validation;
- Conduct new research to address those needs;
- Facilitate sharing of information; modelling techniques, data and expertise between research groups.
- Provide a forum for rigorous review of new mathematical modelling research and tools.



Structure of the Consortium

Structure and operating procedures enable group of modellers to rapidly respond to questions arising from key normative agencies





Steering Committee

Steering Committee 2010 - 2013

- **Prof. Geoff Garnett (Chair), Bill and Melinda Gates Foundation**
- Prof. Timothy Hallett, HIV Modelling Consortium
- Dr. Mead Over, Center for Global Development
- **Dr. Nalinee Sangrujee, Centers for Disease Control and Prevention**
- John Stover, Futures Institute
- **Prof. Rifat Atun, Global Fund to Fight AIDS, TB and Malaria**
- Dr. David Burns, National Institutes of Health
- **Dr. Rob Lyerla, PEPFAR, US Department of State**
- Dr. David Wilson, The World Bank
- **Dr. Chris Dye, World Health Organization**
- Dr. Peter Ghys, UNAIDS
- Dr. David Serwadda, Makerere University
- Prof. Brian Williams, SACEMA



Steering Committee

Steering Committee 2013 - 2017

- **Prof. Geoff Garnett (Chair), Bill and Melinda Gates Foundation**
- Prof. Timothy Hallett, HIV Modelling Consortium
- Dr. Mead Over, Center for Global Development
- **Dr. John Blandford, Centers for Disease Control and Prevention**
- John Stover, Avenir Health
- **Dr. Ade Fakoya, Global Fund to Fight AIDS, TB and Malaria**
- Dr. David Burns, National Institutes of Health
- **Michael Ruffner, PEPFAR, US Department of State**
- Dr. David Wilson, The World Bank
- **Dr. Meg Doherty, World Health Organization**
- Dr. Peter Ghys, UNAIDS
- **Dr. Mark Blecher, South African National Treasury**



Steering Committee Role

- **Two Steering Committee meetings a year**
- Discuss and agree on **work packages** to be undertaken by the Secretariat
- To provide **guidance** to the Secretariat on the approach considered for responding to work package questions where appropriate
- To review requests for project funding sent from collaborators within the Modelling Consortium (via the Secretariat)
- Steering Committee to **share knowledge** with HIV Modelling Consortium and contribute to **dissemination** of the work.
- Secretariat sends two-monthly **email updates** and curates “*open directory*” of all working files, manuscript, concepts notes etc for inspection and comment.
- Numerous consultations by phone and at meetings throughout the year.



The Secretariat

Based at Imperial College London:

Team members:

- Prof. Timothy Hallett, Director
- Dr. Jessica McGillen, Research Associate
- Sarah-Jane Anderson, Research Associate
- Dr. Jeffrey Eaton, Research Fellow (0.5 FTE)
- Kelsey Case, Research Associate (0.5 FTE)
- Jack Olney, Research Assistant
- Ellen McRobie, Project Manager
- Soraya Rusmaully, Administrator (0.5 FTE)



Key Partners

- Strong relationships with 4 key partners that receive core-funding.
- Enables the consortium to be responsive to research questions arising from the Steering Committee with leading experts.



UNIVERSITY *of York*

Prof. Mark
Sculpher



Prof. Andrew
Phillips



Prof. Josh
Salomon



Prof. Peter
Vickerman



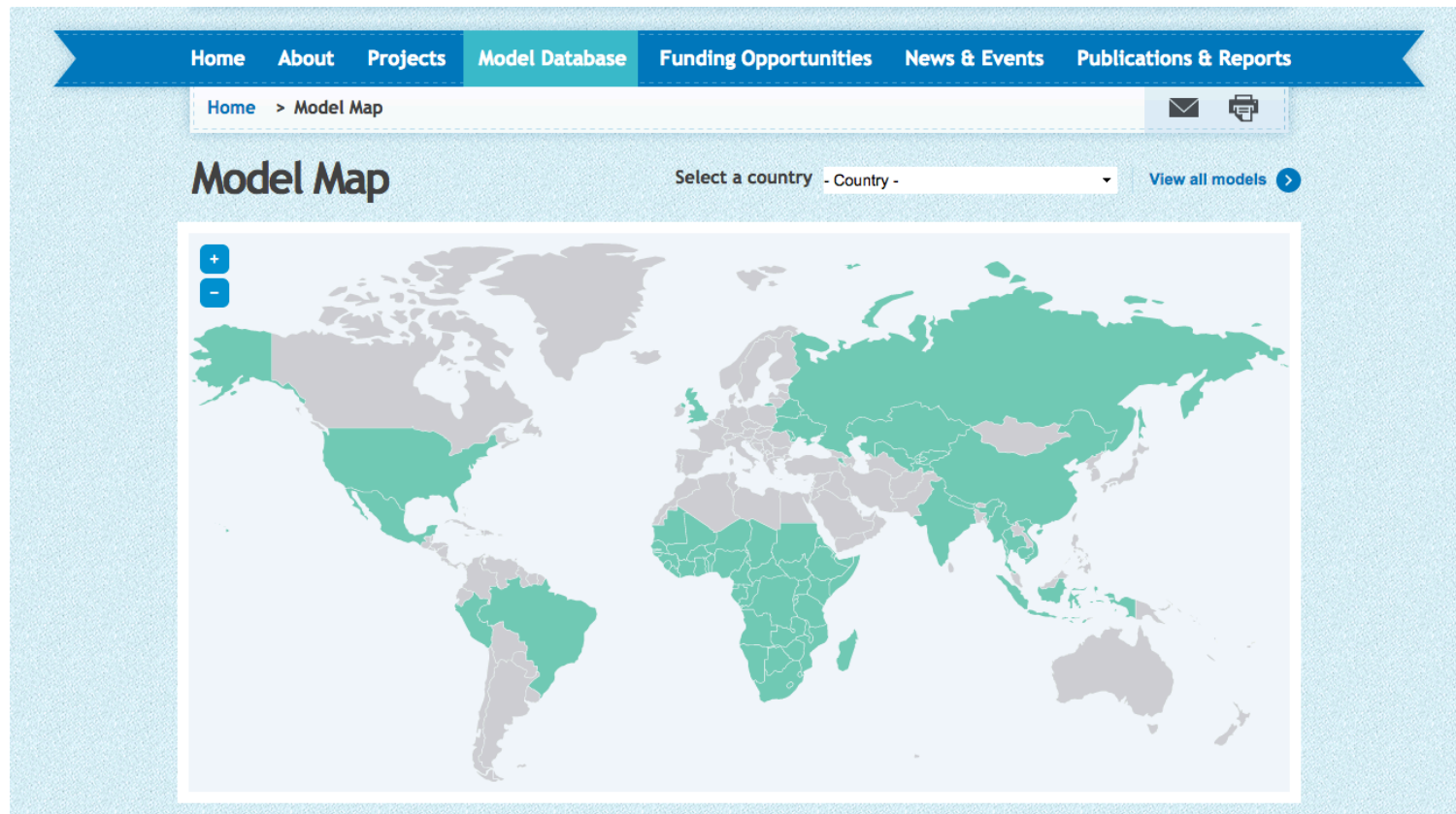
Other Formal Relationships

- ALPHA Network at London School of Hygiene and Tropical Medicine - key 'data partner' <http://alpha.lshtm.ac.uk/>
- UNAIDS Reference Group on Estimates, Modelling and Projections <http://www.epidem.org/>
- MeSH Consortium at London School of Hygiene and Tropical Medicine <http://mesh.lshtm.ac.uk/>
- Other Modelling Consortia -- TB Modelling and Analysis Consortium, NTD Consortium, Diagnostics Consortium



The Consortium

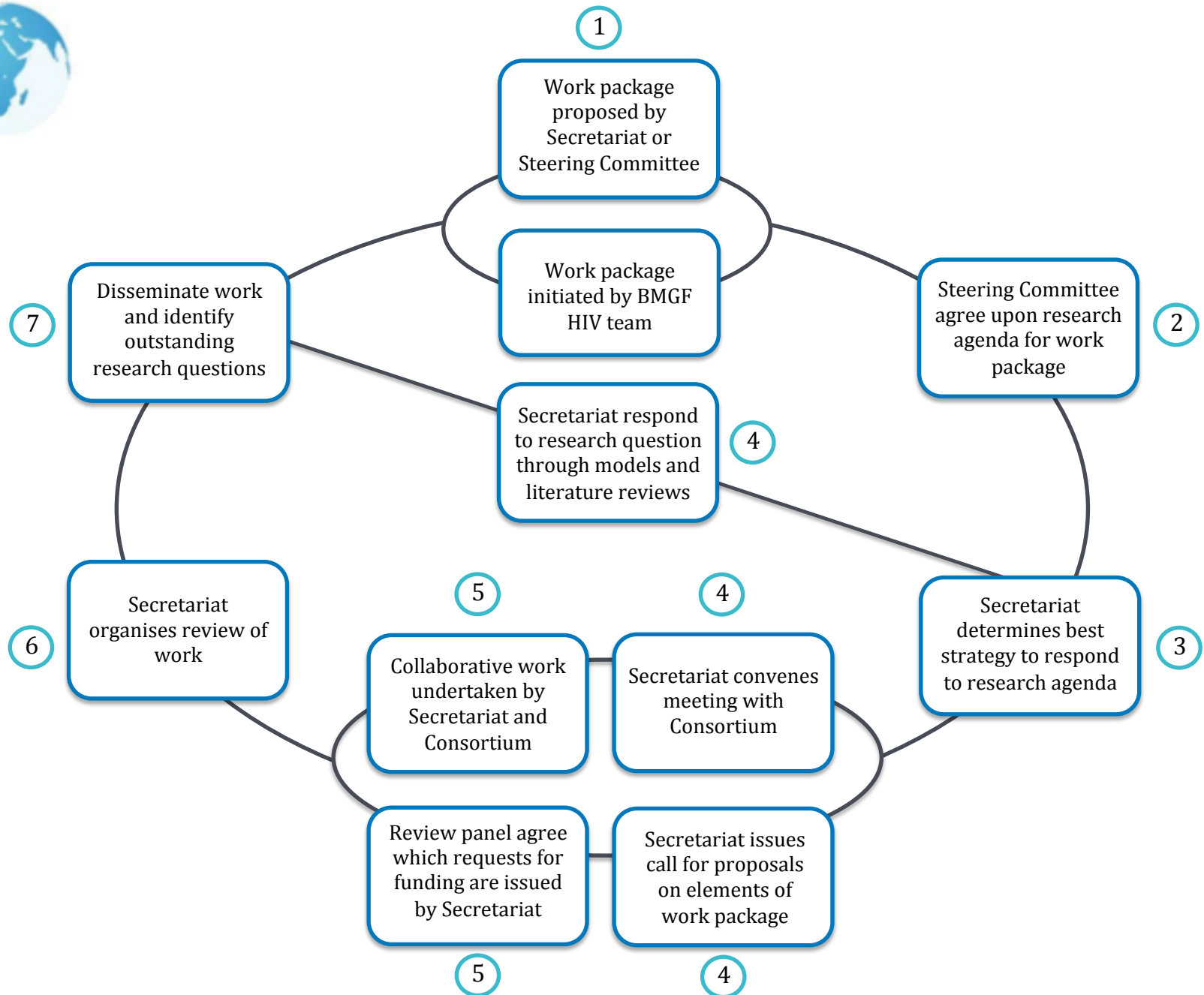
- Anyone who is interested in participating in the work of the HIV Modelling Consortium is able to do so, so long as their work is relevant.
- All models supported by the consortium are peer-reviewed in our consortium meetings.





From This Structure

- Experience and knowledge of funders, program implementers, normative agencies; and be responsive to them.
- Core dedicated team of leading scientists:
 - Experienced in working together and with partners
 - Breadth of interests and skills (population level policy modelling, economics, intra-host and clinical)
- Wide network encompassing almost all active HIV modelling groups worldwide
 - Willing to work collaboratively for common goals
 - Affords much 'red teaming' and multiple points of view.





Complete list of work packages commissioned to date

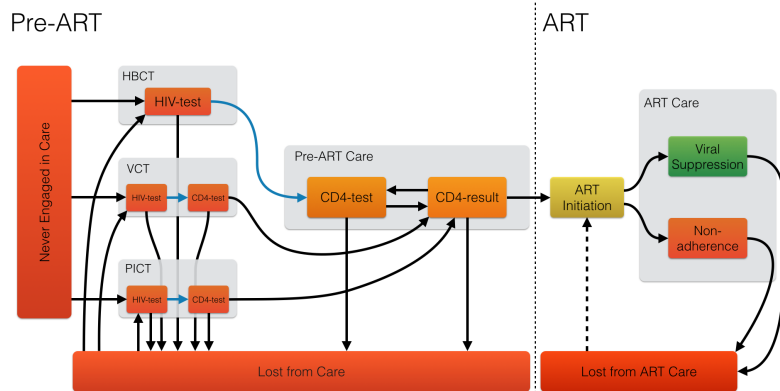
- Sources of infection / Modes of Transmission Model (WB & UNAIDS)
- Estimating potential for drug resistance due to PrEP (BMGF)
- Estimating the potential impact of treatment on incidence (All)
- Estimation and calibration of incidence assays (BMGF)
- Modelling to support development of the 2013 WHO ARV Guidelines (WHO)
- Optimizing the HIV care cascade (BMGF)
- Investigating reported incidence declines (WB)
- Model validation (All)
- Methods for estimating subnational HIV prevalence (GFATM, BMGF, UNAIDS, WB)
- Value of survey information in geographical targeting of interventions (UNAIDS)
- Integrated pan-continental map of HIV prevalence (All;GFATM)
- Estimating impact of an intervention enabling ART-free viral suppression (BMGF)
- Modelling to support development of the 2015 WHO ARV Guidelines (WHO)
- Review of Methods and Model for Allocative Efficiency (WB, UNAIDS)
- Modelling to support application of strengthening care cascade (All)



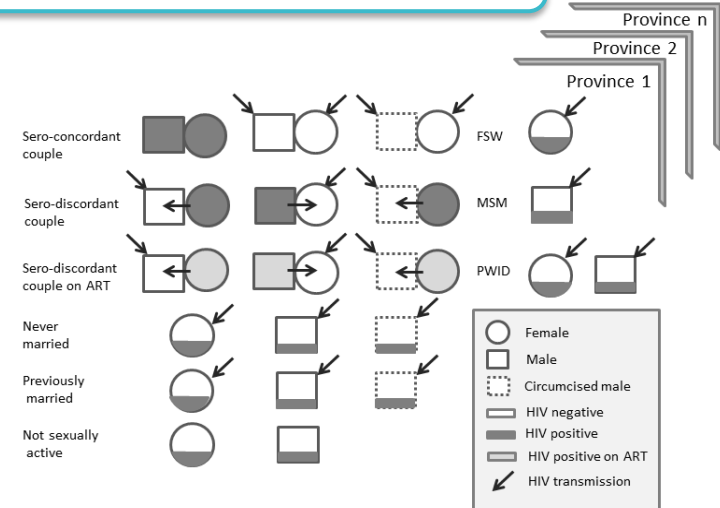
(1) Secretariat or Key Partners Respond to Question

- Where new approaches need to be developed, the secretariat can take on the development work, in collaboration with its partner.

Development of IBM to identify where health losses are occurring along the HIV care cascade



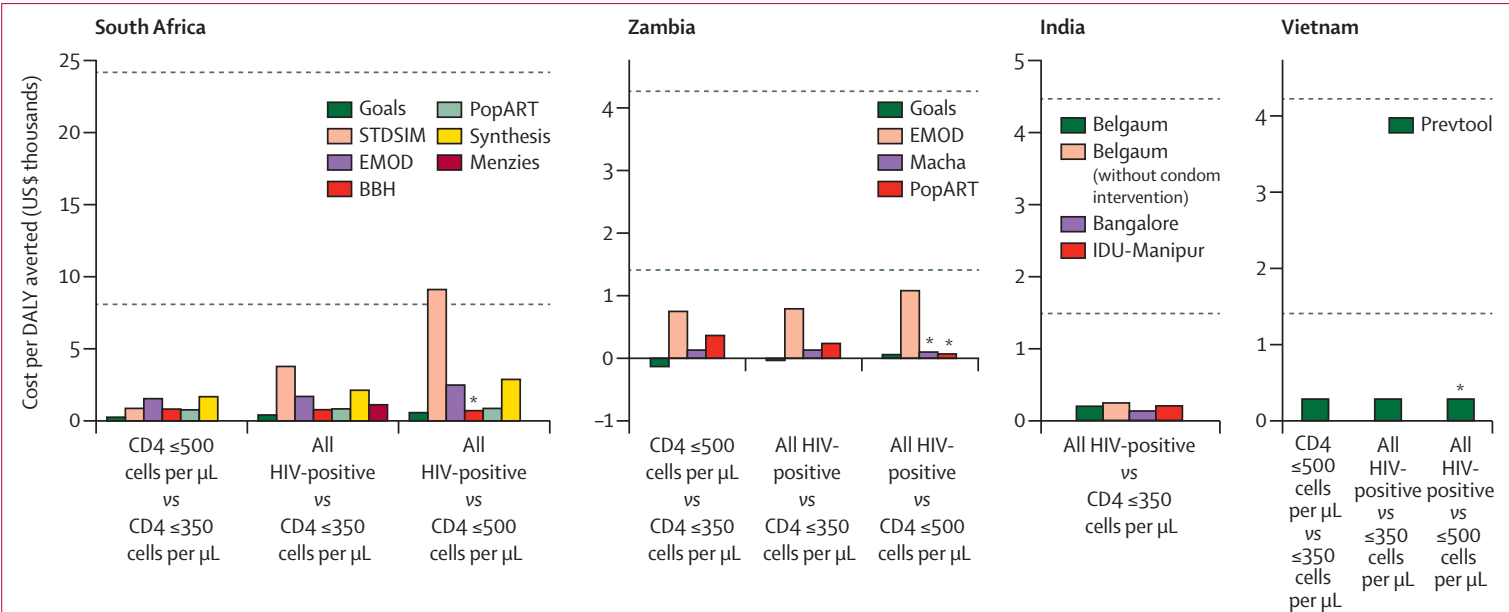
Revised MoT model





(2) Secretariat Coordinate Research Activities With Consortium

- For clear, high-priority question for which multiple models can furnish high quality results, a **model comparison** may be undertaken.
- Ensures results are not overly dependent on **model structure**.





(3) Secretariat Issue Request for Funding Applications

- While defining a work package particular elements of the overall research question may be identified that could be grouped into a distinct **sub-project**.
- Further to consultation with the Steering Committee, the Secretariat will advertise the **funding opportunity** through its website and distribution lists.
- Applications are reviewed by a panel (external and internal to the secretariat) to arrive at a recommendation for funding; and this is put to the steering committee for approval.
- The HIV Modelling Consortium does not able to accept unsolicited requests for funding.



Making a call for proposals

- A call for proposals will be sent out through HIV MC distribution list
- Details of the funding opportunity will be made available online with a given aim, deadline and upper limit of funding available
- Applications reviewed by a panel consisting of:
 - Chair of the Steering Committee
 - One member of the Secretariat
 - Independent external peer reviewers (nominated by Secretariat based on demonstrated expertise in the field, cannot be someone involved in or from an institution where an application has been submitted)

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Model Estimates For the Source of HIV Infections in a Population

View Edit Track

This RFA is now closed to further applications.

Background

In order to make decisions about how programmes to prevent HIV infections should be designed for a country or district, it is useful to have estimates for the number of HIV infections occurring in different sub-populations that may benefit from different forms of intervention. With this aim, the 'Modes of Transmission' (MoT) model has been developed and used in many countries to produce estimates for the distribution of new infections occurring over a one year period in a range of population groups, including sex workers, injecting drug user and those with multiple sexual partners. At a recent meeting of the HIV modelling consortium, questions were raised about the reliability of the existing methods to produce estimates in some settings; in particular whether the assumptions about the patterns of risk in a population are always suitable and how the 'static' nature of the model could influence results. Therefore, the HIV modelling consortium invites proposals to investigate these issues.

Work required

In this call for proposal, we seek innovative work that takes a new approach to estimating the distribution of new infections in a specific population. The new approach should draw on locally-relevant epidemiological data, and produce estimates for the distribution of sources of

Modes of Transmission Model

Reference: MC 1.1

Duration: 6-12 months

Funds available:
Up to £40,000

Number of awards available:
1

Submission closing date:
10 June 2011

Decisions announced:
08 July 2011

Process for reviewing applications:

- Each reviewer gives a numeric score to proposals against predefined (and publically available) assessment criteria.
- Scores of each proposal summed (giving equal weight to all reviewers).
- Proposals ranked according to score, but with a final rank recommended to the Committee.
- Recommendation for funding formed from on basis of number of groups required and funding availability.
- Steering Committee reviews process and makes final decision based on scores.



How We Achieve Our Objectives

Identify questions that demand mathematical modelling input and identifying new modelling results that may require further validation

Facilitate sharing of information; modelling techniques, data and expertise between research groups

Provide a forum for rigorous review of new mathematical modelling research and tools

Provide funding through sub-contracts to commission research to address those needs

Initiation and maintenance of a Steering Committee of experts who convene to define the most topical research questions to be addressed with mathematical modelling

Secretariat develop meeting reports & make available online.
Secretariat develop a database of modellers and references and utilise for data-sharing opportunities and collaborative working

Convene meetings with modellers to critically review and appraise work in the field and identify best ways to move forward

Sub-contracts for each work package issued and recipients of sub-contracts address questions and share findings through papers, presentations, abstracts.

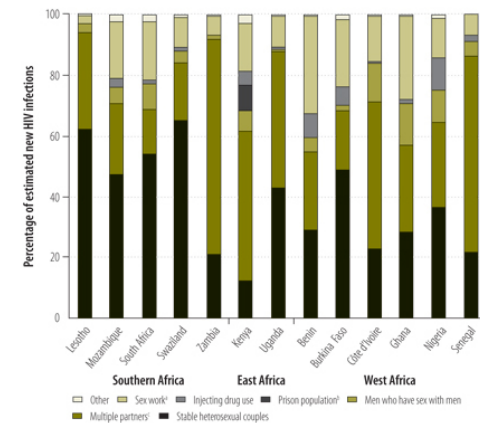


WORK PACKAGES



WP 1a: Sources of Infection

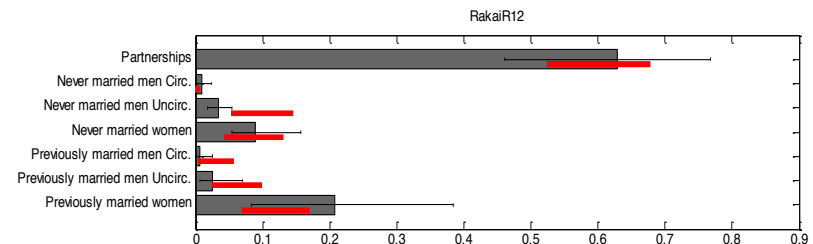
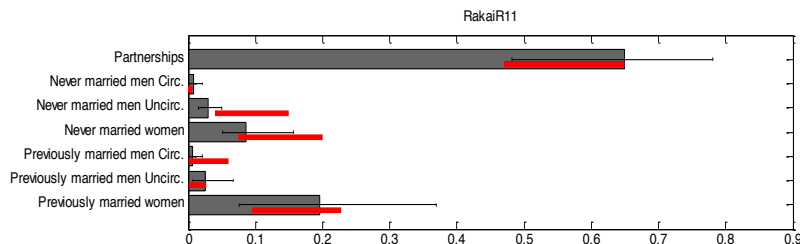
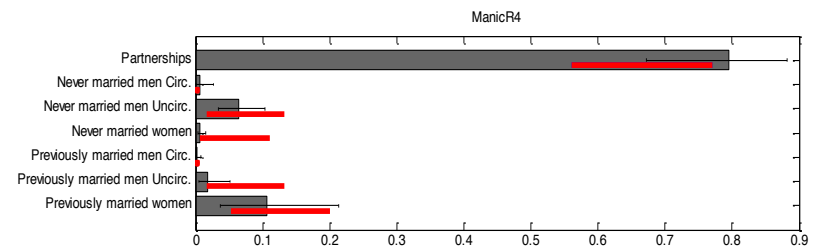
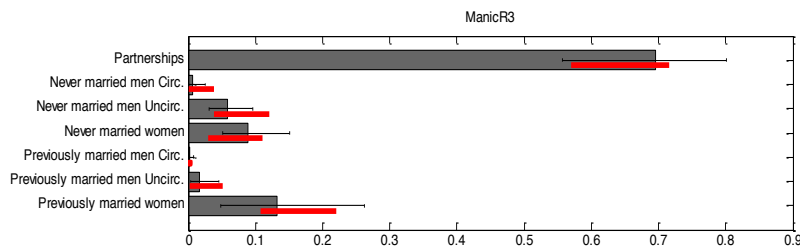
- **Aim:** To review methods for estimating sources of infection in generalised epidemics and evaluate the implications for projections of intervention impact
- **Approach:** A workshop was convened (Montreaux, 2011) and appropriateness of Modes of Transmission model was critically reviewed.
- **Outcome:** A consensus paper was developed that set an agenda for enhancing the use of the tools and a new tool that is used to assess the suitability of the model in particular setting.





WP 1b: Modes of Transmission Model

- **Aim:** Develop a proposal for a model to develop incidence patterns that confronts issues raised in first phase of work package
- **Approach:** Develop model for a generalised epidemic that uses data that are more readily available in countries: age, marital status, and geographical allocation. Testing and validate with cohort data from ALPHA network sites: Karonga, Kisesa, Manicaland, and Rakai
- **Outcome:** Piloted using data from Botswana in 2015 using data from BAIS with another country set to pilot in coming months. Currently being transferred to user-friendly platform by Avenir Health.

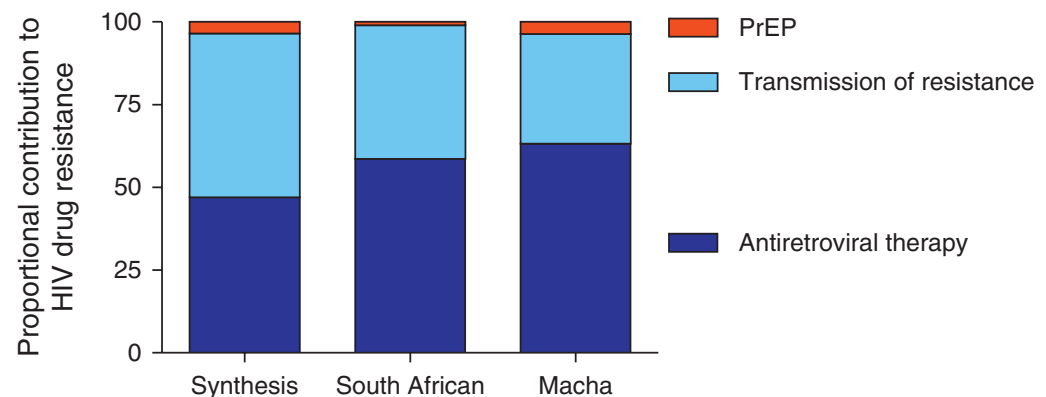




WP 2: Potential for drug resistance due to PrEP

- **Aim:** Establish if there is overall agreement in the potential “threat” posed by the generation and spread of drug-resistant HIV due to PrEP across modellers, clinicians, biologists.
- **Approach:** The Consortium convened a meeting of experts to review models of the risk of resistance as a consequence of PrEP (Seattle, 2011) and agree standard metrics to conduct a multi-model comparison for impact of PrEP.
- **Outcome:** This collaborative work indicating resistance to ART would be greater than that from PrEP was submitted to the US Food and Drug Administration (FDA) for consideration as a part of the regulatory process resulting in the approval of Truvada for PrEP.

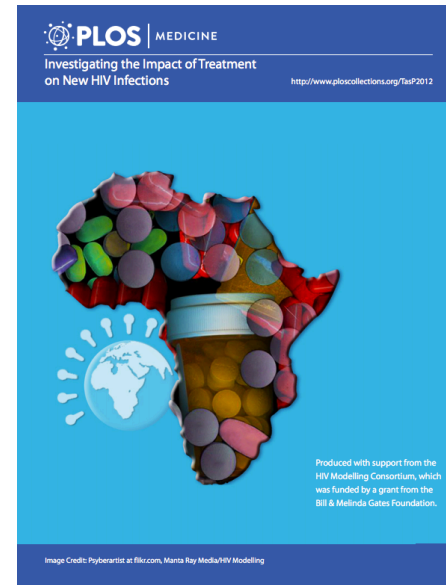
Proportional contribution of events contributing to HIV-1 drug resistance twenty years after the introduction of PrEP (Van de Vijver)





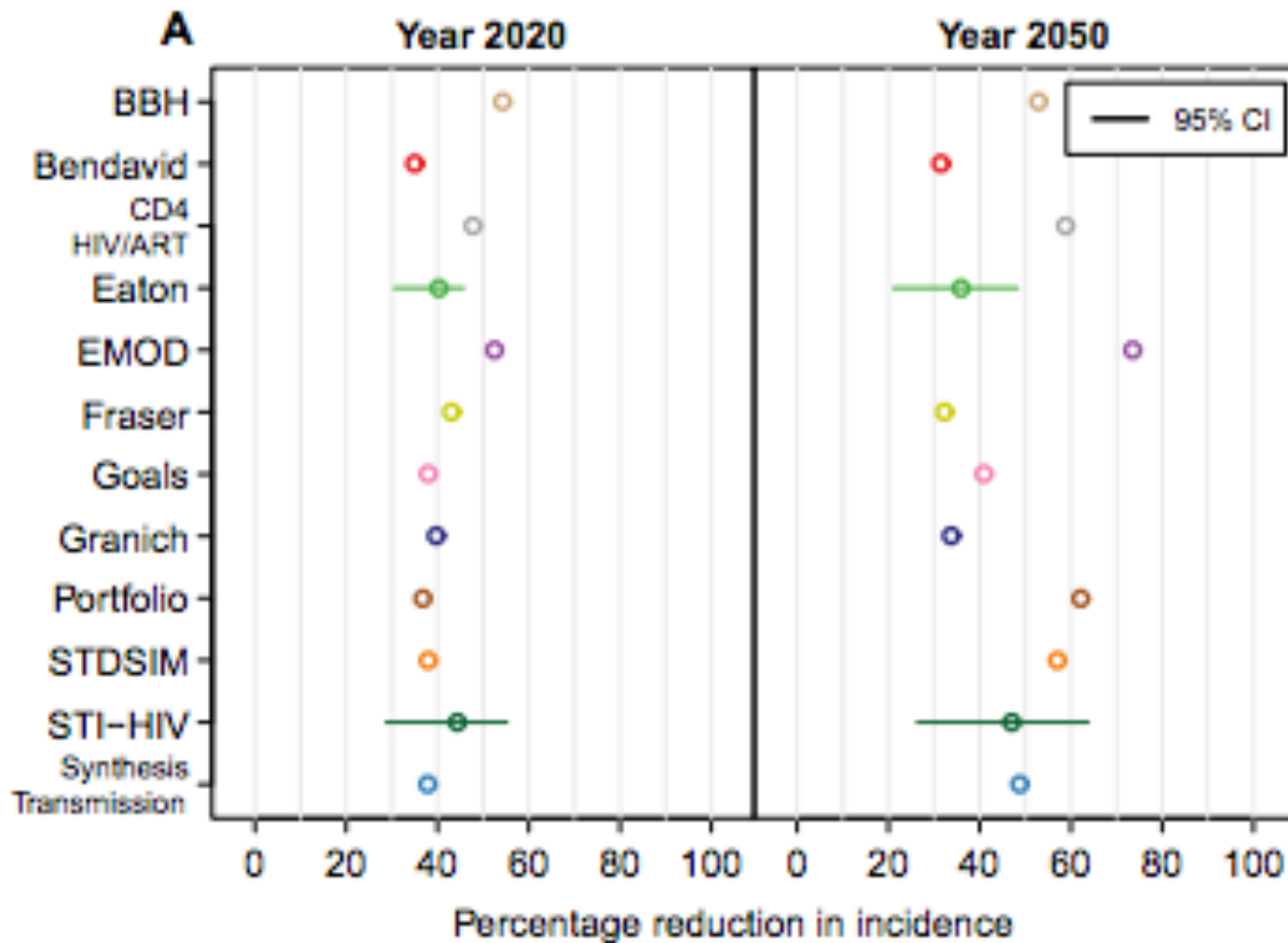
WP3: Treatment as Prevention

- **Aim:** Consolidate guidance from mathematical modelling about the potential impact of 'HIV treatment as prevention' and identify an agenda of high-priority research for policy makers.
- **Approach:** Meeting convened in 2011 (Stellenbosch, South Africa) and coordinated a novel exercise to systematically compare 12 independently developed models of the impact of ART on new HIV infections in South Africa—the most comprehensive comparison of models of any infectious disease undertaken to date.
- **Outcome:** A series of papers were published in PLoS Medicine





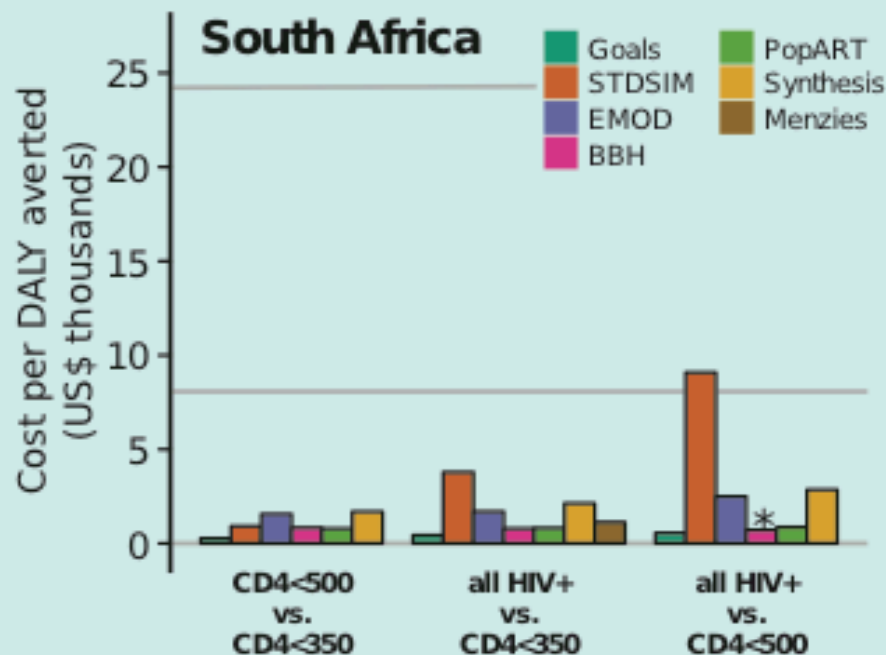
WP3: Treatment as Prevention





WP 8: WHO 2013 Consolidated ARV Guidelines

Incremental cost per DALY averted for expanding ART eligibility criteria to include HIV positive adults with CD4 ≤ 500 or all HIV positive adults, assuming continuation of status quo patterns of healthcare access.



- Results calculated over a 20-year time horizon, with all costs and health benefits discounted at 3% per annum.
- All costs reported in 2012 USD.
- Horizontal dashed lines represent cost-effectiveness benchmarks of one times GDP and three times GDP.

Figure from Eaton JW, Menzies NA et al. How should HIV programmes respond to evidence for the benefits of earlier treatment initiation? A combined analysis of twelve mathematical models. *Submitted*.



WP 9: Optimising the HIV Care Cascade

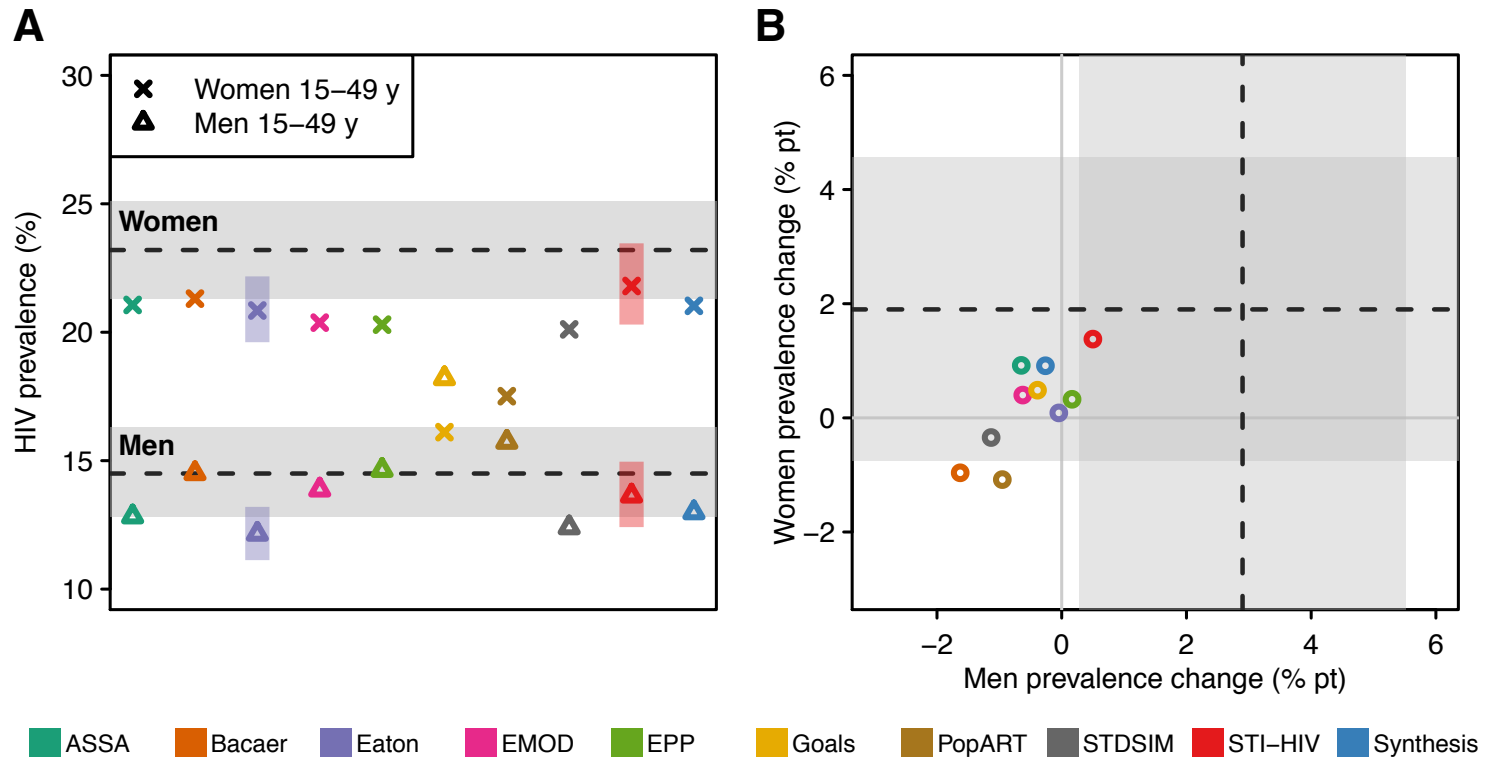
- **Aim:** Develop a mathematical model that represents the stages of the HIV care cascade and can identify where individuals are being lost from care and estimate cost and impact of a suite of interventions. need to better
- **Approach:** Individual based microsimulation model developed, parameterised to data from AMPATH serving a region of Western Kenya to estimate where losses are occurring along the cascade of care.
- **Outcome:** Manuscript developed and model contributed results on prioritization approaches for 2015 WHO ARV Guidelines.





WP12: Model validation

- Aim:** To assess how close model predictions were to new empirical data, reflect on this and validate models to improve their future applications and increase confidence in their projections.



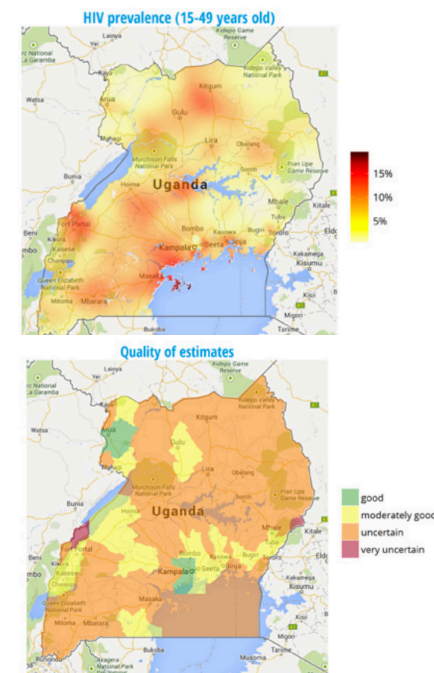
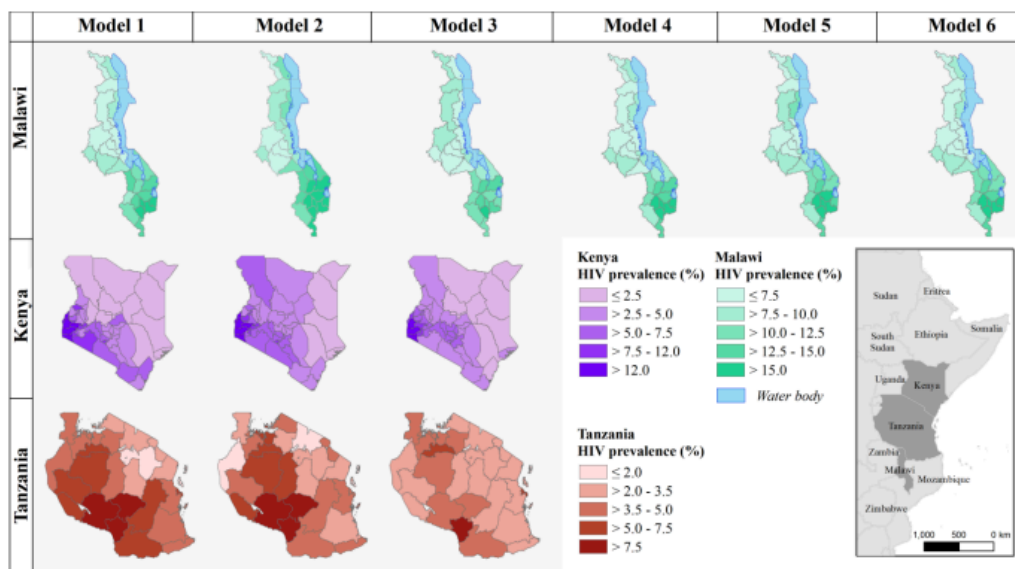


WP 13: Subnational Estimates of HIV Prevalence

Aim: Identify a suitable method for estimating subnational estimates of HIV prevalence.

Approach: A meeting was convened with 6 modelling groups to review proposed methods for generating prevalence estimates using GPS and HIV data from DHS, ANC, land cover, population density, as needed.

Outcome: Set of recommendations developed proposing an interim model and production of more advanced methods long term.





WP 16: Pan-continental model of HIV prevalence for targeted interventions

- **Aim:** Develop integrated pan-African model of HIV prevalence at the subnational level, which will enable targeting of interventions to epidemiological characteristics of each province or county.
- **Approach:** Use approach detailed in Anderson *et al.* and extend to a patch framework of subnational units in Africa that account for 80% of PLHIV and apply Bayesian methods to incorporate uncertainty.

