The UNAIDS HIV Programme Impact Modelling Advisory Group for Target Setting, and Resource Needs and Impact Estimation; Investment Framework including Prioritization

First meeting
14-15 November 2018
Chateau de Penthes
Geneva, Switzerland

Summary

The UNAIDS HIV Programme Impact Modelling Advisory Group (PIMAG) for Target Setting, and Resource Needs and Impact Estimation; Investment Framework including Prioritization met for the first time to:

- review the terms of reference of the advisory group were reviewed including the main roles and responsibilities of the group, lessons learned from the investment framework country applications;
- identify changes, assumptions and new evidence that needs to be reflected in the investment framework; and
- proposed model changes for the 2025 Target Setting and Resource Needs and Impact Estimation; and for in-country Investment Case applications.

The participants approved the proposed Terms of Reference and agreed on the following key action points:

- **Revisions of current Investment Framework Guidance and model structure**. To better support the global TSRNIE and the in-country Investment Framework application, UNAIDS will revise the investment framework guidance, and the PIMAG will review. The Goals team will restructure the model to add a group for AGYW, reflect the Global HIV prevention coalition guidance and other emerging issues, and organize interventions by bundles for specific population groups. Optima will develop default configurations to address these issues as appropriate. Goals will incorporate the testing model that currently exists as a web application and link it to ART coverage. AEM will consider approaches to adding a testing component as well.

- **Synthesis of existing data**. Several areas were identified where a constraint on modelling is a lack of evidence of impact and/or cost. UNAIDS has agreed to organize syntheses of evidence in the areas of AGYW, social enablers, implementation efficiencies and health system integration. Bundles of services will be defined in the TSRNIE technical meetings, including on primary prevention and social enablers;

- **Costing**. Better information is expected on unit costs and how they may change with scale and scope in the coming months through the work of the Global Health Costing Consortium and the Advisory Group on Costs and Resources. The modelling groups are committed to integrating this information as it becomes available.

Details of the discussions are in the succeeding pages.

Background

Mathematical modelling has been used to determine the impact and cost-effectiveness of HIV funding allocation and reaching program targets. These analyses are essential to the development of national strategic plans, Global Fund applications and Investment Cases as well as global strategies such as Fast-Track. Three models have been widely applied for these purposes: Goals, AEM and Optima. Each model has its strengths and weaknesses, but all are similar in that they estimate trends in incidence and mortality and the effects of various HIV interventions on those trends. Each model has been used in a number of countries to support that first round of Investment Cases and the Goals model was also used for the projections for the Global Fast-Track Targets and Resource Estimates.

UNAIDS is currently preparing for a new round of Investment Cases in some countries. UNAIDS has also started a new process focused on 2025 programmatic targets (2015 Target-Setting, 2020-2030 Resource Needs and Impact Estimates). These efforts need to build on previous efforts but also address new issues that have arisen in the last several years, such as a new focus on adolescent girls and young women (AGYW), new technologies and new approaches to improving implementation efficiency. To ensure that the mathematical models are able to incorporate these issues, UNAIDS formed the UNAIDS Advisory Group on HIV Programme Impact Modelling. The first meeting was held in Geneva on November 14-15, 2018. This report summarizes the key findings and conclusions of that meeting.

The current report proposes how the model structure and assumptions can be updated to respond to new expectations, both for the global TSRNIE process and for the country-level investment cases.

Key issues

In-country application of the UNAIDS Investment Framework and required changes
Since 2011, countries have developed country investment cases based on the 2011 Investment Framework. This framework included:

a. "Basic Programme" package inclusive of the following interventions to be applied across the countries based on epidemic dynamics: Behaviour change, condoms, treatment and care, child infections and maternal mortality, male circumcision, and key populations.
b. A list of potential Critical Enablers and Synergies is included for countries to select those relevant to the country context.

There is a need to revise the 2011 Investment Framework and how modelling is used to guide policy-decisions to: a) Adapt the Basic Programme Package to reflect the Five HIV Prevention Pillars (as agreed upon by the Global Coalition on HIV prevention; (Adolescent Girls and Young Women in 15 countries, VMMC key populations, condoms and PrEP), b) improve the ability of the models to package the services by targets including interventions that accelerate implementation and increase delivery efficiency and effectiveness; c) improve measuring of allocative and implementation efficiency, and update the approach to modelling the enablers and synergies.

Bundling interventions
The Steering Committee on Target-Setting, Resource Needs and Impact Estimates has recommended moving away from considering individual interventions in isolation to considering bundles of intervention appropriate for different population groups. Goals, AEM and Optima already generally model interventions for key populations as bundles of

services, including, for example, peer outreach, condom provision, STI treatment, testing, etc. Interventions for the rest of the population are usually modelled individually.

Adolescent Girls and Young Women
Focus on AGYW is identified as priority for locations where segments of adolescent girls, young women and their male partners are particularly vulnerable and affected, mostly in Africa. None of the models currently include AGYW as an explicit group nor have the investment cases included AGYW programmes packages.

AEM applications are focused mostly in Asia so the need for this population group is limited. Optima is a free-form model where the populations and interventions are defined by the user, so it can be used to model AGYW if the information is available to do so, but this is not currently part of the standard set-up. Goals has some interventions that are specific to AGYW but does not currently include them as a separate population group.

Current guidance is that there is no one standard package recommended for AGYW, which becomes a challenge for adjusting the modelling to AGYW for a global HIV Investment framework. UNAIDS Guidance suggests programme packages for AGYW clustered by incidence threshold[1] and this is being further revised, while there is a diversity of programme packages funded by PEPFAR and the Global Fund. The PEPFAR-funded DREAMS programme is delivering a core package that combines evidence-based approaches that go beyond the health sector, addressing the structural drivers that directly and indirectly increase girls' HIV risk, including poverty, gender inequality, sexual violence, and a lack of education in selected geographic area in ten countries. There is a need to include the AGYW in the Investment Framework methodology for relevant countries. The challenges include the programme coverage targets setting and selection of the package of interventions to be modeled, which will be determined by country-level data and choices.

In response to this, the Goals team has agreed to add AGYW as a separate population group in the model. There will also be a parallel group for Adolescent Boys and Young Men (ABYM). Optima can develop templates for these groups for use where appropriate.

Table 1 shows the proposed population groups and corresponding interventions for the revised Goals model. This structure, once finalized, could also be the basis for Optima applications in countries where it is appropriate.

Table 1. Proposed population groups and appropriate intervention bundles

Population Group	Interventions
Adolescent girls and young women (AGYW – age group 15-24 years old)	There is need to agree on the list of cost-effective interventions and programme coverage target that will be modelled at the global level and detailed guidance on how to set programme coverage targets and select the programme package per incidence threshold at country level.
Adolescent boys and young men (ABYM – age group 15-29 years old)	Condoms PrEP PEP VMMC (recommended in 14 countries for 10-29 years old)

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[1] https://hivpreventioncoalition.unaids.org/wp-content/uploads/2018/01/20180702_JC2868_AGYWReport.pdf

	HTC including self-testing
Sex workers	Combination outreach services including condoms, self-testing, PrEP, PEP, community empowerment, STI treatment
MSM	Combination outreach services including condoms, lubricants, self-testing, PrEP, PEP, community empowerment, STI treatment
PWID	Combination outreach services including condoms, self-testing, PrEP, PEP, community empowerment, STI treatment Needle and syringe exchange programs Opioid substitution therapy
Male clients of sex workers	Condoms, self-testing, PrEP, PEP
Women 25+ with multiple partners	Condoms, HTC, PrEP for SDC
Men 25+ with multiple partners	Condoms, HTC, PrEP for SDC
Men and women in monogamous relationships	Condoms, HTC, PrEP for SDC
PLHIV in the above categories	ART incl mode of linkage [e.g. same day initiation], regimen [DTG, 1st vs 2nd line] and adherence support [e.g. community and phone follow-up]

Information on the effectiveness of biomedical interventions is available from trials. Effectiveness information is available for some behavioral interventions from literature reviews and meta-analyses[2],[3]. But for many of the behavioral and community interventions listed in Table 1, especially for AGYW, little information is readily available. Evaluations of the PEPFAR-funded DREAMS initiative may eventually provide this information, but interim results are not expected until 2019. UNAIDS has agreed to organize the available information and have it reviewed at the meeting of the Primary Prevention Technical Advisory Group in March 2019.

PrEP
PrEP is being rolled out in a number of countries. Yet, there are a number of challenges that are relevant to the modelling assumptions related to PrEP and need to be taken into account. Optimal coverage targets and adherence level affect PrEP impact. Thus, it will be important to review the different models' assumptions regarding the coverage targets per population and assumptions regarding adherence. This will also require determining programme package to be modelled when PrEP is delivered as a standalone intervention to include demand-creation and interventions that increase adherence, and when delivered as part of the programme package for a specific population (e.g. key populations).

HIV testing
As new modalities for HIV testing have become available, and with the new emphasis on reaching high levels of knowledge of status among PLHIV, there is a need for the

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[2] Bollinger L, How can we calculate the 'E' in CEA Combination outreach services including condoms, lubricants, self-testing, PrEP, PEP, community empowerment, STI treatment

[3] Thirteen published systematic reviews of behavioral interventions conducted by the Evidence Project (Synthesizing HV Behavioral Intervention Effectiveness in Developing Countries), http://grantome.com/grant/NIH/R01-MH090173-09

mathematical models to incorporate testing explicitly. Currently Goals and AEM have direct input of ART coverage and lack a testing component that identifies PLHIV and estimates linkage to care. Optima can implement such a mechanism if the implementation team develops it. In order to address this new need, the Goals team has developed a new testing model that considers 16 population groups[4] and five testing modalities: provider-initiated testing and counselling (PITC) including index testing, voluntary counselling and testing (VCT), mobile testing, community-based testing and self-testing. The model can be used to scale-up the availability of different testing modalities in different populations and determine the number of new diagnoses, per cent knowing their status, costs and linkage to treatment. The model is currently available as a stand-alone web application[5] and will be integrated in to the Goals model. AEM currently does not have a testing component but may integrate the Goals Testing model in the near future. Optima may develop templates to facilitate the inclusion of testing components in-country applications.

Differentiated targets

All three models currently have the ability to specify coverage targets by intervention and population group. Optima can target by age group while Goals and AEM can target only by risk group. As described above the Goals model will be modified to include separate population groups for adults 15-24 and 25+.

Sub-national targeting and allocation

Models indicate scope for allocative efficiency gains through tailoring programmes to different epidemiological conditions, including through programme package adapted to geographic prioritization.

All three models can be implemented for sub-national regions if the necessary data are available. GOALS and AEM do not allow simultaneous modelling of all sub-national regions in a country, optimization of resource allocation across regions, and measure related efficiencies generated through geographic targeting. Specialized models have been developed to determine optimal geographic allocation of resources with countries[6] and across regions[7].

Incorporating multiple sub-national regions within Goals, AEM is a large task that is not currently feasible for many country applications. However, for the global TSRNIE process, issues of regional allocation can be addressed with simpler customized models or by adapting the lessons learned from existing publications. But these applications would necessarily address just a subset of the full program being modelled at the national level.

A blanket approach to geographic prioritization needs to be avoided as simplifying modelling assumptions regarding 'optimal allocation' at regional level will tend to bias towards "over-estimating" impact and potentially lead to the 'wrong' kinds of things being recommended. In conclusion, there is need to understand more about what is feasible and desirable at a local level and balance these with potential efficiency gains in developing methods and targets, and review how the models that respond to this need.

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[4] Women at ante-natal care, male partners of ANC women, STI patients, TB patients, OI patients, FSW, MSM, PWID, partners of people newly diagnosed, VMMC clients, modern sector employees, students, children, other men and other women.

[5] Available at http://goalshivtestingmodel.org/

[6] Anderson SJ et al. Maximizing the effect of combination HIV prevention through prioritization of the people and places in greatest need: a modelling study. Lancet 2014; 384: 249–56

[7] McMillen J et al. Optimum resource allocation to reduce HIV incidence across sub-Saharan Africa: a mathematical modelling study Lancet HIV 2016; 3: e441–48.

Critical and social enablers
Social enablers include approaches intended to directly support behavior change related to HIV risk (such as community mobilization and media communications) as well as broader structural interventions intended to alter the environment that contributes to risk, such as prevention of violence against girls and key population, keeping children in school, reducing stigma and protecting human rights. In most modelling applications these interventions are either ignored or included only in the costing. All the models could incorporate these interventions into the epidemiological modelling given information on impact. Initiatives such as STRIVE (Tackling the Structural Drivers of HIV)[8] have compiled available research and conducted some new research in these areas. UNAIDS will convene a Technical Advisory Group on Social Enablers that will be tasked with providing information that can be used in the modelling.

The effect of critical enablers might be considered as "effect" on behaviour to increase uptake of services and/or incentivise demand, remove barriers to implementation. The group agreed that there needs to be a fresh look at these components because some might be integrated as part of a bundle of delivery, some might not.

An important issue in modeling social enablers is how much of the cost to allocate to HIV programs, suggesting that HIV should bear only a portion of the total costs. There is a need for a consensus on how best to address this allocation issue.

In conclusion, it will be necessary to establish a panel to review and untangle the different critical and social enablers and their potential contribution to programme and impact targets. Preliminary work is required to review the evidence and present it to the meeting with various options for discussion.

Implementation effectiveness
The effectiveness of biomedical interventions, such as VMMC, is derived from the findings of randomized trials. For other interventions effectiveness estimates are either based on reviews of the best available studies in each country or on meta-analysis of all studies available globally. New innovations in implementation approaches (such as community or phone follow-up to improve adherence, same day treatment initiation to improve linkage to care, self-testing to improve uptake) need to be considered in any new modeling as they can have significant effects in increasing demand, improving adherence, generate implementation efficiencies and require funding. There was general agreement that the existing models can incorporate this type of information but would benefit from a synthesis of available evidence. UNAIDS agreed to facilitate these reviews.

Units costs and economies of scope and scale
All three models include estimates of program costs. For direct interventions these are based on the unit costs of interventions. Unit costs are usually based on the costs of services as currently provided. Optima has the ability to include changing unit costs with scale but the evidence base for this is weak. In addition, programs are constantly revising the way in which services are delivered, looking for better effectiveness (which could raise unit costs) or improved efficiencies (which would lower costs). All three programs could incorporate different unit costs based on implementation approaches given the information about how those unit costs should vary. It is expected that the UNAIDS Advisory Group on

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[8] http://strive.lshtm.ac.uk/about

Costs and Resources will advise and the Global Health Costing Consortium will provide some inputs useful for global and national modeling.

Integration with other health services

Many HIV interventions are implemented through the existing health system and, therefore, benefit from the health infrastructure. Some stand-alone HIV interventions, such as community-based testing or VMMC, have shown that other health services, such as multiple disease testing can be readily added to provide additional benefits. These types of integration may become more important in the future. While the existing models can easily include the effects on the costs of HIV interventions, it is more difficult to assess the added benefits. In order to capture the effects of integration there is a need for more explicit description of what services should be integrated. With that information, these models could incorporate the costs and benefits.

Links to documents and presentations

Annex 1: Agenda

14 November 2018		
Timing	**Topic**	**Lead/Facilitator**
09:00-10:00	Introductions Overview of expectations (TOR) for the UNAIDS Advisory Group on HIV Programme Impact Modelling Overview of TSRN&IE task and process Key decisions from first face-to-face of the Steering Committee meeting Agenda and objectives	Peter Ghys, UNAIDS
10:00-11:00	Summary of key issues that need to be addressed based on lessons learned from in-country investment cases and new interventions: Core programmes - *Which delivery modalities, implementation efficiencies can be included in the modelling component?*	Iris Semini/Taoufik Bakkali, UNAIDS
11:00 – 11:15	*Coffee Break*	
11:15-12:30	Discussion of options to address these key issues	All
12:30-13:30	*Lunch*	
13:30-15:30	Model structure issues: *1.* What are today the bundles of services for specific population groups in the models?; *Q: How can this evolve in response to the S/C recommendation to have bundled services for specific population groups? What additional data is needed?* 2. Are (and if so, how) modalities of testing and treatment and other delivery of HIV services modelled in country applications? *Q: How can this be implemented? What additional data is needed?* 3. Are differential targets for countries, areas, population groups (KP, age/gender) today included in the models? *Q: How can this be implemented? What additional data is needed?*	John Stover, Tim Brown Robyn Stuart All John Stover, Tim Brown Robyn Stuart All John Stover, Tim Brown Robyn Stuart All
15:30 – 15:45	Coffee Break	
16:00 –17:00	Social Enablers - Modellers: how have the Critical Enablers and Synergies been addressed so far in existing models? - UNAIDS: the approach-assumption in the Global Resource Estimates and expectations for the new resource estimates - *Discussion: how can critical enablers be better modelled: estimates of direct effect on epidemiology or behaviours? Improved estimation of costs of required enabling factors?*	John Stover, Tim Brown Robyn Stuart UNAIDS All

17:00 – 17:30	Allocative efficiency – sub-national geographic prioritization of programme elements *Discussion: how it is present in in-country models? If not, how can it be improved?*	Tim Hallett All
17:30	*Close of meeting*	

15 November 2018 – Next Steps		
Timing	**Topic**	**Lead/Facilitator**
09:00-09:30	Summary of Day One	
09:30-10:00	Implementation efficiencies Service delivery modalities, integration, Evidence of economies of scope and scale Interventions to increase demand, utilization, and adherence (improve uptake and adherence)	Till Bärnighausen Paul Revill (remote)
10:00 – 11:00	Discussion: do current in-country models model the integration of HIV services with non-HIV services? *How can this best be modelled in the future?*	John Stover, Tim Brown Robyn Stuart
11:00 – 11:15	Coffee Break	
11:30-12:30	Unit costs Sources of unit costs, the production function, and trends	Jose Antonio Izazola Robyn Stuart
12:30-13:00	Next Steps for investment cases: *Inclusion of delivery modalities *Social Enablers Next Steps for TS, RN&IE: *Inclusion of delivery modalities for testing and treatment (and others services?) *Differential targets *Bundles of HIV services *Bundles of HIV services with non-HIV services *Social Enablers	Peter Ghys/Iris Semini Facilitated Discussions
13:00	Close of meeting	

Annex 2: List of Participants

1. John Stover, Avenir Health
2. Til Bärnighausen, University of Heidelberg
3. Tim Brown, East-West Center
4. Robyn Stuart, University of Copenhagen
5. Peter Ghys, UNAIDS
6. Iris Semini, UNAIDS
7. Jose Antonio Izazola, UNAIDS
8. Erik Lamontagne, UNAIDS
9. Luisa Frescura, UNAIDS
10. Aries Valeriano, UNAIDS

Remote participation:

11. Andrew Phillips, University College London
12. Paul Revill, University of York
13. Tim Hallett, Imperial College of London