

UNAIDS Reference Group on Estimates, Modelling and Projections
Recommendations from the Fall Meeting 2017:
Method Development for the UNAIDS Estimates
16-18 October 2017, London, United Kingdom

Recommendation/Action Item	Lead Person(s)	Proposed timeline
1. Continuous Update and Improvement		
Spectrum AIDS Impact Model (AIM)		
<u>Output Customisation</u> : The Reference Group agrees that the additional display outputs for Spectrum, including the HIV dashboard and treatment cascade plots (e.g. 90-90-90, etc.) are implemented	Avenir Health	Immediate
<u>Uncertainty Analysis</u> : The newly reconfigured uncertainty analyses (based on 300 draws for year of estimate, only saving the upper/lower bounds for indicators, and applying current year variation to earlier years) to be implemented in Spectrum	Avenir Health	Immediate
<u>CD4 Cell Count at ART Initiation</u> : The Reference Group approves offering the choice to users of the two approaches for allocation of CD4 distribution for new individuals on ART (i.e. entering median CD4 count upon initiation or, if data unavailable, by defining the default allocation, with the added parameter to balance between expected mortality and distribution of eligible population)	Avenir Health	Immediate
<u>Age Distribution for New Infections</u> : Further consultation is planned to agree on new age distributions for new infections specific for Europe	Avenir Health, UNAIDS, Tobi Saidel	Immediate
<u>HIV-related Fertility Rate Reduction</u> : Incorporation of subfertility effects in Spectrum were further addressed in the “Modelling Pediatric HIV and need for ART” meeting (19-20 October 2017, London). Recommendations were as follows:		
<ul style="list-style-type: none"> ● Fertility rate ratios (FRR’s) to be adjusted in women not on ART, to incorporate subfertility results presented by Alpha Network (Milly Marston) and Jeff Eaton 	Avenir Health, Milly Marston, Jeff Eaton	Immediate
<ul style="list-style-type: none"> ● Implement parameter in Spectrum to allow changes to the FRR of women on ART. Default value for parameter will remain at 1.0 pending further analysis and investigation 	Avenir Health	Immediate
<ul style="list-style-type: none"> ● ANC routine data is recommended for fitting FRR’s in Spectrum if data meet completeness and reporting standards. ANC sentinel surveillance data are not recommended for fitting FRR’s 	Avenir Health	Immediate

<p><u>Spectrum on the Web</u>: Current efforts to be continued, to make Spectrum (including EPP) available online alongside the desktop version, ready for countries to use in 2019</p>	<p>Avenir Health, East-West Center</p>	<p>Ongoing</p>
<p>Estimation and Projection Package (EPP) <u>Incidence Curve $r(t)$ Fitting</u>:</p> <ul style="list-style-type: none"> The continued use of the equilibrium prior for modelling incidence curves is recommended as default for the immediate term, though the option to remove the equilibrium prior should be available, yet restricted to specific users (e.g. modellers and UNAIDS), for cases where use of the prior causes questionable results Alternative model designs to be further investigated that balance model structure and flexibility, and that consider the following: <ol style="list-style-type: none"> concentrated epidemics and data sparse scenarios optimised fitting time and comparisons to r-flex (random walk) model <p><u>Incorporation of Direct Incidence Estimates</u>: Further investigation for generic methods to improve direct incorporation of incidence estimates (e.g. from PHIA's, and other sources) into EPP/Spectrum is recommended, e.g. exploring correlations between incidence and prevalence data</p>	<p>East-West Center</p> <p>Jeff Eaton, East-West Center, IHME,</p> <p>Jeff Eaton, East-West Center, Avenir Health</p>	<p>Immediate</p> <p>May 2018</p> <p>Immediate</p>
<p>Overall <u>Use of Demographic Household survey (DHS) Data</u>: The continued use of 'unadjusted' DHS data for HIV estimates has been agreed, with the exception of Zambia, where the use of adjusted estimates should be recommended and communicated to the country estimates team</p> <ul style="list-style-type: none"> For the Uganda 2011 AIS, the Reference Group recommends using confirmed HIV testing results. This recommendation should be communicated to the country estimates team and confirmed estimates provided by CDC <p><u>Size Estimates of Key Populations</u>:</p> <ul style="list-style-type: none"> The Reference Group encourages more countries to investigate their key population sizes, and recognises the need for validation of current size estimations for key populations from independent approaches Methods to include key population size estimates with uncertainty estimates into Spectrum/EPP model fitting process for concentrated epidemics (and potentially also generalised epidemics) to be investigated. This should include further research into estimating default uncertainty values based on either global, regional or type of epidemic Novel data sources, such as social media data, are encouraged, but utilization of these data requires further epidemiological analysis and scrutiny (e.g. checking for double counting for estimates based on numbers of app downloads) 	<p>UNAIDS, Mathieu Maheu-Giroux, ICT Intl</p> <p>UNAIDS OGAC/CDC</p> <p>UNAIDS, Le Bao, Abhi Datta, Stefan Baral, Jess Edwards</p> <p>UNAIDS, East-West Center, Avenir Health</p> <p>UNAIDS</p>	<p>Immediate</p> <p>Immediate</p> <p>Ongoing</p> <p>Ongoing</p> <p>Ongoing</p>

<ul style="list-style-type: none"> The Reference Group recognises that current models do not aim to capture the contribution of transmission in/by key populations, and that alternative models would need to be used (and, in some cases, developed) to better reflect transmission dynamics Further research to determine whether key populations (e.g. MSM and FSW) are sufficiently captured and adequately represented in current household survey data is required <p><u>Collaboration with IHME (GBD Estimates):</u> The Reference Group encourages continued collaboration and regular correspondence with IHME, in particular for: (i) comparisons for Brazil and South Africa, investigations on ART mortality; (ii) testing linkage between income and earliness of initiating ART with PHIA data; and, (iii) understanding and communicating differences/similarities between GBD and UNAIDS estimates on overall burden estimates and '90-90-90' statistics.</p> <ul style="list-style-type: none"> Reference Group Secretariat to organise teleconferences with IHME and relevant parties, every 2 months 	<p>Unassigned</p> <p>Leigh Johnson, ALPHA Network (TBC)</p> <p>Secretariat, IHME, UNAIDS, Avenir Health, Leigh Johnson</p>	<p>Ongoing</p> <p>May 2018</p> <p>Ongoing</p>
<p>2. Age-structured models</p>		
<p><u>ASM Development and Implementation:</u> Development for the age/sex-specific model (ASM) and incorporation of age/sex-specific adult mortality to be continued. The design specification should be agreed by the Spring Reference Group meeting, to be ready for testing by countries at the next 2019 UNAIDS estimates regional workshops. Method development should consider the following:</p> <ul style="list-style-type: none"> Model should ensure capability to incorporate additional PHIA survey indicators into model inference Approaches for ASM to be used for generalised epidemics with sparse data sets and concentrated epidemics to be pursued 	<p>Jeff Eaton, East-West Center, Avenir Health</p>	<p>May 2018</p>
<p>3. Use of case-report and mortality data</p>		
<p>Case Surveillance and Vital Registration (CSAVR) Tool</p> <p><u>Incidence Estimation in CSAVR:</u></p> <ul style="list-style-type: none"> The Reference Group agrees to the implementation of the newly reconfigured incidence estimation in CSAVR (estimating new diagnoses and fitting the observed values to those predicted, dropping the time-lag estimation, adding second order segmented polynomial curves and AIC model selection) Further consultation to agree on whether raw or adjusted WHO vital registration mortality data and/or IHME mortality estimates should be used for model fitting Investigate use of more efficient EPP-ASM code base for CSAVR estimation 	<p>Avenir Health, UNAIDS</p> <p>Avenir Health, UNAIDS, IHME, Secretariat</p> <p>Avenir Health, Secretariat</p>	<p>Immediate</p> <p>Immediate</p> <p>Ongoing</p>

<p>Comparison of model estimates using case-reports</p> <p>Brazil and South Africa to be used as case studies to undertake an in-depth model comparison between different modelling tools using case-reporting data for HIV estimates (for Brazil: CSAVR/Spectrum, Imperial College Brazil Model, and IHME models; for South Africa: Spectrum, Thembisa and IHME models), to understand differences and improve guidance for countries on these different approaches</p>	<p>Tara Mangal, Leigh Johnson, Avenir Health, UNAIDS, IHME</p>	<p>May 2018</p>
<p>Mortality on ART Assumptions</p> <p><u>ART Mortality Task Force:</u></p> <ul style="list-style-type: none"> ● A working group dedicated to investigating mortality on ART to be immediately established, with a teleconference to be organised in November 2017 (by the Secretariat) to address: <ul style="list-style-type: none"> ○ Review whether Brazil data can be recommended for use in Brazil; and European data in Europe ○ Review female and male mortality rates for Latin America Region currently in Spectrum from leDEA ○ Review current assumptions for Europe and recommend how they should be adjusted to better match data by the ART Cohort Collaboration (e.g. recent temporal trends) ● By the next Reference Group meeting, the working group should propose new schedules for on-ART mortality and provide possible explanations for trends in mortality rates. Results from other data sources (e.g. China mortality analyses) are welcomed 	<p>ART Mortality Working Group (Secretariat, Avenir Health, UNAIDS, leDEA, Alpha Network, IHME) & ART-CC</p> <p>Alpha Network, leDEA, IHME, Avenir Health, Le Bao/Guo Wei</p>	<p>Immediate</p> <p>May 2018</p>
<p><u>Mortality and Disengagement from Care Model Development:</u></p> <p>Model development to be extended to include CD4 progression/regression. Model to be tested with upcoming data from leDEA-East Africa cohorts and presented at the next Reference Group meeting, to review incorporation into Spectrum</p> <ul style="list-style-type: none"> ● The revised model should be able to accommodate potential novel data sources and, subject to review and testing, should be piloted in Spectrum in 2018, before roll-out for country estimates 	<p>leDEA</p>	<p>May 2018</p>
<p>4. Use of programme service data</p>		
<p><u>Incorporation of ANC-RT Data in EPP:</u></p> <ul style="list-style-type: none"> ● Newly implemented validation screen for routine ANC data (ANC1, number of known HIV positives, number of people tested/ANC visits, number of tested positives, etc.) with coverage diagnostic plots is agreed for current implementation ● Investigation on approaches to compare antenatal routine data (ANC-RT) and sentinel surveillance data (ANC-SS) to be extended to more regions, to improve ANC-RT calibration parameter <p><u>Exploration studies on ANC-RT Data:</u></p> <ul style="list-style-type: none"> ● Investigation of the effect of testing coverage on prevalence to be extended to more countries (e.g. Kenya, Zimbabwe, Cote d'Ivoire, and potentially PEPFAR data) and to be tested at 80% and 85% coverage. Development of simple heuristic adjustment to be explored to improve model efficiency 	<p>East-West Center</p> <p>Ben Sheng, Le Bao</p> <p>Mathieu Maheu-Giroux, Jeff Eaton</p>	<p>Immediate</p> <p>May 2018</p> <p>May 2018</p>

<ul style="list-style-type: none"> • The Reference Group encourages the continuation of studies exploring the impact of facility reporting. • The Reference Group recognises the need for monthly facility data for robust inference of trends from routine health facility data. Standard DHIS extraction tool should additionally include whether facility filed a report in a given reporting period 	<p>Peter Young</p> <p>UNAIDS, WHO, PEPFAR, Global Fund Technical Assistance & partners</p>	<p>May 2018</p> <p>Ongoing</p>
5. Spatially-specific estimates		
Geospatial (HIVE-Map) Model		
<u>HIVE-Map Model Implementation:</u>		
<ul style="list-style-type: none"> • The Reference Group recommends the use of the HIVE-Map as the preferred model for subnational HIV estimates, to be used in those countries for which it is available 	<p>HIVE Team (Pete Gething, Sam Bhatt), UNAIDS</p>	<p>Immediate</p>
<ul style="list-style-type: none"> • The Reference Group encourages collaboration of the PHIA survey team and the HIVE team, to facilitate inclusion of PHIA survey data in HIVE estimates, used in the PEPFAR Country Operational Plans (COP) 2018 	<p>CDC, ICAP, HIVE team, UNAIDS, Secretariat</p>	<p>Immediate</p>
<u>HIVE-Map Dissemination and Communication:</u>		
<ul style="list-style-type: none"> • HIVE-Map to be communicated as providing an extension to Spectrum results to countries, to provide estimates at a granular subnational level 	<p>UNAIDS</p>	<p>Immediate</p>
<ul style="list-style-type: none"> • A joint guidance document for HIVE-MAP use alongside Spectrum should be generated and future joint copying of HIVE team, UNAIDS and partners to be coordinated for future correspondence 	<p>HIVE team, UNAIDS, PEPFAR, Avenir Health</p>	<p>Immediate</p>
<u>HIVE vs SAE Comparison:</u> Model comparisons between HIVE-Map and small area estimates (SAE) model to be extended to more countries and include further indicators, to better understand differences and aid method development		
	<p>HIVE team, Steve Gutreuter</p>	<p>May 2018</p>
<u>HIVE-Map Data Collection and Curation:</u>		
<ul style="list-style-type: none"> • The Reference Group recommends systematic work with Central Statistical Offices to assemble and curate standardised shape files and population data, which may include intelligence gathering from other disease fields 	<p>OGAC, UNAIDS</p>	<p>Sept 2018</p>
<ul style="list-style-type: none"> • UNAIDS are working to plan the next steps to establish a central repository for HIV-related data inputs to the Spectrum model and HIVE-Map model 	<p>UNAIDS, HIVE team</p>	<p>Sept 2018</p>
<u>HIVE-Map Method Development:</u>		
<ul style="list-style-type: none"> • HIVE-Map ART catchment modelling to be further developed using currently available program/cohort study data (e.g. leDEA, Manicaland, ALPHA network, PHIA, other home information collected at clinics, etc.), and to include learning and incorporation of types of health facility 	<p>HIVE team, leDEA, Simon Gregson, ALPHA network, ICAP</p>	<p>Ongoing</p>

