EPP & Spectrum 2014

Report and recommendations from a meeting of the UNAIDS Reference Group on Estimates, Modelling and Projections held in Barcelona, Spain, 8-9 October 2013

REPORT & RECOMMENDATIONS

The meeting of the UNAIDS Reference Group on Estimates, Modelling and Projections was organised for UNAIDS by the secretariat of the Reference Group (www.epidem.org) based at Imperial College London. Participants of the meeting are listed at the end of this document.

Kelsey Case, October 2013

Introduction

The Joint United Nations Programme on HIV/AIDS (UNAIDS) *Reference Group on Estimates, Modelling and Projections* exists to provide impartial scientific advice to UNAIDS, the World Health Organization (WHO) and other partner organisations on global estimates and projections of the prevalence, incidence and impact of HIV/AIDS. The Reference Group acts as an 'open cohort' of epidemiologists, demographers, statisticians, and public health experts. It is able to provide timely advice and also address ongoing concerns through both *ad hoc* and regular meetings. The group is co-ordinated by a secretariat based in the Department of Infectious Disease Epidemiology, Imperial College London.

Aim of the meeting

To review ongoing work and new analyses and generate recommendations for the further refinement and development of the Estimation and Projection Package (EPP) and Spectrum.

The specific objectives of this meeting were:

1) To review results from ongoing method development to improve the models used within EPP.

2) To review results from analyses to inform updates to parameter values in EPP and Spectrum.

3) To review and discuss key issues identified during the regional workshops and country estimation process.

Approach

The meeting featured presentations combined with group discussion to generate consensus recommendations. The list of participants is included in Appendix I and the meeting agenda is included in Appendix II.

The recommendations drafted at Reference Group meetings give UNAIDS and WHO guidance on how best to produce estimates of HIV/AIDS, provides an opportunity to review current approaches and also helps to identify information needs (earlier reports are published on the Reference Group website www.epidem.org). This transparent process aims to allow the statistics and reports published by UNAIDS and WHO to be informed by impartial, scientific peer review.

EPP and Spectrum 2014

In 2013, 115 countries were trained to use EPP/Spectrum and 106 country files were submitted and approved for the UNAIDS Global Report published in September 2013. Feedback from countries and issues identified during this process were incorporated into this meeting agenda. In November 2013, the country files submitted to UNAIDS will become publicly available. Countries will now also update and submit their files annually. The 2014 estimation process will begin in January when countries will update their demographic data and enter new data. New software (full tested) is required by early January to support this process and countries will submit their files at the end of March.

The Asian Epidemic Model (AEM) has been updated to incorporate the CD4 model and the effect of ART on incidence and prevalence and has been directly integrated with Spectrum. Countries that use AEM can do so directly in Spectrum, in place of EPP for the next round of estimates.

EPP

The following details key issues relating to methods and parameter values in the Estimation and Projection Package (EPP) within the AIM module of Spectrum that were reviewed and discussed and the recommendations generated during this meeting.

R-spline and R-trend

Incorporating national surveys into EPP model fitting

Dan Hogan has been working on methods to incorporate national surveys directly into the fitting process. The benefits of this approach (over simple post-hoc calibration currently used) are that it allows survey trends to directly affect the fitting (particularly applicable as more countries have multiple surveys), uncertainty in the ANC bias is incorporated as part of model fitting and incidence is automatically calibrated with observed ART coverage. This method was tested using both the r-spline and r-trend models. The two calibration approaches (*old* and *new*) yield similar point estimates in most settings, with improved fits using the new approach in Kenya (rural) and Zimbabwe (urban). The *new* calibration approach results in more conservative confidence intervals (i.e. wider CIs) but the fitting time is increased (~30% longer).

Dan also investigated methods for capturing the increased uncertainty in survey prevalence estimates due to selective non-participation – a simple regression equation for predicting an inflated standard error -- which is currently implemented in EPP. Testing the implementation of this variance inflation in combination with the new calibration approach, illustrated there are several settings that perform poorly (an unanticipated finding), and that the predicted inflated variance was not always larger than the observed variance (example of rural Lesotho).

Recommendations:

- **Implement Dan Hogan's method for including surveys in the likelihood and estimating the calibration coefficient for both r-spline and r-trend.**
- **Remove the variance inflation (and remove non-response from EPP interface and from the data needs sheet).**
- **Further investigate the increased computation time using this method.**

Follow-up: Tim Brown to implement by *Dec 2013*

Follow-up: Dan Hogan to investigate the worst case scenario for increased computation time (Nigeria and others), *Oct 2013*
Follow-up: Tim Brown to implement in EPP, *end Nov2013*

Use of selection models to account for selection bias in HIV prevalence estimates

Mark McGovern is working on methodological improvements for the implementation of Heckman type selection models to account for selective non-participation in HIV testing in national surveys. Preliminary results from 12 country applications using a random effects model with bootstrap resulted in approximately 3-4x greater CIs in the majority of cases (compared to the complete case) and 6x greater for Lesotho.

To date, the methods used have been done in two steps and require identifying the persuasiveness of the interviewer. Mark is currently working with Giampiero Marra (UCL) and Rosalba Radice (LSE) to further develop these methods and make them more efficient and practical for implementation; they have developed an R package that is easy to use and freely accessible, available at http://cran.r-project.org/web/packages/SemiParBIVProbit Validation work is also currently underway using data form the Africa Centre.

Recommendation: Consider comparing confidence intervals from Mark's use of selection models to those obtained using Dan's approach for including surveys in the likelihood.

Guidance on model selection, r-spline vs r-trend

Countries have requested more detailed explanations for the technical reasons behind the recommendations for using r-spline and r-trend in different circumstances.

Recommendation: Include this information in detail in the user manual/information note

Follow-up: UNAIDS to update the information document, *end Nov 2013*

R-spline fits in training mode vs national

Fits obtained using the r-spline model in training mode (400 unique curves) were sometimes very different than those obtained in national mode. This is due to the model not having enough time to work all the way through the incremental mixture importance sampling (IMIS). It was discussed that countries should be aware of this possibility and use caution interpreting these results with more emphasis placed on obtaining national fits. Changing the initial seed may also overcome the frequency of this occurrence.

Recommendation: Explore impact of increasing initial sample for countries with slow convergence.

Follow-up: Mary Mahy to provide files where national and training fits differed substantially
Follow-up: Tim Brown to investigate by *end Nov2013*

Increasing efficiency of R-spline and R-trend

It may be possible to further improve the efficiency of R-spline and R-trend.

Recommendation: Explore Le Bao proposal for integrating out random effects for a faster likelihood calculation.

Follow-up: Le Bao and Tim Brown, *review April 2013*

Calibration for generalised epidemics in the absence of survey data

Previously, most countries with generalised epidemics calibrate the level of prevalence to a national survey. For countries without a national survey, an urban and rural calibration is used, derived from the Gouws, et al (STI, 2008) analysis of HIV prevalence levels in national surveys compared to fitted ANC fitted, which suggest that a 20% downward calibration on ANC data is required in the absence

of a survey for calibration. Kim Marsh conducted an update of this analysis (Analysis 1) incorporating the additional ANC and national survey data available and expanding to compare national survey data to median ANC surveillance data directly (not-fitted).

Results, Analysis 1: The ratios of national survey prevalence compared to ANC (by region and aggregated) differed depending on whether ANC data were fitted or compared directly to survey estimates with fitted data producing better agreement to survey data. The median differences of all surveys combined indicate that rural calibration may be larger than previously assumed (30% instead of 20%), but when compared to most recent survey data only, the calibration appears adequate for the aggregated data (all countries). However, when the data are disaggregated by region (and by country), the increase in variation observed suggests that global calibration is a crude method for adjustment. There are currently only 5 countries in sub-Saharan Africa without a survey for calibration, but for these countries, regional calibration should be used. Recommended calibrations:

Region	Urban	Rural
Eastern Africa	1.023	0.940
Southern Africa	0.841	0.937
Western/Central Africa	0.699	0.594

Analysis 2: Marsh's second analysis compared trends over time in national surveys and ANC prevalence for countries with more than one survey. Results from this analysis (z-score test) indicate there is broad agreement both in terms of magnitude and direction and particularly for urban as opposed to rural areas. Relative differences in trends reached levels of statistical significance in 6/24 countries (Burundi, Cameroon, Cote d'Ivoire, Ethiopia, Guinea and Kenya). There was no discernible pattern with regard to magnitude or direction of the differences over time. Countries where trends differ may be advised to reinvestigate and evaluate the data entered (survey and ANC), and consider excluding low quality data.

Recommendations:

- **Remove the automatic urban/rural calibration for generalised epidemics in EPP.** Follow-up: Tim Brown, end Nov 2013
- **Generate table for recommendations for regional calibration based on Kim Marsh's work.** Follow-up: Tim Brown, end Nov 2013
- **Add these changes and guidance to the EPP manual.** Follow-up: Tim Brown, end Nov 2013
- **Further consideration for methods to capture the uncertainty around the regional calibrations and compare confidence intervals in generalised epidemic countries without surveys to those with surveys (following the implementation of Dan Hogan's method for incorporating surveys in the likelihood calculation).** Follow-up: Tim Brown, UNAIDS, Reference Group, Dec 2013.

ART effects in EPP

"Bump" in new infections

Some country files have a seemingly unrealistic "bump" in incidence which may be due to overstating the effect of ART. R-spline and R-trend have a flexible epidemic growth rate (r) thus will capture the effect of treatment on incidence. EPP classic has a fixed "r" thus requires adding the effect of ART on incidence.

Recommendations:

- **Test removing the ART infectivity reduction in R-Spline and R-Trend and see if this resolves, maintain this reduction in EPP classic.**

- **Secondary options are to consider smoothing the ART numbers passed to EPP and to consider turning the prevalence adjustment off.**
- **Identify if this resolves "2010 effect", if not, further investigation is needed here.**

Follow-up: Tim Brown, October 2013, *review Dec 2013*
Follow-up: Mary Mahy to supply key files that have this effect, *Oct 2013*

Correction for those 50+ on ART

Countries calculate the total number of adults on treatment (ages 15+) and currently this information is used in EPP instead of just adults 15-49 which has important implications, particularly as epidemics age.

Recommendations:

- **Compare the available data against Spectrum calculations for those 50+ on ART.**
- **Implement correction in EPP.**

Follow-up: Futures Institute to compile information from Spectrum (those 50+ on ART)
Follow-up: Tim Hallett to check ICAP and IeDEA data for comparison
Follow-up: Mary Mahy to request for this information for Latin America to identify if there are regional differences
Follow-up: John Stover and Tim Brown to implement, *review Dec 2013*

Switch from ANC surveillance to PMTCT

Countries are considering switching from surveillance in antenatal care to PMTCT programmes. This will result in different tests being used for surveillance, usually switching from enzyme immunoassays (EIA) to rapid tests (RT) which have different sensitivities, and will also likely expand the number of sites, both of which will have implications for generating estimates of prevalence in EPP. While countries recognise the quality of data in PMTCT is not yet up to par, this change is going happen (much cheaper), with Rwanda already in the process of transitioning.

Peter Young conducted an exploratory analysis to identify the effects in EPP when using PMTCT data as routine surveillance. He first compared the overall relative bias from RT compared to EIA in Mozambique (-5.1% , -0.78 percentage points), but there were no trends over time in the 3 years of data compared and the results were all over the place (as much as ½ the prevalence). The PMTCT data were then implemented in EPP using four different options to explore the effects.

It was discussed that two approaches are needed for use of PMTCT data in EPP/Spectrum, one for the immediate term and one for when PMTCT data become routine. In the short term, in order to be able to appropriately adjust the PMTCT data, countries need to calculate the bias which requires parallel ANC/PMTCT systems.

Recommendations for countries:

- **Maintain parallel ANC/PMTCT systems as long as possible, and at a minimum for 1 year.**
- **Conduct comparison of prevalence in parallel ANC/PMTCT clinics to identify appropriate adjustment for PMTCT (calculate the offset).**
- **For expansion to include additional PMTCT sites for surveillance, address geographic needs, record quality of surveillance.**

Recommendations in EPP:

- **Initially, use the same sites for PMTCT that have been utilised for ANC (to avoid discontinuity in the trends) adjusting the PMTCT data appropriately.**
- **Longer term solution will be determined by outcomes of the research agenda.**

Recommendations for research:

- **Compare ANC/PMTCT across many countries (expansion of PYoung analysis).**
- **Further investigation and analysis to understand the biases in PMTCT data.**
- **Longer term research issue of how to incorporate PMTCT and expanded sites -- treating like separate source (e.g. DHS) or treating like same source (ANC). Ongoing research area to identify how to best incorporate this information in EPP.**

Follow-up: UNAIDS to request data for Rwanda and Botswana for this comparison, *review April 2013*
Follow-up: UNAIDS to convene a teleconference with Anindya De, Ray Shiraishi, Peter Young, Le Bao, and Kim Marsh to determine how to replicate Peter's analysis in other countries and decide on additional analysis required, *review results April 2013*

Excess mortality in IDU

Bradley Mathers and Louisa Degenhardt have updated their systematic review and meta-analysis of IDU mortality (published in the WHO Bulletin, Feb 2013) and conducted additional analyses in order to inform the IDU-specific non-AIDS excess mortality in EPP. These analyses included investigating differences in IDU mortality by gender and HIV status with further disaggregation by region and income status (HIC compared to LMIC) and the effect of opioid substitution therapy availability.

The estimated crude mortality rate (CMR) among IDU from pooled cohort data (overall, 43 studies) was 1.65. Analysis by gender highlighted that while male IDU had greater overall mortality, female IDU had greater excess mortality (age-matched comparison). Serostatus was also associated with mortality over and above AIDS-related mortality. HIV positive IDU had a consistently higher rate of mortality across nearly all studies (CMR HIV+=2.5, CMR HIV- =1.66). Because serostatus is obtained at baseline in these cohorts, the relative difference may be an underestimate.

For the effect of opioid substitution therapy (OST) on non-AIDS mortality among IDU, there were only a small number of studies but mortality was reduced during periods on OST (with raised risk of mortality in the first few weeks). There were also differences observed across income groups, but only very limited studies from LMIC for this comparison. By region, there were also too few studies (and varied cohorts) to make inferences with the possible exception of Western Europe.

The limitations of the analyses include the marked heterogeneity between studies which questions the appropriateness of meta-analyses; the limited data available for each study restricts analysis of multiple factors across studies; and the death rate may not have been captured appropriately (may be underestimated).

Recommendations:

- **Implement the crude mortality rate (instead of excess mortality) for PWID as the default value which can be modified if countries have data to support modification.**
- **Apply the HIV+ IDU non-AIDS CMR (2.5%), EPP to pass proportion of the population who are IDU and proportion of HIV+ who are IDU to Spectrum.**

Follow-up: John Stover and Tim Brown to implement, *review results Dec 2013*

Meta-data file for EPP

It would be useful to have high level summary information for each projection file (curve fitting method, prevalence conditions, calibrations, changes to model priors, training/national fits) in one location in order to better facilitate file review.

Recommendation to capture this information in a .csv file

Follow-up: UNAIDS to define explicit information desired *(Oct 2013),* Tim Brown to implement by *end Dec 2013*.

SPECTRUM

Key updates for Spectrum 2014

The following details new features and updates in Spectrum 2014:

1. **Demographic data in Spectrum**

   UNPOP data

   UNPOP no longer estimates non-AIDS mortality which is used for the demographic projections in Spectrum. Spectrum can estimate the non-AIDS mortality required to reproduce the UNPOP all-cause mortality which results in non-smooth trends in AIDS deaths. Smoothing this trend will result in slightly different all-cause mortality. In addition, the World Population Prospects are done in 5-year time steps for 5-year age groups. Spectrum interpolates for annual estimates by single year so there will be differences compared to UNPOP. The country-specific population files greatly expand the size of Spectrum (67MB) in the full version. *Spectrum Lite* is now also available which does not contain the country data files. These files can be downloaded on an individual basis as needed.

   Creating sub-national projections

   Previously, the demographic data required to create sub-national projections included the base year population, total fertility rate, life expectancy and migration by region. These data can be obtained from the national census bureau or national statistics office and from DHS data or potentially from the US Census Bureau and UNPOP.

   There are now 3 alternative options in Spectrum for creating sub-national projections:

   1. *Adjust to state census:* Create text file for each state, interpolate for population by age and sex for each year. Calibrate within Spectrum to census ("migration" is used as reason for discrepancies).
   2. *Wizard*: Walks you through the process
   3. *New editor:* In Spectrum beta there is a new editor that allows you to simply enter the proportion of the population that is part of the sub-national projection, which reads from the national projection file and adjusts the population for you.

2. **TB-HIV module in Spectrum**

   Futures Institute is working closely with WHO Stop TB on the estimation module which will be used for country-level TB-HIV estimates. The curve fitting has now been implemented in this module (as opposed to Carel Pretorius fitting each country). Carel is also working on a TB Dynamics Module, a separate application which aims to capture the full dynamics of TB and will also be contained in Spectrum.

3. **Validations in Spectrum**

   Spectrum has a validation component which allows users to compare outputs from Spectrum to various data sources. This feature is currently being expanded to include additional data available.

   Recommendations:

   - **Add DHS data for prevalence by age**
   - **Consider adding IHME data for all-cause mortality by age once the age pattern has been validated, do not include in the immediate term.**

   Follow-up: Katrina Ortblad & John Stover

Issues identified during the regional workshops and country estimation process:

1. **Sex ratio of incidence**

   The sex ratio of incidence in Spectrum is read directly from EPP. In concentrated epidemics, many countries switched to use the default values because of erratic patterns observed. It was discussed that early years are often skewed as a result of using ANC data for fitting and due to dynamics of infections in key populations with erratic ratios as incidence rises in different key populations before stabilising.

   Recommendations:

   - **Tim Brown to add descriptive information in the quick start guidelines**
   - **Kim Marsh work on calibration in concentrated epidemics will address this to some degree,** *Review results from this analysis in Dec 2013*

2. **ART**

   Mid-year estimates vs end-year values for ART

   Spectrum indicators represent mid-year estimates (July 1); however, users enter end-year ART values and Spectrum interpolates to obtain the mid-year estimates. Both the mid-year estimates and the end-year values are included in Spectrum which can confuse users.

   Recommendation: Create separate sub-menu for ART with a small number of indicators clearly labelled including ART coverage according to WHO guidelines.

   Follow-up: Futures Institute, *Dec 2013*

   Annual ART drop-out

   Countries report total numbers on ART from programme data but these numbers may be an overestimate if they do not capture patients switching clinics, drop out, etc. As a result, Spectrum may not appropriately capture the pattern of uptake in those newly needing treatment – without removing annual drop-outs, the total numbers on treatment in Spectrum will over-represent survival on ART and under-represent new initiations. Switching to *newly needing treatment* as the denominator and reporting *newly receiving treatment* as the numerator may be a more appropriate solution for modelling treatment. Alternatively, an annual default drop-out rate (modifiable with country data) can be implemented.

   Follow-up: UNAIDS to continue the ART coverage denominator discussion internally; consider implementation of an annual default drop-out rate.

   Generating scenarios for increasing CD4 threshold for ART eligibility to 500

   To appropriately explore the effect of increasing ART thresholds, it is necessary to use the Goals model or another type of process model. This may require more time and technical investment than countries desire, but is the recommended approach for a detailed analysis. For countries where a very simple, basic analysis is desired, it may be possible to adapt Goals files that have already been prepared. Futures Institute currently has Goals files for 24 countries and it may be possible to use these files to conduct a basic analysis.

   Recommendations:

   - **Use the Goals model or another process model to appropriately capture effects of increasing the ART threshold. This component will not be implemented in AIM.**
   - **Futures Institute to investigate in more detail the potential options for a more basic analysis using the Goals files previously prepared.** Follow-up: Futures Institute, *review Dec 2013*

3. **Mortality**

   Estimated AIDS deaths vs vital registration in Latin America

AIDS deaths in many countries in this region are viewed as too high compared to vital registration data, but countries often feel that the prevalence levels are correct. In many cases, key population data obtained from capital cities (e.g. MSM) are used as nationally representative data for these populations. There is a need for further analysis of these files and curve fits, nd consideration of the geographic distribution of key populations and HIV prevalence in these countries. A validation study is currently underway in Argentina but further research is needed and more countries should be involved (e.g. Columbia, Mexico).

Recommendations:

- **First conduct a detailed comparison with IHME GBD information to attempt to reconcile as many differences as possible and identify the key countries with remaining discrepancies.**
- **Comparison of age-specific death rate of HIV compared to VR data available.**
- **Organise a teleconference/group discussion/in-country meeting to address these issues with all affected countries together.**

Follow-up: Katrina Ortblad, IHME, UNAIDS. Conduct comparison in November and plans for next steps, *review findings and progress Dec 2013*

Age-specific mortality from GBD compared to UNAIDS

The next release of GBD (update) will occur in May 2014 with Nov/Dec 2013 the cut-off for receiving data to inform these estimates. However, there are still discrepancies in GBD compared to UNAIDS, for example in Zimbabwe, the age-pattern of all-cause mortality from GBD is much younger that the HIV/AIDS mortality in the UNAIDS estimates (resulting in a large squeeze). It was discussed that the pattern in Spectrum matches survey prevalence, and changing this pattern (to a younger age pattern to match results from the GBD all-cause mortality) would result in not matching the survey prevalence.

Recommendation: Follow-up with GBD team regarding whether they are using the South African age-specific all-cause mortality pattern for Zimbabwe (and other countries) which is younger and could result in this discrepancy.

Follow-up: Katrina Ortblad, Haidong Wang, John Stover, *Oct 2013*

All-cause mortality of HIV-

ALPHA Network has both non-AIDS mortality and all-cause mortality of those HIV negative which are currently underutilised and may be very useful to better inform, particularly areas where there are discrepancies. It would also be useful to link IHME with ALPHA for further comparisons of all-cause mortality.

Recommendations: Compare ALPHA data with UNPOP data, compare with IHME data.

Follow-up: Katrina Ortblad and IHME, LSHTM team (Basia, Emma, Georges), John Stover, *Oct 2013*

4. PMTCT

Many countries have coverage levels of PMTCT greater than 100% and some countries have identified that the number of HIV+ pregnant women is too low. There are likely a combination of factors accounting for these discrepancies including programme data (double-counting or multiple visits), fertility assumptions (fertility reduction and age-specific pattern of fertility) and the age pattern of incidence. Countries also expressed confusion surrounding the sources for default data in the PMTCT editor.

Recommendations:

- **UNAIDS conducting investigations to validate PMTCT programme data including comparisons of ANC vs DHS data,** *review Dec 2013*
- **Review Kim Marsh analysis of sex ratio data to potentially inform,** *review Dec 2013*

- **Further investigation into age pattern of incidence and changes over time – review data from ALPHA network.** Follow-up: Emma Slaymaker, Basia Zaba, Georges Reniers, *review results in Nov 2013*
- **Consider use of adjustment on prevalence in pregnant women (default value of 1 but modifiable if evidence to support changing),** *consider Dec 2013*
- **For countries with high PMTCT coverage levels and a national survey, consider re-fitting the age pattern of incidence to match the survey levels of prevalence. Consider defining criteria for countries that may require adjustment (e.g. high fertility among teenagers), identify changes that result to those in need for PMTCT).** Follow-up: UNAIDS, Reference Group
- **Define the sources of the default data (including ages for cotrimoxazole) in greater detail. Update recommendations for PMTCT guidelines in the Spectrum Quick Start guide.** Follow-up: Futures Institute, *by end Dec 2013*

5. **Extremely wide uncertainty ranges**

   Countries with many multiple sub-regions often have very wide confidence bounds (e.g. Vietnam) likely a result of the uncertainty from each projection added together. Some of the uncertainty may also be due to the underlying curve fits. MSM and client populations often have huge bounds and a key issue may be improving the curve fits among all key populations. Another option is the use of a hierarchical model and information sharing for related populations which would reduce the uncertainty.

   Recommendations:

   - **Have countries review the underlying curve fits in the first instance.**
   - **Le Bao will present his hierarchical model applied to concentrated epidemics and will explore this in detail in a country example,** *review Dec 2013*

6. **Meta-data in Spectrum**

   It would be useful to have high level summary information for each projection file including changes that are made to default data (e.g. breastfeeding patterns), transmission rates (e.g. MTCT probabilities), advanced options and other model parameters in order to better facilitate file review.

   Recommendation: Capture file summary information from Spectrum.

   Follow-up: UNAIDS to define explicit information desired *(Oct 2013),* Futures Institute to *implement by end Dec 2013.*

Appendix I: List of Participants

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Appendix II: Meeting Agenda

EPP and Spectrum 2014

8-9 October 2013

DAY 1

EPP and Spectrum 2014 (Chair: Peter Ghys)			
900	15	Meeting Opening, introductions, objectives	Peter Ghys, *UNAIDS* Tim Hallett, *Imperial College London*
915	15	UNAIDS country estimation process – Feedback from national estimates process, general issues re model fitting, issues flagged, future timelines and annual estimates process	Mary Mahy, UNAIDS
930	15	Discussion	ALL
Session 1 - EPP (Chair: Peter Ghys)			
945	25	Recent updates in EPP - New features, Incorporation of AEM, ongoing work	Tim Brown
1010	20	*Questions and discussion*	ALL
1030	20	Update of Gouws et al analyses of ratio of HIV prevalence in national surveys compared to ANC; update of analyses of trends over time in national surveys compared to ANC	Kimberly Marsh, *consultant*
1050	10	*Questions*	ALL
1100	*30*	*Coffee break*	-
1130	20	Inclusion of national household-based surveys in the likelihood calculation and results from application of this approach in conjunction with variance inflation	Dan Hogan, *WHO*
1150	10	*Questions*	ALL
1200	20	Results from ongoing work applying Heckman selection models in the context of HIV prevalence estimation	Mark McGovern, *HSPH*
1220	40	**Group discussion and recommendations for EPP**	
1300	90	*Lunch*	-
Session 1 ctnd - EPP (Chair: Geoff Garnett)			
1430	20	Excess mortality in IDU – Results from systematic review and proposed parameter refinements in EPP	Bradley Mathers, *UNSW*
1450	20	*Questions, discussion,* **recommendations for EPP**	ALL
1510	25	*Coffee break*	ALL

1535	15	Modes of Transmission from EPP/Spectrum, case reports, MoT analyses:Towards characterising the role of key populations in regional and country-specific epidemics - Incidence trends in IDU, sex workers, and MSM	Karen Stanecki, *consultant*
1550	10	*Questions and discussion*	ALL
1600	20	Comparison of ANC to PMTCT data and country plans and progress towards switching from ANC to PMTCT for surveillance	Peter Young, *CDC Mozambique*
1620	10	*Questions*	ALL
1630	30	**Group discussion and recommendations**	ALL
1700		Close	-

DAY 2

Start	Duration	Subject	Speaker
Session 3 - Spectrum (Chair: Simon Gregson)			
900	45	Spectrum - recent updates and ongoing work including: *UNPOP update, *review of paediatric comparisons, *review of PMTCT coverage, *smoothing ART scale-up to address irregular patterns of new infections, *TB-HIV modelling in Spectrum, *Addressing challenges creating sub-national files, *Creating UPD files	John Stover, *Futures Institute*
945	30	**Group discussion**	ALL
1015	20	Key findings from additional investigation into estimates of mortality in GBD compared to UNAIDS	Katrina Ortblad, *IHME*
1035	10	*Questions*	ALL
1045	20	Age pattern of new infections - review of countries where age pattern does not fit; Estimates in over-50s, review of results from 2012 age pattern of infection	Mary Mahy, *UNAIDS*
1105	15	*Questions and discussion*	ALL
1120	*30*	*Coffee break*	-
1150	30	**Recommendations for Spectrum**	