Modelling paediatric HIV and the need for antiretroviral therapy: September 2018

Report and recommendations from a meeting hosted by WHO and UNAIDS in collaboration with the UNAIDS Reference Group on Estimates, Modelling and Projections

Bern, Switzerland, 20 September 2018

REPORT & RECOMMENDATIONS

The meeting hosted by WHO and UNAIDS in collaboration with the UNAIDS Reference Group on Estimates, Modelling and Projections was organised by the Secretariat of the UNAIDS Reference Group (www.epidem.org) based at Imperial College London and the University of Cape Town. Participants of the meeting are listed at the end of this document.

Kelsey Case, Imperial College London, UK, October 2018

Abbreviations

AIM	AIDS Impact Model
ALPHA	Analysing Longitudinal Population-based HIV/AIDS
ART	Antiretroviral therapy
ART-CC	Antiretroviral Therapy Cohort Collaboration
CDC	US Centers for Disease Control and Prevention
CSAVR	Case Surveillance and Vital Registration tool
DHS	Demographic and Health Survey
ECDC	European Centre for Disease Prevention and Control
EMTCT	Elimination of mother-to-child transmission
EPICC	European Pregnancy and Paediatric HIV Cohort Collaboration
EPP	Estimation and Projection Package
IHME	Institute for Health Metrics and Evaluation
LTFU	Loss to follow-up
MTCT	Mother-to-child transmission
PEPFAR	US President's Emergency Plan for AIDS Relief
PHIA	Population-based HIV Impact Assessment
PMTCT	Prevention of mother-to-child transmission
UNAIDS	Joint United Nations Programme on HIV/AIDS
WHO	World Health Organization

Aim of the meeting

Despite recent successes in the scale-up of services for the prevention of mother-to-child transmission, the global burden of paediatric HIV persists as a significant health challenge. An improved understanding of the trends in paediatric infection at national and global levels remains critical in order to support the continued development and procurement of antiretrovirals. The limited surveillance data available have hampered efforts to accurately assess the number of children in need of ART, and to predict uptake of current treatment recommendations in different settings and age groups. As such, forecasting the demand of paediatric drugs and formulations remains a challenge, potentially undermining treatment outcomes.

The World Health Organization (WHO) and the Joint United Nations Programme on HIV/AIDS (UNAIDS), in collaboration with the UNAIDS Reference Group on Estimates, Modelling and Projections, convened its fifth technical consultation to review and update current parameters and method of paediatric HIV estimation. The overall objective of this meeting was to produce recommendations to improve estimation and projection of children and adolescents living with HIV.

The UNAIDS Reference Group on Estimates, Modelling and Projections

The UNAIDS Reference Group on Estimates, Modelling and Projections exists to provide impartial scientific advice to UNAIDS and other partner organisations on global estimates and projections of the prevalence, incidence and impact of HIV, and to support the further development and refinement of current methods. The Reference Group acts as an 'open cohort' of epidemiologists, demographers, statisticians, and public health experts. It is able to provide timely advice and address ongoing concerns through both *ad hoc* and regular meetings. The group is co-ordinated by a secretariat based at Imperial College London, United Kingdom, and the University of Cape Town, South Africa.

Approach

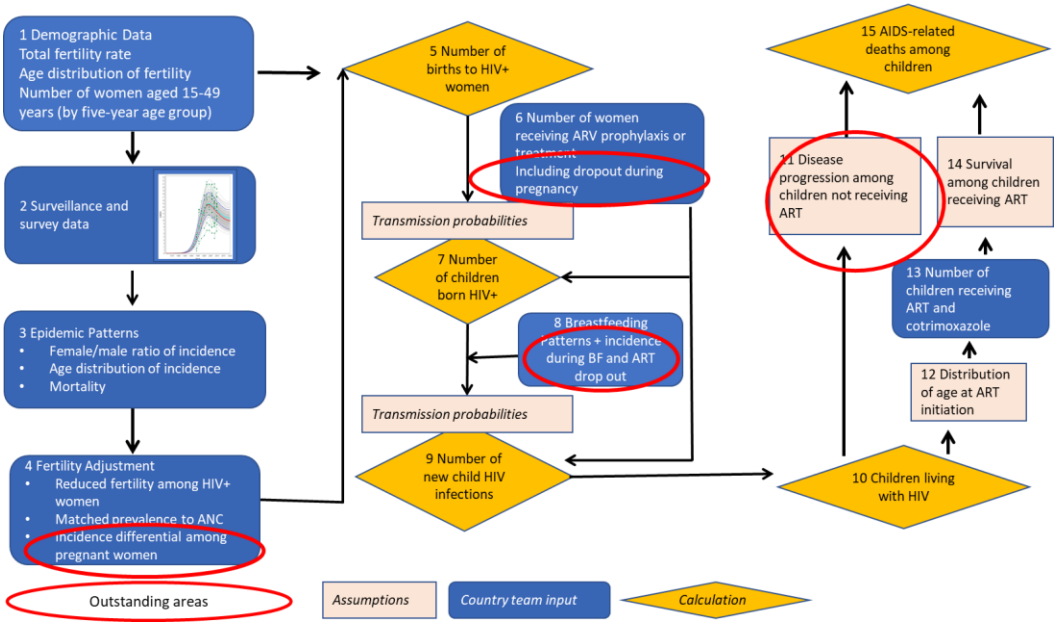
The meeting featured both presentations and facilitated discussion to generate consensus recommendations. These recommendations give UNAIDS and partners guidance on how best to produce estimates of HIV, and the meetings provide opportunities to review current approaches and help to identify information needs. Thirty-two experts attended the meeting – each contributed data, insights and analysis to produce a set of recommendations. We thank them for their attendance and contributions.

This report includes summaries of the presentations and discussions for each session. Links to the presentations are available to meeting participants with member logins on the Paediatric HIV September 2018 meeting page, on the Reference Group website (non-members, please contact the Reference Group Secretariat). The final recommendations have been summarised at the end of this report. Earlier reports from the WHO/UNAIDS Paediatric HIV meetings and past UNAIDS Reference Group meetings are published on the Reference Group website (www.epidem.org) and include further information on the different approaches described in this report. Such transparent processes aim to allow the statistics and reports published by UNAIDS and partners to be informed by impartial, scientific peer review.

The list of participants and meeting agenda are included in Appendix I and Appendix II, respectively.

Summary of the child model in Spectrum and outstanding issues

As with previous meetings of this group, the agenda and discussion followed the below structure to identify model weaknesses and areas for improvement.



Session 1: Estimating births to HIV-positive women

The methods used to produce estimates of HIV and related indicators among children and adolescents are continually updated and refined as new data become available. Estimating the number of births to HIV-positive women is a critical component of the estimates of child HIV infections and other indicators, notably coverage of prevention of mother-to-child transmission (PMTCT). The objectives of this session were to review new data and analyses which affect the estimates of the number of births to HIV-positive women including fertility of HIV-positive women in the antiretroviral therapy (ART) era and HIV incidence during pregnancy.

It was recommended to implement updated fertility rate ratio parameters in Spectrum, based on data from Population-based HIV Impact Assessment (PHIA) surveys and Demographic and Health Surveys (DHS). The PHIA data illustrate the narrowing effect on fertility in HIV-positive compared to HIV-negative women in the ART era. Overall, estimates suggested higher relative fertility among HIV positive women age 20-29 years compared to previous Spectrum default parameters Note that this change will likely result in increased estimates of births to HIV-positive pregnant women in many countries. It was recommended to compare the updated estimates with data available from Malawi, Namibia and the Analysing Longitudinal Population-based HIV/AIDS (ALPHA) network. An analysis of data from the Western Cape suggested higher fertility among HIV positive women on ART compared to HIV negative women. The group should continue to monitor studies of differences in fertility by use of ART.

In concentrated epidemics, it is recommended for countries to place greater emphasis on review of PMTCT coverage and child estimates, noting there are generally less data available in these settings to inform the model assumptions and validate the outputs. It is also recommended to compare the Spectrum estimates of birth to HIV-positive women in Brazil with programme data.

HIV incidence during pregnancy and post-partum period

Milly Marston reviewed the available evidence for the potential increased risk of incident HIV infection during pregnancy and the post-partum period. While pregnant and post-partum HIV-negative women with an HIV-positive partner may be at higher per act transmission for HIV, they may also have lower sexual activity during this period compared to non-pregnant women. Pregnant and post-partum HIV-negative women are also more likely to have an HIV-negative partner. It was agreed there is currently insufficient evidence to support implementing an increased population-level risk of HIV incidence during pregnancy and post-partum period in Spectrum. It was further recommended to continue to monitor developments on recency testing in pregnancy and developments on long-term follow-up of HIV-negative mothers during pregnancy and breastfeeding from elimination of mother-to-child transmission (EMTCT) validation studies.

Sessions 2 and 3: Retention on ART among pregnant women and transmission risk during breastfeeding

In the 2018 UNAIDS HIV/AIDS Estimates, most countries used their programme data to update the default values in Spectrum for retention on ART among pregnant women in PMTCT programmes. Exceptions included Western and Central Africa, and Asia and the Pacific where few countries had programme data for this specific input. Some countries used the ART dropout rate among all women as an approximation. Caitlin Dugdale conducted a review of disengagement from care during pregnancy and the postpartum period in low- and middle-income countries to identify if there is evidence to support an update to the default values in Spectrum. Spectrum currently has separate default values for retention on ART in PMTCT for pregnant women starting ART prior to pregnancy (75%) and during pregnancy (80%). Caitlin's review found limited evidence to support differentiation based on when ART was started. It was recommended to implement a unified default (80%). For postpartum retention in care, monthly loss to follow-up was 1.8% in the shorter term and 2% in the longer term. It was recommended to change the default values in Spectrum to the combined value from these time periods.

The PHIA surveys have data on viral load suppression during pregnancy and breastfeeding. These data suggested that a retention value of 80% was possible, even in countries with over 90% PMTCT coverage. It was recommended to further model the implied viral suppression in the year after birth with the revised default values and to compare these with the PHIA survey data for validation.

It was highlighted that re-engagement is possible, thus these defaults may represent an upper bound.

Transmission risk during breastfeeding

Spectrum currently assumes the same default patterns of breastfeeding for HIV-positive women as HIV-negative women. Countries can alter these patterns based on whether women are in PMTCT programmes, and/or over time, but many high burden countries do not have data to inform revised patterns. Many concentrated epidemic countries recommend HIV-positive women not to breastfeed and these country files are adjusted accordingly.

Data from recent nationally representative household surveys indicate potential differences in the patterns of breastfeeding among HIV-positive women compared to HIV-negative women. These data are noisy with variation over time and between countries (and likely also within countries, i.e. urban/rural). Robert Glaubius presented a preliminary analysis of these patterns in generalised epidemic settings and used the data to inform modelled estimates of breastfeeding patterns by HIV

status. He specified and evaluated a parametric model for HIV-negative women and then fit a hierarchical model with HIV status to the pooled survey data. This approach can be used to estimate patterns of breastfeeding by HIV status, which could be used by countries to inform updated patterns by HIV status and/or over time in Spectrum. It was recommended to update the default patterns of breastfeeding incorporating the latest survey data, and to continue to refine the hierarchical model

In concentrated epidemic settings, Artur Santos highlighted that the guidance for breastfeeding when HIV-positive varies. Policies in Asia generally support breastfeeding (but data are scarce), while in Latin America, countries generally have policies which do advise HIV-positive women to not breastfeed.

Sessions 4 and 5: Transmission probabilities and interpretation of mother-to-child transmission rates

Lynne Mofenson presented an updated literature review on the probabilities of mother-to-child transmission (MTCT) of HIV. This analysis directly informs the MTCT assumptions in Spectrum. Only minor changes are indicated in the updated analysis, with a notable change the recommendation to stratify peripartum MTCT rates by breast feeding versus formula feeding. It was recommended to adopt the new rates from this analysis, but to first test the effect of these changes on the estimates. It was further discussed that women are initiating ART during the breastfeeding period, but at present there is no input in the PMTCT editor to reflect this occurrence. It was recommended the 'Option B' postnatal prophylaxis could be re-labelled and used for this purpose.

In the future, it is important the Spectrum model structure and inputs reflect the increased programmatic efforts to re-test, diagnose and treat HIV-positive women at later ANC visits, during labour and delivery and during breastfeeding. It was noted there is an increasing amount of data for viral load on ART from MTCT visits which may also be useful to further inform MTCT rates in the future.

Interpretation of mother-to-child transmission rates

The ANC routine testing graph, which was previously in EPP, has been moved to Spectrum. The graph reflects the cascade through ANC testing and PMTCT, intended to help identify potential issues (arising from programme data and/or modelled estimates) which contribute to unrealistic estimates of PMTCT coverage and potentially poor prevalence data being used for fitting in EPP.

New charts have also been added to visualise modes of MTCT. These includes stacked bar charts for the type of PMTCT prophylaxis received, the resultant number of new child infections by type of PMTCT prophylaxis, and the resultant contribution to the rate of MTCT. These viewers are intended to help countries better understand what is accounting for the estimated rate of MTCT.

Several facility-based studies and surveys have attempted to measure mother to child transmission rates which could potentially be used to validate the Spectrum output. These studies have been largely supported by the US Centers for Disease Control and Prevention (CDC). Some of these studies have additionally collected data on the risk of maternal HIV incident infections post-delivery, under 18-month mortality in HIV-exposed and unexposed infants and children, coverage of PMTCT interventions, ANC attendance, and HIV testing and maternal ART use during pregnancy and breastfeeding. A formal comparison between the Spectrum results and the PMTCT impact evaluation studies was recommended, and reconciliation of the study results with PHIA viral load suppression.

Finally, a paper or policy brief on *Challenges in achieving and measuring EMTCT: Insights from modelling* is recommended to be produced by this group.

Session 6: Child survival

The objectives of this session were to review data and analyses on child survival, to consider differentiation in survival among youth perinatally infected versus non-perinatally infected youth, and to review the assumptions for the effect of cotrimoxazole on mortality.

Child survival on ART

The default parameters in Spectrum for child survival on ART are informed by data from the IeDEA network. Analysis of the IeDEA data over time indicate the age at ART start among children <5 years has declined in nearly all regions, while the proportion starting at very young ages (<1-2 years) and older ages (>10 years) appears to be increasing. Comparison of these data with Spectrum suggest Spectrum is not capturing the increasing proportion children starting ART at older ages (>10 years).

Estimation of mortality among children who disengage from care is difficult because there are currently limited tracing studies which identify the outcomes of children LTFU. IeDEA South Africa is conducting a tracing study with data collection occurring next year which will be able to further inform these adjustments. It was recommended to maintain the current default values in Spectrum (no adjustment for LTFU) and review the new data when available.

Child survival in absence of ART

In the absence of ART, there has been speculation that the child survival patterns in Spectrum both overestimate and underestimate survival. However, there is currently no strong evidence available to support the implementation of updated patterns. It was recommended that further analyses should be conducted including a review of the mortality rates among older long-term survivors of perinatal infection using data soon available from the European Pregnancy and Paediatric HIV Cohort Collaboration (EPICC) data merge, a review of the IeDEA analysis of mortality among perinatally infected children pre-ART, and triangulation of the paediatric HIV survival assumptions with all-cause mortality trends among children aged 5-14 in South Africa.

Survival of perinatally infected vs non-perinatally infected:

Currently in Spectrum, perinatally infected children age-in to the adult model (at 15 years) where they are then assumed to have the same pattern of survival as non-perinatally infected youth. This simplified assumption is made in the absence of data to inform alternative survival patterns. Sophie Desmonde reviewed IeDEA network data from adolescents to inform differential mortality assumptions. However, in the pre-ART era, there is very limited data for perinatally infected youth, while in the post-ART era there is very high LTFU which results in substantial uncertainty which makes it difficult to draw conclusions. It was recommended to stratify the analysis by duration of treatment and baseline CD4 at ART initiation, and year of enrolment, if possible, and review the results. It was agreed at present to maintain the current model parameters in Spectrum.

Effect of cotrimoxazole

There is recent evidence which indicates a decline in cotrimoxazole use over time and suggests the default parameters in Spectrum may overstate the effect of cotrimoxazole on mortality for children on ART. It was recommended to revise the assumptions in Spectrum to reflect cotrimoxazole affecting mortality for children on ART for only the first year on ART, and to review the impact of this change. It was further discussed that cotrimoxazole was not controlled for in the IeDEA analysis of mortality among children on ART and thus there is potential for double counting of this effect. It was recommended to adjust for cotrimoxazole provision in the IeDEA analysis and to ensure the

cotrimoxazole assumptions in Spectrum are consistent with the total mortality rates estimated from IeDEA.

Survival in concentrated epidemic settings

In concentrated epidemic settings, it was recommended for countries with strong vital registration data to compare estimates of child deaths with adjusted vital registration to identify unrealistic estimates (high or low).

Key Recommendations

UNAIDS Reference Group on Estimates, Modelling and Projections

Pediatric Estimates Meeting

20 September 2018, Bern, Switzerland

Recommendation/Action Item	Lead Person(s)	Proposed timeline
Session 1: Estimating births to HIV+ pregnant women • Update assumptions for HIV incidence during pregnancy and breastfeeding?		
Estimating births to HIV+ pregnant women		
• Implement updated estimates of relative fertility by HIV and ART status, noting uncertainty about pregnancy incidence among women on ART.	Rob Glaubius, John Stover, Jeff Eaton	09-10/2018
○ Compare Spectrum estimates with programme data in countries with routine data on % of births of HIV+ women who were on ART before 1st ANC (e.g. Malawi, Namibia).	Jeff Eaton, CDC	10/2018
○ Review estimates of relative pregnancy incidence amongst women on ART >6 months from PHIA surveys	Sasi Jonnagaladda	10/2018
○ Validate with ALPHA data (Kisumu or pooled)	Milly Marston	2019
• Concentrated epidemics:		
○ Compare Spectrum estimates of births to HIV+ women in Brazil with programme data.	Kim Marsh, Ana Roberta Pascom	01/2019
○ Greater emphasis for countries to review PMTCT coverage, child estimates	UNAIDS	2019
HIV incidence during pregnancy and post-partum period		
• Evidence of population-level relationship of relative HIV incidence during pregnancy and post-partum period is unclear at present. Do not make adjustment in Spectrum; maintain current approach assuming same risk of HIV incidence among pregnant/post-partum women as non-pregnant.		
• Monitor developments on recency testing in pregnancy	CDC, UNAIDS/WHO	Review data mid 2019
• Monitor developments on long-term follow-up of HIV-negative mothers during pregnancy and breastfeeding from EMTCT validation studies.	UNICEF, WHO, CDC UNAIDS	Review data end 2019
Sessions 2-3: Retention on ART among pregnant women and transmission risk during breastfeeding • Update default values for retention during pregnancy and risk of transmission during breastfeeding?		
Breastfeeding patterns		
• Maintain current approach in Spectrum for the use of breastfeeding patterns		
○ Update breastfeeding patterns with latest survey data	Rob Glaubius	10/2018
○ Continue work on hierarchical model and understanding differences between breastfeeding patterns of HIV+ and HIV- women, notably in early surveys (potential confounding by urban/rural, removal of children that have died).	Rob Glaubius	2019

Retention on ART during pregnancy and breastfeeding		
• Retention on ART during pregnancy: Implement a unified default of 80% retention at delivery for both women starting ART during pregnancy and those on ART before conception (Caitlin Dugdale analysis)	Avenir Health	09/2018
○ Assess sensitivity to alternative assumptions in NEMAPP (correcting LTFU to account for % re-entering care/receiving care elsewhere).	Andreas Jahn	09/2018
• Retention on ART during breastfeeding: Aim to update defaults based on updated analysis from Caitlin which combines the entire period (year 1 and 2), *but note this analysis was not specific to breastfeeding population*	John Stover, Caitlin Dugdale	10/2018
• Validation: Use simple model to predict the % viral suppression in postpartum women by BF duration, based on data from Caitlin's review, compare against PHIA data	Reference Group Secretariat	2019
Sessions 4-5: Transmission probabilities and interpretation of mother-to-child transmission rates • Use of updated probabilities of mother-to-child transmission in Spectrum? • Messaging concerns re eMTCT?		
Mother-to-child transmission rates		
• Adopt breast feeding versus formula feeding stratification of peripartum MTCT rates, and other updated transmission rates based on Lynne Mofenson review	Avenir Health, Lynne Mofenson	09-10/2018
○ Review effect on estimates for child infections before adopting	Avenir Health/UNAIDS	09-10/2018
• Use 'Option B' postnatal prophylaxis input to reflect ART initiation during breastfeeding. Re-label 'Option B' input accordingly.	Avenir Health	09-10/2018
• Future development: Ensure that model structure and inputs reflect increased programmatic efforts to re-test, diagnose and treat HIV positive women at later ANC visits, during labour and delivery, and during breastfeeding.	UNAIDS, WHO	Review data end 2019
• Future development: Recognize viral load differentiation of MTCT rates	UNAIDS, WHO	Review data end 2019
National eMTCT rates		
• Formal comparison of Spectrum results and eMTCT validation studies ○ Scrutinize Spectrum estimates and assumptions ○ Use new MTCT tool to investigate and help communicate results	UNAIDS, UNICEF CDC, Avenir Health	01/2019 meeting
• Reconcile eMTCT study results with PHIA viral load suppression results	CDC, UNAIDS	01/2019 meeting
• Further investigation into Malawi inconsistency: ○ 12% positive at under 1 visit vs. 8% in ANC ○ High enrolment in HIV-exposed clinics (70% follow-up in BF), found 1000 infected vs. 6000 predicted by Spectrum	Andreas Jahn, UNAIDS	01/2019 meeting
• Paper and/or policy brief describing "Challenges in achieving and measuring eMTCT: insights from modelling"	UNAIDS, WHO, Reference Group Secretariat	2019

Session 6: Child survival • Any changes to child survival model? • Data available to update cotrimoxazole assumptions?		
Child survival on ART		
• For all survival analyses, move Rwanda from WCA to ESA region, please include Europe and north America in separate group, if available	All IeDEA collaborators UNAIDS, WHO,	09-10/2018
• Note that improved mortality on ART data expected for kids in one year	Imperial Secretariat	Review 2019
• LTFU outcomes: Maintain default values (no adjustment)		
○ Review data (when available) from South Africa tracing study	Leigh Johnson	2019
○ IPM2 available to help conduct for above analysis	Constantin Yiannoutsos	2019
• IeDEA data suggest Spectrum is not capturing an increasing proportion of children starting ART at older ages (11+).		
○ Decide whether to update patterns of ART allocation in Spectrum this round, based on IeDEA data	Mary-Ann Davies, Avenir Health, UNAIDS, Secretariat	10/2018
• Effect of cotrimoxazole		
○ Revise Spectrum assumptions to reflect CTX affecting mortality for children on ART only during the first year on ART, and no effect thereafter.	Avenir Health	9-10/2018
○ Review impact of this change in several countries.	Avenir Health	9-10/2018
○ Adjust for CTX provision in IeDEA analysis of mortality among children on ART and ensure CTX assumptions in Spectrum are consistent with total mortality rates estimated from IeDEA.	Leigh Johnson	Q3-4 2019
Child survival in absence of ART		
• There has both been speculation that paediatric survival patterns in Spectrum overestimate and underestimate survival in the absence of ART, but there is no strong evidence of errors or data currently available to inform updated estimates.		
• Review mortality rates amongst older long-term survivors of perinatal infection using data from new EPICC data merge including pre-ART data and CD4.	Jeannie Collins	2019
• Review IeDEA analysis of mortality among perinatally infected pre-ART	Mary-Ann Davies	2019
• Triangulate paediatric HIV survival assumptions with all-cause mortality trends among children aged 5-14 in South Africa.	Leigh Johnson	2019
Survival of perinatally infected vs not		
• Maintain parameters for now		
○ Stratify analysis by duration of treatment and baseline CD4 at ART initiation (if possible), year of enrolment, and review results	Sophie Desmonde	01/2019 meeting
Survival in concentrated epidemic settings		
• Encourage countries to compare Spectrum child deaths to adjusted vital registration data to identify unrealistically high (or low) values.	UNAIDS	2019

Appendix I: List of Participants

In collaboration with the UNAIDS Reference Group on Estimates, Modelling and Projections

Modelling Paediatric HIV and the Need for ART

20 September 2018

Institute for Social and Preventive Medicine, University of Bern, Switzerland

Participant	Affiliation
Brown, Tim	East West Center
Case, Kelsey	Imperial College London
Ciaranello, Andrea	Massachusetts General Hospital
Davies, Mary Ann	University of Cape Town
Desmonde, Sophie	University of Toulouse
Dugdale, Caitlin	Harvard University
Eaton, Jeffrey	Imperial College London
Fowler, Tim	US Census Bureau
Ghys, Peter	UNAIDS
Glaubius, Robert	Avenir Health
Hazra, Rohan	National Institute of Child Health and Human Development
Jahn, Andreas	Ministry of Health Malawi
Johnson, Leigh	University of Cape Town
Jonnalagadda, Sasi	CDC
Khalifa, Aleya	UNICEF
Mahy, Mary	UNAIDS
Marsh, Kimberly	UNAIDS
Marston, Camilla	LSHTM
Modi, Surbhi	CDC
Mofenson, Lynne	Expert
Mushavi, Angela	MOH Zimbabwe
Newman, Morkor	WHO
Patel, Monita	CDC
Pati Pascom, Ana Roberta	Ministry of Health Brazil
Penazzato, Martina	WHO
Santos, Arturo Brito	UNAIDS Intern
Shiraishi, Ray	CDC
Siberry, George	OGAC
Stover, John	Avenir Health
Tsiouris, Fatima Oliveira	ICAP-Columbia University
Wanyeki, Ian	UNAIDS
Yiannoutsos, Constantin	IeDEA

Appendix II: Agenda

In collaboration with the UNAIDS Reference Group on Estimates, Modelling and Projections

Modelling Paediatric HIV and the Need for ART

20 September 2018

Institute for Social and Preventive Medicine, University of Bern, Switzerland

TIME	AGENDA ITEM	Presenter/Moderator
	Chair: Leigh Johnson (UNAIDS Reference Group)	
9:00 – 9:30	Opening remarks Summary of objectives of Three Frees Outstanding challenges	Leigh Johnson, UNAIDS Reference Group Martina Penazzato, WHO Mary Mahy, UNAIDS
9:30 – 9:45	Overview of Spectrum child model in 2018	John Stover, Avenir Health
9:45 – 11:00	**Session 1: Estimating births to HIV+ women** – Estimates of births to HIV+ women (estimates before ANC-RT, ASFRs, fitting) – Fertlity among women on ART in the western Cape – Estimates of births to HIV+ women in concentrated epidemics Decision - Update historical values? Update estimates of PMTCT need in concentrated epidemics? – Incidence during pregnancy and breastfeeding: interpretation of recent evidence Decision - Update incidence assumptions?	Jeff Eaton, Imperial Leigh Johnson, UCT John Stover, with comments from country participants (Ana Roberta Pascom, Brazil) Milly Marston, LSHTM
11:00 – 11:30	**Coffee Break**	
11:30 – 12:30	**Session 2: Retention on ART among pregnant women** – What countries used for retention in 2018 – Updated evidence on disengagement from care among pregnant women – Viral load at delivery from cohort data – Viral load among pregnant women from PHIA surveys Decision – Update default values of retention during pregnancy?	Mary Mahy, UNAIDS Caitlin Dugdale, Harvard University Constantin Y., Indiana University Sasi Jonnalagadda, CDC
12:30 – 13:00	**Session 3: Transmission risk during Breastfeeding** – Breastfeeding patterns by HIV status – viral load suppression among women <12 months from delivery – Breastfeeding duration among HIV+ women in concentrated epidemics	Robert Glaubius, Avenir Health Sasi Jonnalagadda, CDC Artur Santos, UNAIDS comments from Ana Roberta Pascom, Brazil

	Decision – adjustments required for default data?	
13:00- 14:00	**Lunch**	

Chair Jeff Eaton (UNAIDS Reference Group)		
14:00 – 14:30	**Session 4**: **Transmission probabilities** – Recent evidence on transmission probabilities by regimen Decision – update transmission probabilities?	Lynne Mofenson, Expert
14:30 -15:30	**Session 5: Interpreting national transmission rates** – new transmission rates tool in Spectrum – Recent studies estimating transmission – country interpretation and implications for pathway to elimination Discussion – any messaging concerns?	John Stover, Avenir Surbhi Modi, CDC Angela Mushavi, Andreas Jahn
15:30 – 16:00	**Coffee Break**	
16:00 - 17:00	**Session 6: Child survival** – Updated data on age at ART initiation – Retention in care among children – Approach for updating child survival among children on ART – Child survival among children not on ART – Child mortality in concentrated epidemics Decision – Any changes to child survival model? Data availability to update cotrimoxazole assumptions	Mary-Ann Davies, IeDEA Mary-Ann Davies, IeDEA Leigh Johnson, IeDEA Milly Marston, LSHTM Kim Marsh, UNAIDS
17:00 – 17:30	– Differential mortlaity by vertical vs horizontol infection Decision – change survival for vertically infected?	Sophie Desmonde, IeDEA
17:30 –18:00	**Discussion and next steps** - Adjustments for Spectrum - Research required	Jeff Eaton, UNAIDS Reference Group