Paediatric HIV estimates

Report and recommendations from a meeting of the UNAIDS Reference Group on Estimates, Modelling, and Projections

14 October 2022

Virtual

REPORT & RECOMMENDATIONS

Index

Abbreviations

ANC	Antenatal Clinic
AP	Asia Pacific
ART	Antiretroviral Therapy
CDC	US Centres for Disease Control and Prevention
CLHIV	Children living with HIV
CSAVR	Case Surveillance and Vital Registration
EPP	Estimation and Projection Package
ESA	East and Southern Africa
FRR	Fertility rate ratio
IeDEA	International Epidemiology Databases to Evaluate AIDS
LTFU	Loss to Follow Up
MENA	Middle East/North Africa
PEPFAR	President's Emergency Plan for AIDS Relief
PHIA	Population-based HIV Impact Assessment
PLHIV	People Living with HIV
PMTCT	Prevention of Mother to Child Transmission
SACEMA	South African Centre for Epidemiological Modelling and Analysis
SSA	Sub-Saharan Africa
UNAIDS	Joint United Nations Programme on HIV/AIDS
WCA	West and Central Africa
WHO	World Health Organization

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), managed at SACEMA, Imperial College London and the University of Cape Town. Participants of the meeting are listed at the end of this document (**Appendix B**).
Cari van Schalkwyk, January 2023

Background

UNAIDS Reference Group on Estimates, Modelling, and Projections

The Joint United Nations Programme on HIV/AIDS (UNAIDS) relies on impartial scientific advice from international experts in relevant subject areas to provide guidance on how to best calculate estimates and projections of the prevalence, incidence, and impact of HIV/AIDS globally. The UNAIDS Reference Group on Estimates, Modelling, and Projections acts as an 'open cohort' of epidemiologists, demographers, statisticians, and public health experts to provide scientific guidance to UNAIDS and partner organisations on the development and use of the tools used by countries to generate annual HIV estimates, which are the source for UNAIDS Global HIV epidemic estimates. The group is coordinated by a secretariat hosted at SACEMA, Imperial College London and the University of Cape Town.

Meeting Overview

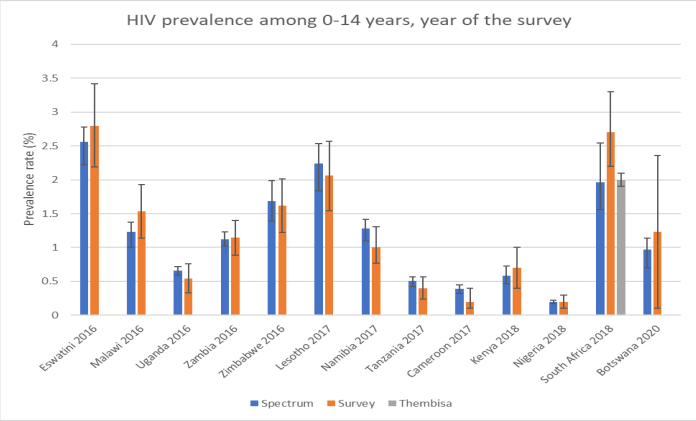
The UNAIDS Paediatric Reference Group meeting was held virtually on the Microsoft Teams platform on the 14th of October 2022. The meeting featured presentations and group discussions to generate consensus recommendations, divided into the following 3 sessions:

This report presents a summary of the meeting presentations and discussions that underpin recommendations by the Reference Group. The presentations are available to meeting participants (**Appendix B**) at www.epidem.org (others, please contact the Secretariat via epidem@sun.ac.za). The final recommendations can be found at the end of this report. The recommendations (**Appendix A**) drafted at these meetings provide UNAIDS with guidance on generating HIV estimates, review current approaches, and identify required data to further improve HIV estimates. The meeting agenda and objectives are in Appendix C. Previous meeting reports are available at www.epidem.org. This transparent process aims to allow the statistics and reports published by UNAIDS and partners to be informed by impartial, scientific peer review.www.epidem.org. This transparent process aims to allow the statistics and reports published by UNAIDS and partners to be informed by impartial, scientific peer review.

Introduction

Mary Mahy opened the meeting, welcomed everyone, and thanked everyone for volunteering their time for this important meeting. She stressed the importance of the UNAIDS paediatric estimates as one of the few sources of estimates for children living with HIV (CLHIV), new infections, and AIDS deaths. These estimates are crucial as countries are preparing grant applications for the Global Fund so that appropriate funding can be allocated to close the gaps for children. UNAIDS estimates show that children still have considerably lower ART coverage than adults and the discrepancy is getting wider. Robustness of these estimates need to be ensured to use them to advocate against these inequalities. Mahy also mentioned the new Global Alliance to End AIDS in Children which relies heavily on the UNAIDS estimates to assist programmes to close gaps.

Mahy **reviewed 2022 estimates and listed some pending challenges.** Generally, estimates of births to women with HIV, children living with HIV, new child infections and HIV-related deaths among children were similar between the 2021 and 2022 estimates rounds. Comparing prevalence estimates from PHIA surveys to Spectrum 2022 estimates in the year the surveys were conducted generally shows good correspondence.



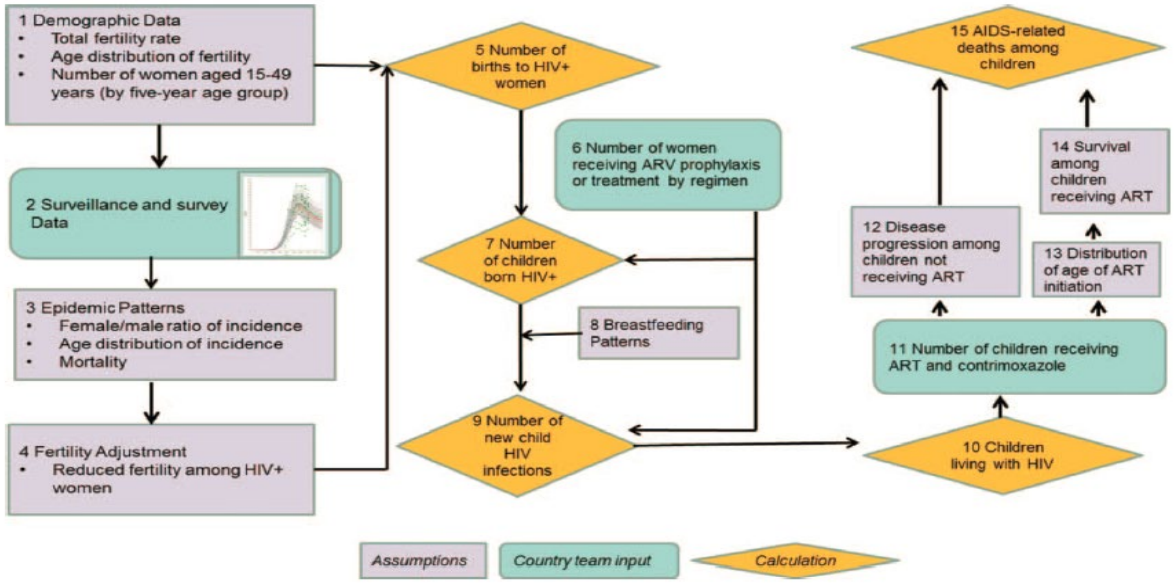
Sources: UNAIDS 2022 estimates and PHIA surveys

The greatest challenge faced by the estimates process is the lack of good programme data (e.g., cause coded vital death registration, evidence of children reached with testing) and empirical data (prevalence estimates are increasingly uncertain due to larger sample sizes required to measure lower prevalence). A second challenge is to ensure nuanced understanding of transmission to children, which depends on understanding ART use before pregnancy, retention on ART, and viral suppression during pregnancy and during breastfeeding – data on the latter two are not available. Another big challenge is a topic that was discussed at the main UNAIDS Reference Group meeting – estimating the number of births to HIV positive women. These estimates suffer from potential biases in ANC routine testing data.

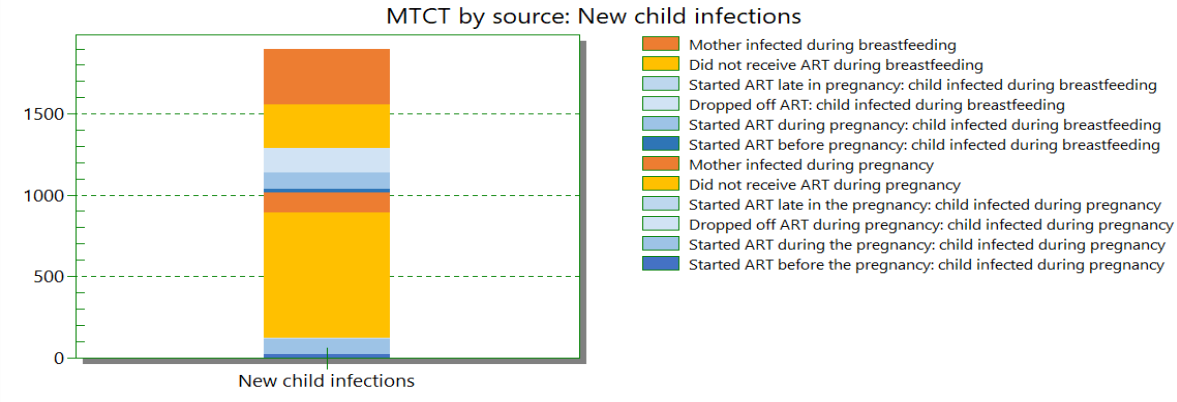
Mahy also gave a brief overview of meeting objectives.
Session 1: Estimates of births to women living with HIV. This session had the aim to review methods to improve estimates of births to HIV positive women specifically through ANC prevalence and fertility adjustments, especially in countries where robust estimates of prevalence among pregnant women do not exist.
Session 2: Estimates of HIV-related mortality among children. This session had the aim to review the existing assumptions, consider a sensitivity analysis, and identify additional data to validate mortality estimates.

Session 3: Treatment coverage among children living with HIV. This session had the aim to review the available treatment data, identify mechanisms to validate estimates of children living with HIV (which is the denominator for treatment coverage), as well as the measure of treatment coverage.

John Stover presented an **overview of Spectrum child model and some changes for the 2023 estimates round**. The first major change (to '1 Demographic Data' in the graph below) is updates in response to the new 2022 World Population Prospects estimates. It is expected that there will be some changes to population sizes and fertility rates. Countries will input new programme, surveillance and survey data that will influence boxes numbered 2, 6, 8 and 11.



To estimate the number of HIV positive women giving birth (and subsequently the number of new child infections), it is important to first estimate the number of women with HIV. The process starts by estimating prevalence and incidence among the adult population by fitting smooth curves to data (using e.g., EPP in countries with survey and ante-natal surveillance data; CSAVR in countries with good case and death reporting; AEM in some Asian countries). Spectrum output is validated by fitting to the age and sex distribution of survey prevalence estimates. Fertility rate ratios are applied to the resulting number of women of childbearing age who live with HIV to estimate the number of births among women with HIV. Lower fertility rates among women with HIV are used, with ratios derived from Demographic and Health Surveys in sub-Saharan Africa. A local adjustment factor to these lower fertility rates can be fitted to get the best correspondence to a country's data. After estimating the number of pregnant women with HIV, programme data on prophylaxis is considered to reduce MTCT and probabilities of transmission depends on the type of prophylaxis or ART use, CD4 count at initiation, retention on ART, and separate probabilities for during pregnancy and during breastfeeding. Resulting new child infections can be displayed by reason for infection, to inform country response:



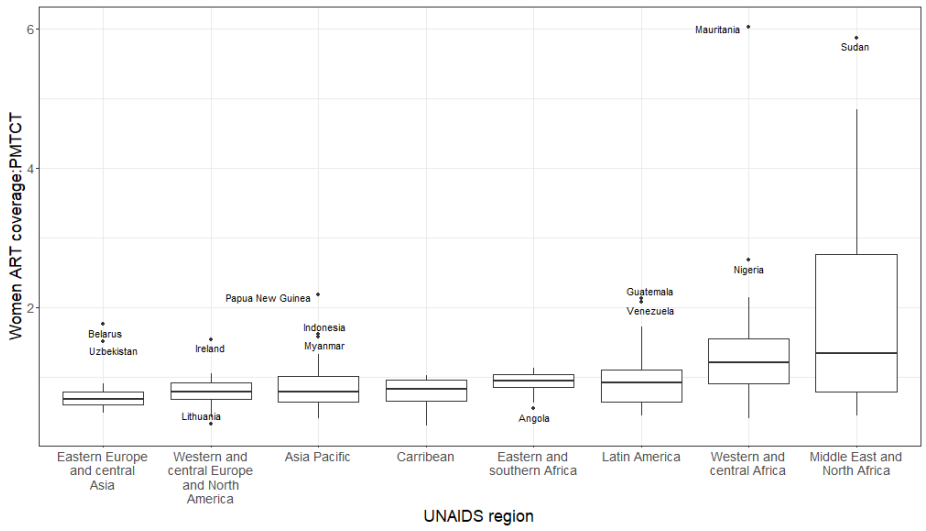
Children from ages 0-4 progress through CD4 percent categories, and from 5-14 through CD4 count categories. They are exposed to non-AIDS and AIDS mortality (the latter derived from cohort studies such as CIPHER and IeDEA) and initiate treatment. At age 15, children age into the appropriate adult population category (e.g., by sex, HIV and ART status).

Session 1 – Estimating births to women with HIV

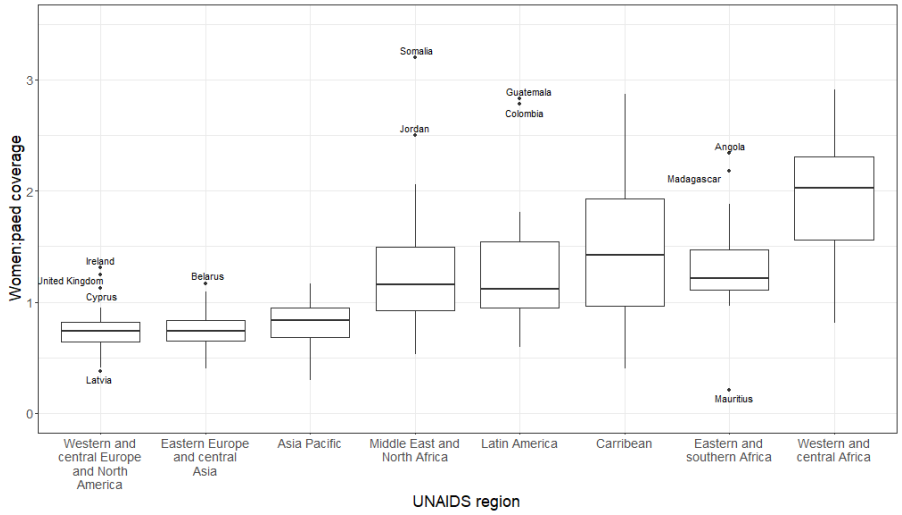
The objective of the session was to review methods to improve estimates of births to women with HIV through ANC prevalence and fertility adjustments, especially in countries without robust estimates of prevalence among pregnant women.

Jeff Eaton started this session with a **description of ANC testing outputs from Naomi vs Spectrum**.
Spectrum focuses on national and, in some cases, provincial level estimates of HIV outcomes by reconstructing the dynamics of the entire history of the HIV epidemic in the country. It models the whole population, including the number of births, the births to HIV positive women, ART to HIV positive women, etc. Modelling MTCT rates requires reconciling the ANC data with the model births and the demographic model which is a major challenge even at the national level.
The Naomi model uses small area statistical methods to derive current estimates and short-term projections of people living with HIV, new infections, and treatment coverage at the district level. Naomi is focused on programmatic planning through modelling the ANC testing programme data outcomes and short-term projections. It calibrates to the total numbers of ANC clients, including the total number of women attending ANC, the number of HIV positive women attending ANC, and the number who are already on ART. Unlike Spectrum, it does not reconcile ANC outcomes with births and paediatric infections.

Maggie Walters followed with a **systematic analysis of adult women ART to PMTCT coverage and adult women to paediatric ART coverage to inform review thresholds**.



In all regions except for WCA and MENA, the median ratio of **adult women ART coverage (aged 15-49) to PMTCT coverage** is below one, with significant correlation between the two indicators found in only AP and ESA.



In most regions, the ratio **of adult women coverage to paediatric coverage** is above one. An analysis of local fertility adjustments showed that these values do not correlate well with the ratio, hence not driving the observed ratios.

Suggested flags to review data are:

- Women's ART coverage: PMTCT < 0.75
- Women's: paediatric ART coverage is <50% or >50% greater than the regional average
- Non-normal distribution of ratios within a region

Key points from the discussion:

- John Stover raised the point that age distributions of women on ART and pregnant women are different and should be factored in the comparison.
- Oli Stevens raised a concern about high local fertility adjustment factors and suggested that thresholds should be reviewed.

John Stover presented on **Fertility rate ratios in concentrated epidemics**. As described earlier, the default fertility reductions are based on data from Sub-Saharan Africa, with relatively higher overall fertility than in many concentrated epidemic countries. As shown in the May 2022 Reference Group meeting, these defaults result in too few pregnant women with HIV and PMTCT and/or paediatric ART coverage estimates of over 100% in some concentrated epidemics. Countries that had and used ANC prevalence data remedied this

by fitting and applying a >1.0 'local adjustment factor'; and some countries lacking ANC prevalence data simply set a 'local adjuster' to a value greater than 1.0, sometimes at the maximum of 2.0. A recommendation from the May meeting was to investigate the impact of changing the default fertility rate ratio to 1.0 (i.e., total fertility rates are independent of HIV status) in low fertility settings (typically concentrated epidemic settings).
In this presentation Stover showed that a study in India (a concentrated epidemic, low fertility setting), found that fertility was much lower among women with HIV (~25%), raising the concern that a FRR of 1.0 may not be valid.
Stover showed the impact of changing FRR to 1.0 among 100 countries with total fertility rates of less than 2.5. Overall, this leads to higher numbers of pregnant women with HIV, lower PMTCT coverage, and more new child infections – 25% more in 2021.

Key points from discussion:

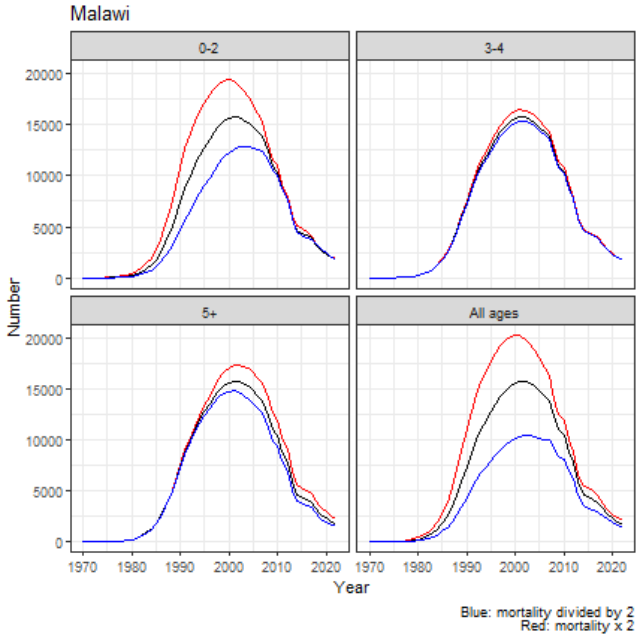
- Stevens noted that countries do not have the ability to review their local adjustment factors against other countries in the region and suggested the addition of a validation menu in Spectrum to compare indicators to other countries.
- The group recommended to not change the default FRR to 1, but to review other sources of data (such as the study in India).

The recommendations following discussions after these presentations are captured in **Appendix A**.

Session 2 – Mortality assumptions

The objective of this session was to review the existing assumptions about mortality in the Spectrum child model and to identify potential additional data sources.

Maggie Walters presented on the **sensitivity of estimated HIV deaths and CLHIV to Spectrum paediatric parameters**. The parameters considered in this analysis were the timing of transmission (perinatal/during breastfeeding at different HIV/ART stages) and HIV mortality when not on ART (depending on age, timing of infection and CD4%). Parameters were *doubled* or *halved* and the impact on HIV deaths estimated. To isolate the impact on HIV related deaths when changing timing of infection parameters, the number of new infections were conserved by *reducing/increasing* other timing of infection parameters so that changes in HIV related deaths do not result from changes in CLHIV. Estimates of HIV related deaths were not sensitive to changes in timing of infection, but estimates varied substantially when *doubling/halving* the off-ART mortality parameters.



This figure shows the large impact of changing off-ART mortality parameters for the 0-2-year age group on HIV related deaths among all CLHIV in Malawi. The impact of changes in parameters for the 3-4 and 5+ age groups are much less pronounced. It is also clear that the impact is less pronounced in later periods with higher ART coverage.

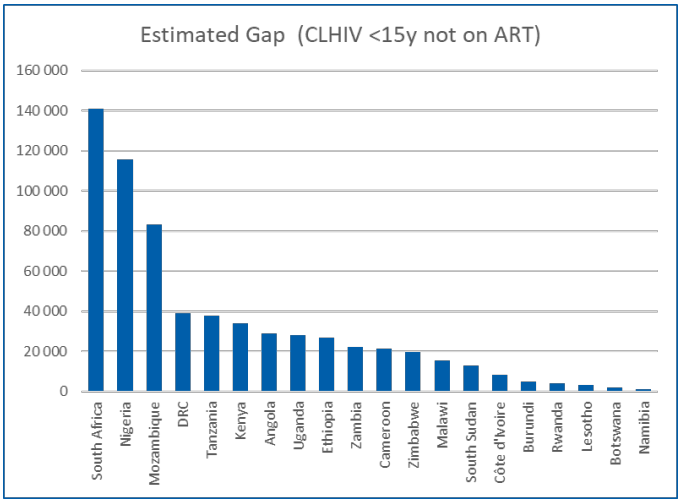
Key points from the discussion:

- It was noted that it would be good to compare this uncertainty with the uncertainty produced by Spectrum (Stover, Johnson)
- Eaton suggested to go one step further by decomposing the uncertainty of Spectrum estimates to understand which model components (births to pregnant women, MTCT rates, paediatric survival) are most important in contributing to the uncertainty.
- Caitlin Dugdale asked whether the benefits in terms of reduced mortality in children who are being breastfed compared to children who are not being breastfed is considered. It was recommended to review the literature on this reduced mortality, and review changes in breastfeeding patterns since the time of the cohort studies that informed mortality parameters (early 2000s).
- Currently there is no age structure below 12 months in Spectrum. There are significant differences in mortality rate in the first year of life depending on timing of ART initiation (Johnson, Ciaranello). The recommendation is to investigate whether there were changes over time in the timing of ART initiation in the first year of life (from IeDEA).

Session 3 – Estimates of children living with HIV (CLHIV) and ART coverage

In session 3 the focus shifted to estimates of CLHIV and ART coverage. Reviewing new data sources and triangulating existing data sources may be able to strengthen our quantification of how many CLHIV there are and where they are.

Ray Shiraishi presented slides titled '**In search of missing CLHIV: Estimation methods and innovative strategies'**, an overview of activities by a working group including members from PEPFAR, UNAIDS, USAID, WHO and CDC. As background, he showed the Figure on page 5 which illustrates a good match between Spectrum and survey prevalence estimates, and also showed treatment gaps estimated by Spectrum:



Country responses to these large treatment gaps are scepticism about Spectrum estimates, since programmes can not find these children and believe that they don't exist. The working group aimed to identify methods to validate these Spectrum estimates (with special focus on 5–14-year-olds). These methods should ideally be quickly implementable, on a limited budget, in a small geographical area, but generalisable to an entire country.

Proposed methods are:

- **Household surveys**: PHIA surveys in future can include index testing (testing children of those who test positive). This may not be the most efficient way to sample children, may be costly and time consuming, and children may not live with their biological parents.
- **School based surveys** may be an efficient and cost-effective way to reach large numbers of children, but limitations include low parental consent for HIV testing and that children who do not attend school will be missed.
- **Take-all approach:** This approach will target existing demographic surveillance sites, distribute inexpensive self-tests to entire communities and thereby test all children within a small catchment area. This design could be time consuming and there may be bias in the reporting of the result of the self-tests.
- **Index testing:** This method will involve testing children of clients at ART clinics, which may enhance case finding, but is limited to children of people with HIV in care. Resulting estimates may be of limited value for validating Spectrum estimates.

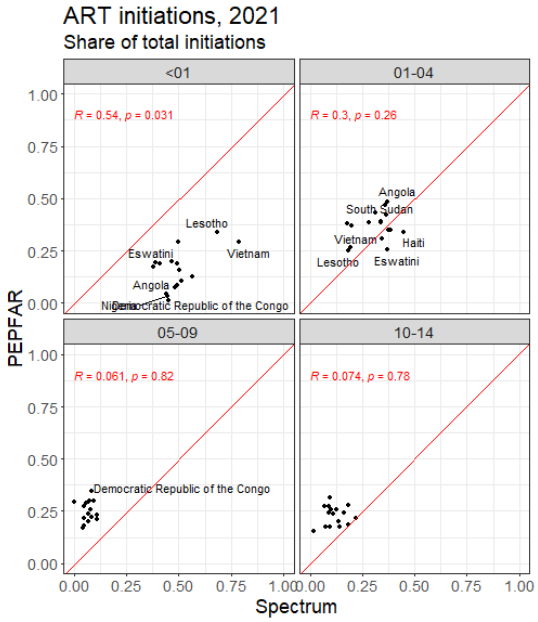
The working group plans to use all these approaches in different settings where appropriate and are currently thinking of ways to get these activities funded.

This was followed by **Milly Marston** who presented on **Demographic surveillance site data to improve estimates of CLHIV and ART coverage**. Marston gave a quick overview of the Alpha network – a collaboration between 10 institutions who independently run general population cohorts in East and Southern Africa. The network was established in 2005. All institutions have their own scientific agendas and tailored research methodologies, but they all collect data on HIV and its interaction with socio demographic characteristics of the population. The Alpha network pools and harmonizes the data from the partner study sites to do comparative and pooled analyses. Marston discussed two sources from the Alpha network that can be used:

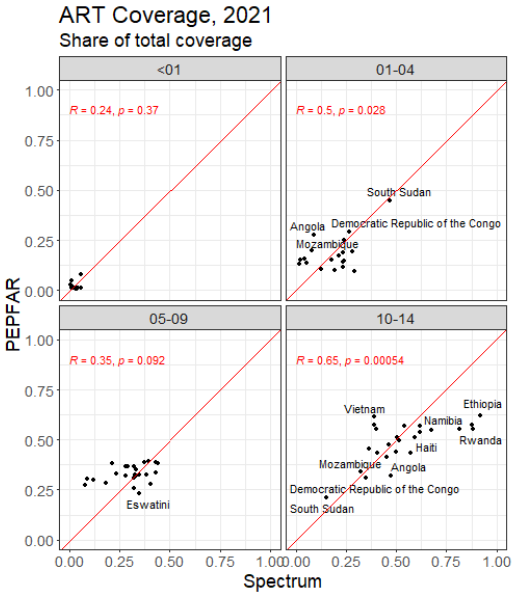
- To improve estimates of the impact of ART on fertility, data from uMkhanyakude (AHRI) in KwaZulu-Natal, South Africa can be used. This site has fertility and HIV related data from 2003, a period covering pre- and post- Option B+ and universal test and treat policies.
- Masaka in Uganda have sporadically included paediatric HIV testing in their sero-surveys since 1989.

Alpha partners have funding for near-future HIV testing of adults.

Maggie Walters presented a **comparison of Spectrum and PEPFAR numbers on age distribution at ART initiation and ART coverage.** Walters noted that while Spectrum's estimates are representative of the national burden, PEPFAR data are only from a fraction of all facilities but more granular reporting of data than national programmes allow comparison by age.



In this figure, the axes represent the proportion of all initiations in each age group and therefore the points for each country will add up to one on each axis. Spectrum allows entry of LTFU and ART initiation data, but this is not used in the model (i.e., no treatment interruption or re-initiation is simulated). PEPFAR ART initiations include re-initiations, and therefore lower proportions among infants are compensated by higher proportions among children aged 5-14. It could also indicate that older children are moving to facilities supported by PEPFAR.



There is better alignment in the age distribution between PEPFAR numbers on ART and Spectrum modelled estimates on ART (shown as proportions of the total).

Key points from discussion:

- Mahy noted that the Spectrum assumptions about the age distribution at ART initiation should be updated using IeDEA data.
- Eaton commented modelling treatment churn in Spectrum should be considered. This will result in a more accurate presentation of reality and results may indicate that programmes might not need to go find undiagnosed children with HIV, but just need to find those already diagnosed who dropped out of treatment.
- A recommendation was made to conduct a rapid literature review to decide a non-zero default paediatric treatment interruption rate in Spectrum for 2023 HIV estimates and to do a full review on paediatric ART interruption by age and mortality among

children re-initiating ART compared to first-time ART initiation before the next Reference Group meeting.

In the final presentation of the session, **Eline Korenromp and Anna Yakusik** presented on **Concentrated epidemics: Triangulate data on paediatric HIV diagnoses and deaths, with modelled MTCT and CLHIV**. First, Korenromp showed some dubious and fluctuating results (using Singapore, Ireland, and Argentina as example), such as PMTCT coverage estimates well above 100% being 'fixed' by setting the fertility rate ratios to the maximum of 2. Yakusik showed a comparison of Spectrum estimated child HIV deaths to vital registration (VR) data reported to WHO's mortality database between 2000 and 2019. Thirteen countries with high quality VR data and concentrated HIV epidemics were included in the analysis. Ratios of Spectrum deaths to VR deaths ranged from a lowest of 3 to 15 and higher in many countries. In addition, these ratios showed no consistency or trend over time. Another finding is that children are dying at younger ages in Spectrum than in the VR data. In a similar comparison performed in 2018 (by Amy Zhang and Kim Marsh) these ratios were smaller. This may be because countries have increased their local fertility adjustment to bring PMTCT down to more realistic values, increasing the number of children with HIV and resulting in more Spectrum estimated HIV deaths among children.

Key points from discussion:

- Annette Sohn questioned the accuracy of the VR data and Korenromp responded that while misclassification is very likely, the ratios are so large that Spectrum does still likely overestimate HIV deaths among children.
- Johnson raised the observation from the adult Reference Group meeting that some excess mortality among PLHIV is not attributed to AIDS and does not get recorded as AIDS deaths, while Spectrum estimates total excess mortality among PLHIV. This may also explain some of the higher mortality in Spectrum compared to VR.
- Stover made the comment that off-ART mortality among children in Spectrum may be too high: if a child gets sick, they are likely to start treatment immediately. Johnson agreed that he had to lower off-ART mortality among children in Thembisa for this reason. Stevens noted that this was reviewed at the paediatric Reference Group meeting in 2020 and recommended not to pursue. Mahy noted that other assumptions and parameters have changed in the meantime and that this should be explored again.

Additional comments from the general discussion:

- Mahy commented that at a recent Global Validation Advisory Committee (GVAC) meeting there was a conversation between HIV and hepatitis representatives to advocate for a large household survey aimed at obtaining biomarkers for children. The challenge would be deciding which indicator should be the determinant of the sample size.

Appendix A

Recommendations

Recommendation	Lead person(s)	Timeline
Session 1: Estimating births to women with HIV (chaired by Mary Mahy) **Objectives:** • **Improve the ability for country teams to identify and resolve issues with ANC prevalence data and how to adjust current assumptions about fertility among HIV+ women**		
Do not assume fertility is the same among women with HIV and HIV negative women in concentrated epidemics • Look for other sources of data on this • Compile fertility information from concentrated epidemic from bio behavioural surveys in FSW	Imperial College London	October 2023
Visualise the fertility rate ratio local adjustment factor compared to values fitted for countries in the region to identify countries with an unexpectedly large adjustment.	Avenir Health	November 2022
Analyse association between HIV prevalence and access to ANC attendance and testing in West and Central African countries to assess whether calibrating pregnant women prevalence to routine ANC testing prevalence may over-estimate births to women with HIV	Imperial College London	October 2023
When reviewing Spectrum estimates files, flag cases where the differences between paediatric ART coverage, women's ART coverage and PMTCT coverage are unexpectedly large, for detailed review of cascade data, assumptions and estimates for women and children. Recommended checks include: • The ratio of paediatric ART coverage to women's ART coverage is 50% higher/lower than the regional average • The ratio of women's ART coverage to PMTCT coverage is less than 75% • Women's ART coverage is more than 15% higher than PMTCT coverage • Compare women's ART coverage with % pregnant women already on ART prior to ANC. (Lower bound for PMTCT coverage if ANC attendance is high; triangulation with adult female ART coverage.)	UNAIDS	2023 estimates
Show uncertainty in estimates of children living with HIV, paediatric ART coverage, and new child infections in UNAIDS reports	UNAIDS	
Session 2: Mortality assumptions (chaired by Leigh Johnson) **Objectives:** • **Review existing assumptions about mortality among children living with HIV (CLHIV) and identify additional data to improve estimates for those**		
Decompose uncertainty in Spectrum paediatric estimates to understand which model components (births to pregnant women, MTCT rates, paediatric survival) are most important in contributing to the uncertainty	Imperial, IHME	October 2023

Recommendation	Lead person(s)	Timeline
Review evidence on the effect of breastfeeding on survival for HIV-positive children, the extent/duration of breastfeeding that occurred in the RCT populations included in Marston *et al.* review that estimated paediatric HIV survival by timing of infection, and the extent to which the survival data remain relevant, given differences across populations (and changes over time) in breastfeeding durations.	Milly Marston	October 2023
Review evidence on changes over time in the timing of ART initiation in the first year of life and potential magnitude of impact on paediatric AIDS mortality estimates during the first year. 1. Changes in age distribution at ART initiation over time (data from IeDEA, EID coverage estimates where available) 2. Implication of changes for mortality	Mary-Ann Davies Avenir, Leigh Johnson, Andrea Ciaranello	October 2023
Session 3: Estimates of children living with HIV (CLHIV) and ART coverage (chaired by Jeff Eaton) **Objectives:** • **Review possible mechanisms to validate estimates of CLHIV and ART coverage**		
Review existing data sources of paediatric HIV prevalence	Imperial College London	October 2023
Spectrum age distribution for children initiating treatment is much younger than in PEPFAR program data. The difference may reflect treatment interruption and re-initiation among CLHIV, implying that a large proportion 'initiating' CLHIV may have been previously diagnosed and treated but inSpectrum, without paediatric treatment interruption, is inputted as new enrolments. Short-term recommendations (2023 estimates round): • Conduct a rapid literature review to decide a non-zero default paediatric treatment interruption rate in Spectrum for 2023 HIV estimates • Display estimated number of previously treated children in Spectrum paediatric outputs. Medium-term recommendations: • Review evidence on paediatric ART interruption by age • Review evidence on effect of new treatment regimens on paediatric ART retention • Review evidence on mortality among children re-initiating ART compared to first-time ART initiation.	 TBD TBD Caitlin Dougdale	 November 2022 October 2023
Analyse what changes to model assumptions (progression, mortality, ART initiation and reinitiation, and/or MTCT rates) would be effective and/or plausible to reconcile Spectrum estimates for paediatric AIDS deaths with paediatric AIDS deaths recorded in vital registration systems.	TBD	October 2023
Review literature on data about excess (non-HIV/AIDS) mortality among children born to HIV-infected mothers (exposed uninfected), e.g., from the UK, US, or Canada	UNAIDS	October 2023

Appendix B

Participants

Name	Organisation
Alison Drake	University of Washington
Amanda Novotney	IHME UW
Andrea Ciaranello	Harvard University
Andreas Jahn	MoH Malawi
Anna Yakusik	UNAIDS
Annette Sohn	amFAR
Austin R Carter	IHME UW
Caitlin Dugdale	Harvard University
Cari van Schalkwyk	SACEMA
Constantin Yiannoutsos	Indiana University
Ehounoud Pascal Eby	UNAIDS
Eline Korenromp	UNAIDS
Elizabeth Carter	CDC
Faikah Bruce	SACEMA
Fatima Tsiouris	ICAP
Gatien Ekanmian	UNAIDS
George Siberry	USAID
Guy Mahiane	Avenir Health
Hilary Wolf	CDC
Hmwe Kyu	IHME
Ian Wanyeki	UNAIDS
Ivy Kasirye	WHO
Jeff Eaton	Imperial College London
Jessica Hoehner	USAID
John Stover	Avenir Health
Keith Sabin	UNAIDS
Leigh Johnson	University of Cape Town
Lev Zohrabyan	UNAIDS
Lynne Mofenson	Independent Consultant
Maggie Walters	Imperial College London
Mary Ann Seday	UNAIDS
Mary Mahy	UNAIDS
Mary-Anne Davies	University of Cape Town
Melaku Dessie	USAID
Milly Marston	LSHTM
Morkor Newman	WHO

Neha Mehta	CDC
Oli Stevens	Imperial College London
Ray Shiraishi	CDC
Reshma Bhattacharjee	USAID
Reshma Kassanjee	University of Cape Town
Rob Glaubius	Avenir Health
Rohan Hazra	NIH
Sadhna Patel	CDC
Savvy Brar	UNICEF
Susan Hrapcak	CDC
Tim Brown	East West Center
Wilford Kirungi	MoH Uganda

Appendix C

Agenda

Time	Duration (mins)	Topic	Presenter(s)/ Lead Discussant
13.00	10	• Welcome and introductions • Review of 2022 estimates and pending challenges • Meeting objectives	Mary Mahy
13:10	10	Overview of Spectrum child model and fertility adjustments	John Stover
Session 1: Estimating births to women with HIV (chaired by Mary Mahy) **Objectives:** • **Improve the ability for country teams to identify and resolve issues with ANC prevalence data and how to adjust current assumptions about fertility among HIV+ women**			
13.20	10	Description of ANC testing outputs from Naomi vs Spectrum	Jeff Eaton
13.30	20	Systematic analysis of paediatric:adult ART coverage and PMTCT:female ART coverage to inform review thresholds	Maggie Walters
13.50	15	Fertility rate ratios (FRRs) in concentrated epidemics: Test impacts of changing FRR to 1.0 for low fertility settings.	John Stover
14.05	40	Discussion	
14.45	15	Break	
Session 2: Mortality assumptions (chaired by Leigh Johnson) **Objectives:** • **Review existing assumptions about mortality among children living with HIV and identify additional data to improve estimates for those**			
15.00	20	Sensitivity analysis: adjusting timing of infection (changing transmission probabilities) and changing assumptions about survival not on ART	Maggie Walters
15.20	30	Discussion	
Session 3: Estimates of children living with HIV and ART coverage (chaired by Jeff Eaton) **Objectives:** • **Review possible mechanisms to validate estimates of CLHIV and ART coverage**			
15.50	15	In search of missing CLHIV: Estimation methods and innovative strategies	Ray Shiraishi
16.05	15	Demographic surveillance site data to improve estimates of CLHIV and ART coverage	Milly Marston
16.20	15	• Comparison of Spectrum and PEPFAR numbers on treatment • Comparison of Spectrum estimates of diagnoses, ART initiations and AIDS deaths vs programme data in SSA	Maggie Walters
16.35	15	Concentrated epidemics: Triangulate data on paediatric HIV diagnoses and deaths, with modelled MTCT and CLHIV	Mary Mahy/ Anna Yakusik/ Eline Korenromp
16.50	40	Discussion	
17.30	**30**	**Recommendations**	Mary Mahy
18.00		CLOSE	