

Investigating the Implementation of Children who are HIV Exposed and Uninfected (CHEU): Tracking Activities during the Exposure Period: Identifying Gaps and Providing Solutions

Final Report

Submitted to the Regional Inter-Agency Task Team on Children and IADS
in Eastern and Southern Africa (RIATT-ESA)

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Acronyms

AIDS	Acquired Immunodeficiency Syndrome
ANC	Antenatal Care
ART	Antiretroviral Therapy
ARV	Antiretroviral
AUC	African Union Commission
CHEU	Children HIV-Exposed but Uninfected
CHW	Community Health Workers
CMIS	Client Management Information System
COP	Country Operational Plan
CSO	Civil Society Organizations
DBS	Dried Blood Spot
DNA	Deoxyribonucleic Acid
EAC	East African Community
EID	Early Infant Diagnosis
ESA	East and Southern Africa
EHR	Electronic Health Records
GAM	Global AIDS Monitoring
GF	Global Fund
eMTCT	Elimination of Mother-To-Child Transmission
HIV	Human Immunodeficiency Virus
HEI	HIV-exposed infants
IPMS	Integrated Patient Management System
KII	Key Informant Interview
MOH	Ministry of Health
MOHCC	Ministry of Health and Child Care
NACP	National AIDS Control Programme
OVC	Orphans and Vulnerable Children
PCR	Polymerase Chain Reaction
PIMS	Patient Information Management System
PLHIV	People Living with HIV
POC	Point-of-Care
PrEP	Pre-Exposure Prophylaxis
PTE	Path to Elimination
RIATT-ESA	Regional Inter-Agency Task Team on Children and AIDS in Eastern and Southern Africa
RNA	Ribonucleic Acid
SADC	Southern African Development Community
SMS	Short Message Service
SOP	Standard Operation Procedure
SRHR	Sexual Reproductive Health Rights

TAT	Turnaround Time
USAID	United States Agency for International Development
USG	United States Government
TWG	Technical Working Group
UNAIDS	Joint United Nations Programme on HIV/AIDS
WHO	World Health Organization

Executive summary

Background

The population of children who are HIV-exposed but uninfected (CHEU) is rapidly growing in Eastern and Southern Africa. While they remain HIV-negative, these children are still at high risk for adverse health and developmental outcomes. Despite considerable progress in preventing vertical HIV transmission, critical gaps persist in tracking, follow-up, and timely HIV testing, particularly during breastfeeding. This report presents findings of a study titled “Investigating the Implementation of CHEU: tracking activities during the exposure period: identifying gaps and providing solutions” which was commissioned by the Regional Inter-Agency Task Team on Children and AIDS in Eastern and Southern Africa (RIATT-ESA). The study identified gaps and provided evidence-based solutions to improve programming that ensures that infants and children who remain at risk of HIV acquisition are engaging in HIV testing according to each country’s national HIV testing guidelines and are supported as they grow.

Methods

The study used a mixed method design which included cross-sectional analysis of secondary data and a qualitative component consisting of key informant interviews augmented by findings from literature reviews. Quantitative data was collected to determine HIV testing uptake and results among infants and children who remain at risk for HIV acquisition, referral to care and initiation of treatment. Qualitative data were used to assess the alignment of national HIV testing strategies to WHO guidelines, integration of tracking mechanisms within primary health care and other health platforms and determine promising and innovative practices that monitor HIV testing uptake, referral, and treatment initiation. The study was conducted in six countries in Eastern and Southern Africa (ESA) region that is three high-performing (Botswana, Eswatini, Zimbabwe), and three low-performing (Angola, Kenya, Tanzania) which were purposively selected. High-performing classification was based on remarkable progress on the path to elimination of mother-to-child HIV transmission (MTCT) for both process indicators (antenatal care coverage, HIV and syphilis testing and

treatment coverage among pregnant women) and impact targets (MTCT rate and case rate of new paediatric HIV infections). A review of WHO guidelines and country specific HIV testing guidelines was conducted to provide the team with a deep understanding of the integration of tracking mechanisms within primary health care and other health platforms. The team also reviewed HIV testing uptake and results among infants who remain at risk for HIV acquisition, referral to care and initiation of treatment from each specific country in the study. Information from the secondary sources complemented that which was collected through key informant interviews (KIIs). The KII comprised of HIV and AIDS program managers, laboratory managers, pharmacy/supply chain managers, and strategic information and evaluation leads from Ministries of Health, as well as CSO representatives. Quantitative data were analyzed using Microsoft Excel generating proportions, trends, identifying program gaps, and evaluating outcomes. Thematic analysis was applied to qualitative data from KII and this enabled identification of key themes related to gaps in tracking activities and potential solutions.

Key Findings

We found that 5 out of the 6 study countries recorded relatively high HIV testing and ART coverage among pregnant women, with Tanzania, Eswatini and Zimbabwe having sustained coverages above 80%, whilst Angola was trailing behind between 2015 and 2023. Most of the study countries recorded significant increases in HIV exposed infants who had a virological HIV test within 2 months of birth; between 2015 and 2023, notable increases were recorded in Tanzania from 48% to 71%, Zimbabwe from 51% to 84%, Botswana from 45% to 86%, and Kenya from 50% to 82%. Eswatini however recorded a decline from 82% in 2015 to 41% in 2023. Although Angola recorded an increase EID coverage from 5% in 2015 to 13% in 2023, this remained too low. Overall, ART coverage among children living with HIV improved significantly across all study countries except Angola whose coverage remained below 30%. Notable improvements were recorded in Tanzania from 41% in 2015 to 66% in 2023, Zimbabwe from 44% to 63%, Kenya from 49% to 70% and Eswatini from 72% to over 95% between 2019 and 2023. All the 6 study countries have guidelines for HIV testing for at-risk infants, and all are aligned to the WHO recommendations, however, they do not have specific activities for CHEU. Some of the barriers to HIV testing uptake and referral to care and treatment among CHEU include limited access to health facilities, inadequate and high health staff turnover, inadequate testing facilities, shortage of regimens, stigma and discrimination and lack of knowledge by mothers on maintaining HIV negative status among CHEU. Promising and Innovative practices that monitor HIV testing uptake, referral, and treatment initiation include use of point-of-Care (POC) Early Infant Diagnosis (EID) testing, integration of paediatric HIV services into maternal and child health systems, use of electronic records to track mother-baby pairs, and presence of community follow-up mechanisms.

Key Recommendations

We recommend the following:

1. Ministries of health should create comprehensive packages for CHEU, as current guidelines do not address their specific challenges. A multisectoral approach is essential, leveraging available data. These packages should include growth and developmental monitoring, nutritional support, psychosocial care, routine HIV re-testing, vaccination catch-up, and caregiver education.
2. Implement task-shifting for POC EID testing by training non-laboratory personnel, like community health workers (CHWs), to operate POC machines. This will allow skilled healthcare workers to focus on more complex tasks, while CHWs support routine screening for growth, development, and HIV exposure risk, including ensuring timely re-testing, and make necessary referrals.
3. Strengthen the integration of EID services to minimize multiple appointments for mother-baby pairs. Integrating maternal, newborn, and child health (MNCH), HIV, nutrition, and immunization services can streamline care and facilitate holistic support — especially during immunization or growth monitoring visits to reduce missed opportunities.
4. Policymakers should advocate for sustainable funding strategies for paediatric HIV care to address potential funding interruptions e.g. case of the Trump Administration 2025. To mitigate disruptions in donor financing, governments must diversify funding sources through domestic financing and public-private partnerships. Policies should be tailored to the unique needs of CHEU, including nutrition, developmental follow-up, and integrated care delivery.
5. Enhance community sensitization to promote the importance of EID and follow-up care for CHEU. Involve people living with HIV and mentor-mothers to advocate for services, reduce stigma, and educate caregivers on health monitoring. Efforts should also address harmful beliefs and misinformation that may hinder the uptake of services.
6. Scale up digital systems like electronic health records and mobile applications to improve tracking of mother-baby pairs and reduce loss to follow-up. A comprehensive database should monitor CHEU growth, vaccination status, and appointments. These systems should also include SMS reminders for caregivers and digital dashboards to support program managers, ensuring interoperability between facility- and community-level data.
7. Health ministries should invest in expanding access to testing facilities and training providers, while also implementing strategies to combat stigma related to HIV. Ensure equitable healthcare access for all women, regardless of socioeconomic status or location. Special attention should be given to ensuring equity in service delivery,

particularly in rural and peri-urban areas and among vulnerable populations such as adolescent mothers.

1. Introduction

1.1. Background

The Regional Inter-Agency Task Team on Children and AIDS in Eastern and Southern Africa (RIATT-ESA) is a network of organisations working together to influence global, regional and national HIV and AIDS policy formulation and implementation for children and their families.

The network's leadership consists of the Elizabeth Glaser Paediatric AIDS Foundation (EGPAF) (Interim Chair), the East African Community (Deputy Chair), and the Regional Psychosocial Support Initiative (REPSSI) (Secretariat). A Steering Committee oversees its work, while a Program Manager collaborates with three Technical Working Groups (TWGs) dedicated to Advocacy, Social Protection, and Care and Support to implement the annual work plan and advance child-focused HIV responses in the region.

In line with its strategic mandate, RIATT-ESA commissioned this study to identify existing gaps and provide evidence-based solutions to improve programming that ensures that infants and children who remain at risk of HIV acquisition. The aim was to assess whether these children are receiving timely HIV testing in accordance with national HIV testing guidelines, and to identify opportunities to enhance follow-up, referral, and treatment initiation.

The study was conducted across six countries in the Eastern and Southern Africa (ESA) region—three classified as high performing (Botswana, Eswatini, Zimbabwe) and three as low performing (Angola, Kenya, Tanzania)—based on progress made toward elimination mother-to-child transmission (eMTCT) indicators. This comparative approach enabled analysis of both enabling factors and persistent barriers across diverse programmatic contexts. These efforts are timely and aligned with recent calls to accelerate action in Eastern and Southern Africa to achieve the 2030 HIV targets. As highlighted by Govender et al. (2023), children, adolescent girls, and young women continue to face disproportionate risks of HIV infection and limited access to testing and care, underscoring the need for innovative, youth- and child-responsive strategies. This study aligns with RIATT-ESA's strategic objectives by:

- Supporting regional bodies such as the Southern African Development Community (SADC), East African Community (EAC), and African Union Commission (AUC) in reinforcing child-focused HIV services and systems,,
- Advocating for enhanced child-sensitive social protection systems that address vulnerabilities linked to HIV transmission, and
- Leveraging the expertise of RIATT-ESA's Technical Working Groups (Advocacy, Social Protection, and Care and Support) to ensure the study findings translate into actionable policies and programs.

The study outcomes include:

- a. Description of each study country's programming to monitor HIV testing uptake and results among infants who remain at risk for HIV acquisition,
- b. Proportion of infants at risk of HIV infection tested according to national guidelines,
- c. Proportion of parents who received results within one week of testing,
- d. Care referral and antiretroviral therapy (ART) initiation among infants who test HIV positive,
- e. For infants who are found to be HIV positive, referral to care within a week of a parent being notified of an infant's HIV status,
- f. Proportion of infants who initiated ART on their initial encounter with the health care system after testing HIV positive,
- g. Implementation challenges, gaps, strengths, and opportunities for improvement for each country's programming, and
- h. Practical recommendations applicable to all countries, as well as those tailored to specific countries offering recommendations for programming to monitor HIV testing uptake and results among infants who remain at risk for HIV acquisition, as well as care referral and HIV treatment initiation among infants who test HIV positive.

1.2. Introduction

More than one million women living with HIV give birth each year, of which the majority are in sub-Saharan Africa (Matenga et al., 2024; Slogrove et al., 2022). With the expanded access to antiretroviral therapy (ART) for all people living with HIV (PLHIV) in the last decade, there has been an increased population of children who are HIV-exposed but uninfected (CHEU) (Bagel 2024, Begnel et al., 2025). About 90% of CHEU reside in sub-Saharan Africa, (Begnel et al., 2025; Slogrove et al., 2016) with recent data showing marked declines in vertical HIV transmission to as low as 3% in South Africa, 2.4% in Eswatini and 1.8% in Botswana (Mutanga et al., 2023). The current World Health Organization (WHO) guidelines recommend virologic testing for HIV-exposed infants (HEIs) using a deoxyribonucleic acid polymerase chain reaction (DNA PCR) test at 4–6 weeks of age to optimize detection of intrauterine, intrapartum, and early postnatal HIV transmission (Consolidated Guidelines on HIV Prevention, Testing, Treatment, Service Delivery and Monitoring: Recommendations for a Public Health Approach, 2021). However, in 2016, only 50% of HEI in 21 priority countries received early infant diagnostic (EID) testing by 2 months which shows limitations in tracking and tracing of HEI and children (Medley et al., 2018). Several factors have been noted to contribute to this poor follow-up but more notably is the poor retention of HIV-infected mothers after delivery, lack of systems for linking mothers to their infants, under-staffed health facilities, and lack of understanding of the importance of HIV testing post the first negative result (le Roux et al., 2016; Medley et al., 2018).

While it is vital to avoid HIV acquisition, it is equally important to ensure that the CHEU thrives. There is supporting evidence that these children remain at high risk of morbidity and mortality when compared with children that are HIV unexposed and uninfected (CHUU); hence, monitoring them remains vital (le Roux et al., 2016; Slogrove et al., 2016). The etiology

of worse outcomes among CHEU relative to CHUU is often unclear and has been postulated to arise from various combinations of exposures including antigenic exposure to HIV virus and maternal immune dysregulation from HIV, in-utero and early-life infections, exposure to antiretroviral drugs, and environmental and social factors associated with HIV (Begnel et al., 2025; Slogrove et al., 2022, 2023). Accurately excluding HIV infection and classifying children and infants as CHEU is essential to ensuring that morbidity assigned to CHEU is not in fact due to undiagnosed HIV-infection (Consolidated Guidelines on HIV Prevention, Testing, Treatment, Service Delivery and Monitoring: Recommendations for a Public Health Approach, 2021). Interventions are required to ensure that the diagnosis of infants as HIV-uninfected is appropriately designated after all risk of HIV acquisition has been eliminated, including following completion of infant ARV prophylaxis (Slogrove et al., 2016) and the infant is no longer breastfeeding.

There is a lack of consensus on effective interventions to optimize the health and wellbeing of this growing population of CHEU. In this era, public health programming and policy development must now encompass a holistic approach that includes supporting children with HIV exposure to address poor life course outcomes. Starting life HIV-free is not a sufficiently high enough bar. CHEU requires support to thrive to their fullest potential. The effects of HIV exposure include low birth weight, prematurity, growth impairment and neurodevelopmental delays, hence a multisectoral approach is required in managing these children (Comprehensive Package of Care for Infants and Young Children Exposed to HIV: Policy Brief, 2021).

Considering the significant health benefits of breastfeeding in the context of HIV in preventing infant morbidity and mortality and the reduced risk of HIV transmission if mothers are receiving ART and have suppressed viral loads, WHO recommends that mothers living with HIV who are receiving ART and have suppressed viral loads may breastfeed their infants for up to two years, with the infants being exclusively breastfed in the initial six months to prevent vertical HIV transmission in the postpartum period and optimize infant survival (Begnel et al., 2025; Comprehensive Package of Care for Infants and Young Children Exposed to HIV: Policy Brief, 2021). Breastfeeding decreases infants' risk of mortality, diarrhea and respiratory disease and is associated with healthy growth and development, benefits that can now be extended to more CHEU (Bagel 2024, n.d.; Begnel et al., 2025). Unfortunately, about half of new infant infections are estimated to occur during the breastfeeding period (Consolidated Guidelines on HIV Prevention, Testing, Treatment, Service Delivery and Monitoring: Recommendations for a Public Health Approach, 2021; Evans et al., 2016; Medley et al., 2018) which makes it a critical period to keep screening the HIV exposed infants and children. The vertical HIV transmission occurring postnatally is postulated to be usually from maternal seroconversion during breastfeeding or mothers not initiating or retained on ART (Medley et al., 2018). Nevertheless, improving adherence and retention support to ensure that women remain virally suppressed, and strengthening routine HIV testing throughout pregnancy and breastfeeding is essential in preventing vertical HIV transmission.

While countries in the ESA region have made remarkable progress in scaling up treatment for pregnant women living with HIV and reducing new infections among children (Final Report: An Assessment of National Paediatric Testing Guidelines and Advocacy in the EAC and SADC, 2022), there is urgent need for access to evidence-based and relevant practices that ensure more HIV exposed children are screened and their diagnosis is determined for future management. Excluding HIV infection and classifying infants as CHEU is essential to ensuring integrity of CHEU morbidity and mortality data (Slogrove et al., 2016). Misclassification of HEU infants as HIV-infected or delayed diagnosis of HIV infection have detrimental life-long implications. In a meeting conducted in 2016, it was proposed that:

“Confirmation of positive HIV-PCR results should be the standard of care. Re-evaluation of the appropriate lower age limit at which a serologic HIV test can be used to diagnose HIV infection is needed. The timing of postnatal ARV prophylaxis and breastfeeding cessation needs to be taken into consideration when diagnosing infants as HIV-uninfected. The term CHEU should be reserved for HIV-exposed children in whom HIV infection has been excluded.” (Slogrove et al., 2016).

With the above concern, there is a possibility that some children are labelled CHEU while they are not leading to high estimates of morbidity and mortality in this subpopulation. There are several factors that have been cited for children not to be fully screened. In Namibia, Nigeria, and Kenya, women living with HIV lacked information on the importance of EID (limited community sensitization), resulting in them not returning for follow-up testing and care (Final Report: An Assessment of National Paediatric Testing Guidelines and Advocacy in the EAC and SADC, 2022). Medical emergencies like COVID-19 with its travel restrictions prohibited breastfeeding mothers from visiting health facilities. Increased turnaround time of EID or PCR HIV tests also made mothers to be anxious to the extent that some would not have the courage to return for the results if they are not delivered on the same day (Final Report: An Assessment of National Paediatric Testing Guidelines and Advocacy in the EAC and SADC, 2022). However, even though this was to be addressed by presence of point of care (POC) HIV testing machines, some mothers were cited to doubt the same day results, and this makes screening of HEI difficult. Associated transport costs for those living in hard-to-reach areas also contributed to limited screening of HEI, especially for those who would have had a negative first HIV test. Lastly, the absence of digitized health informatics made tracking of mother-baby pairs difficult leading to lost-to-follow-up (Final Report: An Assessment of National Paediatric Testing Guidelines and Advocacy in the EAC and SADC, 2022).

WHO has updated its guidelines in anticipation of driving growth and increasing identification of children at risk of HIV and this includes testing at birth, using alternative entry point testing, the increasing adoption rate of POC testing and updated WHO algorithms with nucleic acid testing (NAT) use at nine months of age (Consolidated Guidelines on HIV Prevention, Testing, Treatment, Service Delivery and Monitoring: Recommendations for a

Public Health Approach, 2021; Final Report An Assessment of National Paediatric Testing Guidelines and Advocacy in the EAC and SADC, 2022). In addition, for the universal elimination of perinatal and postnatal HIV acquisition, it is essential that all pregnant and breastfeeding women with HIV and their exposed infants receive effective antiretroviral drugs (Slogrove et al., 2020). However, there have been concerns about monitoring the implementation of these guidelines. There is a need for effective interventions that optimize the health and wellbeing of this growing population of CHEU. Public health commitment and programming must go beyond HIV prevention and encompass a holistic approach that includes supporting these children (Gross et al., 2023).

Following up infants and young children exposed to HIV throughout and beyond the exposure period is critical to minimize the risk of HIV transmission and to intensify efforts to improve child survival, promote child growth and development to obtain holistic health and well-being outcomes (Comprehensive Package of Care for Infants and Young Children Exposed to HIV: Policy Brief, 2021). Many countries in ESA have implemented activities to track HIV testing engagement among infants and children with gestational exposure to HIV who remain at risk for HIV acquisition; however, inconsistencies in implementation, data management challenges, and weak follow-up mechanisms hinder optimal outcomes. There is a need to evaluate programmatic efficacy.

1.3. Elimination of Vertical HIV Transmission

WHO notes that countries with high background prevalence of HIV, syphilis and hepatitis B virus (HBV) among pregnant women may find it difficult to achieve elimination of mother-to-child transmission (eMTCT) validation targets, even if they have made considerable efforts to reduce MTCT. Countries in these situations can be recognized for their impressive achievements as they progress along the Path to Elimination (PTE). World Health Organization (WHO) developed a set of defining criteria for PTE in collaboration with the African Regional Validation Secretariat and with input from the Global Validation Advisory Committee. PTE recognizes three tiers of progress towards elimination, each with its own set of process and impact targets (Table 1). The approach was agreed on during a series of consultations with countries in the African Region in 2016 and early 2017 (Global guidance on criteria and processes for validation: elimination of mother-to-child transmission of HIV, syphilis and hepatitis B virus). Path to Elimination of MTCT of hepatitis B virus (HBV) was incorporated into the global guidance in 2021.

Table 1: Gold, Silver and Bronze Path to Elimination Tiers

Gold Tier	
Process indicators (>95%)	Impact indicators (≤250)

• Antenatal care (ANC) coverage (at least one visit) (ANC-1) of $\geq 95\%$ • Coverage of HIV and/or syphilis testing of pregnant women of $\geq 95\%$ • Antiretroviral treatment (ART) coverage of HIV-positive pregnant women of $\geq 95\%$ • Treatment coverage of syphilis-seropositive pregnant women of $\geq 95\%$	HIV	• Mother-to-child transmission (MTCT) rate of HIV of $< 2\%$ in non-breastfeeding populations OR $< 5\%$ in breastfeeding populations • A case rate of new paediatric HIV infections due to MTCT ≤ 250 cases per 100,000 live births
	Syphilis	• A case rate of congenital syphilis (CS) of ≤ 250 per 100,000 live births
Silver Tier		
Process indicators ($> 90\%$)	Impact indicators (≤ 500)	
• Antenatal care (ANC) coverage (at least one visit) (ANC-1) of $\geq 90\%$ • Coverage of HIV and/or syphilis testing of pregnant women of $\geq 90\%$ • Antiretroviral treatment (ART) coverage of HIV-positive pregnant women of $\geq 90\%$ • Treatment coverage of syphilis-seropositive pregnant women of $\geq 90\%$	HIV	• Mother-to-child transmission (MTCT) rate of HIV of $< 2\%$ in non-breastfeeding populations OR $< 5\%$ in breastfeeding populations • A case rate of new paediatric HIV infections due to MTCT ≤ 500 cases per 100,000 live births
	Syphilis	• A case rate of congenital syphilis (CS) of ≤ 500 per 100,000 live births
Bronze Tier		
Process indicators ($> 90\%$)	Impact indicators (≤ 500)	
• Antenatal care (ANC) coverage (at least one visit) (ANC-1) of $\geq 90\%$ • Coverage of HIV and/or syphilis testing of pregnant women of $\geq 90\%$ • Antiretroviral treatment (ART) coverage of HIV-positive pregnant women of $\geq 90\%$ • Treatment coverage of syphilis-seropositive pregnant women of $\geq 90\%$	HIV	• Mother-to-child transmission (MTCT) rate of HIV of $< 2\%$ in non-breastfeeding populations OR $< 5\%$ in breastfeeding populations • A case rate of new paediatric HIV infections due to MTCT ≤ 750 cases per 100,000 live births

1.4. Justification

Despite significant progress in preventing vertical HIV transmission of HIV, critical gaps persist in the longitudinal tracking, follow-up, and timely HIV testing of infants born to women living with HIV, particularly during breastfeeding. In response, many countries in the ESA region have implemented activities to monitor testing engagement among HIV-exposed infants who remain at risk of HIV acquisition. However, weak integration across service

platforms, inconsistent implementation, and gaps in data systems continue to undermine the continuity of care.

CHEU represent a growing yet underserved population with unique vulnerabilities, including increased risk of morbidity, and developmental delays. Current HIV testing strategies often do not fully address these ongoing risks during the exposure period, particularly in breastfeeding contexts. This study was therefore designed to identify operational and policy gaps in the tracking and care of CHEU and propose actionable, evidence-based solutions. The ultimate goal is to strengthen programming that ensures timely HIV testing, sustained follow-up, and access to integrated care services for infants and children with ongoing HIV exposure, according to each country's national HIV testing guidelines.

1.5. Study Objectives

The assessment identified existing gaps and provided evidence-based solutions to improve programming that ensures that infants who remain at risk of HIV acquisition are engaging in HIV testing according to national HIV testing guidelines. The study specifically:

1. Assessed HIV testing uptake and results among infants who remain at risk of HIV acquisition, and referral to care and initiation of treatment.
2. Evaluated implementation of national HIV testing guidelines for at-risk infants, and their alignment to WHO-recommended guidelines.
3. Identified barriers to HIV testing uptake and referral to care and treatment.
4. Documented promising and innovative practices that monitor HIV testing uptake, referral, and treatment initiation.
5. Assessed the integration of these tracking systems into primary health care (PHC) and health platforms (postnatal care, child health, nutrition centers, etc.).
6. Provided policy and programmatic recommendations to strengthen monitoring and ensure early testing and treatment interventions.

2. Methodology

2.1. Study design

A mixed method study design was conducted, and it included cross-sectional analysis of secondary data and a qualitative component consisting of key informant interviews augmented by findings from literature reviews. Different methods of engagement allowed triangulation of data and validation of patterns that emerged through analysis. Quantitative data was collected to determine HIV testing uptake and results among infants who remain at risk for HIV acquisition, referral to care and initiation of treatment. Qualitative data were used to assess the alignment of national HIV testing strategies to WHO guidelines, integration

of tracking mechanisms within primary health care and other health platforms and determine promising and innovative practices that monitor HIV testing uptake, referral, and treatment initiation. The desk-review prioritized studies involving CHEU, specifically those addressing health outcomes and interventions tailored for this population. Articles discussing tracking activities and monitoring strategies for CHEU were essential. Literature that highlights challenges in managing CHEU—as well as reviews or meta-analyses that summarize gaps—was included to provide a clearer picture of the existing barriers and areas needing further exploration. Geographically, the search concentrated on studies conducted in regions or countries with significant HIV prevalence. We limited our literature search to peer-reviewed journal articles, systematic reviews, and grey literature such as reports and guidelines and theses and dissertations related to CHEU and EID. The primary focus was on English-language publications. Several databases were considered for this study and these included PubMed, Google Scholar, WHO global health library, Cumulative Index to Nursing and Allied Health Literature etc.

2.2. Study setting

The study was conducted in six countries in the ESA region—three high performing and three low performing. These countries included Angola, Kenya, Tanzania, Zimbabwe, Botswana, and Eswatini.

2.3. Study participants (Key Informants)

These comprised of HIV and AIDS program managers, laboratory managers, pharmacy/supply chain managers, and strategic information and evaluation leads from Ministries of Health, as well as CSO representatives.

2.4. Sampling procedures

2.4.1. Selection of countries: Six countries in the eastern and southern African (ESA) region—three high performing (Botswana, Eswatini, and Zimbabwe) and three low performing (Angola, Kenya, and Tanzania) were purposively selected. Botswana, Eswatini, and Zimbabwe were designated high-performing given their remarkable progress on the path to elimination of mother-to-child HIV transmission (MTCT) for both process indicators (Antenatal care coverage, HIV and syphilis testing and treatment coverage among pregnant women) and impact targets (MTCT rate and case rate of new paediatric HIV infections due to MTCT)

2.4.2: Selection of study participants: A maximum of 3 HIV and AIDS program managers, laboratory managers, pharmacy/supply chain managers, and strategic information and evaluation leads from each participating country were purposively selected.

2.5. Data management tools and processes

Table 2: Data collection tools and processes by study objectives

Study Objective	Data Type	Data Collection Tool	Key Variables	Data Collection Procedure
Assess HIV testing uptake and results among infants who remain at risk of HIV acquisition, and referral to care and initiation of treatment	Quantitative	Checklist focusing on country-level annual HIV estimates, program data, and reports	HIV exposed infants (HEI) tested & received results, HIV exposed and uninfected (HEU) children receiving minimum package of clinical services ¹	Desk review of country-level annual HIV estimates, data, and program reports
Evaluate implementation of national HIV testing guidelines for at-risk infants, and their alignment to WHO-recommended guidelines	Qualitative	Checklist focusing on degree of alignment of country-level guidelines with WHO recommendations	Alignment of country-level guidelines with WHO recommendations	Desk review of country-level implementation guidelines, HIV program reports, and WHO guidelines
Identify barriers to HIV testing uptake and referral to care and treatment	Qualitative	Key informant interview (KII) guide	Barriers to HIV testing uptake and referral to care and treatment	Administer KII guide to selected (max 3) country HIV program managers
Document promising and innovative practices that monitor HIV testing uptake, referral, and treatment initiation	Qualitative	Key informant interview (KII) guide	Promising and innovative practices that monitor HIV testing uptake, referral, and treatment initiation	Administer KII guide to selected (max 3) country HIV program managers
Assess the integration of these tracking	Qualitative	a) Checklist focusing on country level	Integration of tracking systems into PHC and	a) Desk review of country level guidelines and

¹ A comprehensive package of services for HIV exposed but uninfected children include HIV testing, prevention, treatment, and care services, with a specific focus on preventing vertical HIV transmission (PMTCT). This package aims to ensure these individuals remain HIV-free and receive appropriate support.

systems into PHC and health platforms (postnatal care, child health, nutrition centers)		guidelines, b) Key informant interview (KII) guide	health platforms (post-natal care, child health, nutrition centers)	HIV program reports, b) Administer KII guide to selected (max 3) country HIV program managers
Provide policy and programmatic recommendations to strengthen monitoring and ensure early testing and treatment interventions.	These were derived from study data			

Three (3) key informant interviews (KIIs) were conducted in each of the 6 study sites with strategic personnel at Ministry of Health, one key technical partner working in paediatric HIV programming, and one representative from Civil Society Organizations (CSOs) representing paediatrics interests. The semi-structured interviews consisted of a series of inter-related questions that explored barriers to HIV testing uptake and referral to care and treatment, promising and innovative practices that monitor HIV testing uptake, referral, and treatment initiation, as well as the level of integration of tracking systems into primary health care and other health platforms.

2.6. Data analysis and dissemination of findings

2.6.1. Quantitative data: Microsoft Excel was used to analyse quantitative data generating proportions, trends, identify program gaps, and evaluate outcomes.

2.6.2. Qualitative data: Thematic analysis was applied to qualitative data from key informant interviews and this enabled identification of key themes related to gaps in tracking activities and potential solutions. This facilitated corroboration of findings from both qualitative and quantitative data.

2.7. Advocacy

One of the aims of this assessment was to enhance the identification of CHEU in poorly performing countries by advocating for the best practices and strengthen approaches from best performing countries. The study pinpointed key stakeholders in paediatric HIV service provision through key informant interviews for targeted advocacy – understanding that

successful advocacy involves leaders operating within their roles to achieve desired outcomes.

2.8. Ethical considerations

Written informed consent was obtained from all study participants (key informants) prior to data collection. All signed consent forms were kept by the consultant in locked cabinets with restricted access. All primary data collected from key informants was kept confidential.

3.0. Findings

A comprehensive package of services for HIV exposed but uninfected children include HIV testing, prevention, and care services, with a specific focus on preventing vertical HIV transmission. This package aims to ensure these individuals remain HIV-free and receive appropriate support. HIV prevention includes 1) regular HIV testing for both the mother and the infant, 2) PMTCT including interventions like ART for the mother, infant ARV prophylaxis, and counseling on infant feeding options, 3) Pre-Exposure Prophylaxis (PrEP) for individuals at high risk of HIV infection to significantly reduce their risk, and 4) Post-Exposure Prophylaxis (PEP) for individuals with recent potential HIV exposure, requiring medication within 72 hours (*Comprehensive Package of Care for Infants and Young Children Exposed to HIV : Policy Brief*, 2021). Care and support includes interventions such as 1) Co-trimoxazole prophylaxis to prevent certain infections in infants exposed to HIV, 2) Postnatal care to ensure ongoing monitoring and support for both mother and infant, including feeding support and promoting nurturing care, 3) linkage to care i.e., connecting individuals with HIV testing results to appropriate care and support services, 4) psychosocial support to address the maternal emotional and social aspects of living with HIV, and 6) social, educational and economic support.

Secondary analysis of data from UNAIDS-supported annual HIV estimates and the Global AIDS Monitoring (GAM) report for the study countries for the period 2015 to 2023 was conducted and outputs used in this report. These data include HIV testing and ART initiation among pregnant women, HIV testing uptake and results among HIV exposed infants, treatment for children living with HIV, as well as mother-to-child HIV transmission rates. We focused on these data as they are 1) collected using standard procedures and definitions across all countries, hence are comparable, 2) cover a longer period during which WHO released its guidelines on at least 2 time periods, thereby enabling the researchers to track country-level adaptation and implementation, and 3) these data are publicly available.

3.1. HIV Testing for Pregnant Women

Figure 1 summarizes trends in proportion of pregnant women who knew their HIV status for the 6 study countries for the period 2015 to 2023.

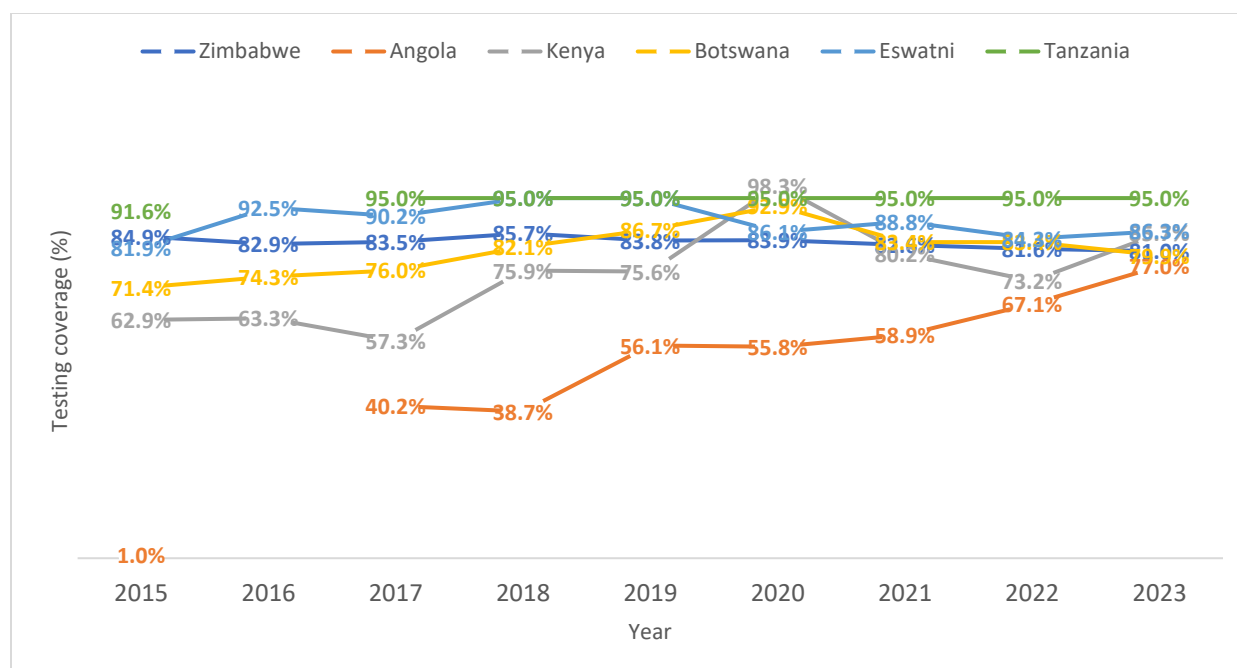


Figure 1: Trends in percentage of pregnant women who knew their HIV status for the 6 study countries, 2015 to 2023 (Source: Global AIDS Monitoring and UNAIDS 2024 estimates)

Five out of the 6 study countries recorded relatively high HIV testing coverage among pregnant women, with Tanzania, Eswatini and Zimbabwe having sustained coverages above 80% between 2015 and 2023. However, between 2020 and 2023, Kenya, Botswana, and Eswatini experienced a decline in coverage, with Kenya's coverage dropping from 98.3% to 85.7%. The downward trend is worrisome given the need for countries to meet the 95% coverage required for EMTCT validation. Additionally, the suboptimal coverage places HIV exposed but uninfected children at risk of HIV infection due to their continued exposure, as well as missing critical services including HIV EID, as their exposure status remain unknown. This reversal in gains accrued over the years can partly be attributed to the Covid-19 pandemic which resulted in women failing to access health services due to movement restrictions. As noted by Govender et al. (2023), the pandemic further disrupted HIV prevention and treatment services for children, adolescent girls, and young women in Eastern and Southern Africa, threatening progress toward global HIV targets. Other factors contributing to suboptimal coverage include young age, low or no education, not being in a union, unemployment, and low household wealth index. Additionally, limited media exposure, stigmatizing attitudes towards people living with HIV, male-headed households, and rural residence are significant factors at both individual and household levels. At the community level, low media exposure and high illiteracy rates are significant factors, while at the country level, high fertility rates and low literacy rates are also associated with lower rates of HIV testing during antenatal care (Tamir et al., 2024). Although Tanzania hasn't achieved other EMTCT validation targets, it sustained high testing coverages among pregnant women (95%) from 2017 to 2023.

Angola recorded phenomenal improvement from a coverage of less than 2% in 2015 to 77% by 2023, although this falls short of the EMTCT target of 95%.

3.2. ART among HIV positive pregnant women

Figure 2 shows maternal ART coverage among HIV positive pregnant women in the 6 study countries for the period 2015 to 2023.

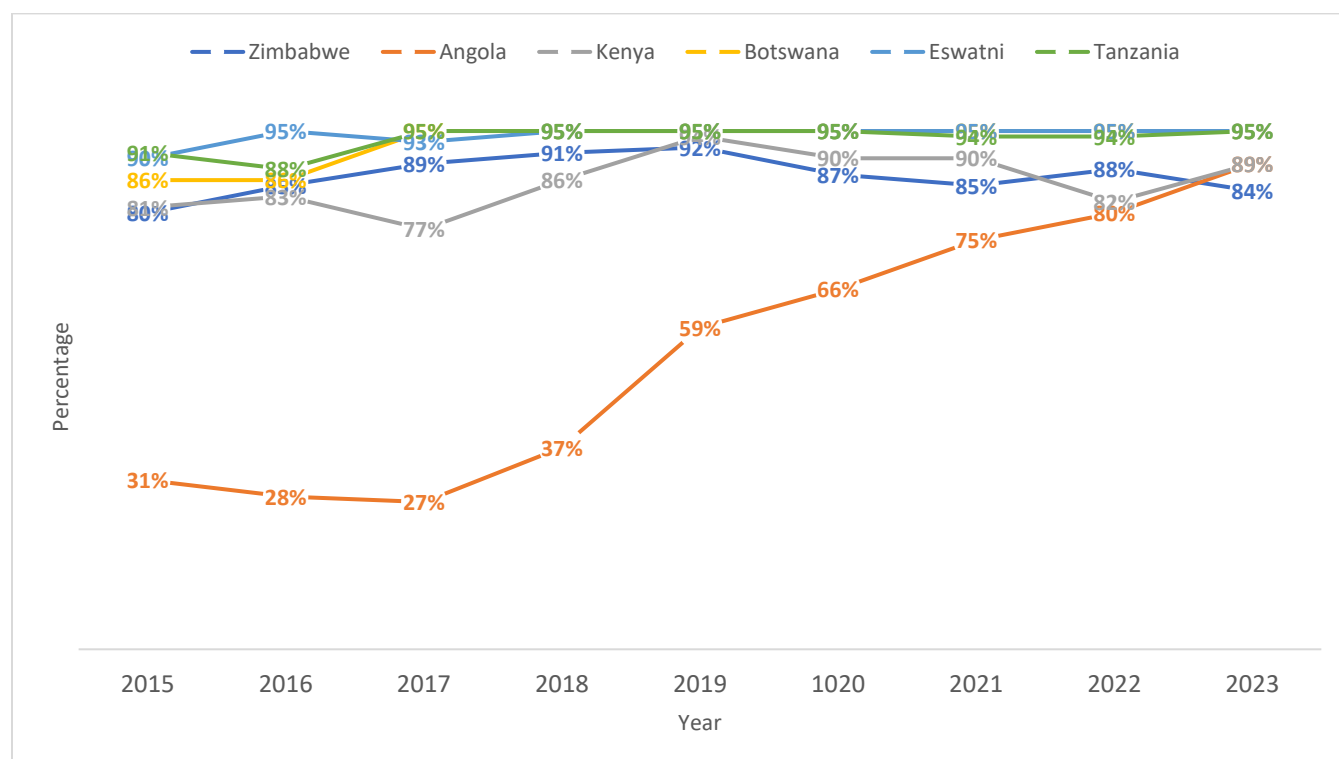


Figure 2: Maternal ART coverage among HIV positive pregnant women in the 6 study countries for the period 2015 to 2023 (Source: Global AIDS Monitoring and UNAIDS 2024 estimates)

Five out of the 6 study countries had ART coverages above 80% between 2015 and 2023, with Tanzania and Eswatini recording 95% coverages between 2017 and 2023 – thereby meeting one of the process indicator targets for EMTCT. Coverage for Angola increased exponentially from 31% in 2015 to 89% in 2023. Three countries, i.e., Angola, Kenya, and Zimbabwe had coverages below 90% in 2023. Multiple barriers exist that prevent access to, receipt of, and adherence to ART for pregnant women living with HIV in sub-Saharan Africa. These include individual barriers of poor knowledge of the benefits of ART for PMTCT, drug side effects, stigma and discrimination, and participant denial; the interpersonal barrier of non-disclosure; the community barrier of religious beliefs; and the health system barriers of inaccessibility, lack of confidentiality, and poor documentation (King et al., n.d.). Many of these concerns were also noted in a meta-analysis of perinatal HIV transmission in sub-Saharan Africa, with the addition of the following challenges: late initiation of ART, non-

adherence, non-involvement of men in antenatal care, and lack of community-led PMTCT programs(Yah & Tambo, 2019).

3.3. HIV testing uptake and results among HIV exposed infants

The six study countries recorded significant increases in both the number and proportion of HIV exposed infants who received virologic tests according to the WHO guidelines between 2015 and 2022; declines were however noted across most countries in 2023. Table 3 and Figure 3 summarize trends in number and percentage of infants born to pregnant women living with HIV who received a virological test for HIV within 2 months of birth respectively.

Table 3: Trends in number of infants born to pregnant women living with HIV who received a virological test for HIV within 2 months of birth (Source: Global AIDS Monitoring and UNAIDS 2024 estimates)

Country	Year								
	2015	2016	2017	2018	2019	1020	2021	2022	2023
Zimbabwe	37,000	45,000	41,400	40,000	35,400	44,600	54,300	47,900	41,200
Angola	1,200	300	170	350	1,800	680	770	-	3,200
Kenya	36,600	38,800	35,500	43,200	43,400	40,900	37,600	51,900	44,700
Botswana	5,900	5,900	6,100	9,800	9,800	11,900	8,600	7,200	7,200
Eswatini	-	8,600	8,300	8,500	-	-	4,100	8,600	2,900
Tanzania	36,100	37,000	34,100	38,700	37,600	50,200	40,900	58,800	50,700
Total	116,800	135,600	125,570	140,550	128,000	148,280	146,270	174,400	149,900

Overall, there was an increase in the absolute number of HIV exposed infants with a virological HIV test within 2 months of birth from 116,800 in 2015 to over 174,400 in 2022, before declining to 149,900 in 2023.

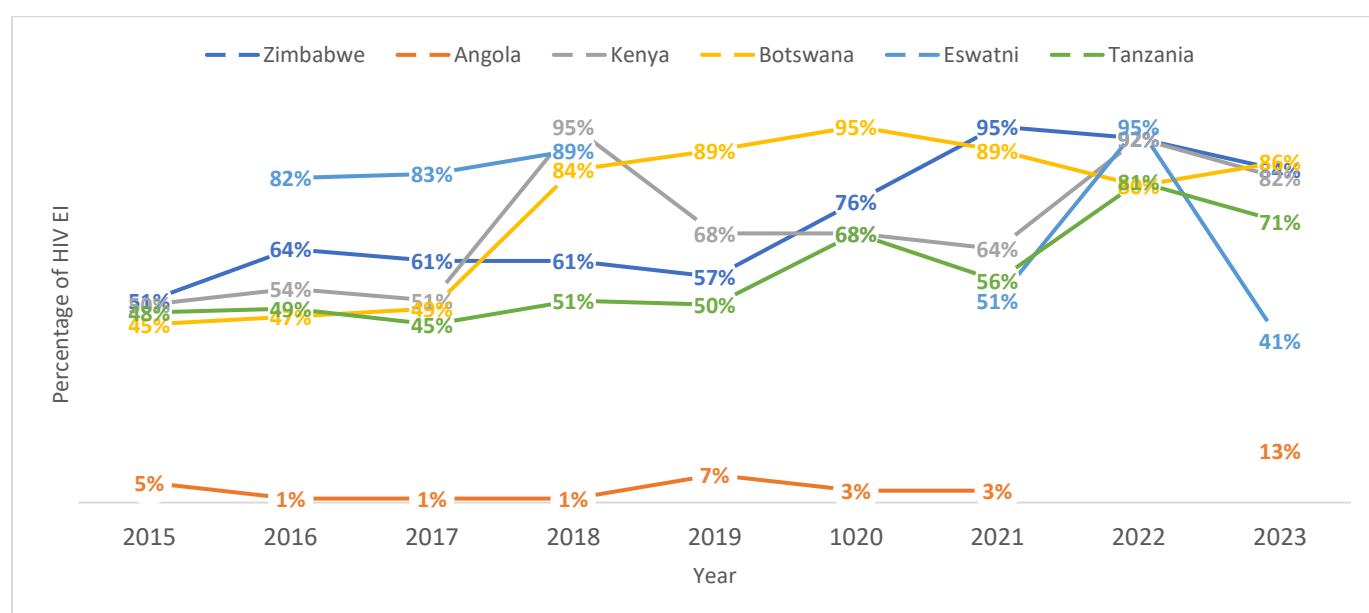


Figure 3: Trends in percentage of infants born to pregnant women living with HIV who received a virological test for HIV within 2 months of birth (Source: Global AIDS Monitoring and UNAIDS 2024 estimates)

Most of the study countries recorded significant increases in HIV exposed infants who had a virological HIV test within 2 months of birth. Between 2015 and 2023, notable increases were recorded in Tanzania from 48% to 71%, Zimbabwe from 51% to 84%, Botswana from 45% to 86%, and Kenya from 50% to 82%. Eswatini however recorded a decline from 82% in 2015 to 41% in 2023. Although Angola recorded an increase from 5% in 2015 to 13% in 2023, this coverage remained too low. None of the study countries managed to sustain coverages above the EMTCT validation target of 95% thereby delaying diagnosis and treatment of children infected by HIV. This suboptimal performance can be attributed to inadequate capacity of nurses to collect a dried blood spot or perform a rapid HIV test, centralized DNA PCR testing in a limited number of laboratories, unstable sample and results transportation systems resulting in long turnaround times (TAT) from sample collection to return of results to facilities, frequent breakdown laboratory testing platforms, EID testing reagent stock-outs, unwillingness of parents to provide consent for their children to be tested because they are concerned about stigma, or fear that a child's positive test result will reflect their own HIV status (Kranzer et al., 2014; McCoy et al., 2016). Although all 6 study countries have adopted HIV testing at birth for exposed infants using POC platforms, coverage is limited to a few selected sites because of inadequate machines; additionally, POC EID machine breakdown in the absence of maintenance plans and stock out of testing cartridges contributes to suboptimal performance.

3.4. Treatment for children living with HIV

Table 4 summarizes the number of children aged 0-14 years living with HIV on antiretroviral therapy (ART) in the 6 study countries.

Table 4: Number of children aged 0-14 years living with HIV on ART in the 6 study countries.

	2015	2016	2017	2018	2019	2020	2021	2022	2023
Zimbabwe	58,900	64,600	68,100	52,400	59,800	55,200	52,400	51,500	44,100
Angola	4,200	3,200	3,800	4,800	5,100	6,000	6,900	7,800	8,700
Kenya	71,500	78,800	86,300	77,100	73,100	69,400	64,000	57,400	52,300
Botswana	8,500	7,400	6,100	5,400	4,200	4,400	4,600	3,900	3,300
Eswatini	8,400	9,500	9,900	8,600	8,600	8,900	7,200	6,500	5,600
Tanzania	43,200	44,100	44,900	47,700	49,900	49,300	46,700	45,700	44,900
Total	194,700	207,600	219,100	196,000	200,700	193,200	181,800	172,800	158,900

Figure 4 shows the percentage of children living with HIV on ART in the 6 study countries for the period 2015 to 2023.

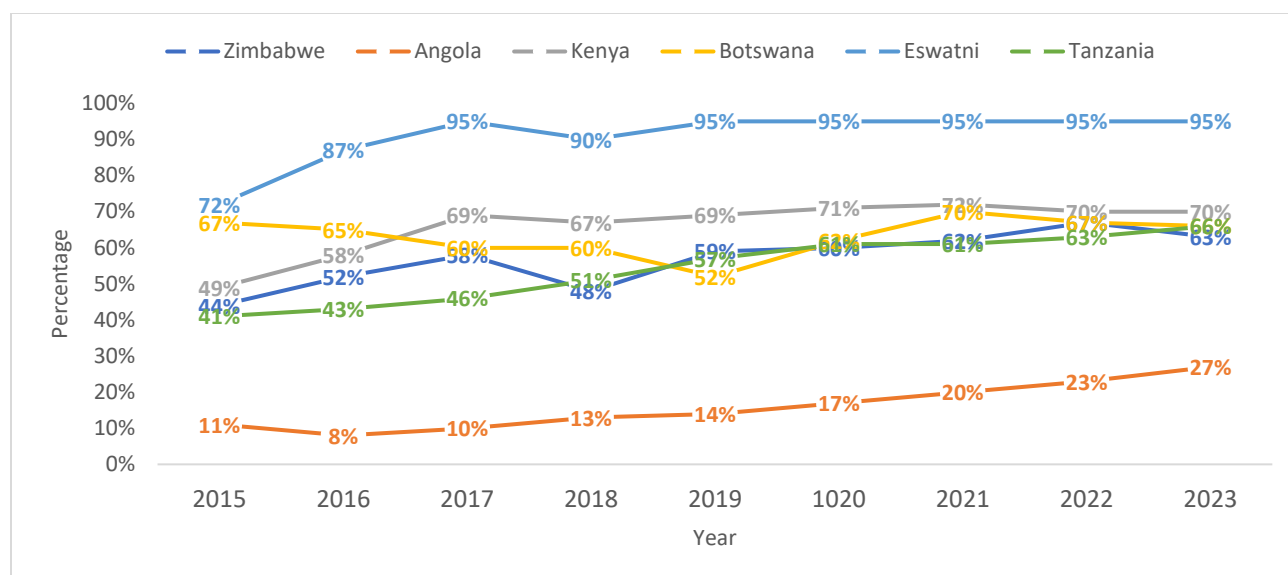


Figure 4: Percentage of children aged 0-14 years living with HIV on ART in the 6 study countries for the period 2015 to 2023 (Source: Global AIDS Monitoring and UNAIDS 2024 estimates)

Overall, ART coverage among children living with HIV improved significantly across all study countries except Angola whose coverage remained below 30%. Notable improvements were recorded in Tanzania from 41% in 2015 to 66% in 2023, Zimbabwe from 44% to 63%, Kenya from 49% to 70% and Eswatini from 72% to over 95% between 2019 and 2023. The low ART coverage can be attributed to a complex interplay of factors, including socioeconomic, healthcare system, and individual-level barriers. These barriers lead to low testing rates, poor adherence to treatment, and challenges in initiating and maintaining children on ART. Studies have shown that predictors of child enrolment on ART include long distance to the facilities, low caregivers' income, fear of stigma, and lack of HIV-positive status disclosure to fathers (Mageda et al., 2023).

3.5. Elimination of Mother-to-Child HIV Transmission

Figure 5 summarizes trends in MTCT rate for the 6 study countries for the period 105 to 1023.

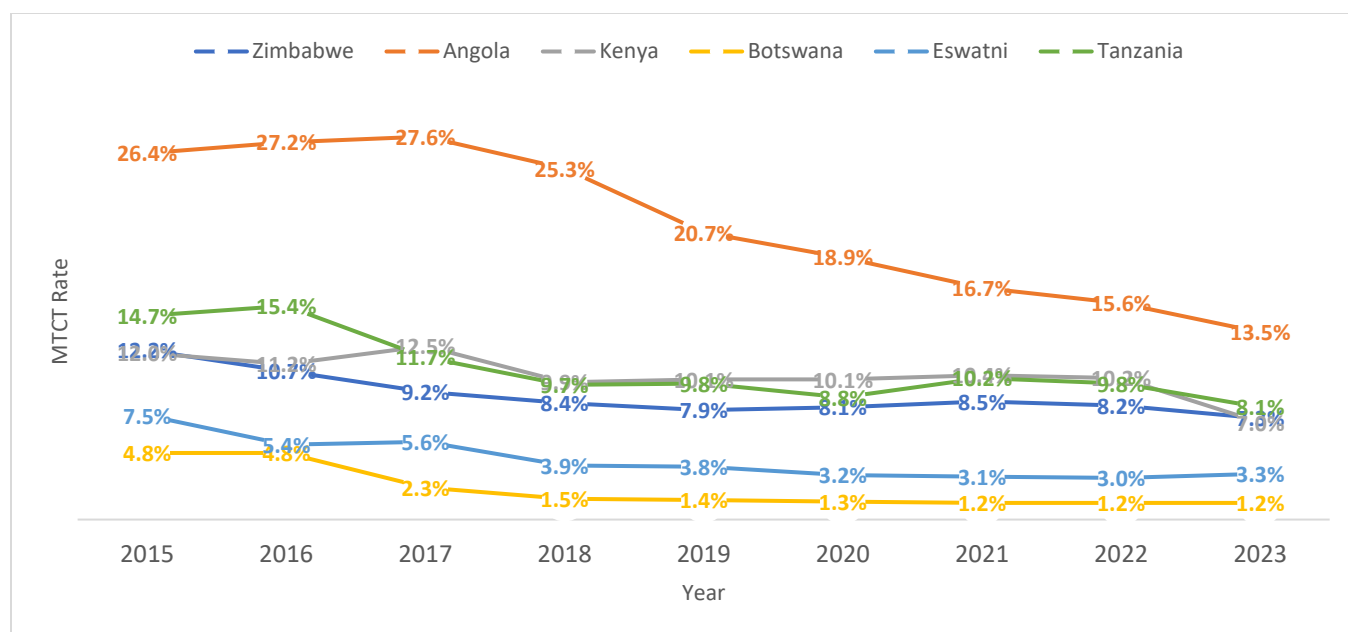


Figure 5: Trends in MTCT rate for the 6 study countries for the period 2015 to 2023 (Source: Global AIDS Monitoring and UNAIDS 2024 estimates)

All the 6 study countries recorded significant declines in their MTCT rate, with notable decline for Angola from 26.4% in 2015 to 13.5% in 2023. However, the MTCT rates for Zimbabwe, Angola, Kenya and Tanzania remain above the EMTCT target of 5% for breastfed countries and 2% for non-breastfeeding countries. Botswana and Eswatini have since achieved the EMTCT target and have managed to sustain this from 2015 and 2018 respectively, despite having relatively high HIV prevalence among pregnant women. Failure to achieve the EMTCT targets among study countries can be attributed to high prevalence of HIV among pregnant and breastfeeding women – 16.7% for Zimbabwe, 13.4% in Angola, 16.4% in Tanzania, 6.1% in Kenya.

3.6. Implementation of national HIV testing guidelines for at-risk infants, and their alignment to WHO-recommended guidelines.

WHO guidelines recommend early infant diagnosis (EID) for all HIV-exposed infants, prioritizing those with known maternal HIV infections or those showing symptoms of HIV disease. Testing should be performed using virological assays (like PCR) in the newborn period, at 1-2 months, and again at 3-6 months, with antibody tests used for those 18 months and older. The testing schedule for HIV-Exposed Infants (HEI) is as follows:

- **Initial test:** Within the first 48 hours of life, if possible.
- **Follow-up tests:** 1-2 months, and again at 3-6 months.
- **Additional testing:** Consider testing at 14 days to potentially detect earlier infections.
- **Final diagnosis:** For breastfeeding infants, follow-up testing continues throughout the breastfeeding period and until a final diagnosis is determined.

- **Symptomatic infants:** Infants with signs or symptoms of HIV infection should be tested immediately.

The recommended HIV testing methods include:

- **Nucleic Acid Amplification Tests (NATs):** Include HIV DNA PCR and HIV RNA assays.
- **Point-of-care (POC) testing:** Provides same-day results, enabling timely clinical decisions.

Key considerations:

- **Provider-initiated testing and counseling:** Recommended for infants with known perinatal exposure or those presenting with HIV-related symptoms.
- **Linkage to care:** Ensuring that infants diagnosed with HIV are linked to appropriate treatment and care services.
- **Training:** Healthcare workers need training on age-appropriate testing algorithms, standard operating procedures, and HIV counseling.
- **Exclusive breastfeeding for 6 months** is recommended for HIV-infected mothers (or those of unknown status) who are on ART and have suppressed viral loads.
- **Appropriate complementary foods** should be introduced after 6 months, while breastfeeding continues for up to 12 months.
- **National guidelines:** National HIV testing and treatment guidelines should be aligned with WHO recommendations.

Countries are expected to adopt the WHO guidelines to their context, ensuring alignment and implementation fidelity. Table 5 summarizes the availability of HIV testing guidelines for at-risk infants for the 6 study countries.

Table 5: Availability of HIV testing guidelines for at-risk infants for the 6 study countries

HIV Testing Guidelines & Alignment to WHO Recommendations	Country					
	Zimbabwe	Angola	Botswana	Eswatini	Kenya	Tanzania
Have guidelines for HIV testing for at-risk infants (Yes/No)	Yes	Yes	Yes	Yes	Yes	Yes
HIV testing guidelines for at-risk infants aligned to WHO recommendations (Yes/No)	Yes	Yes	Yes	Yes	Yes	Yes
Recommend Nucleic Acid Amplification Tests (NATs) i.e., HIV DNA PCR and HIV RNA assays (Yes/No)	Yes	Yes	Yes	Yes	Yes	Yes

Recommend the initial test within the first 48 hours of life (Yes/No)	Yes	Yes	Yes	Yes	Yes	Yes
Recommend follow-up test at 1-2 months after birth (Yes/No)	Yes	Yes	Yes	Yes	Yes	Yes
Recommends follow-up testing throughout the breastfeeding period breastfeeding, and final diagnosis after cessation of breastfeeding/end of MTCT risk period (Yes/No)	Yes	Yes	Yes	Yes	Yes	Yes
POC EID incorporated into the guidelines (Yes/No)	Yes	Yes	Yes	Yes	Yes	Yes
Specific activities for CHEU	No	No	No	No	No	No

All the 6 study countries have guidelines for HIV testing for at-risk infants, and all are aligned to the WHO recommendations (Table 5). Although all countries' guidelines incorporate POC EID, implementation of birth testing using these platforms are at various stages with most countries having piloted, but few have scaled up beyond the pilots. There is no specific guidance on the management of CHEU across study country guidelines. This has potential to hamper initiatives aimed at providing comprehensive services to CHEU, thereby compromising their quality of life.

- All countries indicated that they have POC machines for HIV EID but distribution is limited.

"The country has 67 Point of Care machines, and these may not be able to cater for all facilities to enable testing children for HIV. These machines are mainly found in government-run health facilities, with limited presence in privately owned facilities. Limited availability of testing machines had resulted in the implementation of hub and spoke model where a central location (the hub with testing facilities) serves as a point of connection for multiple peripheral primary health care facilities (the spokes). This model is effective but has challenges of delays and sometimes affecting quality of samples during transportation". (Zimbabwe)

"Point of Care Machines are limited in the country, and they are found at high volume facilities at national, provincial and sometimes district level and low volume facilities rely on transportation of samples which cause some delays in testing and sharing of results". (Botswana)

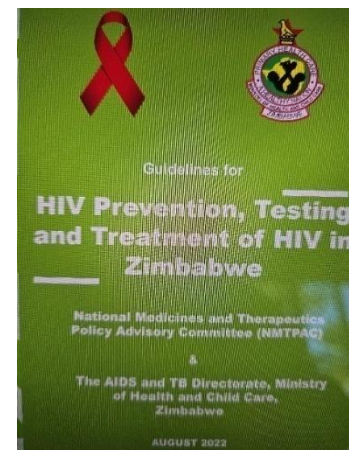
- Where Dried Blood Spot (DBS) samples are used for testing, there are delays in transportation and processing of results hence resulting in missing out some HEI. Also, sometimes the poor quality of DBS samples results in repeat testing, thereby further increasing the turn-around time.

“There are transportation challenges for Dried Blood Spot samples which causes delay in testing and sharing results. Also, when the DBS samples fail to meet the required standards, repeat testing delays sharing of results and following up mother-baby pairs”. (Tanzania)

Detailed analysis of HIV Guidelines

Zimbabwe: The HIV testing component of the national guidelines includes HIV Early Infants Diagnosis (EID) but however, does not specify activities for the management and tracking of the CHEU subpopulation. Key aspects of the guidelines include:

1. **Routine HIV testing for exposed infants:** All infants born to mothers living with HIV should be tested for HIV, ideally using point-of-care (POC) tests at birth and at 6-8 weeks of age.
2. **Dried Blood Spot (DBS) samples:** For infants testing negative at birth, DBS samples are collected at 6-8 weeks for DNA PCR testing.
3. **Confirmatory testing:** Infants with a positive POC HIV test result require a confirmatory sample for POC NAT testing and immediate enrollment in HIV care.
4. **Delayed testing and treatment concerns:** Challenges with turnaround times (TAT) for DBS testing and result delivery can delay treatment initiation, highlighting the need for optimized testing strategies and efficient result reporting.
5. **Addressing refusal of testing:** While parental or caregiver consent is generally required for infant testing, guidelines outline procedures for addressing situations where consent is unreasonably withheld, including involving clinic or hospital supervisors and, in some cases, seeking authorization from a magistrate.
6. **Integration with other services:** The guidelines encourage integrating HIV testing services with other child health services, such as immunization clinics and nutrition programs, to improve access and early identification of HIV-positive infants.
7. **Focus on equity and access:** The guidelines emphasize the importance of reaching all exposed infants, including those in hard-to-reach areas, and addressing barriers to testing and treatment.



8. **Strengthening the cascade of care:** Efforts are focused on optimizing each step of the EID cascade, from testing to treatment initiation, to ensure that HIV-positive infants receive timely and appropriate care.
9. **Training and capacity building:** Guidelines highlight the need for adequate training of healthcare providers on EID procedures, including HIV testing, sample collection, and result reporting.

Botswana

Botswana has integrated HIV clinical care guidelines (2023) that includes among others, HIV early infant diagnosis (EID). Botswana's EID program, introduced in 2005, focuses on identifying HIV-infected infants through DNA PCR testing, typically at 6 weeks of age or their first health-care contact. Key aspects of the program include:

1. **Testing:** HIV-exposed infants are tested for HIV using DNA PCR.
2. **Timing:** The recommended testing window is typically between 4 and 8 weeks postpartum, with a median time to EID testing of 9 weeks.
3. **Dried Blood Spot (DBS) Testing:** The program utilizes DBS samples collected at clinics and transported to a central laboratory, allowing for easier sample collection and transport.
4. **Integration with PMTCT:** The EID program is closely linked with the PMTCT program to ensure a continuum of care for both mother and child.
5. **Targeted Testing:** Botswana has also implemented targeted HIV testing at birth for infants identified as high-risk based on maternal factors (e.g., <8 weeks of ART during pregnancy, lack of maternal HIV suppression).
6. **ART Initiation:** Early ART initiation is crucial, and Botswana has demonstrated success in initiating ART within the first week of life for some infants.
7. **Follow-up:** The program includes follow-up of HIV-infected infants to ensure they receive ART and are retained in care.

Eswatini

Eswatini's 2022 Integrated HIV Management Guidelines provide comprehensive guidance for HIV management, including EID, according to differentiated service delivery. Eswatini's (EID) guidelines recommend testing all HIV-exposed infants, ideally within 4-8 weeks of birth, to identify and initiate treatment for those infected. The guidelines emphasize POC testing for timely results and ART initiation, with a focus on retention in care and viral suppression.

Key elements of Eswatini's EID guidelines:

1. **Early testing:** Testing is recommended within 4-8 weeks of birth using molecular assays like PCR to detect HIV in infants.
2. **POC testing:** POC testing allows for rapid results and timely ART initiation, crucial for improving infant health outcomes.
3. **ART initiation:** Infants testing positive for HIV should be started on ART as soon as possible.
4. **Retention in care:** Ensuring infants remain in care and adhere to ART is vital for achieving viral suppression.
5. **Breastfeeding:** Mothers known to be HIV-infected should exclusively breastfeed for the first 6 months, with complementary foods introduced after that, and continue breastfeeding for 12 months.
6. **Follow-up testing:** Infants should continue to be tested until breastfeeding is stopped, with a final test at least 6 weeks after cessation.

Specific details from the guidelines:

1. **National pilot:** Eswatini implemented a pilot program for HIV testing at birth, with results returned to mothers at community health clinics.
2. **High uptake and ART initiation:** The pilot program in Eswatini showed high uptake of POC birth testing, with almost all HIV-positive infants initiated on ART.
3. **Retention and viral suppression:** A high percentage of infants initiated on ART in the pilot program were retained in care and achieved viral suppression at 6 months.
4. **Strategic placement of POC EID:** Eswatini utilizes strategies to expand access to POC EID testing, including placement at various clinic types and through hub-and-spoke networks.
5. **Addressing gaps:** Eswatini is working to address gaps in HIV testing among specific populations, including children and women, to achieve epidemic control.

Kenya

Kenya's EID guidelines for HIV involve testing HIV-exposed infants at specific ages to enable early diagnosis and treatment. The current guidelines recommend HIV DNA PCR testing at birth (pilot only), 6 weeks, 6 months, and 12 months, with an antibody test at 18 months to confirm HIV status.

Key aspects of the Kenyan EID guidelines:

1. **Testing at Birth (Pilot):** While not yet fully implemented, birth testing (0-2 weeks) is being piloted to assess feasibility and impact.
2. **6 Weeks:** HIV DNA PCR testing is standard at 6 weeks of age, aligning with the immunization program.

3. **6 Months:** HIV DNA PCR testing is also conducted at 6 months.
4. **12 Months:** Another HIV DNA PCR test is performed at 12 months.
5. **18 Months:** A final antibody test is administered at 18 months to determine final HIV status.
6. **ART Initiation:** ART is initiated immediately upon confirmation of HIV-positive status through PCR testing at any age, according to the guidelines.

Important considerations:

1. **Timeliness:** Early and timely testing is crucial for initiating ART before 12 weeks of age, which is associated with better health outcomes for HIV-positive infants.
2. **Integration:** EID services are integrated with other maternal and child health services, such as immunization programs, to improve access and uptake.
3. **Pilot Studies:** Pilot projects are ongoing to assess the feasibility and impact of new testing strategies like birth testing, before wider implementation.
4. **Data Collection:** Routine data collection on EID is essential for monitoring program performance and identifying areas for improvement.

Tanzania

Tanzania's EID guidelines, aligned with WHO recommendations, focus on testing all HIV-exposed infants, regardless of their mothers' ART status. Testing typically occurs at 4-6 weeks, 6 months after breastfeeding, and 18 months for final diagnosis. Despite high PMTCT program enrolment, EID uptake has been lower than desired.

Key aspects of Tanzanian EID guidelines:

1. **Universal Testing:** All infants exposed to HIV, including those whose mothers received ART for PMTCT, should be tested.
2. **Testing Schedule:**
 - a. Virological testing (NAT) is recommended at birth for infants at low risk of HIV acquisition and breastfeeding.
 - b. Testing at 4-6 weeks, 6 months after breastfeeding, and at 18 months is crucial.
 - c. Additional testing is recommended if there's a significant delay between initial tests.
3. **ART Initiation:** Infants testing positive for HIV should be immediately started on ART regardless of WHO staging or CD4 counts.

4. **Breastfeeding Considerations:** If breastfeeding, ongoing testing is recommended every 3 months. Rapid cessation of breastfeeding should be followed by a test at 6 weeks post-cessation.
5. **EID Uptake:** Studies highlight the need to improve EID uptake, particularly at early ages. Factors influencing uptake include knowledge, attitudes, and social support.
6. **PMTCT Integration:** The PMTCT program includes counselling, ART provision, safe infant feeding support, family planning, and referral to care.
7. **Improving EID Uptake**
 - a. Addressing barriers to EID uptake, such as knowledge gaps and social support issues, is crucial.
 - b. Strengthening the integration of EID services into existing healthcare systems is important.
 - c. Ensuring timely return of results and linkage to care are vital components of an effective EID program.

Angola

Angola has an EID program that aims to identify HIV-infected infants as early as possible. Although the country has partially adopted the WHO PMTCT guidelines, it has developed a National Plan for Elimination of MTCT. Angola's EID guidelines for HIV involve using virological testing (HIV DNA or RNA tests) for infants with perinatal HIV exposure, as antibody tests are unreliable due to maternal antibodies. Testing is recommended at birth, 14-21 days, 1-2 months, and 4-6 months, with additional tests during and after breastfeeding. Confirmatory testing is essential for positive results.

Key Aspects of Angola's EID Guidelines:

1. **Virological Testing:** Angola follows the WHO recommendation of using virological assays (DNA or RNA tests) to diagnose HIV in infants, as antibody tests are unreliable due to maternal antibodies.
2. **Testing Schedule:** Infants with perinatal HIV exposure should be tested at birth, 14-21 days, 1-2 months, and 4-6 months
3. **Breastfeeding:** The guidelines state that virological testing should be done every 3 months during breastfeeding and again at 4-6 weeks and 4-6 months after breastfeeding cessation.
4. **Confirmatory Testing:** A positive virological test result should be confirmed with a repeat virological test.
5. **Dried Blood Spots (DBS):** DBS samples are commonly used for EID in Angola due to their ease of collection, storage, and transportation, particularly in resource-limited settings.

6. **Addressing Gaps in Testing:** [The ICAP at Columbia University reported](#) that initiatives like RISE are working to improve early infant diagnosis and treatment adherence through community-driven programs.
7. **Challenges:** EID coverage remains low in Angola, with room for improvement in testing rates within the recommended timeframes.

Important Considerations:

1. **Non-B Subtypes:** Angola, like many other African countries, needs to be aware of the potential for non-B subtype HIV infections and ensure diagnostic assays can detect them.
2. **False Positives:** According to the Clinical Info HIV.gov guidelines, it is crucial to confirm positive results with a repeat test, as false positives can occur.
3. **Point-of-Care (POC) Testing:** POC tests and technologies are being developed and implemented to improve access to EID, especially in remote areas.

3.7. Barriers to HIV testing uptake and referral to care and treatment.

Despite significant progress in scaling up prevention of PMTCT programs in sub-Saharan Africa, numerous barriers continue to impede the early identification, testing, and treatment of HEI. Desk review and KII identified the following barriers across the 6 study countries:

1. Health System Barriers

a. Limited Access to Testing Facilities: In many rural areas across the study countries, access to healthcare facilities capable of conducting EID is limited due to geographical distance, transportation challenges, and under-resourced health systems. For example:

- In **Angola**, health facilities offering EID are concentrated in urban areas, making it difficult for rural populations to access services (*Final Report: An Assessment of National Paediatric Testing Guidelines and Advocacy in the EAC and SADC, 2022*).
- In **Tanzania**, long distances to healthcare facilities and inadequate transport infrastructure are significant barriers to accessing HIV testing and care for HEI (*Bwana et al., 2018*).
- In all the six countries, poverty significantly hinders the continuum of care—from awareness to the access and sustained use of health services. Food insecurity in some communities has adversely affected breastfeeding practices, with some mothers extending breastfeeding beyond 12 months to prevent child malnutrition. However, this practice increases the risk of HIV transmission. Additionally, poverty-related challenges, such as the inability to afford transportation, prevent many mother-baby pairs from attending routine health facility visits and HIV testing during immunization.

“Although health services are free in the country, some mother-baby pairs cannot afford the traveling costs and fail to pay administration costs due to poverty, and this limits them from visiting the health facilities.” (Zimbabwe)

“Health services are free in Botswana, but long distances and traveling costs discourage mother-baby pairs to visits health facilities.” (Botswana)

“Angola is still hit by poverty with about 4 in 10 people living in poverty especially in rural areas. Poverty affects access to health and nutrition programs and results in abscondment of treatment.” (Angola)

“Poverty remains a challenge in some rural parts of Kenya, with approximately a quarter of the population living below the poverty line. This financial hardship limits access to health facilities, as many individuals cannot afford transportation or cover certain medical expenses. (Kenya)

b. Delays in Laboratory Turnaround Times: Centralized laboratory systems and delays in returning test results are common across the study countries, leading to missed follow-up appointments and delayed initiation of ART for infants and children testing positive.

- In **Zimbabwe**, delays in the return of test results from centralized laboratories have been reported as a major barrier to timely initiation of care for HIV-exposed infants (Adetunji et al., 2020).
- Angola, Botswana, Kenya, Tanzania and Zimbabwe reported some samples being transported for over 100km which causes delays in testing and providing results, and the long distances and dirty roads affects the quality of samples during transportation.
- Angola is experiencing significant delays in the transportation, processing, and sharing of HIV testing samples.

“A recent assessment in Angola showed a turn-around time of 45 days for processing HIV testing results from remote rural areas which is caused by long distances and delays in sample processing and sharing the results”. (Angola)

c. Resource Constraints: Insufficient healthcare worker training, understaffing, and shortages of testing commodities are widespread issues.

- **Angola** faces significant health system resource constraints, including a lack of skilled personnel, testing kits, and POC diagnostic tools(Angola Country Operational Plan COP 2021 Strategic Direction Summary, 2021).

- Zimbabwe has high staff attrition due to the searching for greener pastures regionally and internationally leaving staffing gaps at health facilities. The remaining staff are overwhelmed, and this affects HIV testing for children and following up. The same applies for Tanzania and Angola

“Some local health facilities are manned by few staff members who may be overwhelmed, hence this effect delivery of critical services. Some facilities lack staff trained in paediatric HIV counselling, testing, and follow-up due to brain drain, leaving staff who may not be confident or updated on guidelines for managing HIV testing, care and treatment for children”. (Zimbabwe)

“Some health centres in rural areas also called health posts are manned by one person who leaves it closed when off-duty or attending some workshops”. (Angola)

- Although Eswatini and Botswana do not have staffing challenges, the country experiences movement of health staff from remote rural areas to urban centers seeking better working conditions.

“Health care staff mainly move from rural to urban areas, thereby leaving rural health facilities with few staff, but the Ministry of Health makes sure all facilities are well resourced”. (Eswatini)

- Kenya is faced with staffing challenges and most staff in HIV testing care and treatment are supported through donor funding, and the recent work stop order by USAID resulted in laying off most of staff.

“Staff for HIV, TB and malaria programs are mainly supported by donor funding, and the work stop order by USAID resulted in a huge number of staff losing their jobs and this negatively impacted HIV testing programs”. (Kenya)

- All six countries reported running out of laboratory consumables and this delays processing of results.

“Facilities in remote areas are still faced with challenges of testing kits stockout and long turnaround times for DBS which can lead to loss to follow-up of the mother-baby pairs”. (Tanzania)

“In 2024, Eswatini had two months of stockouts and this affected HIV testing across all age groups”. (Eswatini)

2. Sociocultural Barriers

a. Stigma and Discrimination: HIV-related stigma remains a pervasive issue, discouraging mothers from bringing their infants for HIV testing or follow-up care.

- In **Kenya, and Zimbabwe**, mothers have reported fear of stigma and discrimination at health facilities, particularly in communities where HIV remains highly stigmatized (Final Report: An Assessment of National Paediatric Testing Guidelines and Advocacy in the EAC and SADC, 2022). Our key informant reported that:
“Stigma and discrimination continue to prevent some mothers from presenting themselves and their children for HIV testing. Many fear that their own or their child’s HIV status may become known within the community, particularly during outreach testing activities. As a result, mother-baby pairs often miss critical HIV testing opportunities.” (Angola)

b. Cultural Beliefs and Practices: Cultural norms and beliefs about illness and healthcare-seeking behaviors can negatively impact HIV testing uptake.

- In **Angola**, traditional beliefs about childhood illnesses often lead caregivers to prioritize traditional healers over biomedical interventions, delaying infant HIV testing and nearly 53% of women giving birth at home (Angola Country Operational Plan COP 2021 Strategic Direction Summary, 2021).
- Across all countries, there is a common cultural practice where mothers give birth in their parents’ communities to receive support in caring for the newborn.

“Customary, mothers give birth at their parents’ home for care and support and this pose challenges in following up the mother-baby pair when they return to their area of residence”. (Botswana)

- Zimbabwe is characterized by the high mobility of mothers for work and trading, thereby leaving their children with secondary caregivers who may fail to take the children for HIV testing (Mutambara & Naidu, 2023). Also of note is the low level of spouses and gender-based violence:

“In Zimbabwe, high mobility among mother-baby pairs poses significant challenges for tracking and follow-up. Mothers often migrate to marketplaces, farms, and mines in search of seasonal employment, with some crossing into neighboring countries as cross-border traders. As a result, many working mothers leave their children in the care of secondary caregivers, who frequently fail to bring the children for scheduled HIV testing.” (Zimbabwe)

“There is limited male involvement in HIV testing which may result in disapproval of children being tested for HIV. Also, lack of male involvement in HIV testing also results in reinfection of the mother baby pair during breastfeeding”. (Kenya)

“Gender-Based Violence still exist where men deny their families including children from getting tested for HIV. Also, in abusive marriages or relationships, failure of mothers to disclose their HIV status compromise testing of children for HIV.” (Botswana)

- All six countries highlighted certain religious and cultural practices such as the use of holy water and traditional medicine that leads some mother-baby pairs to miss scheduled clinic visits, skip medications, and avoid HIV testing.

“Religious and traditional beliefs in some sections of the population hinders them from adhering to scheduled health facility visits, taking their medication and presenting themselves for HIV testing”. (Tanzania)

- Cases of home deliveries in Angola, Botswana, Eswatini, Kenya, Zimbabwe and Tanzania are still being recorded which result in some children being missed for HIV testing and treatment services.

“There are still home deliveries which are being reported and these result in the children failing to be tested for HIV”. (Zimbabwe)

3. Caregiver-Related Barriers

a. Maternal Knowledge and Awareness: A lack of knowledge about the importance of EID and follow-up care is a significant barrier across the study countries.

- In **Kenya and Zimbabwe**, studies have shown that many mothers are unaware of the need for EID and the testing schedule for HEI, particularly those who have not attended adequate antenatal care (ANC) visits (Katirayi et al., 2020).
- In **Botswana**, despite high ANC coverage, gaps in maternal knowledge about postnatal HIV testing for infants persist (Ramokolo et al., 2019).
- Tanzania reported knowledge gaps among mothers regarding the need for continued HIV testing of their children and maintaining an HIV-negative status. This information gap is largely attributed to limited contact with health facilities following the completion of routine immunizations

“Furthermore, after finishing primary vaccination at 12 months, there is limited interaction between mother-baby pair and the facility which remains a missed opportunity for testing children”. (Tanzania)

b. Caregiver Retention in PMTCT Programs: Retention of mothers and their infants in PMTCT programs is a major challenge.

- In **Tanzania, Zimbabwe, and Eswatini**, high drop-out rates from PMTCT programs have been reported, with many caregivers failing to return for follow-up testing after the initial EID (Teasdale et al., 2022) .
- In Eastern and Southern African block, teenage pregnancy stands at approximately 15%. Young mothers often face challenges, including limited awareness and negative attitudes, which can hinder timely presentation of the mother-baby pair for HIV testing at health facilities (Shibeshi et al., 2024).

“Prevalence of teenage pregnancy in the country is high and these young mothers have negative attitude and lack of knowledge on continuing with PMTCT programs and also presenting their children for HIV testing.” (Eswatini)

4. Programmatic, funding and Policy Barriers

a. Inconsistent Implementation of National Guidelines: Inconsistent implementation at the facility level limits the effectiveness of these programs.

- **Angola** faces significant challenges in aligning its national policies with WHO guidelines due to limited resources and weak health infrastructure (Angola Country Operational Plan COP 2021 Strategic Direction Summary, 2021).
- The health delivery system, specifically HIV testing, care and treatment in almost all the six study countries have been historically relying on donor funding with the US government being the major source of funds. The US work stop order negatively affected HIV testing, care and treatment programs in the region.

“The sudden withdrawal of donor funding especially USAID has profound effects on HIV care and testing in the country as most operations ranging from HIV testing, care and treatment, supporting staff as well as strengthening the monitoring and evaluation systems were through this funding”. (Zimbabwe)

- Withdrawal of funding had negatively affected facility and community testing, laboratory sample processing, community follow up mechanisms and had also weakened the monitoring and evaluation system.
- Eswatini and Botswana had their governments contributing to eMTCT programs and although the USG funding cut affected them, the countries had some sustainability measures through government funding.

“In Eswatini, the government had taken over the supply chain whilst foreign donors mainly offer technical support. Thus, funding cut mainly affected the technical support”. (Eswatini)

- Of the 21 provinces in Angola, 3 are on trial for HIV testing, care and treatment from Global Fund (GF) whilst other funders, mainly USG were taking care of the other 18 provinces. Funding cut by USAID deeply affected the country.

“USG supported projects for HIV testing, care and treatment were in 18 of the 21 districts and ending of funding cycle deeply affected HIV, TB and malaria interventions”. (Angola)

b. Weak Health Information Systems: Inadequate data management systems hinder the tracking of HIV-exposed infants and their linkage to care.

- In **Kenya**, while progress has been made in implementing electronic health record systems, this has not been nationally disseminated, hence reducing its implementation. In most countries in the region, data collection is still through paper based systems regardless of systems developed to respond to COVID-19(Final Report: An Assessment of National Paediatric Testing Guidelines and Advocacy in the EAC and SADC, 2022).
- All the six countries in the study primarily rely on a paper-based monitoring and evaluation system. Although the electronic monitoring and evaluation system had been rolled out, its implementation is limited to a few facilities and is often hindered by power outages and unreliable internet connectivity.

“The country heavily relies on paper-based records although the country had rolled out electronic records called Comprehensive Care and Treatment (CTC) to some facilities, but there is still limited coverage as well”. (Tanzania)

“Angola had adopted DHIS, and this is run by the government. However, some rural facilities are not yet supported, and the system is affected by power outages as well as internet connectivity which disrupts the tracking of mother-baby pairs for HIV testing”. (Angola)

3.8. Promising and Innovative Practices that Monitor HIV Testing Uptake, Referral, and Treatment Initiation and integrate in to health platforms

The review in the study countries identified the following:

Zimbabwe

- Zimbabwe is implementing programs for testing HEI through linking mother-baby pairs from ante-natal care (ANC) to postnatal care.

“Zimbabwe is a breastfeeding country where safe breastfeeding is done coupled with testing of HIV exposed children at 6 weeks, 12 months and 18 months or

thereafter. Prophylaxis is given from birth, and services are integrated with growth monitoring which helps in tracking infants who are HIV exposed to remain uninfected. The final HIV status post 3 months breastfeeding is also determined". (Zimbabwe)

- Through the eMTCT program, Zimbabwe, use unique identification code (UIC) for longitudinal tracking of mother-baby pairs. However, these platforms rely on donor funding and are affected by power outages and internet connectivity challenges and with current funding challenges they are likely to be dropped.
- Introduction of POC testing using the hub and spoke model had gone an extra mile in optimizing HIV testing for children. HIV testing services had been decentralized where a central, well- equipped facility either at district or provincial level supports smaller, peripheral health centres within 10-15 km radius. POC EID machines, such as the GeneXpert platform, have been deployed in high-burden areas, reducing turnaround times from weeks to hours.
- The country is implementing the Expanded Program on Immunization (EPI) and growth monitoring schedules where HIV testing for HEI is riding on. Such programs are being implemented at facility and community level through outreach thereby having a wider coverage.
- The country has strengthened foot soldiers through community health workers (CHW) in rural areas and health promoters in urban areas who make follow ups on mother-baby pairs up to the final HIV status outcome.

"We had incorporated mothers who successfully went through our PMTCT program as village health workers, and they also help to track mother-baby pairs for HIV testing." (Zimbabwe)

- EHR, through generation of reports and use of dashboards had managed to quickly follow-up mother-baby pairs and act rapidly. Although limited specific geographical coverage, in areas where this platform is being used, it is effective.

"The country has rolled out Impilo EHR system that incorporates testing and treatment of HIV exposed and uninfected children. Although coverage of facilities is still below 50%, the system has improved data quality and clinical management of clients because of its in-built prompts which support clinical decision making." (Zimbabwe)

- Synergy between Orphans and Vulnerable Children (OVC) interventions with clinical partners is helping tracking mother-baby pairs in communities and linking them for testing.

- Health talks and riding on community gatherings is being done in communities which is supported by traditional leadership that is village heads, councillors and chiefs. Such platforms have helped to disseminate information and mobilize for outreach services at community level.
- The country had made deliberate efforts to cascade the customized HIV testing guidelines, Operational and Service Delivery Manual for the Prevention, Care and Treatment of HIV to local level so that all health care staff are well versed with guidelines for testing.
- Task shifting has addressed healthcare worker shortages, through training of non-specialist health workers to conduct EID testing (Simmonds et al., 2020).

Tanzania

- Tanzania has moved forward in implementing the CTC which is a national electronic HIV care and treatment data system managed by the Ministry of Health through the National AIDS Control Programme (NACP). The platform tracks people living with HIV (PLHIV) across the care continuum from enrolment, ART initiation, viral load monitoring, to outcomes.
- HIV testing for children managed to ride on other community and facility activities like immunization, community outreach activities and health education platforms. Also, the sharing of reports within these programs had resulted in evidence informed decision making which helps in following up the mother-baby pairs.

*“The Expanded Program on Immunization had increased HIV testing uptake for children who are HIV exposed as this ride on 6 weeks, 12 months, and 18–24 months visits without needing separate appointments at the health facility”.
(Tanzania)*

- Community health worker engagement helps to link mother-baby pairs to facilities for HIV testing, care and treatment. It is through the clinical partners and community health workers that help identify and refer children who are HIV exposed through household visits.

*“The Ministry of Health through community structures is initiating demand creation through information dissemination and riding on routine community activities to reach out mother baby pairs for HIV testing, care and treatment”.
(Tanzania)*

- Outreach services in remote or underserved areas are provided through mobile clinics, community health workers who were provided with bicycles to ensure mobility.

Eswatini

- The country is implementing a mother baby pair initiative where the duo visits the health facility together to avoid numerous appointments.
- Demand creation is done through chiefs' meetings and community gatherings where health education talks are done.
- The country has a robust electronic records monitoring system called Client Management Information System (CMIS) which promote real-time capturing of mother-baby pairs and enables tracking.

"The Client Management Information System (CMIS) is very efficient in capturing and tracking mother-baby pairs. This system had replaced the paper-based system hence promoted efficiency". (Eswatini)

- The country has established DBS transportation system which reduces turn-around time for sample processing.

"The Ministry of Health had invested in sample transportation and real-time sharing of HIV testing results which makes it faster to track mother-baby pairs". (Eswatini)

- Sexual reproductive health rights (SRHR) programs at health facilities are synchronised with mother-baby pair visits to avoid long queues and several appointments. These platforms enable HIV testing for children.

Botswana

- In Botswana, linkages between facility and community implementing partners help to track mother-baby pairs. The country managed to integrate EID into the broader child welfare system has streamlined referral and follow-up processes, improving retention in care (Okello et al., 2021).

"The synergy between facility and community implementing partners and integration of services creates platform for tracking mother-baby pairs and establish their HIV testing outcomes". (Botswana)

- The country had also invested in mentorship programs for health staff on HIV care and treatment of children. POC EID testing has been introduced in select facilities, enabling real-time diagnosis and improving ART initiation rates for infants.

- Botswana has strengthened the use of EHR that is Integrated Patient Management System (IPMS) at national level and Patient Information Management System (PIMS) at regional level which enables tracking of mother-baby pairs.

“Use of the electronic patient monitoring records at national and regional level promotes following up mother-baby pairs and also real-time sharing of HIV testing results”. (Botswana)

- PMTCT information which is also translated to vernacular is shared through print, electronic, and national television and radio so that HIV awareness, health promotion and nutrition information is disseminated to all areas.
- Working with Navigators who are community-based health workers helps in mobilising children for HIV testing and tracking to the outcome.

Angola

- The country had invested in outreach programs for HIV counselling and testing in different communities which are platforms for following up mother-baby pairs.

“Angola as a country has some robust health outreach programs which are supported by the government and the donor community. Such initiatives help in ensuring HIV testing for children and following up”. (Angola)

- The government had adopted DHIS2 which is an electronic records management system, and this enables tracking of mother-baby pairs.
- The presence of community health workers assist in following up mother-baby pairs up to final HIV testing status.
- The country had invested in vehicles and motorcycles for sample transportation to improve efficiency.

“The Government of Angola has invested in vehicles and motorcycles to support the collection of samples and the delivery of results to both local and remote health facilities, helping to reduce the turnaround time for result dissemination.” (Angola)

- Mobile health (mHealth) technologies, such as SMS reminders and mobile applications, have been adopted to improve communication between caregivers and healthcare workers (Essajee et al., 2017).

Kenya

- Availability of customized HIV testing guidelines, SOPs, job aides and mentoring of staff at all levels helps to implement HIV testing programs.

- The country has a well-supported integrated EID and VL website which allows clinicians to access clients' data at the facility level while partners can review important indicators on a dashboard. (Final Report: An Assessment of National Paediatric Testing Guidelines and Advocacy in the EAC and SADC, 2022).

“The use of electronic health monitoring system had gone a long way in real-time tracking of mother-baby pair up to the final HIV status (Kenya)”

- Kenya has strong clinical and community synergy as well as stakeholders' engagement for HIV testing. There are also psycho-social support groups for following up mother-baby pairs in the community to reduce stigma.
- Integration of HIV testing, referral, and treatment services into other health services has ensured that HIV-exposed infants are identified and monitored at key touchpoints, such as immunization visits, growth monitoring, and postnatal care.

“In Kenya, the government with support from funding partners provides mentorship and supportive supervision to health workers to strengthen the delivery of HIV testing, care, and treatment and integration of the services nationwide.” (Kenya)

4.0. Study Limitations

This study is subject to some limitations. First, the only standard and reliable health service uptake data available to researchers were the UNAIDS annual HIV estimates and data in Global AIDS Monitoring (GAM) report for the period through 2023; 2024 data will only become available in July 2025. This limited to breadth and depth of analysis that could be conducted, including generating care cascades for individual countries and the block. Second, in-depth interviews could not be conducted across all countries due to various reasons including limited buy-in into the study by target national HIV program managers. However, despite these limitations, study results remain valid and relevant to HIV exposed but uninfected children in the study countries as well as east and southern African region.

5.0. Conclusion

- All study countries except Angola recorded significant increase in the proportion of pregnant women knowing their HIV status, as well as HIV positive pregnant women on life-long ART between 2015 and 2023
- Most of the study countries recorded significant increases in HIV exposed infants who had a virological HIV test within 2 months of birth, with notable increases in Tanzania, Zimbabwe, Botswana, AND Kenya; Eswatini however recorded a significant decline, with Angola's EID coverage remaining below 15%.

- Overall, ART coverage among children living with HIV improved significantly across all study countries except Angola whose coverage remained below 30%.
- All the 6 study countries have guidelines for HIV testing for at-risk infants, and all are aligned to the WHO recommendations, however, they do not have specific activities for CHEU.
- Critical barriers to HIV testing uptake and referral to care and treatment among CHEU include limited access to health facilities, inadequate and high health staff turnover, inadequate testing facilities, shortage of regimens, stigma and discrimination and lack of knowledge by mothers on maintaining HIV negative status among CHEU.
- Promising and innovative practices that monitor HIV testing uptake, referral, and treatment initiation include use of point-of-Care (POC) Early Infant Diagnosis (EID) testing, integration of paediatric HIV services into maternal and child health systems, use of electronic health records to track mother-baby pairs, and presence of community follow-up mechanisms.

6.0. Recommendations

Because of our findings, we recommend strengthening EID and monitoring CHEU through the following actions:

1. Ministries of health should develop comprehensive, context-specific packages for CHEU, as the reviewed guidelines were generic and not addressing specific challenges for CHEU. These packages should include growth and developmental monitoring, nutritional support, psychosocial care, routine re-testing, immunization follow-up, and caregiver education. A multisectoral approach is needed, leveraging available health, nutrition, and social protection data to inform service delivery.
2. Implement task-shifting for POC EID Testing, thus training non-laboratory personnel, such as community health workers (CHWs) and primary counselors, to operate POC EID machines. This approach can free up skilled healthcare workers for more complex tasks. Train CHWs to monitor CHEU children for growth, nutrition, and developmental milestones while conducting EID testing to ensure holistic care.
3. Ministries of health to strengthen the integration of CHEU services within existing maternal, newborn, and child health (MNCH), HIV, nutrition, and immunization platforms to avoid multiple appointments for mother-baby pairs. Utilize key contacts such as immunization visits to provide EID testing, deliver results, and offer counseling. This also presents an opportunity to provide CHEU with nutritional support, growth monitoring, routine vaccinations, and preventive care alongside HIV testing.
4. Policymakers should advocate for sustainable funding strategies for paediatric HIV care and treatment, to address for abrupt funding interruptions, as has happened with the Trump Administration. Governments should actively participate in Public-

Private partnerships and integrate CHEU priorities into national HIV strategies and health budgets. Develop dedicated policies addressing the unique health needs of CHEU, including nutrition, infection prevention, caregiver education, and developmental care.

5. Increase community sensitization efforts to promote the importance of EID and follow-up care. Engage people living with HIV (PLHIV) and mentor-mothers to advocate for services, reduce stigma, and support peer education. Use community platforms to educate caregivers of CHEU on the importance of regular health monitoring, growth and nutrition surveillance, and early stimulation, while addressing stigma and gender-related barriers to care.
6. Scale up digital systems such as electronic health records (EHRs), SMS reminder systems, and mobile health applications, to improve the tracking of mother-baby pairs and reduce loss to follow-up (LTFU). CHEU should be explicitly included in digital tracking platforms. Develop comprehensive databases to monitor CHEU growth, vaccination status, scheduled follow-up visits, and service uptake. Digital dashboards should also support program monitoring at facility and district levels.
7. Health ministries should invest in infrastructure and human resources to expand access to HIV testing, treatment, and follow-up services. This includes training healthcare providers, reducing stigma and discrimination associated with HIV, promoting inclusive, gender-sensitive, and youth-friendly approaches. Ensure equitable access to healthcare services and commodities for all women and children, regardless of their socioeconomic status, geographic location, or age.
8. In view of the funding cuts by the United States government for HIV prevention, care and treatment, including for CHEU, health ministries should integrate HIV management into other services to reduce stand-alone programs that countries are not able to sustain.

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