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Implementation of tuberculosis (TB) services for children living with HIV in US President's Emergency Plan for AIDS Relief-supported programs in 16 high TB/HIV-burden countries in sub-Saharan Africa

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Conflicts of interest

There are no conflicts of interest.

Abstract

Introduction: We assessed implementation of tuberculosis (TB) services among children living with HIV (CLHIV) (<15years) in 16 African countries supported by US President's Emergency Plan for AIDS Relief (PEPFAR) between October 2018 and September 2022 [fiscal year (FY) 2019–FY2022).

Methods: We reviewed PEPFAR TB indicators describing symptom screening, treatment initiation, and TB preventive treatment (TPT) initiation and completion among CLHIV. We describe performance of these measures at semi-annual time points from FY2019 to FY2022 with stratification by age, sex, geographic region, and antiretroviral therapy (ART) status for FY2022.

Results: During FY2019–FY2022, the proportion of CLHIV with a positive TB symptom screen was low, ranging from 2.5 to 4.1%, while TB treatment initiation among those who screened positive fluctuated from 19 to 43%. Similarly, TPT initiation among CLHIV newly initiating ART fluctuated during this time, ranging from 13 to 37%, while TPT completion rose from 55 to 85%. In 2022, 80% of CLHIV were screened for TB and 3.6% had a positive symptom screen. Among those, 15% of CLHIV already on ART and 40% of CLHIV newly initiating ART were started on TB treatment. In 2022, among CLHIV newly initiating ART, 37% started TPT within 6 months, and 84% completed the full course of TPT.

Conclusion: TB screening and screening positivity were suboptimal. CLHIV starting TB treatment following positive symptom screen was higher than expected, especially among those newly initiating ART. Most CLHIV did not start TPT within 6 months of ART initiation. These findings suggest that programs are missing opportunities to diagnose and prevent TB in CLHIV.

Keywords

children; HIV; pediatric; tuberculosis; tuberculosis case finding; tuberculosis preventive therapy

Introduction

In 2023, an estimated 1.25 million children (aged <15 years) developed tuberculosis (TB) globally, while 191 000 died from this preventable, curable disease [1]. An estimated 73% of child deaths from TB were among children under 5 years [1], while 96% were among those who were never treated [2]. There are no published global estimates for the burden of TB among children living with HIV (CLHIV), but 31000 CLHIV (<15 years) died from TB among 76000 AIDS-related child deaths in 2022 [1,3].

The disproportionate burden of disease and death among children is due to unique immune system factors and clinical presentation. Children, especially those under 2 years, malnourished, or living with HIV, are more likely to progress rapidly from TB infection to severe manifestations of TB disease [4–7]. CLHIV are at increased risk of developing TB and experiencing poor outcomes, especially if they're newly initiating antiretroviral therapy (ART) [7–9]. Diagnosing TB among children can be challenging, leading to delays in treatment and higher likelihood of death from TB [1,4,10–13]. This has led to substantial pediatric TB case-finding gaps: in 2023, only 48% of children under 5 years and 61% of

children 5–14years with TB disease were diagnosed compared with 77% of adults (>15 years) [1].

Routine, systematic TB screening and child-focused case-finding efforts in settings where children seek care can facilitate rapid linkage to TB diagnosis and treatment services or TB preventive treatment (TPT) whenever appropriate [1,13–17]. The US President’s Emergency Plan for AIDS Relief (PEPFAR) is the largest platform providing pediatric TB/HIV services globally, and has prioritized systematic TB screening, diagnosis, prevention, and treatment among all people with HIV (PWH), including CLHIV [18]. According to PEPFAR guidance, systematic TB screening for all PWH should occur at every clinical encounter. If a child screens positive, they should receive a diagnostic evaluation for TB. If they screen negative or have TB ruled out after screening positive, they should receive TPT at least once [18,19]. CLHIV newly initiating ART who screen negative for TB should start TPT within 6 months. CLHIV less than 10 years of age are considered TB screen-positive if they present with any one of the following: current cough; fever; poor weight gain; night sweats; or close contact with a TB patient. This screen is aligned with global guidance, with the addition of night sweats [1]. These symptoms are common to childhood illnesses, thus most children who screen positive will not be diagnosed with TB; a diagnosis of TB requires further clinical, radiological, and/or bacteriologic evaluation [19–21].

Better understanding the performance of TB services can inform improvements to the TB/HIV response and reduce the burden of TB among children. The aim of this analysis is to review the performance of TB services for CLHIV aged under 15 years in 16 high-burden TB/HIV countries supported by PEPFAR between October 2018 and September 2022 [fiscal year (FY) 2019–FY2022] using standardized, routinely reported PEPFAR Monitoring, Evaluation, and Reporting (MER) indicators [22]. As this period encompasses the COVID-19 pandemic, this analysis may provide insight into the performance of PEPFAR-supported pediatric TB services during significant health system disruptions that impacted TB programs worldwide [23,24].

Methods

Data source, study population, and setting

PEPFAR MER data are routinely collected by implementing partners and reported in aggregate with stratifications by age, sex, and ART status, among others. Some indicators assess repeated measures (e.g. TB screening and screening outcome), where many, but not all, individuals will be included from one reporting period to the next (Table 1). Others are one-time assessments (e.g. initiation and completion of TPT). The indicators included in this analysis were reported semi-annually by PEPFAR-supported treatment sites [25] in 16 countries in central/west, east, and southern sub-Saharan Africa during a 4-year period: 1 October 2018 to 30 September 2022 (corresponding with FY2019–FY2022) (Table 1). All 16 countries are considered high-burden for HIV-associated TB (high TB/HIV burden) [1]. Countries were categorized as follows, consistent with standard sub-regional categorizations: central/west Africa (Cameroon, the Democratic Republic of the Congo, and Nigeria); east Africa (Ethiopia, Kenya, Tanzania, and Uganda); and southern Africa (Botswana, Eswatini, Lesotho, Malawi, Mozambique, Namibia, South Africa, Zambia, and

Zimbabwe). We analyzed MER data describing TB services provided to CLHIV on ART aged under 15 years served at PEPFAR-supported HIV clinics.

Measures

We describe six TB indicators (adapted from PEPFAR MER guidance [22]) to describe the pediatric TB/HIV clinical cascade (Table 1 and Fig. 1) including TB screening, treatment and prevention indicators among CLHIV on ART. Table 1 details reporting frequency, numerator, and denominator for each indicator described.

Tuberculosis screening and treatment: TB screening and treatment indicators include TB screening coverage, TB screening positivity, and TB treatment initiation among those screening positive (Table 1, indicators 1–3). Programs set a goal to screen 100% of all PWH at each clinical encounter. Data on screening are reported as the number of PWH receiving at least one screening for TB during each semi-annual reporting period [18]. The expected proportions of PWH screening positive for TB are 15% for those newly initiated on ART (within the previous 6 months) and 5% for those already on ART [18]. Screening coverage is not described specifically by ART status in this analysis; the indicator describing the number of PWH in care (TX_CURR, see Table 1) is not stratified by ART status, rather capturing both those already on and newly initiating ART. TB treatment initiation is used as a proxy for TB diagnosis because lack of age-disaggregated data for the full TB diagnostic cascade precludes assessment of additional MER indicators, including whether a specimen was sent for testing, diagnostic test type used, and diagnostic test result. The TB treatment initiation rate is, therefore, calculated as the proportion initiating TB treatment among those who screen positive. This metric may provide valuable information about screening quality and diagnostic evaluation performance, as only a small proportion of children screening positive would be expected to be diagnosed and treated for TB.

Tuberculosis prevention: TB prevention indicators described for CLHIV on ART included TPT initiation and completion among CLHIV newly initiated on ART, and TPT completion among all CLHIV on ART (including both newly initiated and already on ART) (Fig. 2, indicators 4–6). TPT initiation is not described specifically for CLHIV already on ART, as MER does not account for those who have previously completed TPT and are thus ineligible for TPT at a specific time point, therefore, we cannot delineate which CLHIV are eligible for TPT among those who are already on ART. Nearly all those newly initiated on ART who have TB ruled-out will be eligible for TPT, and all CLHIV who initiate TPT should complete it [18].

Data analysis

We reviewed and described the performance of each of these MER TB indicators in FY2022 and across the 4-year analytic period (FY2019–FY2022) in semi-annual intervals for the 16 included countries. For FY2022, we stratified variables by geographic region, sex, and ART status wherever possible. Across the 4-year analytic period, we describe performance over time and by region. Because PWH should receive at least one TB screening during each semi-annual reporting period, most of the same individuals screened for TB in one semiannual reporting period would be screened again the following period. In addition,

the symptoms used for TB symptom screening are common to other childhood illnesses and opportunistic infections affecting PWH [21], and it is possible some individuals screen positive in multiple reporting periods. Therefore, rates for screening coverage and yield, as well as TB treatment initiation among those screening positive, are presented as the annual mean value of two semi-annual reporting periods. Conversely, TPT initiations and completions were summed across semiannual reporting periods, as these values represent unique individuals (i.e. CLHIV newly starting TPT). Group stratifications included sex, geographic region (central or west Africa, east Africa, or southern Africa), and ART status (newly initiated or already on ART), wherever applicable. In addition, we conducted a supplementary analysis reviewing performance of the six MER TB indicators during FY2022 between CLHIV aged younger than 15 years and adolescents and adults living with HIV aged at least 15 years.

Sites reporting illogical values for any indicator, such as a numerator greater than or equal to 110%, were excluded from the analysis for that time period. Data from Kenya were excluded for the TB screening, screening-positivity, and TB treatment initiation indicators for FY2022 due to a known data quality issue. TPT initiation data are not included for the period October 2018–March 2019 because the denominator for this indicator is calculated from data collected before October 2018, which was not included in this analysis.

All analyses were conducted using R software and Microsoft Excel. This analysis is purely descriptive and includes no tests of statistical significance. This activity was reviewed by the US Centers for Disease Control and Prevention (CDC), deemed not research, and was conducted consistent with applicable federal law and CDC policy. (See 45 C.F.R. part 46, 21 C.F.R. part 56; 42 U.S.C. §241(d); 5 U.S.C. §552a; 44 U.S.C. §3501 et seq.)

Results

Tuberculosis screening and treatment

In FY2022/Quarter Four (Q4), 524543 CLHIV were in care in the 16 countries in PEPFAR-supported programs. An average 80% of CLHIV in FY2022 were screened for TB using the standard symptom screen, of whom 3.6% screened positive. Among those screening positive, 20% initiated TB treatment (Table 2). Screening coverages in central and west Africa (93%) and east Africa (95%) were higher than in southern Africa (71%). East Africa had the highest proportion of CLHIV screening positive (4.3%). The proportion of CLHIV who were initiated on TB treatment after screening positive for TB varied across regions (east Africa 25%, southern Africa 18%, and central/west Africa 14%). Among CLHIV newly initiated on ART and screened for TB, 11.5% screened positive and 40% of those screening positive were initiated on TB treatment. Comparatively, 3.1% of those already on ART screened positive, and 15% of those screening positive initiated TB treatment. Screening coverage rates were similar among PWH (≥ 15 years) and CLHIV (82 and 80%, respectively; Table 3). Compared to older PWH, CLHIV had higher screening positivity (3.6 vs. 2.5%) and lower TB treatment initiation rates among those screening positive (20 vs. 23%).

Between FY2019 and FY2022, semiannual TB screening coverage among CLHIV fluctuated between 70 and 81% and TB screening positivity between 2.5 and 4.1% (Fig. 2a). TB treatment initiation among all CLHIV screening positive fluctuated substantially over the 4-year time period, ranging from 19 to 43%. Performance over time for TB screening positivity, screening coverage, and treatment initiation stratified by region is available in Fig. 2b–d.

Tuberculosis preventive treatment

In FY2022, 37% of CLHIV newly initiated on ART started TPT within 6 months of initiating ART (Table 4). CLHIV in east African countries had lower TPT initiation rates (23%) than those in southern (40%) and central/west African countries (44%). In FY2022, approximately 86% of all CLHIV on ART who initiated TPT in the previous 6-month reporting period completed it. TPT completion among all CLHIV on ART varied by geographic region, from 83% in southern Africa to 92% in central/west Africa. TPT completion rates among CLHIV who were newly initiating both ART and TPT (84%) were similar to TPT completion among all CLHIV on ART (86%). The TPT initiation rate among CLHIV newly on ART was 37% in FY2022 compared to 59% among older PWH newly on ART (Table 3). TPT completion for both PWH and CLHIV newly on ART was 84%.

Between FY2019 and FY2022, TPT initiation among CLHIV newly initiating ART steadily increased over time, from 13% in FY19/Q4 to 37% in FY22/Q4 (Fig. 3a). During FY2019–FY2022, TPT completion rates among all CLHIV on ART ranged from 77 to 86%. Cumulatively, from FY2019 to the end of FY2022, 344 177 CLHIV (newly and already on ART) initiated TPT, of whom 82% (281 875) completed TPT. Performance over time stratified by region for these three indicators is available in Fig. 3b–d.

Discussion

Among more than 500 000 CLHIV served in PEPFAR-supported HIV clinics in each semiannual period, linkage to diagnostic and preventive TB services was suboptimal but showed improvement over time. Reported TB screening coverage and screening positivity among all CLHIV on ART did not meet expectations. Nearly two-thirds of CLHIV newly initiated on ART did not start TPT within 6 months of starting ART across all years, though performance improved in FY2022/Q3–Q4 for southern and central/west Africa. In comparison to these notable gaps, a majority of CLHIV initiated on TPT completed it across regions but fell short of the goal of 100% completion [18]. It is notable that TB screening coverage, TPT initiation, and TPT completion were maintained or rose steadily in all regions during the height of the COVID pandemic.

Tuberculosis screening and treatment

TB screening and evaluation for TB among CLHIV was overall sub-optimal: while east and central/west Africa reported very high screening coverage, the proportion screening positive was below expected thresholds across time periods and regions. A study reviewing records from 2014 to 2017 found that when TB symptom screening is applied rigorously and consistently, 15% of all CLHIV (regardless of ART status) screen positive for TB in

clinic settings similar to those included in our analysis [21]. A separate, multisite study from 2019 to 2021 reported 6% screen-positive rate among CLHIV (already on ART/established in care) being routinely screened in healthcare settings in the Catalyzing Pediatric TB Innovations (CaPTB) project, which also included settings outside of sub-Saharan Africa [26,27]. Lower-than-expected proportion screening positive in our analysis (3.1% (already on ART) – 11.5% (newly initiating ART)) may indicate low-quality, inconsistent, or poorly reported TB symptom screening.

All regions had high proportions of TB diagnoses/treatment initiations among those who screened positive for TB, regardless of ART status. Because symptoms used to screen for TB are also common in other childhood illnesses and opportunistic infections affecting CLHIV, most children screening positive are not expected to be diagnosed with TB. The studies mentioned above found that 3.5–14% of CLHIV with a positive TB symptom screen were ultimately diagnosed with TB [21,26,27]. Of note, in these two studies, a relationship between screening positive and being diagnosed with TB was evident: a higher screen-positive rate (15%) coincided with lower TB diagnosis among those screen-positive (4%) [21], while a lower screen-positive rate (6%) coincided with higher diagnosis among those screen-positive (14%) [21,26]. A more rigorously applied symptom screen will refer more children for evaluation than ultimately have disease, but it will also ensure those with less severe or obvious TB disease are appropriately evaluated [18]. Both studies demonstrated higher screen-positive rates and lower diagnosis/treatment among those screening positive than in PEPFAR-supported settings included in this analysis.

The proportion of CLHIV newly initiating ART who were initiated on TB treatment following a positive TB symptom screen (40%) was high compared with previous findings [21,25]. This may indicate poor screening or reporting practices and missed opportunities to detect TB among this population. This finding may also indicate truly high incidence of TB among CLHIV newly initiating ART, but higher proportions of children would still be expected to screen positive if this were the case. Especially for southern and west/central Africa, trends over the analytic period show the proportion of children initiated on TB treatment appeared lower when screening positivity was higher while the proportion initiated was higher when screening positivity was low. This may be an effect of seasonal peaks in other childhood illnesses with overlapping clinical presentation or suggest that during low screen-positive periods, only the sickest children were being referred for diagnostic evaluation. Further study is warranted to better understand the quality and fidelity of TB screening, expected yield in various settings among CLHIV newly initiating and already on ART, as well as the diagnostic tools employed to make a treatment decision among CLHIV in PEPFAR-supported programs. Globally, new screening and diagnostic approaches for children and adolescents have been recommended, including use of child-friendly specimens, rapid diagnostic tests, and integrated treatment decision algorithms to improve pediatric TB diagnosis [19,28].

Tuberculosis preventive treatment initiation and completion

TPT initiation early in the course of ART, once TB disease is ruled out, is important to prevent TB disease morbidity and mortality. This is especially true for younger CLHIV,

who are often severely immunosuppressed at the time of HIV diagnosis and ART initiation [8,9,29]. Less than half of CLHIV newly initiating ART during FY2019–FY2022 were initiated on TPT within the same reporting period of initiating ART. Timing of ART and/or TPT initiation may be appropriate but may fall in different semiannual reporting periods, leading to artificial underreporting of some TPT initiations. Nevertheless, our findings are consistent with previously published findings, which demonstrated that from 2015 to 2019, 43% of CLHIV on ART in western Kenya initiated TPT within the first 6 months of ART, but in total, 68% of CLHIV on ART initiated TPT regardless of the time on ART [30]. A delay in TPT initiation following ART initiation may occur if there are supply chain issues, or if a clinician has concerns regarding high pill burden, side effects, presumptive TB disease, or treatment for an acute illness [30]. Our findings demonstrated that PWH 15 years of age and older also experienced suboptimal TPT initiation rates during that period, but rates were still considerably higher (by approximately 20%) than among CLHIV, highlighting further the global gap in TPT uptake among children compared to adults [31,32].

Approximately 85% of CLHIV who initiated TPT in FY2022 completed the course, and completion rates between CLHIV and PWH (≥ 15 years) were similar. Completion rates increased over time but did not exceed 86%. Literature describing factors associated with TPT completion in CLHIV is sparse. One study assessed factors among adolescents and young adults living with HIV in Kenya and determined those on ART longer (1–2 years) were more likely to complete TPT than those new on ART (<1 year) [33]. We did not find such a difference in our analysis, though ‘newly initiated on ART’ is defined by MER guidance as within 6 months instead of 1 year. TPT completion rates may improve as shorter and more tolerable regimens (e.g. 3HP) become more widely available for CLHIV [34]. Nevertheless, individualized preferences and challenges will need to be accounted for to assure TPT adherence and completion [35,36]. Overall, our analysis shows that, from FY2019 through FY2022, more than 280 000 CLHIV completed TPT in the 16 high TB and TB/HIV-burden countries.

Limitations

Several limitations related to MER data collection and reporting hindered the interpretation of our findings. First, variabilities in national guidance, interpretation of reporting requirements, and available tools and diagnostics may impact program function and recording and reporting practices across countries. We reported findings based on established PEPFAR guidance and data available in MER. Second, limitations of MER prevent full assessment of the pediatric TB/HIV cascade, including lack of age-stratification of diagnostic evaluation indicators (e.g. specimen sent for lab testing and test result returned positive) and lack of more finely delineated age stratifications, such as by 5-year increments, for TB screening, treatment, and prevention variables. Third, underreporting and inconsistencies in reporting of TB MER data may have occurred and vary across PEPFAR-supported sites, which may impact our findings. Exclusion criteria were applied to mitigate the impact of illogical values, which resulted in datapoints being censored, particularly in the TB prevention cascade. While retaining these values may have artificially inflated performance, censoring them may also have impacted findings. Correlation may

exist between quality of reported data and service delivery; facilities excluded due to data quality issues may have been more likely to also exhibit suboptimal service delivery. Fourth, patient-level data are not reported to PEPFAR, and MER data are based on aggregate values. Therefore, it is not possible to determine whether the same patient cohort is represented at every stage of the TB treatment or prevention cascades. Fifth, our findings are not generalizable to CLHIV or children with TB outside the PEPFAR-supported sites from the 16 countries reviewed in this analysis. Sixth, no causal or associative inferences can be made from this purely descriptive analysis for which no tests of significance were performed. Mitigation measures taken during the COVID-19 pandemic, which began in mid-FY2020 in sub-Saharan Africa, may have resulted in interruptions to care impacting performance during that time.

In conclusion, in this analysis of PEPFAR data from 16 high-burden countries, we reviewed implementation performance of TB/HIV services for CLHIV. While gradual progress is evident, an achievement amidst the disruptions of the COVID pandemic, substantial gaps persist in the delivery of TB screening and prevention services for CLHIV across the 4-year period. Closing these gaps and ensuring CLHIV receive regular, high-quality TB screening and diagnosis, and prompt prevention services are key to reduce their risk of TB-related morbidity and mortality. Lastly, TB reporting gaps persist, particularly with regard to age-specific data and diagnostic evaluation. The limited data available for children under 5 are notable given their heightened risk. Enhancing implementation of pediatric TB/HIV services can help ensure children affected by HIV and TB are not left behind.

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data available on request from the authors.

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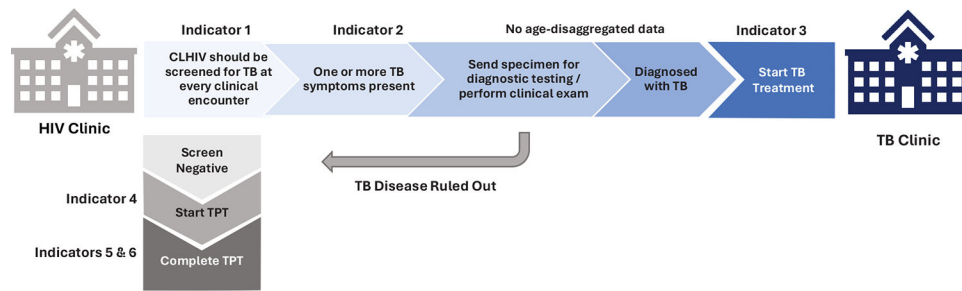


Fig. 1. Tuberculosis care cascade from HIV clinic entry point for children living with HIV*.

*TPT initiation only described for those newly initiated on ART (measure #4) while TPT completion described for those newly initiated (measure #5) and all on ART (measure #6). ART, antiretroviral therapy; TPT, tuberculosis preventive treatment.

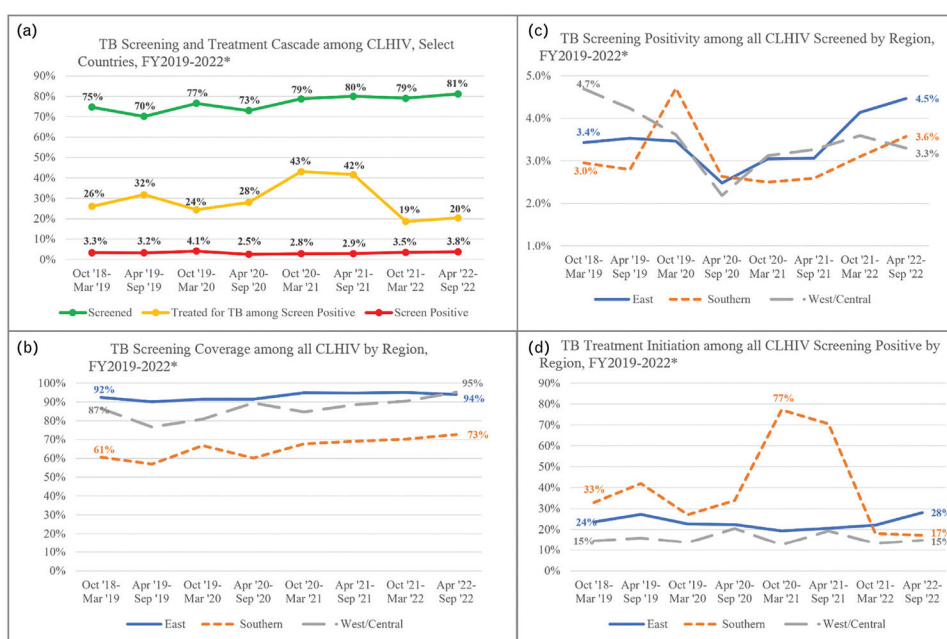


Fig. 2. Tuberculosis screening and treatment cascade among children living with HIV (<15 years old) in the US President's Emergency Plan for AIDS Relief-supported sites, October 2018–September 2022 (FY2019–FY2022).

*CLHIV, children living with HIV, FY, fiscal year; PEPFAR, US President's Emergency Plan for AIDS Relief. *FY2022 excludes data from Kenya.

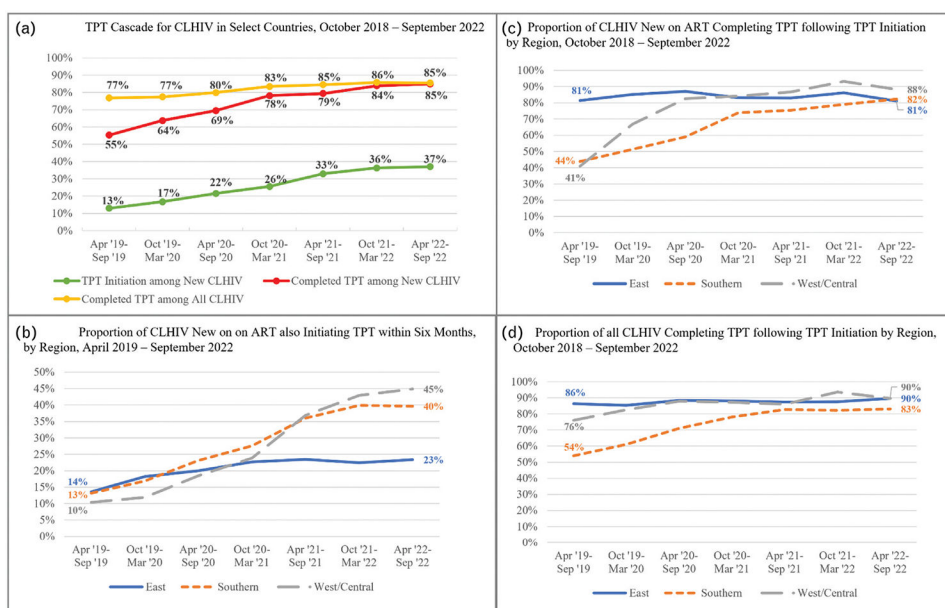


Fig. 3. Tuberculosis preventive treatment indicators among children living with HIV (<15 years old) on antiretroviral therapy in PEPFAR-supported sites, October 2018–September 2022 (FY2019–FY2022).

*ART, antiretroviral therapy; CLHIV, children living with HIV; FY, fiscal year; PEPFAR, US President's Emergency Plan for AIDS Relief; TPT, tuberculosis preventive treatment.

*TPT initiation data not included for FY19/Quarter two (October 2018–March 2019)

because the denominator for this indicator is calculated from data collected before October 2018. Data collected prior to October 2018 was not included in the analysis.

Table 1.
Description of HIV/tuberculosis monitoring, evaluation, and reporting indicators or measures.

Indicator	Reporting frequency	Numerator (MER indicator symbol)	Denominator (MER symbol)
1. TB screening coverage	Semiannual (6 months)	CLHIV on ART who were screened for TB with a symptom screen at least once during the semiannual reporting period (TX_TB_D)	CLHIV receiving ART during the semiannual reporting period (TX_Curr)
2. TB screening positivity	Semiannual (6 months)	CLHIV on ART who screened positive for TB at least once during the semiannual reporting period (TX_TB_D_Pos)	CLHIV on ART screened for TB with a symptom screen at least once during the semiannual reporting period (TX_TB_D)
3. TB treatment initiation among screened positive ^a	Semiannual (6 months)	CLHIV on ART who were started on TB treatment during the semiannual reporting period (TX_TB_N)	CLHIV on ART who screened positive for TB at least once during the semiannual reporting period (TX_TB_D_Pos)
4. TPT initiation among CLHIV newly initiated on ART	Semiannual (6 months)	CLHIV newly initiated on TPT who were initiated on ART during the previous reporting period (TB_Prev_D_New)	CLHIV newly initiated on ART who were not started on anti-TB treatment in the same semi-annual reporting period (i.e. had TB 'ruled-out') (TX_New - TX_TB_N_New)
5. TPT completion among CLHIV newly initiated on ART	Semiannual (6 months)	CLHIV newly initiated on TPT who were initiated on ART during the previous reporting period and completed a full course of TPT (TB_Prev_N_New)	CLHIV newly initiated on TPT who were initiated on ART during the previous reporting period (TB_Prev_D_New)
6. TPT completion among CLHIV on ART	Semiannual (6 months)	CLHIV on ART who were initiated on TPT during the previous reporting period and completed a full course of TPT (TB_Prev_N)	CLHIV on ART who were initiated on TPT during the previous reporting period (TB_Prev_D)

ART, antiretroviral therapy; CLHIV, children living with HIV; MER, monitoring, evaluation, and reporting indicators; TPT, tuberculosis preventive treatment.

^aThis measure is a proxy created by the authors from two indicators (TX_TB_N and TX_TB_D_POS) routinely reported by partners to address the noted gaps in age-disaggregated diagnostic data for CLHIV.

Table 2.

Tuberculosis screening and treatment indicators among children living with HIV (<15 years old) in US President's Emergency Plan for AIDS Relief-supported sites, October 2021–September 2022 (FY2022)^a.

	(1) TB screening coverage among all CLHIV on ART	Proportion screened	(2) TB screening positive among all CLHIV on ART	Proportion screened	(3) TB treatment initiation among screened positive ^b Proportion initiated on treatment among CLHIV screened positive
Sex					
Male	80%		3.7%		19%
Female	80%		3.6%		20%
Geography ^c					
Central/West Africa	93% (92–96%)		3.4% (2–4.2%)		14% (6–32%)
East Africa	95% (92–98%)		4.3% (1.6–6.3%)		25% (24–42%)
Southern Africa	71% (0–97%)		3.3% (0.6–18.1%)		18% (0–60%)
ART status					
Newly Initiated	Not calculated ^d		11.5%		40%
Already on ART	Not calculated ^{c,d}		3.1%		15%
Total	80%		3.6%		20%

These data are presented as annual means of two semiannual reporting periods for fiscal year (FY) 2022. ART, antiretroviral therapy; CLHIV, children living with HIV; TPT, TB preventive treatment.

^aExcludes data from Kenya.

^bThis measure is a proxy created by the authors from two indicators (TX_TB_N and TX_TB_D_POS) routinely reported by partners to address the noted gaps in age-disaggregated diagnostic data for CLHIV.

^cWithin region, variability by country is indicated in the parentheses.

^dScreening coverage among clients already on ART was not calculated separately. While TX_NEW can be used as the denominator to calculate screening coverage among new ART clients, TX_CURR cannot be disaggregated by HIV treatment status to isolate only those clients who have been on ART longer than 6 months. While it would be possible to subtract TX_NEW from TX_CURR to infer this value, this approach presents challenges in the context of screening coverage because TX_TB is a semiannual indicator.

Table 3.

Tuberculosis/HIV measures (proportion and (denominators)) children living with HIV (<15 years old), compared to people with HIV (≥15 years old) in US President’s Emergency Plan for AIDS Relief-supported sites, October 2021–September 2022 (FY2022).

Indicators ^b	<15 years	≥ 15 years	Total ^b
(1) TB screening coverage ^a	80%	82%	82%
(2) TB screening positivity ^a	3.6%	2.5%	2.6%
(3) TB Treatment initiation among screen positive ^a	20%	23%	23%
(4) TPT initiation (among newly initiated on ART)	37%	59%	58%
(5) TPT completion (among newly initiated on ART)	84%	84%	84%
(6) TPT completion (among all)	86%	87%	87%

Note: Indicators 1–3 are presented as annual means of two semiannual reporting periods for FY2022. ART, antiretroviral therapy; CLHIV, children living with HIV; FY, fiscal year; PEPFAR, US President’s Emergency Plan for AIDS Relief; PWH, people with HIV; TPT, tuberculosis preventive Treatment.

^aExcludes data from Kenya.

^bTotal among those with reported age. Age was not reported for <1% of PWH on ART and approximately 2% of people with TB on ART in FY2022, and these data were excluded from this analysis.

Table 4.

Tuberculosis preventive treatment indicators among children living with HIV (<15 years old) on antiretroviral therapy in US President's Emergency Plan for AIDS Relief-supported sites, October 2021–September 2022 (FY2022).

Legend	(4) TPT initiation	(5 and 6) TPT completion	
	Percent initiated on TPT (number initiated on TPT/number of CLHIV newly initiated on ART)	(5) Percent completed TPT (number completed TPT/number of CLHIV newly initiated on ART and initiated on TPT)	(6) Percent completed TPT (number completed TPT/number of CLHIV on ART and initiated on TPT)
Sex			
Male	37% (11689/31701)	84% (943/11689)	87% (37268/42956)
Female	36% (12934/35462)	85% (10935/12934)	85% (46490/54835)
Geography ^a			
Central/West Africa	44% (6551/14919) [37–48%] ^a	91% (5944/6551) [72–96%] ^a	92% (17538/19095) [67–96%] ^a
East Africa	23% (3673/16057) [5–48%] ^a	88% (3222/3673) [78–89%] ^a	88% (19101/21635) [80–91%] ^a
Southern Africa	40% (14399/36187) [4–58%] ^a	81% (11612/14399) [39–100%] ^a	83% (47119/57061) [47–100%] ^a
Total	37% (24623/67163)	84% (20778/24623)	86% (83758/97791)

ART, antiretroviral therapy; CLHIV, children living with HIV; FY, fiscal year; PWH, people with HIV; TPT, TB preventive treatment.

^a Range of country-level results is indicated in the brackets.