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Impact of integrating tuberculosis and orphans and vulnerable children services on case-finding and treatment outcomes

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Abstract

Background: Household poverty, malnutrition, overcrowding, and HIV infection place orphans and vulnerable children (OVC) at increased risk of tuberculosis (TB) disease and other adverse health outcomes. We integrated TB and OVC services in Uganda, comparing TB screening, diagnostic, and treatment outcomes before (October 2021–September 2022) and after (October 2022–September 2023) integration.

Methods: At baseline, TB services included passive TB screening for OVC program beneficiaries with HIV. During implementation, community-based staff conducted in-home TB screening and specimen collection, accompanied beneficiaries to health facilities, followed up diagnostic results, and provided adherence counselling. We compare screening, diagnosis, and treatment for TB before and after program integration using chi-square and Fisher's exact tests to assess strength of associations.

Results: Following integration, household members were three times more likely to be screened for TB [RR: 3.13, 95% CI: 3.06–3.2, $P < 0.0001$] and 10 times more likely to be diagnosed with TB (RR: 10.00, 95% CI: 3.61–27.68, $P < 0.0001$). Among 46 beneficiaries screening positive prior to integration, only four (9%) received TB diagnostic evaluation compared with 198/198 (100%) following integration ($P < 0.0001$). At baseline, all beneficiaries evaluated (4/4, 100%) were diagnosed with TB, compared to 25% (49/198) following integration. All beneficiaries initiating treatment completed it during both time periods.

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Conflicts of interest

There are no conflicts of interest.

Ethical procedure: ethical approval for this study was obtained from the Higher Degrees, Research and Ethics Committee at the Makerere College of Health Sciences, School of Public Health Institutional Review Board and the Uganda National Council of Science and Technology (UNCST). This project was reviewed in accordance with CDC human research protection procedures and was determined to be non-research.

Conclusion: Integrating TB services into OVC programming increased TB screening, diagnostic investigation, and case-finding among beneficiaries. These gains highlight the impact of harnessing OVC resources to address gaps in TB care, especially among populations that may face barriers to seeking care at a health facility.

Keywords

HIV/AIDS; orphans and vulnerable children; pediatric tuberculosis; service integration; tuberculosis

Introduction

In 2023, children and adolescents (0–14 years) accounted for an estimated 12% of the 10.8 million people with tuberculosis (TB) disease and 15% of the 1.3 million deaths from TB globally [1]. In 2023, an estimated 2.6 million (24%) people with TB disease were undiagnosed and untreated, but the gap was especially great among children. More than half of children under 5 years and more than 40% of all children (0–14 years) were estimated to be undiagnosed and untreated [1]. This is particularly concerning given that nearly all TB deaths among children (96%) are among those never treated [2] and most are among children under 5 years of age [1]. Young children and adolescents with HIV (C/AWH) are at increased risk of rapid progression to severe TB disease following TB exposure due to an immature or compromised immune system [3-6]. Efforts to develop child-friendly TB diagnostic approaches and scale-up case-finding and prevention efforts for children have led to substantial improvement in both access to and quality of TB services for children with TB [7]. The U.S. President's Emergency Plan for AIDS Relief (PEPFAR), which is the largest single funder of HIV services worldwide, has played a large role in scaling up access to TB screening, diagnostic, prevention, and linkage to care services for C/AWH. Closing these gaps by screening children at risk of TB, preventing development of disease through TB preventive treatment (TPT), ensuring appropriate diagnostic evaluation of symptomatic children, and providing TB treatment can reduce morbidity and mortality in this population [7,8]. Specifically, integrating TB services into programs for children and at health entry points where children seek care has been shown to improve TB case detection [9-11].

The orphans and vulnerable children (OVC) program, an important component of PEPFAR, provides comprehensive services to promote health and well-being among AIDS-affected children and adolescents (0–17 years). AIDS-affected children include those who have lost at least one parent to AIDS, infants of mothers with HIV at risk of treatment interruption, biological children of parents managing HIV-related health challenges, and children with HIV [12]. Since the onset of the HIV pandemic, more than 14 million children worldwide have been orphaned due to AIDS and 1.4 million children (0–14 years) were living with HIV in 2023 [13]. Household poverty, malnutrition, overcrowding, HIV infection, and lack of social support systems, are among the socioeconomic factors that affect OVC and also place them at increased risk of TB disease and other adverse health outcomes [14,15]. OVC programs play a key role in providing health services, nutritional support, screening for comorbidities, and HIV testing and counselling for the whole household in addition to HIV

treatment support [linkage to antiretroviral therapy (ART) and long-term adherence support] for beneficiaries with HIV.

In 2023, there were 870 000 OVC in Uganda; the burden of TB in this population was not known [13]. In the Rwenzori region (mid-western Uganda), Baylor College of Medicine Children's Foundation Uganda (BFU) began implementing PEPFAR's OVC program in 2018, serving an average of 31 000 OVC and caregivers with approximately 75% of beneficiaries under age 18. We leveraged the existing BFU OVC program infrastructure to implement an integrated package of TB services with the aim of improving service provision, increasing TB case-finding, and improving TB treatment outcomes compared to existing care modalities.

Methods

We integrated comprehensive TB services within the existing OVC program supported by BFU in Rwenzori region from October 2022 through September 2023 to improve TB case-finding and treatment outcomes compared to a baseline period (October 2021–September 2022). As part of the existing comprehensive BFU OVC program, beneficiaries in six districts of Rwenzori region received services to mitigate social, economic, and health challenges across four domains: safety, economic strengthening, education, and health [12]. Health services included nutrition and psychological counselling, provision of health information, ART delivery and follow-up for C/AWH, and screening for other conditions (e.g. malaria and TB). At baseline, TB screening was limited to OVC and caregivers who were living with HIV and relied on self-reported symptoms (primarily cough) during home-based visits or health facility consultations to trigger referral for evaluation. Across the six districts, civil society organizations (CSO) provided services through social workers and parasocial workers (PSW) who initially conducted a home visit to assess social, health, educational, and economic needs to link households with appropriate services. Households were then visited quarterly to provide services, with additional follow-up as needed.

We integrated comprehensive TB services into this existing program, including TB-specific health education, active TB screening using a standard multi-symptom screen (any one of cough, fever, weight loss/failure to thrive, night sweats, or known contact with TB) [8], referral and linkage to care, at-home specimen collection and transport to clinic, diagnostic results follow-up, and adherence counselling for TB treatment and TPT (Fig. 1). Relevant services were provided to all household members (beneficiaries) present during each visit regardless of age, HIV status, or beneficiary status. Seven CSOs implemented the integrated service package in four of the six BFU-supported districts in Rwenzori region: one CSO in each of Kyegegwa and Kabarole districts and Fort-Portal City, and four CSOs in Kasese district. Each CSO engaged two of their SW and 15–30 of their PSW to provide general services and implement the comprehensive TB package. CSO staff had limited training on TB screening prior to integration but received comprehensive training on all services to be provided (e.g. screening, specimen collection, referral, and treatment support) prior to project implementation. CSOs were linked with health facilities that were proximate to their catchment area. While households could enter or exit the OVC program, the catchment area and households served were similar between baseline and implementation periods.

During the implementation period, social workers and PSW visited households once each quarter to provide TB-specific health education and screen all people present in the household for TB symptoms. If anyone in the household screened positive (presence of any symptom in the multi-symptom screen), the social worker/PSW collected a specimen for diagnostic evaluation [e.g. sputum for GeneXpert or urine for lateral flow urine lipoarabinomannan (LF-LAM)] [16] and transported it to a designated health facility. If a specimen could not be obtained or the social worker/PSW or beneficiary preferred to visit the health facility instead, the social worker/PSW would either accompany the beneficiary to the health facility or provide a referral for their care. If a beneficiary screened negative (no symptoms), they were assessed for TPT eligibility (e.g. living with HIV, contact with someone with TB) [17], and, if eligible, referred to the health facility for TPT initiation. In addition to quarterly visits, social worker/PSW would also return to the household to provide results from the diagnostic evaluation and routine adherence counselling (approximately weekly) for TB treatment or TPT, as indicated.

Baseline data were abstracted from existing OVC and community registers and TB laboratory and treatment registers at the associated health facilities. During implementation, data were abstracted quarterly by a trained data collection team from project-specific OVC-TB registers and community follow-up registers tailored to capture TB-specific information. Additional data from health facilities (e. g. HIV status, TB diagnostic results, TB treatment initiation, and completion dates) were abstracted from health facility registers if it was unavailable in the OVC and community registers. Age of household members was based on age documented at first encounter during the respective periods. Unique OVC identification numbers, age, and sex were used to link data across registers. The primary outcomes of interest included:

1. Proportion of household members screened for TB;
2. Proportion of household members screening negative;
3. Proportion of household members receiving TPT among those screening negative;
4. Proportion of household members completing TPT among those initiating;
5. Proportion of household members screening positive (presumptive TB);
6. Proportion of household members evaluated for TB among those with presumptive TB;
7. Proportion of household members diagnosed with TB among those with presumptive TB;
8. Proportion of household members started on TB treatment following diagnosis; and
9. Proportion of household members successfully completing TB treatment.

While TPT services were part of the integrated service package, TPT data were spread across multiple registers in both the community and health facilities and included limited patient information. This resulted in a high degree of incompleteness for outcome measures

related to the TPT care cascade. These data and reporting on outcomes three and four above were excluded from the analysis.

All services were provided quarterly during both time periods. Data are presented as an annual sum of beneficiaries that were ever-screened, ever-evaluated, ever-diagnosed, and/or ever-treated for TB during the full year baseline and implementation periods. We also present quarterly TB screening and diagnostic outcome data by age for the implementation period to describe quarterly inputs. Demographic and clinical factors are described with summary statistics for both the baseline and implementation periods. Outcomes of the TB care cascade in the baseline and implementation periods were compared using chi-square and Fisher's exact tests to assess association. Relative risk ratios (RR) and confidence intervals (CIs) were calculated using a 95% CI, with *P* values less than 0.05 deemed significant. Analysis was performed using Stata/IC17 (Stata Corporation, College Station, Texas, USA) and R v4.4.1 (R Foundation for Statistical Computing, Vienna, Austria). This activity was reviewed by the U.S. 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). The protocol was also reviewed by the Higher Degrees, Research and Ethics Committee at the Makerere College of Health Sciences, School of Public Health and the Uganda National Council of Science and Technology (UNCST).

Results

The total number of household members served during baseline was 17 564, while during implementation that number increased to 21 535 (Table 1). Though the proportion of individuals served across districts remained similar, there was a slight increase in the proportion served in Kasese and a slight decrease in Kyegegwa between the time periods. At baseline, 57% of beneficiaries were female with a median age (IQR) of 13 years (9–23 years) compared to 52% of beneficiaries with a median (IQR) age of 14 years (10–24 years) during implementation. At baseline, 32% of beneficiaries were living with HIV and, of these, 86% were on ART compared to the implementation period when 33% of beneficiaries were living with HIV and 99.9% were on ART. The number of HIV-exposed infants declined between baseline (116, 0.7%) and implementation (40, 0.2%) (Table 1).

Screening

The proportion of all household members ever-screened increased from 31.2% (5483/17 564) at baseline to 97.8% (21 058/21 535) during implementation (Table 1). Fig. 2 shows screening coverage by population [all household members, people with HIV (PWH), and those <18 years]. For baseline, data are presented as ever-screened at any point during the baseline year while for the implementation period, data are presented quarterly, showing the cumulative proportion of beneficiaries ever-screened through each quarter. Quarter 4, therefore, describes cumulative proportion of household members ever screened across the implementation year. For all household members, screening coverage increased from 31% at baseline to 85% in the first quarter of implementation followed by gradual increases in quarters 2 and 3 to reach more than 98% in the last quarter. For the subgroups PWH and

those under 18 years, screening coverage at baseline was slightly higher at 46 and 34%, respectively (Fig. 2). During the implementation period, screening coverage rose from 87% during the first quarter to 99% at the end for PWH and from 85 to 98% for beneficiaries under 18 years. During the implementation period, household members were three times more likely to be screened for TB compared to baseline (RR 3.13, 95% CI: 3.06–3.20, $P < 0.0001$) (Table 2). Among those screened, a similar proportion screened positive (0.9%, 198/21 058) during implementation and baseline (0.8%, 46/5483).

Diagnostic and treatment outcomes

Among beneficiaries screening positive, only 9% (4/46) were evaluated for TB at baseline compared to 100% (198/198) during implementation, a statistically significant difference ($P < 0.0001$). At baseline, all four people evaluated for TB were diagnosed with TB compared to 25% (49/198) during implementation ($P = 0.0043$). Comparing TB diagnoses among all household members, they were 10 times more likely to be diagnosed with TB during the implementation period compared to baseline (RR: 10.0, 95% CI 3.61–27.68, $P < 0.0001$). All four people diagnosed with TB at baseline were bacteriologically confirmed and were under 18 years of age, including one (25%) under 5 years. During the implementation phase, 88% (43/49) of those diagnosed with TB were bacteriologically confirmed and 74% (36/49) were under 18 years of age, including 6 (12%) under 5 years (Fig. 3a). During implementation, diagnoses peaked in the second quarter and then fell slightly (Fig. 3b). Among the diagnosed cases during both baseline and implementation periods, all were initiated on TB treatment and treated successfully (Table 1).

Discussion

Compared to the baseline period, we observed significant improvements in the proportion of clients receiving TB screening, diagnostic evaluation, and TB diagnosis while maintaining high treatment success rates following integration of comprehensive TB services with the existing OVC program. The increase in the number of TB cases in the implementation period suggests that routine, active, multi-symptom screening paired with interventions that reduce the burden of seeking care (e.g. at-home sample collection and accompanied referral to the health facility) may be more effective than the limited, passive approach utilized at baseline. Reduced loss to follow-up between screening positive and diagnostic evaluation may also suggest that the health system was boosted by the involvement of social workers and PSW who facilitated linkage to care and documentation at both the health facility and in the community.

The increase in screening coverage was likely influenced both by the expansion of the scope of screening (all people present in the household, regardless of age or beneficiary or HIV status) as well as the active solicitation and documentation of all relevant symptoms at each screening encounter. The expanded scope likely resulted in children (<18 years) comprising a smaller proportion of all TB diagnoses ($n = 36$, 74%) in the implementation period compared to baseline ($n = 4$, 100%). Children are at increased risk of rapid progression to TB disease and death after exposure to someone with TB, and this risk is even greater for C/AWH [3,5]. Screening all household members in contact with a child at high-risk for TB,

not just those meeting age or other requirements, can identify people with infectious TB more quickly, triggering treatment for the adult and screening, diagnostic, and/or prevention services for the child. Such interventions can avert TB disease and poor health outcomes while also reducing transmission in the household and community. More active solicitation and documentation of symptoms may have resulted in more robust documentation of all screening outcomes, including negative symptom screens. At baseline, positive screens may have been more likely to be documented, but the proportion screening positive was similar among those screened between the two time periods, suggesting that this is not the case.

While intensive quarterly screening was successful, case detection yields began falling in quarter 3 (Fig. 3b), especially among children, which may indicate that most prevalent TB cases in these households had been identified by this point, resulting in diminishing returns. However, cases were still identified in quarters 3 and 4, suggesting that repeated screening did identify cases that may have otherwise been missed with reduced screening frequency. While screening for C/AWH is recommended at every clinical encounter (typically twice a year) [8], there are no global recommendations for routine TB screening of people who are HIV-uninfected without a known contact with TB. Further research may inform whether quarterly, semi-annual, or annual at-home screenings are most appropriate in this population, taking into consideration the need to optimize resources in resource-limited settings without compromising outcomes.

Linkage to care, specifically to a diagnostic evaluation following positive symptom screen, improved from 9% at baseline to 100% during the implementation period. The comparison of baseline and implementation periods suggests that during the baseline period, diagnostic evaluation only happened for severe cases among PWH who presented to health facilities. The intervention leveraged community outreach and linkages to care in order to improve early diagnosis for all children and caregivers. At-home specimen collection by social worker/PSW and accompanied referrals to the health facility likely contributed to the increase in successful linkage to care. The low rate of diagnostic evaluation and high rate of diagnosis among those evaluated at baseline likely reflect that only the most severely ill sought care while those experiencing less severe symptoms or barriers to seeking care delayed a visit to the health facility, possibly resulting in continued transmission in the household or community. The cost of seeking care for TB has been documented as a major barrier to care in high-burden, low-income regions [18,19] and may have been a factor in this project. At-home specimen collection and accompanied referral were designed intentionally to reduce the time and financial cost of seeking care on the families during the implementation period. Prior work shows that the economic cost of pediatric TB in Uganda is high: 44.1% of caregivers missed work, 24% of families depleted savings, and 18.4% of households incurred catastrophic healthcare expenses (>20% annual income) [20]. Such economic impacts can worsen vulnerabilities and increase the likelihood of worse health and socioeconomic outcomes. Therefore, screening, prevention, early diagnosis, and treatment of TB as well as interventions that reduce barriers to care through integrated services may improve social, health, and economic outcomes and reduce catastrophic costs affecting families. However, the burden of seeking care may have been shifted, to some degree, to the social worker/PSW providing at-home services. The addition of TB services, particularly diagnostic follow-up, accompanied referral, specimen transport, and treatment counselling,

likely increased workload for social worker/PSW compared with baseline activities, which did not include these services but may have been the missing link in assuring those who needed care received it.

While not an objective of this project, we observed that nearly 100% of PWH during the implementation period had their ART status documented in their records, compared to 85% at baseline, which may indicate that service integration could improve both HIV and TB clinical indicators and/or recording and reporting. Comprehensive service delivery models that simultaneously address both conditions may improve patient outcomes in high-burden regions by leveraging existing resources and platforms given the persistently high rates of co-infection in regions with a high burden of both HIV and TB [21].

Our findings reflect the broader importance of integration of related health services at the community level to strengthen healthcare delivery and address barriers to care [22-24]. Leveraging community-based infrastructure likely contributed to improvements in TB screening coverage, pre-treatment loss to follow-up, and TB case detection. These findings align with global strategies emphasizing community-driven models to address TB in high-risk populations [25]. Findings are also consistent with a project in Nigeria, which built TB program capacity and engaged volunteers to provide community-based TB services and health education for OVC. These efforts were successful in increasing case-finding among OVC and such integration was reported to be feasible and acceptable in Nigeria [11].

A qualitative analysis of staff perceptions of acceptability, feasibility, and impact of this program more directly explores the role and importance of community-based volunteers and staff (forthcoming). A cost analysis is underway. Future research to better understand and quantify the impacts of TB service integration is warranted.

Limitations

Changes to screening eligibility and introduction of a project register may have resulted in better documentation of screening during implementation. Differences in documentation practices at baseline may have resulted in an inaccurate accounting of true screening coverage. Linking data across sources may have resulted in missed documentation of linkage to care in some instances. Missing data impacted the ability to describe the TPT cascade of care; ensuring patient data in community and facility TPT registers are complete (along with location and demographic details) and stored may improve ability to trace individuals in the future. This evaluation was not designed to account for potential confounding factors, like changes to healthcare access or program performance during the analytic periods, though the authors are not aware of significant changes during this time. The results of this evaluation are limited to the regions and populations included in this evaluation and may not be generalizable to other settings.

Conclusion

We observed a statistically significant increase in TB screening, diagnostic evaluation, and case-finding among OVC and their households following integration of comprehensive TB services into OVC programming. These interventions may have interrupted transmission at

the household and community level, protecting children at the greatest risk of poor health outcomes from further TB exposure. These gains highlight the effectiveness of harnessing OVC resources to address gaps in TB care, especially among populations that may face barriers to seeking care at a health facility. Tailoring frequency of routine TB screening based on population needs and risk factors may optimize use of resources while maximizing case-finding. Integrating TB/HIV management into well-established programs can address the intertwined challenges of these diseases in high-risk communities. Further research into appropriate frequency of screening, financial sustainability, scalability, and long-term impacts of such efforts would be instructive for considering scaling this model to other high-burden settings.

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Data availability statement:

the data are available from the corresponding author on reasonable request.

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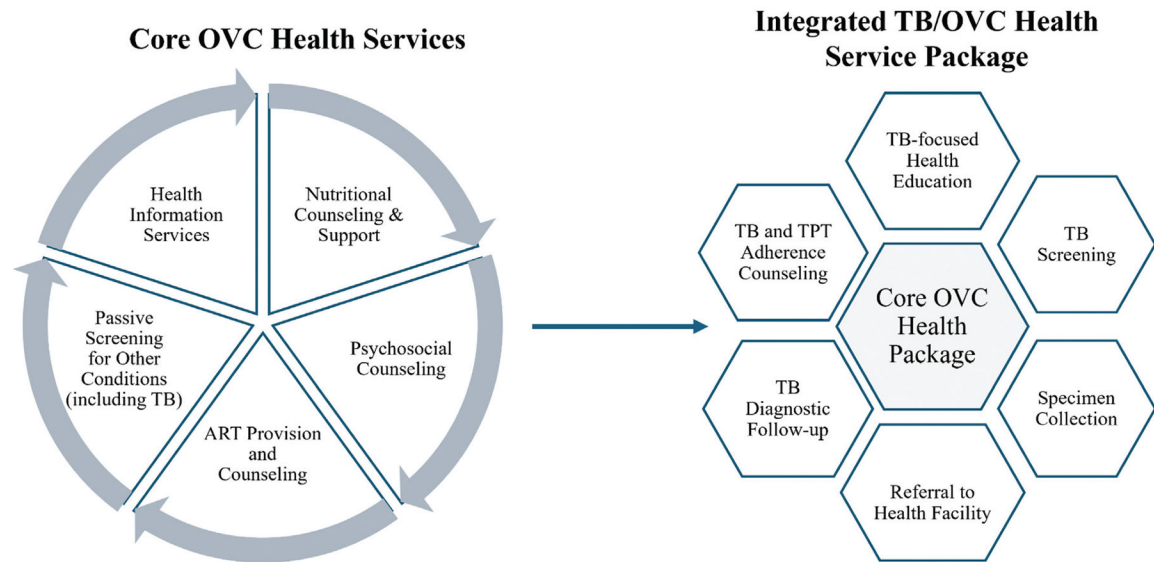


Fig. 1. Depiction of core health services provided to orphans and vulnerable children (OVC) and the Integrated Tuberculosis (TB)/OVC Service Package.

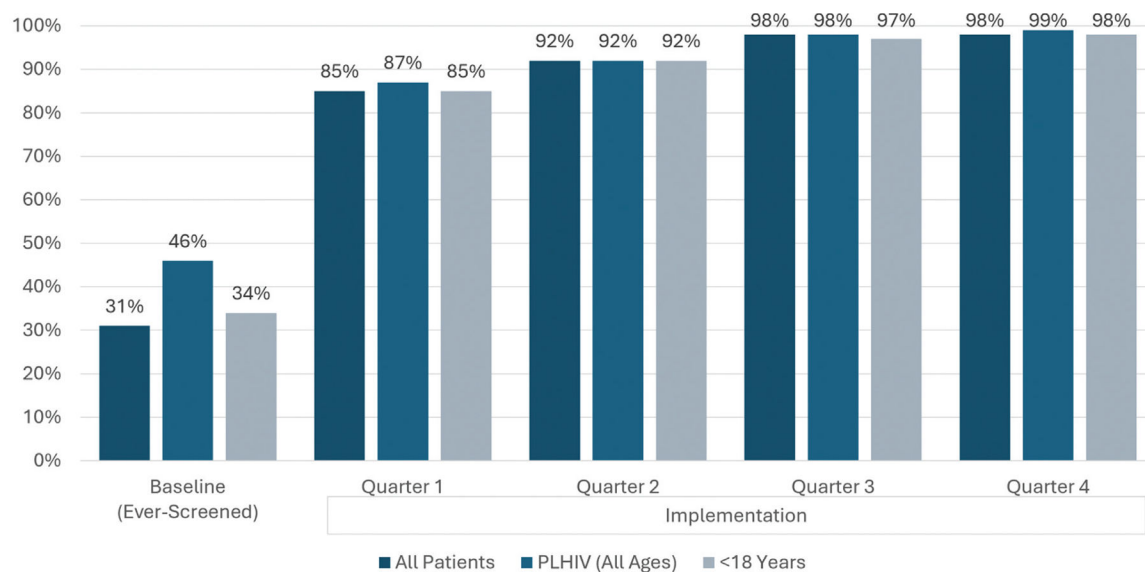
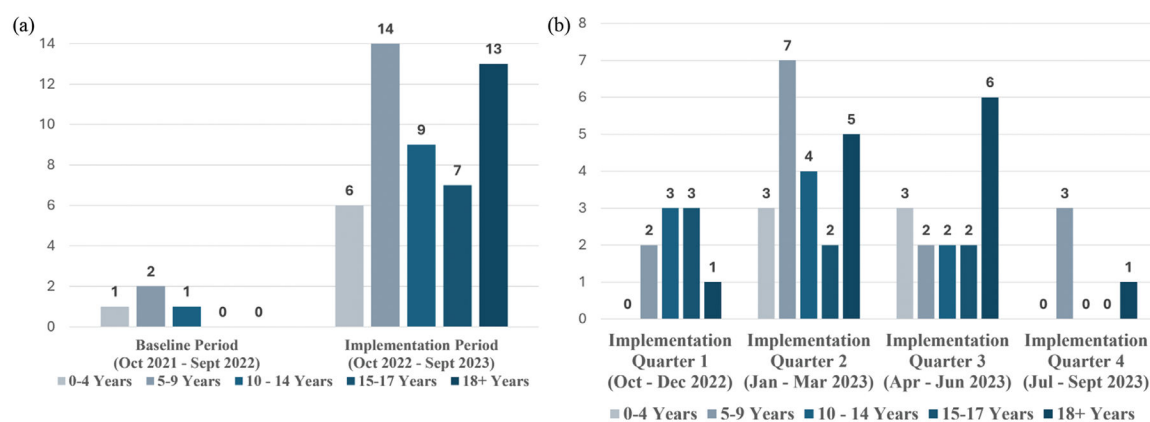


Fig. 2.

The cumulative proportion of beneficiaries and household members of the orphans and vulnerable children program screened for tuberculosis (TB) during the baseline ($N = 17\,564$) and implementation period ($N = 21\,535$) (October 2022–September 2023), by population characteristics, Rwenzori region, Uganda.

**Fig. 3.**

(a and b) Age-specific tuberculosis case detection in households served by the orphans and vulnerable children program during baseline (October 2021–September 2022) and implementation periods (October 2022–September 2023), Rwenzori region, Uganda.

Table 1.

Demographic and clinical characteristics of beneficiaries of the Orphans and Vulnerable Children (OVC) Program during baseline and implementation of Integrated Tuberculosis and OVC Services, Uganda, 2021–2023.

	Baseline [October 2021– September 2022 (N = 17 564)]	Implementation October 2022– September 2023 (N = 21 535)]
District/city		
Fort Portal	3423 (19.5%)	4022 (18.7%)
Kabarole	4755 (27.1%)	5526 (25.7%)
Kasese	4381 (24.9%)	6850 (31.8%)
Kyegegwa	5005 (28.5%)	5137 (23.9%)
CSO name		
A	530 (3.0%)	872 (4.0%)
B	3423 (19.5%)	4016 (18.6%)
C	1136 (6.5%)	1438 (6.7%)
D	499 (2.8%)	666 (3.1%)
E	4755 (27.1%)	5532 (25.7%)
F	5005 (28.5%)	5137 (23.9%)
G	2216 (12.6%)	3874 (18.0%)
Sex		
Male	7580 (43.2%)	10 254 (47.6%)
Female	9984 (56.8%)	11 281 (52.4%)
Age		
Median [Q1, Q3]	13.0 [9.0, 23.0]	14.0 [10.0, 24.0]
0–4	1749 (10.0%)	1724 (8.0%)
5–9	3330 (19.0%)	3262 (15.1%)
10–14	5803 (33.0%)	7091 (32.9%)
15–17	2195 (12.5%)	3574 (16.6%)
18+	4487 (25.5%)	5884 (27.3%)
HIV status		
HIV-exposed Infant	116 (0.7%)	40 (0.2%)
Negative	11 322 (64.5%)	14 379 (66.8%)
Positive	5601 (31.9%)	7116 (33.0%)
Unknown/not documented	525 (3.0%)	0 (0%)
ART status (among HIV-positive)	<i>n</i> = 5601	<i>n</i> = 7116
On ART	4797 (85.6%)	7108 (99.9%)
ART unknown	804 (14.4%)	8 (0.1%)

Table 2.

Description of the tuberculosis diagnostic care cascade among beneficiaries of the Orphans and Vulnerable Children Program from baseline (October 2021–September 2022) and implementation periods (October 2022–September 2023), Rwenzori region, Uganda.

	Baseline (<i>N</i> = 17 564) [<i>n</i> (%)]	Implementation (<i>N</i> = 21 536) [<i>n</i> (%)]	<i>P</i> value
Screened for TB			
Yes	5483 (31.2%)	21 059 (97.8%)	<0.0001
No	12 081 (68.8%)	477 (2.2%)	
TB screening outcome	<i>n</i> = 5483	<i>n</i> = 21 059	
Positive	46 (0.8%)	198 (0.9%)	0.4841
Negative	5437 (99.2%)	20861 (99.1%)	
Diagnostic evaluation following screening	<i>n</i> = 46	<i>n</i> = 198	
Yes	4 (8.7%)	198 (100%)	<0.0001^a
No	42 (91.3%)	0	
TB diagnostic outcome	<i>n</i> = 4	<i>n</i> = 198	
Diagnosed with TB	4 (100%)	49 (24.7%)	0.0043^a
Not diagnosed with TB	0	149 (75.3%)	
HIV status among those diagnosed with TB	<i>n</i> = 4	<i>n</i> = 49	Not calculated
Positive	4 (100%)	42 (85.7%)	
Negative	0	7 (14.3%)	
Initiated TB treatment	<i>n</i> = 4	<i>n</i> = 49	Not calculated
Yes	4 (100%)	49 (100%)	
No	0	0	
TB treatment outcome	<i>n</i> = 4	<i>n</i> = 49	Not calculated
Successful treatment	4 (100%)	49 (100%)	
Unsuccessful treatment	0	0	
Overall TB case detection	<i>N</i> = 17 564	<i>N</i> = 21 536	
Diagnosed with TB	4	49	<0.00001
Not diagnosed with TB	17 560	21 487	

P values derived from Pearson's chi-square or Fisher's exact tests comparing proportions at baseline and during implementation. Bold font indicates statistical significance.

^aFisher's exact test applied.