



3RD CONFERENCE ON **INNOVATIONS IN TUBERCULOSIS**

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ABSTRACT BOOK

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ORAL ABSTRACT PRESENTATIONS

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1

Shortened Intensive Anti-Tuberculosis Treatment and Aspirin for African and Asian Children with TB Meningitis: Week-48 Results of the SURE Trial

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Background: Tuberculous meningitis (TBM) in children is associated with high mortality and significant neurological sequelae. The WHO-recommended standard-of-care antituberculosis treatment (standard-ATT) is 12 months long and has suboptimal central nervous system penetration. Inflammation plays a key role in the neurological manifestations of TBM, yet data on the potential role of aspirin remain limited.

Methods: SURE (ISRCTN 40829906) is a factorial, partially blinded, randomised-controlled trial in African (Zimbabwe, Zambia, Uganda) and Asian (India, Vietnam) children (29 days to <18 years) with confirmed or suspected TBM. Participants were randomised to receive intensified ATT [isoniazid(20mg/kg), rifampicin(30mg/kg), pyrazinamide(40mg/kg), levofloxacin(20mg/kg)] for 6 months) or standard ATT [isoniazid (10mg/kg), rifampicin (15mg/kg), pyrazinamide (35mg/kg), ethambutol (20mg/kg) for 2 months, then isoniazid (10mg/kg) and rifampicin (15mg/kg) for 10 months] and simultaneously to aspirin(20mg/kg) or placebo for 8 weeks; all

received corticosteroids. Primary outcome for ATT randomisation was mortality and for aspirin/placebo was modified Rankin Scale(mRS) at 48 weeks, analysed by modified-intention-to-treat. We specified a 10% non-inferiority margin for ATT and 16% minimally clinically significant difference for aspirin.

Results: Between March 2021 and July 2024, 369 children were randomised; 5 children were lost before week-48, and 17 had no week-48 mRS. 195[53%] were male; median (IQR) age 4.8(1.3-10) years; 15[4%] were living with HIV; 170[46%] MRC grade 1 and 199[54%] grade 2/3 TBM disease; 286[77%] definite/probable TBM. 29/183 (16%) intensified-ATT versus 21/180 (12%) standard-ATT died (adjusted risk difference=5.1% (95%CI -1.7% to +12.0%; p=0.14), not meeting the pre-specified 10% non-inferiority margin. Severe disability/death (mRS 5/6) occurred in 38/176 (22%) aspirin versus 25/170 (15%) placebo (adjusted odds ratio=1.80, (95%CI 0.95-3.41; p=0.07). ATT-related grade 3/4 adverse events (AEs) occurred in 47% intensified versus 33% standard ATT (p=0.006), including grade 3/4 drug-induced liver injury (25% vs 9%; p=0.001); difference between aspirin versus placebo were 45% vs 35% (p=0.05); bleeding events were rare and similar between arms.

Conclusion: Neither 6-month intensified ATT nor aspirin improved outcomes in paediatric TBM, with evidence of increased toxicity, particularly hepatotoxicity. New therapeutic strategies are urgently needed to improve survival and disability outcomes in TBM.



2

Evaluation of Global Treatment Decision Algorithms for Tuberculosis Screening in Children Living with HIV: An Analysis of the TB Gaps Study, July 2023 to October 2025

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Background: In 2022, the World Health Organization (WHO) published Treatment Decision Algorithms (TDAs) to improve pediatric tuberculosis (TB) diagnosis. TDAs were developed for children <10 years with symptoms suggesting pulmonary TB. However, TB is often asymptomatic and symptom-agnostic TB screening tools exist for people with HIV, such as C-reactive protein (CRP) and chest x-ray (CXR). We evaluated the performance of TDAs with expanded, symptom-agnostic entry criteria in children with HIV (CWH) aged 0-9 years.

Methods: TB GAPS enrolled CWH into a prospective TB screening and diagnostic cohort in five high-TB-burden countries: Eswatini, Malawi, Lesotho, Uganda, and Tanzania. All children received CRP and CXR despite symptoms. We compared the diagnostic accuracy of TDAs (TDA-A includes CXR and TDA-B excludes CXR) using standard (WHO-defined TB symptoms for TDA entry) and expanded entry criteria including TB symptoms of any duration, CRP ≥ 5 mg/L, or an abnormal CXR. Sensitivity, specificity, and diagnostic yield, were calculated using the U.S. National Institutes of Health (NIH) consensus definition inclusive of lateral-flow lipoarabinomannan assay.

Results: During July 2023 through October 2025, we evaluated 948 CWH (median age 6 years, range 0-9); 90 met NIH consensus criteria for TB. With the expanded criteria applied to TDA-A, sensitivity was 88.9% (95% confidence interval (CI): 80.5–94.5) and specificity was 72.0% (95%CI: 66.9–76.8). The expanded criteria applied to TDA-B demonstrated a lower sensitivity of 80.0% (95%CI: 70.2–87.7) but a higher specificity of 91.7% (95%CI: 88.2–94.4). When TDA entry criteria was limited to participants with standard TB symptoms, diagnostic yield was 46.7% (42/90) for TDA-A and 40% (36/90) for TDA-B, compared to 88.9% (80/90) for TDA-A and 74.4% (67/90) for TDA-B when using the expanded, symptom-agnostic entry criteria.

Conclusions: Reliance on standard, symptom-based entry criteria for TDAs failed to identify over half of CWH meeting the NIH consensus definition for confirmed or unconfirmed TB, compared to only 11% using the symptom-agnostic criteria. These findings suggest that performance of TDAs in CWH may be improved by expanding entry criteria to include symptom-agnostic screening tools, which may be a promising adjunct to close the TB diagnostic gap and end TB.



3

National Childhood TB Week: Lessons Learnt from the Use of Portable Digital X-Ray (PDX) Equipped with Artificial Intelligence for TB Screening among Children Presented with No Symptoms in Lagos, Nigeria

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Background: Lagos State accounts for 11% of TB cases in Nigeria with an estimated 54,000 persons projected to be suffering from TB in the year 2023 based on the National Incidence Rate of 219 per 100,000 population. Childhood TB detection has been on the increase from 2018 to 2023, with 517(5%) diagnosed in 2018 to 1,025(6%) diagnosed in year 2023. Therefore, diagnosing childhood TB remains a major challenge in Southwest Nigeria due to issues relating to diagnostic challenges, lack of sensitive diagnostic tools, children presenting with no symptoms of TB and inadequate pediatricians at the primary health care (PHC) level.

Material and Methods: To increase child TB detection through the use of artificial intelligence (computer aided detection for TB; CAD4TB), KNCV Nigeria, with support of both State and Federal Ministry of Health (LSMOH and FMOH) actively supported the National TB community testing week in Lagos Nigeria, with the use of chest X-ray mobile Vans equipped with CAD4TB device for TB screening of children in the following settings; school and out-of-school children, children in both urban and slum communities from 27th May to 2nd June 2024.

Results: A total of 1,465 children (aged 0-4yrs) were screened for TB in 123 communities and 17 high yielding government own schools. 178 presumptive children were identified. Among them, 154 had high CAD4TB scores (≥ 50) with no

symptoms, while 24 presented with symptoms and sample were collected and referred for diagnosis. Radiographic images were transmitted, and real time results received virtually by a team of 7 Radiologist through an application known as XMAP. Among them, 154 children whose CAD4TB scores ≥ 50 , 15 were clinically diagnosed with TB. Among these numbers, 6 were later re-confirmed and diagnosed with TB through GeneXpert (stool sample).

Conclusions: Intensified community screening on child TB using the X-ray mobile vans equipped with CAD4TB, particularly in TB-endemic areas with limited resources, has proven that the existing gap in childhood TB diagnosis could be breached with the use of an AI-supported mobile X-ray system. This intervention is recommended for a nationwide scale-up to increase Childhood TB diagnosis and improve TB/HIV service integration.



4

The Burden of Multimorbidity in TB-HIV Patients in Uganda: A Retrospective Cohort Analysis

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Introduction: Multimorbidity – the co-existence of two or more long-term health conditions (LTCs)– is increasing in high tuberculosis (TB) burden countries. Yet few studies have estimated the prevalence of multimorbidity in patients with TB, and none specifically in TB-HIV patients. This retrospective cohort study used HIV clinic data from the Infectious Diseases Institute in Kampala, Uganda, to determine the prevalence of multimorbidity in TB-HIV patients at the time of TB diagnosis, and its effect on TB treatment outcomes.

Methods: Adults living with HIV and diagnosed with TB between 1st January 2014 – 14th November 2024 were included. Clinical, laboratory and prescriptions records were used to categorise 41 different LTCs. The prevalence and patterns of multimorbidity were examined and the effect on WHO-defined TB treatment outcomes was assessed using regression.

Results: Among 993 included patients, 76.1% (95% CI: 73.4-78.8%) had multimorbidity and 34.3% had three or more LTCs (95% CI 31.4-37.4%). Anaemia (52.1%) and undernutrition (34.3%) were most prevalent. The prevalence of multimorbidity was higher in patients with a CD4+ count <200 cells/ μ L (87.0% vs 70.1%). Multimorbidity was associated with a 3.70% absolute increase in adjusted risk of an unsuccessful TB treatment outcome, but a wide confidence interval (CI) inclusive of the null effect (95% CI -0.35-7.74%, likelihood ratio test p=0.07). When categorised by number of conditions, there was no difference in risk between patients with HIV plus one LTC, but patients with HIV plus two or

more LTCs had a 6.04% increased risk of an unsuccessful outcome (95% CI 1.08-10.99%, LRT p=0.04). However, the CIs of these strata overlapped considerably.

Conclusion: Multimorbidity was highly prevalent at TB diagnosis in this cohort of people with TB-HIV, highlighting the complexity of care required alongside prescription of ATT.



5

Host Factors Modulate Bacterial Burden and Clinical Severity in Pulmonary Tuberculosis: Insights from a Multi-Centre Ghanaian Cohort

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Tuberculosis (TB) manifests clinical heterogeneity across individuals, which has complicated disease management and control. Identifying reliable precursors of disease trajectory and severity can improve risk stratification and reduce the morbidity and mortality associated with TB.

We investigated the determinants of TB severity in 727 sputum-positive individuals recruited across five health facilities in Ghana and categorized into TB-Only, TB-HIV, and TB/diabetes mellitus (TB-DM) cohorts. Disease severity was assessed using the Bandim TB score II, and bacterial load was estimated using GeneXpert MTB/RIF Ultra cycle threshold (Ct) values, sputum microscopy grade, and time to culture positivity (TTP). Our findings revealed that disease severity differed significantly across cohorts ($p = 0.014$), with TB-HIV individuals presenting with more severe disease. Multivariate logistic regression analysis identified body mass index (BMI), ethnicity, and Mycobacterium tuberculosis complex (MTBC) lineage as independent predictors of disease severity. Each 1 kg/m² decrease in BMI increased TB severity by 94% (OR = 0.94; 95% CI 0.91–0.98; $p = 0.002$). Individuals with Ewe ancestry had 62% lower odds (OR = 0.62, 95 % CI = 0.44–0.85, $p = 0.003$) of severe TB and individuals infected with lineage 2 surprisingly showed lower severity (Bandim scores). Host nutritional status, ancestry, and pathogen genotype emerged as stronger determinants of TB clinical outcomes than bacterial burden alone.

These findings highlight the need for an integrated host and pathogen interaction framework to understand TB pathogenesis and improve treatment outcomes.



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Effect of Prior TB Preventive Therapy on All-Cause Mortality during TB Treatment among People with HIV/TB in Rural Eastern Uganda: A Target Trial Emulation

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Background: Tuberculosis preventive therapy (TPT) is the cornerstone for preventing TB disease. However, it is uncertain whether prior TPT completion improves survival once TB disease develops in people with human immunodeficiency virus (PWH) while on anti-retroviral therapy (ART). We evaluated the effect of prior TPT completion on all-cause mortality during TB treatment among PWH who developed TB disease while on ART in rural eastern Uganda. Prior TPT completion served as a proxy for sustained engagement in HIV care.

Methods: We applied target trial emulation (TTE) to mimic a hypothetical randomized trial using real-world retrospective cohort data. TTE addresses design flaws in observational studies, such as immortal time bias and prevalent user bias, providing less biased causal effect estimates. Individuals who had completed a full course of TPT before the start of the index TB treatment episode formed the intervention group, while the control group comprised those with no history of TPT before the index TB treatment initiation. We defined time zero (start of follow-up) as TB treatment initiation, measured baseline covariates before this point, and applied inverse probability of treatment weighting to balance baseline covariates between the groups. We estimated all-cause mortality rates using person-time methods and Kaplan–Meier curves and performed propensity-score weighted Cox proportional hazards analysis for cause-effect estimation. We reported adjusted hazard ratios (aHR) with 95% confidence intervals (CI).

Results: Of 719 participants, 296 (41.2%) had completed TPT prior to the start of the index TB treatment episode, and 83 (11.5%) had died. The mortality rate was 7.13 per 10,000 person-days, higher among participants without prior TPT than those with prior TPT completion (18.0% vs. 2.4%, log-rank $\chi^2(1) = 35.3$, $p < 0.001$). Median survival was 277 days (95% CI: 213–689). Prior TPT completion was associated with an 87% lower hazard of all-cause mortality (aHR 0.13, 95% CI: 0.06–0.29).

Conclusion: Prior TPT completion substantially reduced all-cause mortality among PWH who developed drug-susceptible TB disease while on ART. Therefore, strengthening engagement in HIV care should be prioritized across HIV programs to lower all-cause mortality among PWH, with completion of TPT serving as an important component and marker of such engagement.



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Effect of Pulmonary Rehabilitation on Lung Function and Quality of Life in Pulmonary Tuberculosis Survivors with Post-Tuberculosis Lung Disease: A Systematic Review and Meta-Analysis

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Background: Post-tuberculosis lung disease (PTLD) is a significant global public health challenge. The contribution PTLD on long-term morbidity and impaired quality of life is increasingly recognized. There is limited evidence on effective management strategies of PTLD. This systematic review and meta-analysis aimed to evaluate the effect of pulmonary rehabilitation (PR) in improving lung function and health related quality of life (HRQoL) among individuals with post-tuberculosis lung disease.

Methods: This review conducted by following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines. Interventional studies, randomized controlled trials, and cohort studies having exposure to pulmonary rehabilitation program and reporting outcomes on exercise tolerance, lung function, and quality of life PTLD patients were included. A comprehensive literature search was conducted on PubMed, EMBASE, Scopus, Cochrane Central Register of Controlled Trials, ClinicalTrials.gov and Google scholar between July 25 and August 1, 2025. Data were extracted by two individuals using a structured, pre-designed Excel form. The extracted data were cleaned and analyzed using R software version 4.5. random effect model was employed to accommodate methodological variation.

Results: A total of 13 studies consisting of 747 participants were included. The pooled mean change of 6-minute walk distance (6MWD) was

60.04 meters (95% CI: 27.83-92.20). The pooled mean change in forced expiratory volume in one second (FEV₁), forced vital capacity (FVC), the ratio of forced expiratory volume to forced vital capacity (FEV₁/FVC) and partial pressure of oxygen in arterial blood (pao₂) were 0.07L (95% CI: 0.01;0.14), 0.06 L (95% CI: -0.02;0.14), 1.06 % (95% CI: -1.66;3.78) and 2.64 mmHg (95% CI: 0.15;5.12) respectively. The mean change in SGRQ scores was -18.85 (95% CI: -22.43-15.27).

Conclusion: Despite methodological heterogeneity and lack of randomized controlled study, pulmonary rehabilitation is a promising intervention in improving exercise tolerance, lung function and HRQoL of PTLD patients. More high-quality Randomized Clinical Trial (RCT) and longitudinal studies are needed to have strong evidence to recommend PR programs as part of regular recommendation for PTLD care to achieve better health outcomes.



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Epidemiologic, Clinical and Radiographic Predictors of Post-TB Lung Disease in an Eswatini: A Prospective Cohort

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Background: Post-tuberculosis lung disease (PTLD) is an increasingly recognized public health challenge. Globally, over five million individuals survive Tuberculosis (TB) annually, with approximately half developing long-term lung impairment and up to 15% experiencing severe PTLD. There is limited data on epidemiologic, clinical, radiographic predictors of PTLD especially in high TB/HIV burden countries to inform long term management of TB survivors.

Methods: We conducted a prospective cohort study in which microbiologically confirmed TB patients aged 18 years and older were enrolled in Eswatini between December 2023 and 2025. We collected epidemiologic, clinical, and radiographic information and participants underwent spirometry tests at baseline and End of Treatment (EOT). Lung function was expressed as z-scores and categorized as normal, obstructive, restrictive, or mixed impairment. Chest radiographs were performed at baseline and follow-up visits and assessed for structural abnormalities including cavitation, fibrosis, opacities, bronchiectasis, and emphysema using Qure AI. Multivariable regression models were used to identify epidemiologic, clinical, and radiographic predictors of persistent lung impairment.

Results: Among 201 microbiologically confirmed participants, 128 (63.7%) were male, the median age was 36 years (IQR 28–47), 85 (42.3%) were living with HIV, 53 (26.4%) were underweight at baseline, and 36 (17.9%) were current smokers. At 6 months, lung impairment persisted in a proportion of some participants: 29% obstructive,

13% restrictive, and 7% mixed patterns. Younger age was associated with greater recovery in FVC z-scores by EOT. Underweight TB patients (<18.5 kg/m²) had lower baseline FVC z-scores compared with those with normal BMI (median -0.50 vs 0.65), but demonstrated greater improvement during treatment, with larger increases in FVC z-scores by EOT (Wilcoxon p<0.001). Participants living with HIV showed slightly greater FVC recovery than HIV-negative individuals.

Radiographic abnormalities were common and persistent: fibrosis increased from 22.1% to 50%, emphysema remained stable (18.8% to 17.5%), and opacities showed minimal change (83.8% to 79.2%).

Conclusion: These findings support the integration of routine post-TB lung function assessment into TB care, with targeted follow-up for older, underweight individuals and those with persistent radiographic abnormalities to inform early rehabilitation and secondary prevention strategies.



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Metal-Induced Stress Disrupts Translational and Survival Pathways in Mycobacterium Tuberculosis

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Tuberculosis, caused by *Mycobacterium tuberculosis*, remains a major global health burden, particularly with the increasing emergence of drug-resistant strains to currently available antitubercular therapies. There is therefore an urgent need to discover novel antimycobacterial agents or to enhance the efficacy of existing drugs. In this study, we investigated the role of transition-metal-based superparamagnetic iron oxide nanoparticles (SPIONs) as antimycobacterial agents, the metabolic response of *M. tuberculosis* to these nanomaterials, and their ability to enhance the antimicrobial activity of repurposed drugs. SPIONs were synthesized via chemical co-precipitation and surface-modified with secondary metals, silver (Ag) and copper (Cu) to generate bimetallic SPIONs (Ag@SPIONs and Cu@SPIONs) and trimetallic SPIONs (Ag-Cu@SPIONs). To further enhance antimicrobial efficacy, the repurposed drugs sulfadiazine and meloxicam were functionalized onto the nanoparticles, yielding S_Ag@SPIONs, S_Cu@SPIONs, M_Ag@SPIONs, and M_Cu@SPIONs. Antimycobacterial activity was evaluated using time-kill kinetics against *M. tuberculosis* H37Rv, supported by microscopy, while transcriptomic profiling was conducted using RNA sequencing.

The average particle size of the surface-modified SPIONs was below 20 nm. Time-kill assays demonstrated antimycobacterial activity in the order Ag-Cu@SPIONs > Ag@SPIONs > Cu@SPIONs, with minimum inhibitory concentrations (MICs) of 31.25 µg/mL, 62.5 µg/mL, and 62.5 µg/mL, respectively. Drug-functionalized SPIONs showed enhanced and synergistic activity in the order S_Ag@SPIONs > S_Cu@SPIONs > M_Ag@SPIONs >

M_Cu@SPIONs, with MICs of 7.8 µg/mL, 15.6 µg/mL, 62.5 µg/mL, and 62.5 µg/mL, respectively. Transcriptomic analysis revealed significant perturbation of essential genes following metallic treatment, including downregulation of genes encoding penicillin-binding proteins, mycobacterial membrane protein large (MmpL6), sigma factor G, proline-rich membrane proteins, and ribosomal RNAs (*rrl* and *rrs*), indicating metal intoxication, cell-wall disruption, and translational collapse.

Concurrently, adaptive stress responses were activated through upregulation of genes encoding universal stress proteins, structural maintenance of chromosomes (SMC family), and the ESX-6 secretion system, reflecting attempts at metal detoxification and mitigation of oxidative imbalance. Despite these adaptive mechanisms, the treatment effects overwhelmed bacterial defenses, resulting in growth arrest and pronounced cell-wall disruption, as confirmed by microscopy.



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Adverse Drug Reactions among People Receiving Treatment for Multidrug-Resistant Tuberculosis in Tanzania: Implications for the Safety and Optimization of Drug-Resistant TB Treatment

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Background: Treatment for multidrug-resistant tuberculosis (MDR-TB) requires second-line anti-tuberculosis medicines that are associated with frequent and sometimes severe adverse drug reactions (ADRs). Optimizing the safety of drug-resistant TB treatment regimens is critical to ensuring adherence, preventing treatment interruption, and improving outcomes. Evidence on the burden and determinants of ADRs among people receiving treatment for MDR-TB in Tanzania remains limited. This study assessed the proportion, severity, and predictors of ADRs among patients receiving MDR-TB therapy in selected Tanzanian hospitals.

Methods: An analytical cross-sectional study was conducted between March and May 2023 in four referral hospitals in Tanzania. Adult patients receiving MDR-TB treatment from January 2022 to May 2023 were included. Data were collected through patient interviews and medical record review. ADR severity was graded using the Hartwig and Siegel scale, and causality was assessed using the WHO–UMC criteria. Factors associated with ADR occurrence were analyzed using modified Poisson regression. Statistical significance was set at $p < 0.05$.

Results: A total of 264 people receiving MDR-TB treatment were included (median age 40 years; 67.8% male). Overall, 57.9% experienced at least one ADR. The most frequently reported ADRs were peripheral neuropathy (23.5%), dermatological disorders (22.2%), and joint pain (22.2%). Most ADRs were mild in severity (55.6%, level 1), and 88.2% were categorized as “possible” according to

WHO–UMC causality assessment. Treatment modification or discontinuation due to ADRs most commonly involved bedaquiline (6.8%), cycloserine (3.0%), and linezolid (3.0%). In multivariable analysis, occupation was independently associated with ADR occurrence, with students less likely to experience ADRs compared to self-employed individuals (95% CI 0.06–0.80; $p = 0.022$). Anemia was also independently associated with ADRs (adjusted PR 1.47; 95% CI 1.13–1.75; $p = 0.03$).

Conclusion: More than half of MDR-TB patients experienced ADRs, predominantly mild in severity. Peripheral neuropathy was the most common event. Occupation and anemia were independent predictors of ADR occurrence. These findings underscore the need for strengthened pharmacovigilance and targeted clinical monitoring to enhance the safety and effectiveness of drug-resistant TB treatment programs.



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Applied Machine Learning for Predicting Multidrug-Resistant Tuberculosis (MDR-TB) Treatment Outcomes in Tanzania: A Retrospective Study in Tanzania

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Background: Multidrug-resistant tuberculosis (MDR-TB) remains a major global health challenge, particularly in low- and middle-income countries where treatment is prolonged and outcomes remain suboptimal. Undernutrition is a well-established risk factor for TB progression and poor treatment response, yet its role within predictive modeling frameworks and across MDR-TB treatment regimens has been insufficiently explored in sub-Saharan Africa.

Methods: We analyzed MDR-TB treatment outcomes using two complementary datasets: (1) a retrospective cohort of 477 MDR-TB patients treated at Kibong'oto Infectious Disease Hospital (KIDH), Tanzania, between 2009 and 2024. Clinical, demographic, and nutritional variables, including body mass index (BMI) and nutritional therapy status, were evaluated using logistic regression, random forest, and gradient-boosting models. The dataset was stratified by treatment regimen, yielding a bedaquiline, a short-term injectable, and a long-term injectable. We applied logistic regression, random forest, and XGBoost models to predict outcomes in MDR-TB). Model performance was assessed using cross-validated F1 scores and ROC-AUC, alongside feature importance analyses.

Results: The dataset was stratified by treatment regimen, bedaquiline-based cohort of 210 patients (103 failures, 107 successes), a short-term injectable cohort of 37 patients (18 failures, 19 successes), and a long-term injectable cohort of 230 (88 failures, 142 successes). Predictive models trained on the KIDH cohort achieved substantially improved predictive performance, with F1 scores of 0.766 for bedaquiline-based regimens, 0.667 for

short-term injectable regimens, and 0.787 for long-term injectable regimens. Across all models, BMI and other nutrition-related variables consistently ranked among the strongest predictors of treatment outcome. Nutritional therapy was mainly provided to undernourished patients, showing appropriate targeting. However, some patients, particularly those who later died, had poor outcomes despite receiving support, likely reflecting more severe illness. More than half were co-infected with HIV, highlighting their increased vulnerability.

Conclusions: Baseline nutritional status, particularly BMI, has been identified as an early predictor of patient responses to MDR-TB treatment across various regimens. Nutrition-related features consistently influenced machine learning performance, emphasizing undernutrition as a modifiable risk factor that can be addressed at the start of treatment. These insights enable early allocation of clinical resources, such as nutritional support and balanced diet plans, to patients at the highest risk.



13

Leveraging Wastewater-Based Epidemiology (WBE) to Close the Tuberculosis (TB) Case-Detection Gap: A Multi-Stakeholder Pilot in Eswatini

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Background: Despite achieving the 95–95–95 HIV targets, Eswatini continues to miss approximately 37% of individuals with tuberculosis (TB), many of whom remain asymptomatic and undiagnosed in the community. Current TB surveillance relies largely on clinical detection, limiting insight into population-level transmission. Building on lessons from COVID-19 surveillance, we are piloting Wastewater-Based Epidemiology (WBE) as an innovative strategy to identify TB transmission hotspots. Our objective was to test the hypothesis that Mycobacterium tuberculosis complex (MTBC) DNA can be detected and quantified as part of a comprehensive WBE program in a high TB burden setting.

Methods: Between April and July 2025, we conducted intensive stakeholder mapping and engagement to ensure site prioritization, operational alignment, and Ministry of Health (MOH) project ownership. From April 2025 till present, biweekly wastewater samples were collected from 14 strategic sites in all four regions of Eswatini: comprising of seven water treatment plants, four hospitals outflows, one factory outflow, one refugee camp, and one correctional facility. Passive sampling methods were used for wastewater collection. The samples were analyzed using GeneXpert Ultra for Mtb detection.

Results: Stakeholder engagement achieved full participation, including Water Affairs, the National Tuberculosis Control Program, National AIDS Program, University of Eswatini, Eswatini Health Laboratory Services, Regional Health Management Teams, regional hospitals, and representatives from correctional, refugee, and industrial sectors. Twelve stakeholder visits were conducted across all four regions, with coverage across all four major referral hospitals. Out of 228 wastewater samples tested by Xpert Ultra, MTBC DNA was detected in 103 samples (45%), including 48 higher-load (non-trace) and 55 trace detections. These positive samples came from 12 of 14 sampling sites, giving a site-level positivity of 86%.

Conclusion: MTBC DNA can be successfully detected in wastewater across diverse settings in Eswatini. WBE may represent a feasible, non-invasive early warning system for TB, potentially enabling a shift from passive detection to data-driven, targeted public health action. Early and sustained stakeholder engagement ensured alignment with national priorities and will support scalability within the MOH framework if WBE is demonstrated to predict TB transmission hotspots and can be used to target TB screening activities.



14

The Role of Community Networks in the Transmission and Persistence of M. Tuberculosis in Urban Africa with Endemic Tuberculosis

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Background: Tuberculosis (TB) remains endemic in many resource-limited settings, in part due to ongoing, unobserved transmission within poorly defined social contact networks. Understanding how social network structure shapes transmission is critical for designing effective control strategies.

Methods: We investigated Mycobacterium tuberculosis transmission dynamics in Lubaga Division, Kampala, Uganda, by constructing a sociocentric contact network based on personal networks of 130 TB index cases and 123 community controls frequency-matched by age, sex, and parish. Whole genome sequencing (WGS) was performed on isolates from 99 index cases to identify genetically related strain clusters. Social distance between genomically linked cases was estimated using the sociocentric network.

Results: Network structure partially explained persistent TB transmission. Key features included the presence of highly connected individuals (network hubs), transmission occurring predominantly through weak or distant social ties rather than close contacts, and geographic structural holes linking cases through unknown

intermediaries. Genetically related cases were frequently separated by multiple social steps, suggesting indirect transmission within community mixing spaces.

Conclusions: Active case finding limited to close contacts of index cases is unlikely to substantially interrupt TB transmission. Greater impact may be achieved through population-based interventions targeting geographic and social hubs where community mixing occurs and transmission is amplified.



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Exhaled Breath Condensate for Mycobacterium Tuberculosis Detection Using a Lateral Flow TB Lipoarabinomannan Assay among Adult People Living with HIV/Aids and Children in Uganda

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Introduction: Exhaled breath condensate (EBC) has been identified as a promising alternative non-sputum sample for TB diagnosis in people living with HIV/AIDS (PWH) and children.

Materials and Methods: In this proof-of-concept laboratory diagnostic accuracy study nested within a larger cohort study of TB presumptive adult PWH and children in Uganda, participants provided sputum, urine, EBC and blood samples. EBC was collected using a handheld pre-cooled RTube and run on TB-lipoarabinomannan assay (Determine™ TB-LAM Ag, Abbott, USA). The diagnostic accuracy of EBC-LAM was compared against sputum Xpert Ultra (Ultra), culture, and a composite microbiological reference standard (CMRS) of sputum Ultra and culture. We also conducted a head-to-head comparison of EBC and urine-LAM in adult PWH.

Results: A total of 99 consecutive eligible adults and 87 children provided EBC samples with 11 (11.1%) and 5 (5.7%) having bacteriologically-

confirmed TB respectively. The sensitivity and specificity of EBC-LAM, % (n/N, 95% CI) against sputum Ultra was: 44.4 (4/9, 13.7-78.8) and 84.7 (72/85, 75.3-91.6) among adults and 50.0 (2/4, 6.7-93.2) and 71.9 (59/82, 60.9-81.3) in children, respectively. The sensitivity and specificity of EBC-LAM, % (n/N, 95% CI) against sputum culture was: 66.7 (4/6, 22.2-95.7) and 85.2 (75/88, 76.1-91.9) among adults and 50.0 (2/4, 6.7-93.2) and 71.9 (59/82, 60.9-81.3) in children, respectively. In a head-to-head comparison, EBC-LAM detected 50% (5/10) of the microbiologically confirmed TB cases compared to 27.3% (3/11) by urine-LAM. The area under ROC curve was (EBC LAM vs Urine LAM): 0.65 (95% CI 0.46 – 0.82) versus 0.54 (95% 0.40-0.69), p-value= 0.384 against sputum Ultra, 0.76 (95% CI 0.55–0.97) versus Urine LAM = 0.51 (95% 0.35-0.68), p-value = 0.033 against sputum culture, and 0.68 (95% CI 0.51–0.84) versus = 0.53 (95% 0.40-0.67), p-value = 0.189 against CMRS1

Conclusion: The LAM antigen is detectable in EBC samples of adult PWH and children with presumptive TB. The diagnostic sensitivity of EBC-LAM was comparable to other non-sputum-based biomarker TB assays in PWH and children. The EBC-LAM seemed to detect more TB confirmed PWH individuals compared to urine TB-LAM. To confirm these findings, more extensive validation studies of EBC TB-LAM should be conducted among children and PWH.



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Evolving Role of an Unemployed, Tech-Enabled Youth Volunteer Workforce in Strengthening Tuberculosis Services in Nigeria

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Background: Nigeria bears one of the highest tuberculosis (TB) burdens globally, compounded by widespread youth unemployment and a substantial treatment gap for common mental disorders (CMD), which frequently co-occur with TB. In response to these intersecting public health and socioeconomic challenges, RedAid Nigeria (RAN) adopted an innovative human resource model. This model recruits and trains unemployed graduates i.e., who are proficient smartphone users- as Health Facility Screening Officers (SOs), Community Health Volunteers (CHVs), or community-based Volunteer Liaison Officers (VLOs) to support active TB case-finding and service integration initiatives across various TB grant implementations. This paper outlines the evolution of the VLO model across multiple projects and examines its contribution to scalable, person-centered health system strengthening.

Methods: The VLO model evolved across several TB REACH waves and a community information project. VLOs were deployed to:

- WAVE 5: Support active TB case-finding in hard-to-reach areas.
- WAVE 9: Use smartphones for real-time data capture and patient tracking.
- WAVE 10: Integrate mental health screening (depression and substance use) into routine TB care.
- WAVE 11: Expand access to integrated care for TB, pneumonia (CAP), and COPD.
- Audiopedia Project: Provide audio-based health education to illiterate women in urban slum, deployed via WhatsApp or physical memory cards.

Evaluations utilized mixed-methods designs and the Consolidated Framework for Implementation Research (CFIR).

Results: The impact across projects was substantial:

- Audiopedia: 20 VLOs reached 503 women, significantly improving health knowledge via WhatsApp and memory cards.
- Wave 5: 30 VLOs screened over 1 million individuals, more than doubling TB notifications (up to 183.3% increase).
- Wave 10: 37 personnel integrated TB and mental health care, targeting a 20% increase in case detection and screening 25% of patients for CMD.
- Wave 11: Preliminary data shows 52% of TB targets met, alongside a 138% increase in pneumonia detection and improved COPD identification.

Conclusion: The RAN VLO model is a scalable, dual-purpose innovation that transforms socioeconomic challenges into health system assets. By employing youth to bridge gaps in TB, respiratory and mental health services, the model provides a replicable framework for resilient, person-centred care in resource-constrained settings.



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Outcomes of Routine Tuberculosis Contact Investigation in Primary and Secondary Health Facilities in Southern Malawi

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Background: Tuberculosis (TB) case identification remains a challenge in high-burden settings. Active TB contact investigation improves TB case identification. In Malawi, active contact investigation prioritizes children under five years and contacts of bacteriologically confirmed TB cases. We assessed the performance of TB contact investigation in routine program settings to inform policies and practices.

Methods: We conducted a retrospective cohort analysis using routine TB program data from 10 EGPAF-supported facilities in Southern Malawi. We included contacts of all clients diagnosed with active TB between January and December 2024. Data were abstracted from facility-based contact tracing registers and analyzed in Stata 18. Bacteriologically confirmed TB was defined as TB diagnosed by positive sputum microscopy or Xpert MTB/RIF. Descriptive statistics summarized the TB contact investigation cascade. Logistic regression examined the factors associated with active TB among contacts tested for TB.

Results: Overall, 1,978 contacts (182 were < 5 years) were elicited from 644 index TB patients, 1860 (94.3%) of whom were screened for TB, using the WHO's four-symptomatic screening. Of these, 219 (11.8%) were classified as having presumptive TB. TB prevalence among the presumptive TB patients was 12.8% (95% CI: 9.0% - 17.9%). Of the 135 contacts under five years who were not diagnosed with TB, 91 (67.4%) initiated TB preventive therapy (TPT). TB prevalence was higher when the index patient had clinically diagnosed TB than when the index patient had bacteriologically confirmed TB: 28.3% vs. 10.2%,

respectively (p=0.005). In a multivariate analysis, contacts elicited from clinically diagnosed TB patients had higher odds of TB than those elicited from bacteriologically diagnosed TB: adjusted odds ratio 3.28 (95% CI 1.30 – 8.24). No significant differences in TB prevalence were observed by sex, age group, HIV status, or facility location (urban vs. rural).

Conclusion: TB screening was high among elicited contacts. However, TPT coverage in contacts under five years was suboptimal. Efforts to increase TPT coverage in this group are required. The higher TB prevalence among contacts of index patients with a clinical diagnosis warrants further investigation.



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QTcF Prolongation among Patients Treated with Bedaquiline for Multidrug-Resistant Tuberculosis at Kibong'oto Infectious Diseases Hospital, Tanzania: A Retrospective Cohort Study

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Background: Bedaquiline-containing regimens are central to the treatment of multidrug-resistant tuberculosis (MDR-TB), achieving high culture conversion and reduced mortality¹⁻⁴. However, concerns about QT interval prolongation and subsequent arrhythmias have led to intensive electrocardiogram (ECG) monitoring^{5,6}, influencing clinical practice and limiting MDR-TB service expansion in resource-limited settings. This study aimed to determine the incidence of QTcF prolongation and identify factors associated with MDR-TB treated with bedaquiline-containing regimens in Tanzania.

Materials and Methods: We conducted a retrospective cohort study at Kibong'oto Infectious Diseases Hospital, a national referral center for MDR-TB in Tanzania, including adults with bacteriologically-confirmed MDR-TB treated with bedaquiline-containing regimens between January 2021 and December 2024. Patients with incomplete ECG data or missing key clinical information were excluded. Demographic, clinical, laboratory, treatment, and ECG data were extracted from medical records. QT intervals were corrected using the Fridericia formula (QTcF), classified according to Common Terminology Criteria for Adverse Events (CTCAE) criteria⁷. Incidence of QTcF prolongation was calculated for the full cohort. A nested age- and sex-matched analysis compared patients who developed QTcF prolongation with those who did not. Time to QTcF prolongation was assessed using Kaplan-Meier analysis and compared between treatment regimens using the log-rank test. All statistical

tests were two-sided, with p-values <0.05 considered statistically significant.

Results: Among 267 MDR-TB inpatients treated with bedaquiline-containing regimens, 45 patients (16.9%) developed QTcF prolongation; these were compared with 45 age- and sex-matched controls. Baseline characteristics, including body mass index, HIV status and anti-retroviral use, were similar between groups. Patients without QTcF prolongation had higher smear and culture positivity and more frequent cavitory disease. QTcF prolongation was associated with specific treatment regimen combinations, occurring earlier and more frequently in regimens combining both bedaquiline and delamanid. Kaplan–Meier analysis demonstrated significant differences in time to QTcF prolongation by regimen (log-rank $p=0.012$). Mortality did not differ between groups.

Conclusions: QTcF prolongation was primarily driven by treatment regimen rather than baseline characteristics or markers of TB disease severity. The highest and earliest risk was observed in regimens combining both bedaquiline and delamanid. These findings support targeted ECG monitoring during early treatment in patients receiving high-risk regimens.



POSTER ABSTRACT PRESENTATIONS

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Treatment Outcomes in Integrated Tuberculosis-Depression Care in Nigeria's Resource-Limited Context: A Secondary Analysis of Intervention Arm Data

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Background: Integrated tuberculosis and depression care delivered by non-specialist health workers (NSHWs) has shown effectiveness comparable to standard care in controlled research settings. However, evidence on patient-level outcomes during real-world implementation in resource-constrained, politically fragile environments remains limited. We examined TB treatment outcomes and their predictors among participants receiving integrated TB-depression care in Nigeria, contextualizing findings within the challenges of early 2025.

Methods: This secondary analysis focused exclusively on the intervention arm (n=226) from a quasi-experimental study across eight sites in Nigeria. Participants with TB and significant depressive symptoms (PHQ-9 ≥ 4) received protocol-driven depression care (psychoeducation, problem-solving therapy, and antidepressants as indicated) delivered by trained NSHWs alongside standard TB treatment. TB treatment outcomes were categorized per WHO guidelines. Analysis was stratified by sociodemographic and clinical characteristics. Implementation occurred during early 2025, a period marked by pockets of sub-national geopolitical tension that caused some disruptions to care delivery, health worker deployment, and patient movement, reflecting real-world conditions in fragile health systems.

Results: Overall local treatment success was 74.8%, modest relative to the 90-95% global target but achieved despite substantial contextual challenges. Mortality was 8.9%, loss to follow-up 10.2%, and transfer-out 2.2%. Marked disparities emerged: HIV-positive participants had dramatically lower success (57.1% vs. 77.2% in HIV-negative), higher mortality (17.9% vs. 7.6%), and greater loss to follow-up (25.0% vs. 8.1%). Widowed persons faced poorest outcomes (65.0% success; 20.0% mortality), while married persons achieved 79.3% success. Paradoxically, participants with no formal education showed the highest success (87.5%), compared to 70.3% among those with primary education, possibly reflecting differential health-seeking behaviours or community support networks. Urban residents experienced higher mortality than rural counterparts (12.3% vs. 5.8%). Relapse TB cases outperformed new cases (87.5% vs. 73.6% success).

Conclusion: Within integrated TB-depression care delivered under real-world resource constraint conditions, HIV co-infection, widowhood, and urban residence identified subgroups with substantially higher risk of unfavourable outcomes. These findings, generated during a period of some disruption, demonstrate both the resilience of task-shared models and the imperative for enhanced support targeting PLHIV and socially vulnerable populations to close persistent equity gaps in TB care.



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Uptake and Completion of Tuberculosis Preventive Therapy in Facility-Identified Populations beyond Household Contacts and People Living with HIV: A Systematic Review and Meta-Analysis

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Background: Tuberculosis (TB) preventative therapy (TPT) is a key intervention for eliminating TB worldwide. TPT is recommended for individuals who are at higher risk, such as household contacts, people living with HIV (PLHIV), health care workers (HCWs), prisoners, immigrants, and those with comorbidities. Implementation of TPT among PLHIV and children under 5 years old has been extensively studied, demonstrating gaps in coverage. There is a lack of evidence regarding uptake and completion across a wider variety of populations.

Methods: We systematically searched Medline, Embase, and Global Health for studies reporting TPT uptake and/or completion in non-PLHIV and non-household contact populations. Narrative synthesis focused on describing diversity of

groups. Pooled estimates of uptake and completion rate were calculated using random-effects meta-analysis. Subgroup analyses examined population type and regimen (standard, short-course, mixed).

Results: Thirty-six studies (50,190 participants) were included, targeting the following groups: prisoners, immigrants, healthcare workers, solid-organ transplant candidates, general population (child, adolescent, and adult subgroups), individuals with silicosis, gold miners, college students, renal disease patients, individuals with diabetes mellitus, the homeless, refugees, and patients with specific infections. TPT uptake was near-universal (pooled proportion = 100%; 95% CI: 88%–100). However, the complete rate was lower, 71% (95% CI: 65%–77% pooled estimate) and varied by subgroup; highest in general populations at 76.0% and lowest among prisoners and immigrants at 60%. Point estimates of completion for shorter regimens (70% [95% CI: 55%–83%]) were higher compared to standard 6–9-month isoniazid (59% [95% CI: 49%–68%]), though this difference was not statistically significant.

Conclusions: While TPT uptake is high when offered, completion of TPT remains suboptimal, especially in vulnerable groups. Wider adoption of short-course regimens, targeted adherence support, and systematic screening strategies are needed to optimise TPT's public health impact.



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The Complex Interaction Between Tuberculosis and Hodgkin's Lymphoma in an HIV-Positive Patient: Diagnostic Challenges in a Resource-Limited Setting

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Background: Tuberculosis (TB) and lymphoma have overlapping clinical, radiological, and laboratory features, especially in patients living with HIV. This overlap often delays diagnosis and proper treatment, particularly in low-resource, high-burden countries, contributing to high patient mortality and morbidity.

Case Presentation: A 61-year-old HIV-positive man from Phalombe District, Malawi, presented with chest pain, cough, chills, shortness of breath, and swelling in his lower limbs. He had been on anti-TB therapy for two months with minimal improvement. Examination revealed bilateral basal crackles, abdominal distension, and swelling in the feet. Laboratory tests showed severe anemia (Hb 6.2 g/dL), increased platelet count, and elevated white blood cell count. Abdominal ultrasound identified splenic micro-abscesses, and echocardiography showed left ventricular hypertrophy. Despite ongoing anti-TB treatment and supportive care, the patient developed a mobile, rubbery left cervical lymph node. Histopathology revealed sclerotic nodules with Reed–Sternberg cells, confirming Hodgkin's lymphoma. He was referred to Queen Elizabeth Central Hospital (QECH) Oncology Unit for chemotherapy.

Discussion: The coexistence of TB and lymphoma is uncommon but clinically important. Both conditions can present with fever, weight loss, night sweats, and lymphadenopathy. In HIV-infected individuals, chronic immune activation and impaired tumor shadowing increase the risk of both infections and cancer. This case emphasizes the diagnostic challenge where persistent symptoms despite TB treatment may indicate an

alternative or concurrent diagnosis. Maintaining high clinical suspicion, conducting multidisciplinary evaluations, and obtaining tissue biopsy are crucial for accurate diagnosis and management.

Conclusion: In areas where TB is common, clinicians should consider malignancy in HIV-positive patients who show poor response to anti-TB therapy. Early tissue diagnosis and prompt referral to oncology services can improve patient outcomes.



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Human ace2 and tmprss2 Polymorphisms Associated with Susceptibility to Mycobacterium Tuberculosis and SARS-CoV-2 Co-Infection in a Cameroonian Cohort

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Background: SARS-CoV-2 and Mycobacterium tuberculosis (Mtb) share similarities in their modes of transmission, pathophysiological symptoms, and clinical manifestations. An imbalance in the immune response characterised by elevated levels of some inflammatory cytokines caused by tuberculosis (TB) and COVID-19 may increase the risk of developing a severe disease-like condition. It has been reported that TB increases the expression levels of Ace2 (angiotensin converting enzyme 2) and Tmprss2 (transmembrane protease serine 2) proteins, which are essential for SARS-CoV-2 entry into the host cell and COVID-19 pathogenesis. Mutations in ace2 and tmprss2 genes may intrinsically lower the susceptibility and/or severity in COVID 19-infected participants. In this study, the immune response involved during SARS-CoV-2 and Mtb co-infection was measured and genotype frequency of 13 SNPs of ace2 and tmprss2 genes in a Cameroonian cohort were evaluated.

Methods: Participants presenting signs and symptoms of a respiratory disease were enrolled in six hospital facilities in Yaounde, Cameroon. Genotype frequency of 13 SNPs of ace2 and tmprss2 genes in a Cameroonian cohort consisting of COVID-19-positive, TB-positive, TB-COVID-19 and a control group were studied. Cytokine levels during TB and/or COVID-19 were estimated alongside markers of liver and kidney function.

Results: Higher plasma IL10, IFN- γ , TNF- α and serum AST, Urea and D-dimer levels were associated with Mtb and SARS-CoV-2 co-infections in this study. Variations in genotype distribution of seven SNPs (rs2285666, rs6632677, rs4646116, rs4646140, rs147311723, rs2074192 and rs4646142) in ace2 gene were identified. These variations were correlated with the expression levels of some cytokines and biochemical markers. Our most significant findings include the association of heterozygous mutant alleles of rs4646140 and double mutant alleles of rs147311723 in the ace2 gene with increased IL-6 expression levels in study participants. Additionally, the double mutant alleles of rs4646142 were linked to elevated IFN- γ levels.

Conclusion: This study indicates that heterozygous and double mutant alleles of most SNPs of ace2 increased inflammatory response which may lead to deleterious outcomes in individuals with time.



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Integrated Symptomatic and Asymptomatic TB Screening: Innovations from Uganda's National Program

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Background: Uganda continues to face challenges in TB case detection, particularly among high-risk and mobile populations. To close gaps in notifications and strengthen health system resilience, the National TB and Leprosy Program (NTLP) implemented integrated screening strategies that combined symptomatic and asymptomatic approaches across health facilities, communities, workplaces, and drug-resistant TB (DR-TB) hotspots.

Methods: Between October–December 2025, NTLP deployed mobile TB clinics, portable digital chest X ray/CAD systems, and GeneXpert diagnostics in 65 districts. Screening was conducted in chronic care clinics, community hotspots, workplaces, and through contact tracing of DR TB patients. Health workers were trained to embed digital tools into routine workflows, supported by multisectoral coordination under the Multisectoral Accountability Framework for TB (MAF TB).

Results: Uganda's integrated TB screening initiative demonstrated measurable gains in case detection by combining symptomatic and asymptomatic approaches. Leveraging mobile clinics, CAD-enabled digital X-ray, GeneXpert, and workplace outreach, the program expanded coverage to high-risk populations and strengthened surveillance systems. Results highlight both the scale of implementation and the effectiveness of digital innovations in strengthening surveillance and treatment linkage, integrating services for HIV, malaria, and other health priorities. These outcomes underscore the potential of multisectoral, technology-driven strategies to accelerate TB control and advance Universal Health Coverage in resource-constrained environments.

- Community hotspots: 11,831 screened; 978 (8.3%) abnormal CXR; 160 TB cases diagnosed and treated.
- Digital X ray sites: 25,642 screened; 5,907 presumptive; 641 TB cases confirmed (387 bacteriologically confirmed, 254 clinically diagnosed).
- Workplaces: 1,014 screened; 8 TB cases detected; integrated HIV, malaria, and cancer screenings conducted.
- DR TB contact tracing: 205 index patients traced; >3,600 contacts screened; 1 DR TB and 22 DS TB cases identified.
- Integrated surveillance (Ankole & Lango): 18,900 screened; 245 TB cases diagnosed; additional HIV, malaria, nutrition, and maternal health services delivered.

Conclusion: Uganda's integrated TB screening strategies demonstrate the value of combining symptomatic and asymptomatic strategies with digital innovations. By leveraging mobile clinics, CAD-enabled X-ray, and multisectoral outreach, significant case detection gains, strengthened surveillance. This model offers a replicable approach for high-burden, resource-constrained settings, positioning Uganda as a leader in innovative TB case finding.



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Prevalence and Determinants of Cigarette Smoking among People with Tuberculosis in Lesotho: Evidence from a Nationwide Cross-Sectional Survey

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Background: Low- and middle-income countries face a significant dual burden of tuberculosis (TB) and cigarette smoking. Nevertheless, studies examining the prevalence and determinants of smoking status and frequency among people with TB (PWTB) are scarce in sub-Saharan Africa, including Lesotho. Therefore, this study evaluated the prevalence and determinants of smoking status and frequency among people with TB in Lesotho.

Methods: Data on people with TB from the 2023 Lesotho Demographic and Health Survey were used in this study (n = 224). The data were adjusted for sampling weight, stratification, and cluster sampling design. The outcome variables were smoking status and smoking frequency (daily smoking and occasional smoking). The predictor variables included socio-demographic factors, household characteristics, alcohol use, TB-related stigma, and mental health status. We evaluated the association between outcome and predictor variables using Pearson's chi-squared test and complex sample logistics regression. Statistical significance was set at a p-value < 0.05.

Results: The prevalence of cigarette smoking among PWTB is 32.2%. The prevalence of daily and occasional smoking among PWTB is 24.9% and 7.3%, respectively. Being male (AOR=120.15, 95%CI:30.53-472.81, p<0.001), no media exposure (AOR=21.96, 95%CI:5.79-83.31, p<0.001), low media exposure (AOR=4.76, 95%CI:1.33-17.09, p=0.017), alcohol use (AOR=12.64, 95%CI:3.24-49.35, p<0.001), and mild depression (AOR=3.28, 95%CI: 3.28, 95%CI: 1.04-10.38, p=0.043) increased the odds of smoking among PWTB. Nevertheless, moderate/severe depression

(AOR=0.06, 95%CI: 0.00-0.73, p=0.027) reduced the likelihood of smoking among PWTB. Being male (AOR=234.07, 95%CI:108.69-504.08, p<0.001), no media exposure (AOR=18.93, 95%CI:4.58-78.28, p<0.001), and alcohol use (AOR=21.26, 95%CI:3.79-119.23, p=0.001) increased the odds of smoking among PWTB. In contrast, moderate/severe depression (AOR=0.00, 95%CI: 0.00-0.00, p<0.001) reduced the likelihood of smoking among PWTB. Being male (AOR=46.55, 95%CI:4.69-461.61, p=0.001), no media exposure (AOR=94.66, 95%CI:7.60-1179.67, p=0.001), and low media exposure (AOR=26.34, 95%CI:2.54-272.98, p=0.007), and mild depression (AOR=6.18, 95%CI:1.43-26.66, p=0.015) increased the odds of smoking among PWTB.

Conclusion: The high prevalence of smoking among PWTB can be improved in Lesotho. Policies and programs to reduce smoking among PWTB must target the male gender, improve media exposure to anti-tobacco campaigns, reduce alcohol consumption, and improve mental health among people with TB.



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Differential Responses of Mycobacterium Tuberculosis Complex Lineages to Tuberculosis Treatment Regimens

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Tuberculosis (TB), caused by the Mycobacterium tuberculosis complex (MTBC), comprises ten lineages globally, all present in Africa. While some lineages, like Mtb lineages 2 and 4, are widespread, others, such as Maf lineages 5 and 6, are restricted to West Africa. Despite this diversity, drug-susceptible TB is treated uniformly with a six-month antibiotic regimen, ignoring lineage-specific variations that may affect outcomes. Addressing these differences is crucial for improving TB control.

We transformed drug-susceptible clinical isolates representing Africa's MTBC diversity with luminescence and green fluorescent protein reporter plasmids. These isolates were tested in a 20-day drug susceptibility assay to evaluate lineage-specific responses. Inhibitory concentrations (ICs) for first-line, second line, and new anti-TB drugs were determined using the Collaborative Drug Discovery (CDD) Vault. In-house custom Python scripts identified optimal IC values and time points per lineage. These findings guided the evaluation of nine novel treatment regimens using checkerboard assays.

IC measurements were most consistent between day10 and 15 post-treatment across all lineages, with earlier or later time points showing variability. Notably, the IC50 of first-line drugs like rifampicin varied up to 4-fold between Mtb-lineage 4 and Maf-lineage 6. Across the nine multidrug regimens, Mtb lineage 4 showed the greatest overall susceptibility, while Maf lineages 5 and 6 and M.bovis exhibited consistently higher AUC values and significantly reduced drug

inhibition. Temporal analyses further demonstrated that Maf lineage 6 responded more slowly than Mtb lineage 4, showing significant early-phase differences that diminished over time, whereas Mtb lineage 2 remained largely comparable to Mtb lineage 4 across regimens.

MTBC lineage diversity significantly impacts anti-TB regimen efficacy. Some regimens showed enhanced efficacy against specific lineages, underscoring the potential of lineage tailored treatments to shorten therapy and improve TB control outcomes.



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Integration of Tuberculosis and HIV Testing Services for Pregnant Women: An Approach to TB Case Finding among Pregnant Women in the Community

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Background: Tuberculosis (TB) remains a significant public health threat in Nigeria and continues to be one of the leading causes of mortality. Despite improvements in treatment coverage, substantial gaps persist in screening and case notification, particularly among pregnant women who lack access to formal Antenatal Care (ANC) services. This underserved population is often among the missed TB cases, heightening the risk of adverse maternal and neonatal outcomes including inadequate maternal weight gain, spontaneous abortion, and early fetal demise. Moreover, active TB in mothers increases the likelihood of postpartum transmission to neonates. The implementation of the community TB/HIV Testing Services (HTS) intervention for pregnant women presented a unique opportunity to close these diagnostic and treatment gaps.

Method: The intervention was implemented under the GC7 N-THRIP grant, with IHVN as the principal recipient and LTR as a subrecipient across five states: Adamawa, Borno, Gombe, Plateau, and Yobe. It aimed to enhance Public-Private Mix (PPM), community-based TB case detection, and HIV Testing Services (HTS) for pregnant women without access to formal ANC. Outreach strategies included house-to-house visits, mobile clinics in nomadic/slum areas, IDP camps, TBAs, maternity, and faith-based homes. Trained community

volunteers and CBOs conducted activities across 93 LGAs from January–December 2024, using standardized tools to capture and report data aligned with national TB indicators.

Results: Out of 145,020 pregnant women screened, 7,418 were identified as presumptive TB cases and tested, yielding 455 confirmed TB diagnoses. Of these, 232 (51%) were identified via community outreaches, 105 (23%) through house-to-house visits, 50 (11%) from TBAs, and 68 (15%) through other outreach approaches. Community outreach had the highest diagnostic yield.

Conclusion: The GC7 N-THRIP community-based TB/HTS intervention demonstrates a strategic and effective model for identifying and treating TB among vulnerable pregnant women, addressing missed cases and overcoming diagnostic access barriers in marginalized settings.



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Improving TB Treatment Adherence Using Visual Tracking Tools in Resource-Limited Settings in Magoye, Rural Zambia amidst Climate Change

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Background: Tuberculosis (TB) remains a significant public health challenge in rural Zambia, where patients face barriers such as limited health infrastructure, travel difficulties, and the emerging impacts of climate change on accessibility. Treatment adherence is critical to preventing drug resistance and improving outcomes. Low-cost, community-centered interventions are essential in this context.

Objective: To evaluate the effectiveness of visual tracking tools in enhancing TB treatment adherence and patient engagement in Magoye, rural Zambia.

Methods: A total of 120 TB patients receiving treatment at three health facilities in Magoye were provided with a color-coded chart and token system. Daily doses were marked with tokens, and treatment milestones were visually tracked. 15 community health workers and family members were trained to support patients. Adherence rates, treatment completion, and patient engagement were monitored over 6 months and compared with baseline data from the previous year (n=110).

Results: Patients using visual tracking tools achieved an adherence rate of 92%, compared to 73% in the previous cohort. 87% of patients completed the full treatment course, compared to 68% historically. Health workers reported easier monitoring, and all 120 patients expressed improved understanding of treatment milestones. The intervention remained effective despite climate-related disruptions, such as seasonal flooding that limited access to facilities.

Conclusion: Visual tracking tools are a low-cost, scalable, and effective intervention to improve TB treatment adherence in rural, resource-limited settings affected by climate change. Incorporating these tools into routine care empowers patients, engages families, and enhances treatment outcomes.



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Comparative Analysis of Cost Effectiveness of Chest X-Ray Driven Outreach Screening versus Non-Chest X-Ray Screening in Tuberculosis Diagnosis and Reducing TB Incidence in Kampala by 2030: A Cross-Sectional Study

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Tuberculosis (TB) remains a major public health challenge in Uganda, one of the 30 high TB burden countries globally. Approximately 94,000 TB cases are diagnosed annually, corresponding to a prevalence of 213 cases per 100,000 population, with an estimated 245 new infections and 30 TB-related deaths occurring daily. Uganda aims to reduce new TB infections by 90% by 2030. As a low-income country with constrained health financing, identifying cost-effective strategies to enhance TB case detection is essential. This study compares the cost-effectiveness of mobile digital chest X-ray-driven outreach screening with non-chest X-ray outreach using intensified case finding (ICF) in Kampala Region.

A cross-sectional cost-effectiveness analysis was conducted using projected five-year costs and outcomes. The Incremental Cost-Effectiveness Ratio (ICER) was calculated to compare modalities. Chest X-ray outreaches required a one-time capital investment of UGX 300 million and weekly operational costs of UGX 500,000, screening 4,205 individuals per week and detecting 35 confirmed TB cases. Non-chest X-ray outreaches cost UGX 1,627,000 weekly, screened 1,570 individuals, and detected 6 TB cases per week. Over five years, total projected costs were UGX 430,000,000 for chest X-ray outreach and UGX 423,020,000 for non-chest X-ray outreach. Estimated total TB cases detected were 9,100 and 1,560, respectively. The cost per TB case detected was UGX 47,252 for chest X-ray screening compared to UGX 271,167

for non-chest X-ray screening. The ICER was UGX 928 per additional TB case detected.

Despite higher initial capital costs, mobile chest X-ray outreach demonstrates substantially greater case detection efficiency and lower cost per case over time. Scaling up chest X-ray-based screening in high-density, high-burden settings could significantly improve TB case detection and accelerate Uganda's progress toward achieving its 2030 TB reduction targets.



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Molecular Epidemiology of Drug-Resistant Tuberculosis (DR-TB) in West Africa: A Multi-Country Genomic Surveillance Pilot Study

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Tuberculosis (TB) remains a major public health crisis in West Africa, compounded by rising drug resistance. To establish regional genomic surveillance, we conducted a multi-site pilot study across seven institutions in six West African countries including The Gambia, Ghana, Nigeria (Lagos/Ibadan), Mali, Burkina Faso, and Togo.

The project recruited 862 DR-TB patients diagnosed with GeneXpert over two years, yielding 574 Mycobacterium tuberculosis Complex (MTBC) isolates. We successfully performed whole genome Sequencing (WGS) on 362 isolates, ultimately achieving high-quality genomic data for 302 isolates (83.4% pass rate), demonstrating the technical feasibility of sub-regional WGS.

Using TB Profiler, we found that 53% (n=159) of analysed genomes were resistant to at least one anti-TB drug. These included multi-drug resistance (MDR-TB) as the largest resistant group at 39% (n=62), followed by isoniazid mono-resistance (27%) and rifampicin mono-resistance (19%).

Genomic analysis confirmed S315T in katG and S450L in rpoB as the dominant resistance-conferring mutations for isoniazid and rifampicin.

Crucially, the detection rate of resistance markers varied dramatically across sites, from a high of 88.9% in Ghana to a low of 17.1% in NIMR-Nigeria (Lagos). Unexpectedly, 47% of analysed genomes lacked known resistance markers albeit their respective sputum samples had been diagnosed rifampicin resistant by GeneXpert. Furthermore, WGS identified three M. bovis isolates and a mixed M. bovis/MTBC infection, highlighting significant zoonotic risks and the complexity of regional transmission.

These findings provide critical, high-resolution genomic data essential for understanding DR-TB transmission dynamics and evolution. The observed regional variation in resistance prevalence and the detection of non-human MTBC species emphasise the urgent need for tailored, multi-faceted control strategies and continuous genomic surveillance across West Africa.



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Digital Adherence Technologies in Uganda's TB Program: Strengthening Treatment Monitoring and Scale Up through Data Driven Systems

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Abstract Summary: Uganda's TB program introduced Digital Adherence Technologies (DATs)—smart pill boxes, video supported treatment, and SMS reminders—achieving a 96% treatment success rate across 15 regions. Despite modest uptake, DATs improved adherence monitoring, reporting transparency, and patient linkage to care. Strengthened MEL frameworks position Uganda for national scale up.

Background: Uganda's National TB and Leprosy Program (NTLP) has advanced the use of Digital Adherence Technologies (DATs) to improve treatment outcomes. Supported by the Global Fund, IDI-LPHS-TBA, DATs—including smart pill boxes, video supported treatment (VST), and SMS reminders—were deployed across 15 regions in FY2024/25. Over 1,500 patients were enrolled, achieving a 96% treatment success rate, surpassing national targets. Despite these gains, uptake remains modest (80% for smart pill boxes, 20% for VST), underscoring the need for stronger monitoring, evaluation, and learning (MEL) systems to guide scale up.

Methods: Between January 2024 and December 2025, NTLP distributed 2,500 smart pill boxes and 100 smart tablets to 70 health facilities. Training was provided to health workers to embed DATs into routine workflows. 519 patients were evaluated within the same period, were enrolled on smart pill boxes (n=343) and VST (n=176), including 310 DR TB and 209 DS TB cases. Technical mentorship and provision of data bundles supported implementation fidelity and patient monitoring.

Results: DATs achieved a 96% treatment success rate among enrolled patients, with improved monitoring of adherence and enhanced reporting transparency. Uptake remains limited due to data access constraints, but technical mentorship and provision of data bundles are boosting utilization. District ownership increased through dashboard reviews and stakeholder feedback loops.

Conclusion: Digital Adherence Technologies have strengthened TB treatment monitoring in Uganda, demonstrating feasibility, scalability, and impact. By embedding DATs into district health systems and reinforcing MEL frameworks, Uganda is building evidence for national scale-up. This approach enhances patient-centered care, improves adherence outcomes, and strengthens National Response confidence through transparent reporting.



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Integrating Community-Based TB and HIV Screening for Children: Lessons and Impact from Nigeria's National Childhood TB Testing Week

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Background: Nigeria bears the highest tuberculosis (TB) burden in Africa, with substantial under-detection among children. Gaps in childhood TB case findings are driven by limited provider capacity, low community awareness, and weak integration of TB services into routine child health platforms. Given the close epidemiologic and programmatic linkages between TB and HIV in children, these gaps also result in missed opportunities for early HIV diagnosis and linkage to care. To address these challenges, the National TB Program (NTP) launched the National Childhood TB Testing Week (NCTW) in 2023 as a nationwide campaign to intensify community-based childhood TB screening while integrating HIV testing services. We assess the contribution of integrated community outreach platforms to childhood TB case detection and HIV diagnosis during a national childhood TB testing campaign in Nigeria.

Methods/Program Description: The Institute of Human Virology Nigeria (IHVN), in collaboration with the NTP and State TB Programs, supported implementation of NCTW across all 36 states and the Federal Capital Territory from 21–27 September 2025. The campaign combined advocacy and community sensitization with targeted outreach activities to screen children aged 0–14 years for TB across formal and informal schools (including almajiri/tsangaya), nutrition and immunization clinics, congregate settings, urban slums, and hard-to-reach communities. HIV testing was integrated for eligible children to promote early diagnosis and linkage to care. Provision of auxiliary medicines for common childhood

illnesses was used to enhance caregiver engagement and service uptake.

Results: During NCTW, 359,589 children were reached and 320,367 (89%) screened, identifying 56,948 (18%) presumptive cases. Of these, 52,784 were evaluated, yielding 3,232 TB diagnoses (6.1%), with 93% initiated on treatment. The one-week NCTW generated 7.5% of Nigeria's 2024 childhood TB notifications (3,232/43,000) and 8.9% of 2023 notifications (3,232/36,197), achieving 3.9–4.6-fold higher weekly case detection compared to routine programmatic averages.

Conclusions/Next Steps: NCTW proved time-bound TB/HIV screening rapidly intensifies childhood TB detection. Routine integration into schools, nutrition, and immunization platforms offers scalable strategy to close detection gaps and reduce child TB/HIV mortality.



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Assessing Use of Lollipop Saliva Swab Method in Detecting Pulmonary Tuberculosis in Newly Confirmed Sputum Positive Xpert MTB/Rif TB Clients: A Pilot Study

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Background: Tuberculosis (TB) remains as a major cause of preventable morbidity and mortality globally. There is growing interest in innovative and less invasive diagnostic options for TB, such as oral swabs. This pilot study evaluated the sensitivity of oral swabs collected using our novel 'lollipop method' and tested with Xpert MTB/RIF Ultra (Ultra) among participants with confirmed pulmonary TB.

Methods: This was a prospective cohort study conducted at Martin Preuss Centre in Lilongwe, Malawi, from February to June 2025. We enrolled 38 adults with confirmed pulmonary TB using Xpert MTB/RIF Ultra test, on expectorated sputum, stratified into 20 HIV-negative and 18 HIV-positive status. The participants had 5 trace, 2 very low, 9 low, 10 medium and 12 high bacillary loads. After informed consent and before TB treatment initiation, participants provided samples using the lollipop method. The method requires participants to suck on a sterile swab, as they would suck on a lollipop, for 30 seconds. The swabs underwent ultra-testing. The results from the lollipop swab samples were referenced, to the routine testing of expectorated sputum using Xpert MTB/RIF Ultra test.

Results: To date, 38 participants have been enrolled, with 68% male, mean age 37 years (standard deviation: 8 years), and 47% PLHIV. Ultra

test on lollipop swabs was positive in 25 (66%) participants, disaggregated by HIV status, 13/20 (65%) were from HIV-negative participants and 12/18 (67%) were from HIV-positive participants. Only one (3%) lollipop swab had an 'invalid/error' result. Based on bacillary load, the results of the ultra-MTB/Rif on the lollipop swab were 0/5 'trace', 1/2 "very low" 6/9 on 'low,' on 8/10 on 'medium,' and on 10/12 'high.

Conclusions: TB detection by lollipop swab method was promising in this pilot study. We recommend using larger sample size to improve TB detection rate using this novel, non-invasive method.



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DETEC-TB: A New Method for Tuberculosis Active Case Finding Using Serial Interferon Gamma Release Assay in Adolescents in Tanzania

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Background: Tuberculosis (TB) remains a leading infectious disease, with an estimated 10.8 million new cases worldwide in 2023, nearly 25% of which were not diagnosed or reported. This reservoir of undetected disease sustains transmission. Passive case finding, which screens household contacts of diagnosed TB patients, typically identifies only 2-7% cases because transmission often occurred years earlier. We hypothesized that detecting recent TB infection in adolescents through serial interferon-gamma release assay (IGRA) testing could shift case finding closer to transmission and increase detection of undiagnosed TB among close contacts.

Methods: We are conducting a 5-year prospective cohort study of 1,200 secondary school adolescents aged 13-15 years in two high-TB-

burden districts of Dar es Salaam, Tanzania, using multistage cluster sampling and screening with the T-SPOT.TB IGRA. Adolescents who are IGRA-negative at baseline are followed four monthly for 16 months for repeat IGRA to identify incident TB infection. Adolescents are classified as having prevalent infection (IGRA-positive at baseline), incident infection (conversion during follow-up), or no infection. Household and close contacts in each category are evaluated to identify TB source cases using chest radiography, and sputum GeneXpert, targeting approximately 400 contacts. Chi-square tests and logistic regression will be used to compare TB prevalence and estimate odds ratios.

Results: Now in year three, 1,163 adolescents from 21 schools were enrolled. At baseline, 123 (10.6%) had prevalent infection, and among those initially IGRA-negative, 67 developed incident infection at 4, 8, 12, and 16 months (33, 12, 6, and 4 cases). We evaluated 243 contacts of 68 adolescents (44 incident, 24 prevalent). Eight microbiologically confirmed TB cases were identified by Xpert, including two rifampicin-resistant. Two confirmed cases were asymptomatic and would have been missed by symptom screening. Three additional asymptomatic contacts had chest radiographs consistent with active TB despite negative Xpert results.

Conclusion: Serial IGRA testing identifies recent TB transmission and enables targeted reverse contact tracing to detect undiagnosed TB. DETEC-TB shifts case finding from a disease-based to an infection-driven strategy, moving control efforts closer to transmission. Using schools as an entry point may offer a scalable way to improve case detection, interrupting transmission in high-burden settings.



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A Co-Design Approach to the Development of a Cough Audio-Based Mobile Health Tool for Tuberculosis Screening and Testing Triage in South Africa and Uganda

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Background: Symptom-based TB screening – the standard in many low-and middle-income countries (LMICs) – is inconsistently implemented and insufficiently sensitive, leaving many people with TB undiagnosed. Mobile health (mHealth) tools have been developed to provide faster, more objective, and potentially more accurate alternatives to conventional screening. However, designing mHealth solutions for low-resource, high-burden settings is complex, shaped by infrastructural constraints, limited digital health literacy, socio-cultural factors, and the need to align diverse stakeholder priorities. We report on the first iteration of the human-centred design process used to identify design requirements for a cough-audio based TB screening tool to support triage for confirmatory testing at health facilities South Africa and Uganda.

Methods: Between 2023 and 2024 we developed a first mHealth prototype within the 4-CAGE-TB project (<https://cagetb.org/>), which was co-designed with end users (health facility staff and people attending health facilities) and consortium experts, using semi-structured interviews, observations, and group discussions. Insights from these data were systematically analysed to identify existing procedural and contextual challenges that needed to be addressed by the mHealth design.

Results: We identified eight problem elements affecting TB screening and diagnosis ranging from highly to partially solvable within design. Among these are passive, uncoordinated screening practices, variable health worker expertise, TB-related stigma, and limited digital infrastructure,

digital literacy, and trust. We subsequently formalised 15 design requirements at organisational, functional, usability, and technical levels, and four guiding design objectives. These objectives emphasise embedding the tool into existing clinical routines, accommodating heterogeneous skills, literacy levels, and infrastructural conditions, and reducing stigma and mistrust through transparent, non-alarmist interfaces. A co-design approach was essential to ensure contextual fit, usability, and alignment with user needs. Together, these insights provide a foundation for future design iterations and continued prototype development.

Conclusions: mHealth tools in LMICs must work within practical realities, i.e., they must function offline, on low- and mid-range devices, and use familiar interfaces. Effective design must go beyond technical feasibility to address workflows, socio-cultural practices, and equity. Coupling advanced technical features with clear guidance and trust-building elements ensures usability, acceptance and functionality.



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Data to Action: Leveraging the TB Situation Room to Scale TB Preventive Therapy Uptake in Osun State, Nigeria

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Background: Tuberculosis preventive therapy (TPT) is a vital intervention for reducing the progression from TB infection to active disease among high-risk populations. However, gaps in implementation persist in many high-burden African settings due to poor routine data use, limited accountability, and fragmented follow-up systems. In Osun State, Nigeria, only 27% of 4,205 eligible contacts were started on TPT in Q1 2025, revealing significant TB prevention gaps. This intervention aimed to increase TPT uptake through a structured data-to-action approach integrated into routine program operations.

Methods: The Osun State TB Program established a TB Situation Room (SR): a technology-enabled physical space that serves as a mechanism for routine data review, performance monitoring, and accountability. Through the SR routine TB surveillance data were analyzed through structured deep dives to identify local government areas (LGAs) and health facilities with low TPT performance. Targeted capacity-building was provided to DOTS officers and local government TB and Leprosy Supervisors to strengthen facility-based TPT delivery. Bi-weekly SR meetings reviewed performance dashboards, monitored progress, and tracked corrective actions at both the state and LGA level.

Results: TPT uptake rose from 27% in Q1 2025 to 74% in Q3 2025, exceeding the program target of 60%. Out of the 30 LGAs in the state, 11 achieved high TPT coverage, while the remaining 19 showed varying levels of improvement, reflecting differences in implementation intensity and follow-up mechanisms. The intervention led to a significant overall increase in the number of eligible contacts accessing TB preventive therapy.

Conclusion: This intervention demonstrates that embedding structured routine data use, accountability mechanisms, and frontline capacity-building within TB programs can significantly enhance TPT implementation in high-burden settings within a relatively short period. The TB SR approach enabled quick identification of implementation gaps and efficient translation of data into action, contributing to better TB prevention outcomes. This model offers a scalable and context-appropriate strategy for increasing TPT coverage across similar African health systems.



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Addressing Tuberculosis Disparities: A Review of Systematic Screening for Men in Southwest Nigeria

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Background and Challenges to Implementation:

Previous research has identified that a lower proportion of men are reached during active case-finding despite TB being commoner in them. This underscores the need to have activities that would specifically target men in a bid to find all missing people with TB. These are results from the USAID funded TB-LON 3 project implementation Lagos and Ogun States.

Intervention or Response: A ranking of all Local Government Areas (LGAs) in both Lagos and Ogun States were done and top 9 high TB burden LGAs were purposively selected for this initiative. Hubs where higher number of men are most likely to be found were mapped in each selected LGA. This included transportation hubs, beer parlors, sports bars, meetings of male-dominated trade unions/associations, brothels, drug addicts' hide-outs e.t.c. Females present were screened and recorded separately. The TB screening was integrated with HIV counseling and testing and conducted during peak period of human traffic to the identified places. WHO 4 symptom checklist and CAD enabled ultra-portable digital X-ray (where available) was used to identify people presumed to have TB while their sputum samples were collected and analyzed with the GeneXpert Rif Assay afterwards.

Results/Impact: The results presented are over a 28-month period between July 2022-September 2024. A total of 6,824 adult males were screened with a presumptive TB and TB yield of 18% and 14% respectively was recorded. This resulted in number needed to screen (NNS) and number needed to test (NNT) of 39 and 7 respectively.

These indicators are way higher for the general populace at 254 and 10 respectively on the same TB-LON 3 project.

Conclusions: Deliberate efforts to target men would ensure that no one is left behind in the search for missing TB cases. This provides a useful guide especially in resource constrained settings where it important to target activities towards areas of prospective high yield.

Summary: This provides evidence that deliberate efforts to target specific gender would ensure that no one is left behind in the search for missing TB cases.



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Strengthening TB–HIV Program Monitoring through Digital TB Surveillance: A Quality Improvement Initiative in Delta State, Nigeria

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Background: Timely and accurate tuberculosis (TB) data are essential for effective TB-HIV program implementation, decision making and client follow-up. There are usually challenges of paper-based reporting systems which contribute to delayed reporting and incomplete documentations which are more evident within the Community Public-Private Mix (CPPM) platforms that generate large volumes of TB-HIV data across multiple service delivery points. This study assessed the effect of digital TB surveillance on data completeness and timeliness in Delta State, Nigeria.

Methods: A quality improvement intervention was implemented within the CPPM TB program in Delta State, Nigeria where an electronic TB surveillance system was introduced to complement the paper-based reporting across more than 300 community and private-sector service delivery points. A retrospective analysis of aggregated program data covering an 18-month period (January 2024 to June 2025) was conducted to assess the documentation of HIV status among TB clients. Descriptive analysis was performed using R and Microsoft Excel to assess reporting completeness and timeliness.

Results: Following the implementation of the electronic TB surveillance system, reporting completeness for the key TB indicators improved from 80% to 98% while the mean reporting timeliness reduced from 11 days to 8 days. Documentation of HIV status among TB clients

increased from 90% to 100% post-intervention, thereby strengthening TB-HIV program monitoring.

Conclusions: Digital TB surveillance implemented through a quality improvement approach significantly strengthened data completeness, accuracy and timeliness within the TB-HIV program. This demonstrates the value of digital surveillance as a strategy for scale up to other states and areas where data completeness and timeliness remain a challenge.



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Harnessing AI and Big Data for Integrated TB Surveillance: Lessons from Uganda's Ankole Sub Region

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Background: Between January 2024 and March 2025, Ankole sub region in western Uganda experienced a syndemic rise in TB, malaria surges, and declining HIV ART initiation rates. Surveillance efforts identified a “high burden transmission corridor,” with Ntungamo alone reporting 255 new TB cases in Q1 2025. HIV prevalence exceeded national averages (>9% in some sub counties), while malaria peaks strained diagnostics and supply chains. The withdrawal of USAID funded vertical TB/HIV programs further weakened outreach and adherence support, underscoring the need for integrated, AI driven approaches.

Design/Methods: From October to November 2025, a one month integrated surveillance initiative deployed a mobile TB clinic, four portable digital X ray machines with AI assisted CAD4TB, GeneXpert diagnostics, and harmonized DHIS2 dashboards using TB.info. Health facility staff and Village Health Teams were trained to embed these tools into routine screening, referral, and reporting, restoring decentralized outreach and strengthening primary care workflows.

Results: The integrated surveillance activity in Ankole region demonstrated how AI and big data can transform TB case finding and health system performance. By combining mobile clinics, CAD4TB enabled digital X ray, GeneXpert diagnostics, and harmonized DHIS2 dashboards, the initiative delivered measurable outcomes across TB, HIV, and malaria platforms. These innovations not only improved detection and treatment linkage but also enhanced reporting completeness, enabling real time surveillance and adaptive planning.

- 12,000 individuals screened for TB, with 93 confirmed cases.
- CAD4TB supported 42% of detections in Ntungamo and Isingiro.
- HIV self testing reached 3,700 people, identifying 55 positives, >90% linked to ART.

- Malaria RDTs screened 800+ children, diagnosing 43 cases.
- Digital dashboards improved reporting completeness to >90%, enabling real time surveillance and adaptive planning.

Conclusion: AI enabled diagnostics and big data platforms strengthened early case detection, treatment linkage, and health system performance. By restoring decentralized outreach and reinforcing community trust, this integrated approach is scalable, enhances community oriented primary care, and accelerates progress toward a resilient health system strengthening. Uganda's experience demonstrates how AI and big data can transform TB surveillance and program implementation in resource constrained settings, offering a replicable model for regional pandemic preparedness



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AI-Driven Subnational TB and HIV Risk Modelling to Support Precision Program Implementation in South Africa

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Background: Tuberculosis (TB) remains a leading cause of morbidity and mortality in South Africa, with substantial geographic heterogeneity in disease burden and access to care. Routine notification and laboratory data are influenced by testing intensity, health system performance, and service access, which may obscure underlying patterns of risk. There is a need for data-driven approaches that integrate diverse data sources to identify high-risk communities and optimise programmatic targeting. Artificial intelligence (AI) and large-scale data integration provide an opportunity to strengthen precision public health for TB and HIV prevention and treatment.

Methods: EPCON developed an AI-enabled subnational modelling platform that integrates national TB prevalence survey data, laboratory testing data, routine programmatic indicators, demographic and socioeconomic variables, and remote sensing-derived contextual measures. A Bayesian probabilistic modelling framework estimates testing-rate-adjusted TB risk at Health Sub-District level while accounting for spatial structure and variation in population testing dynamics. Outputs are calibrated to trusted national burden benchmarks to preserve spatial patterns while ensuring alignment with official reference totals.

Model outputs are disaggregated to Enumeration Area (EA) resolution and combined with a contextual vulnerability index incorporating settlement informality, population density, and access to healthcare. Interactive geoportals and

dashboards provide visualisation tools for stakeholders, enabling interpretation and operational planning.

Findings: The AI-driven framework generates fine-scale TB risk estimates and vulnerability maps that highlight areas where elevated predicted burden and structural disadvantage co-occur. Spatial cross-validation demonstrates improved prioritisation performance compared to spatial interpolation baselines, with higher observed testing yield in model-ranked high-risk areas. The integrated geoportal translates complex probabilistic outputs into intuitive choropleth maps and prioritisation layers, supporting micro-planning and targeted case finding at sub-district and community levels.

Conclusions: This work demonstrates how AI and big data integration can strengthen TB and HIV program implementation in high-burden settings. By combining survey data, routine programmatic indicators, contextual covariates, and spatial modelling within a transparent Bayesian framework, the EPCON platform supports equitable, data-driven resource allocation. The approach bridges advanced analytics and operational decision-making, offering a scalable model for AI-supported precision public health in South Africa and similar high-burden contexts.



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The Role of Coordinated Sample Logistics in Reducing Turnaround Time and Improving TB Case Detection Across Public and Private Facilities in Oyo State, Nigeria

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Background: Delayed diagnosis remains a key contributor to TB morbidity and mortality, particularly in resource-constrained settings. In Oyo State, Nigeria, effective sample referral has proven critical in bridging diagnostic gaps. This abstract highlights how a coordinated sample logistics system improved diagnostic turnaround time (TAT) and enhanced TB case detection across public and private health facilities in the state.

Methods: In the last year, a total of 66 trained sample movers comprising 33 independent riders and 33 Linkage Coordinators (LCs) operated across all 33 LGAs in Oyo State. The study was focused on 15 functional GeneXpert sites, 8 of which were collocated with TB-LAMP machines. A total of 534 health facilities generated at least one sample during the period. Weekly data from the Damien Foundation sample logistics dashboard was used to track sample movement, pending loads, and laboratory functionality.

Results: By the end of 2024, 66,714 samples from public facilities and 42,900 samples from private facilities were moved, leading to the prompt diagnosis of 4,410 TB cases. The average TAT was significantly reduced from 6–5 days in 2023 to 2–3 days in 2024, improving timely initiation of treatment. Key drivers of this improvement included timely redistribution of samples from overburdened sites, enhanced laboratory communication through weekly follow-up calls, and use of a real-time dashboard to monitor sample movement and backlog.

Conclusion: A well-coordinated sample logistics system supported by trained personnel and digital monitoring can significantly improve TB diagnostic efficiency and early case detection in high-burden states. This model demonstrates the importance of decentralization, real-time oversight, and responsive redistribution in sustaining programmatic gains in TB control.



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Harnessing Artificial Intelligence for Predictive Epidemiology: Early Lessons from Epi-Control (Epcon) Hotspot Mapping to Strengthen TB/HIV Surveillance in Northwest Nigeria

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Background: Effective targeted case finding for TB and HIV is essential for interrupting transmission. In Northwest Nigeria, widespread insecurity has disrupted routine surveillance systems, which remain largely reactive, delaying early detection and inefficiently using limited resources. Innovative predictive approaches integrating epidemiological and sociodemographic data are needed to proactively identify high-risk clusters. The Epi-Control (EPCON) platform, an artificial intelligence-enabled hotspot mapping tool using machine-learning-based risk stratification, was deployed to strengthen TB/HIV surveillance in unstable settings. This paper describes early implementation outcomes of EPCON in improving targeted screening coverage among pregnant women in conflict-affected areas.

Intervention: Between July and October 2025, community-based active TB/HIV screening targeting pregnant women was conducted across seven states in Northwest Nigeria. EPCON applied predictive modeling integrating routine programmatic and demographic data to identify transmission hotspots for prioritized outreach. Data collected included women aged 15–49 years, TB screening outcomes, and HIV testing outcomes among eligible women. Implementation outcomes assessed were program reach, targeting efficiency, and diagnostic cascade completion. Descriptive analyses summarized performance across EPCON-identified hotspots.

Results: EPCON identified 323 predicted TB/HIV transmission hotspots across the seven states. Among an estimated 535,167 women aged 15–49 years residing in hotspot areas, 155,181 (29.0%) were reached through targeted outreach. Of these, 107,469 (69.3%) were screened for TB, yielding 6,382 (5.9%) presumptive cases. Nearly all presumptive cases (6,372; 99.8%) completed diagnostic evaluation, with 174 confirmed TB cases identified. For HIV services, 145,089 pregnant women were eligible for testing, of whom 145,079 (99.9%) were tested and received results. Forty-nine women tested HIV positive, corresponding to a 0.03% positivity yield. Despite low HIV positivity, the intervention achieved near-universal testing coverage and high diagnostic cascade completion, demonstrating efficient service delivery in EPCON-prioritized locations.

Conclusion: AI-enabled predictive hotspot mapping using EPCON facilitated efficient targeted TB/HIV case finding among pregnant women in insecure settings. By improving outreach precision, maximizing diagnostic completion, and sustaining high testing coverage despite access constraints, predictive epidemiology offers a practical approach to strengthening surveillance where routine systems are disrupted. Scaling AI-driven surveillance tools could enhance program performance and resource optimization in other high-burden, conflict-affected contexts.



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Evaluation of Performance of Qure AI and Manually Interpreted X-Ray against Bactec Liquid Culture

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Introduction: Early and accurate detection of pulmonary tuberculosis (TB) remains critical for effective disease control. While the BACTEC MGIT 960 liquid culture system is the diagnostic gold standard, its long turnaround time limits rapid clinical decision-making. The Qure.ai (qXR) artificial intelligence solution has demonstrated efficacy in interpreting chest X-rays for various conditions, such as Tuberculosis, offering significant potential to enhance diagnostic workflows and patient management. This study evaluates the performance of Qure AI X-ray for pulmonary tuberculosis detection compared with the gold-standard BACTEC MGIT 960 liquid culture system.

Methodology: A prospective study was conducted between August 2024 to February 2025 in two facilities (district and peripheral facility) in Kisumu County. 799 presumptive TB cases using 4WSS were enrolled, of which 62% were females and 38% were males, with mean age of 43 (95%CI:42.09-44.37). Participants received both manually read Xray by Radiologist and Qure AI X-rays. One sputum sample per patient was collected after the Xray, and processed, and inoculated in MGIT at reference Laboratory. Outcomes from manually interpreted X-rays were, Normal. Abnormal suggestive or abnormal others, while from Quire AI, results were classified as either normal or abnormal with a score of between 0.1-1. Sensitivity, specificity, Positive predictive value and negative predictive values were calculated using excel.

Results: MGIT culture positivity rate was 13%. Qure AI, results with scores of greater than 0.3 were analyzed against culture positives and they demonstrated a sensitivity of 88% and specificity of 76%. Positive predictive and negative predictive values of 26.9% and 98% respectively. 49% were male and 51% were female. Abnormal suggestive for manually interpreted X-ray were analyzed

against culture positive, with sensitivity of 86% and specificity of 84%. Positive and Negative predictive values were 34% and 98% respectively. Abnormal others with positive cultures were 6.8%. 63% were male and 37% female.

Conclusion: Both Qure AI and manually interpreted chest X-rays showed meaningful diagnostic value when benchmarked against MGIT culture. Integration of Qure AI X-ray analysis into screening programs may improve access to rapid triage, particularly in high-burden and resource-constrained settings. Further research is recommended to validate performance in children below 14 years.



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Labxpert: Bridging the Gap in Real-Time TB Diagnostics and Patient Linkage in Uganda

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Background and Objectives: Delays in reporting TB diagnostic results and low utilization of instruments hinder timely treatment initiation and effective surveillance in Uganda. Labxpert, a web-based connectivity solution, was developed to capture automated data from GeneXpert, Truenat, and digital X-ray machines, enabling real-time monitoring, error detection, and patient notification. We evaluated the impact of Labxpert on improving diagnostic efficiency, operational oversight, and linkage of patients to TB care.

Methodology: Labxpert was implemented across a network of high-burden districts, integrating data from GeneXpert, Truenat, and digital X-ray instruments. The system categorizes machine status (active, dormant, inactive), monitors error rates per module, tracks replaced modules, and provides real-time utilization dashboards. Alerts are automatically sent to patients and clinicians regarding results. Facility- and stakeholder-level strategies included training, error analysis, system orientation, and dashboard use for operational decision-making. Metrics assessed included instrument functionality, utilization trends, error reduction, RR-TB case monitoring, and patient notification efficiency.

Results: Labxpert enabled real-time detection of faulty modules, improved utilization rates across facilities, and provided actionable data for error reduction. MDR-TB cases were tracked efficiently with automated alerts to clinicians and patients, improving treatment initiation timelines. Facilities reported faster response to equipment downtime, better stock management, and enhanced data-driven planning. Stakeholders utilized geospatial and dashboard visuals for resource allocation and targeted interventions, resulting in more timely, coordinated TB care.

Conclusions: Labxpert bridges critical gaps in TB diagnostic networks by enabling real-time

monitoring, error management, and patient linkage. This scalable digital solution strengthens laboratory efficiency, enhances programmatic decision-making, and contributes to faster diagnosis and treatment initiation, providing a model for high-burden settings seeking to accelerate progress toward End TB targets.



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Evaluation of the Diagnostic Performance of the Xpert MTB/RIF Ultra Assay Using Stool Samples for Childhood Pulmonary Tuberculosis in Southwest Ethiopia

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Background: Diagnosing tuberculosis (TB) in children remains challenging due to non-specific clinical manifestations, low bacillary burden, and difficulties in obtaining respiratory specimens. Gastric aspirate collection is invasive and often impractical in resource-limited settings. Stool-based Xpert MTB/RIF Ultra represents a promising non-invasive alternative; however, local evidence on its diagnostic performance is limited. This study aimed to evaluate the diagnostic accuracy of stool Xpert MTB/RIF Ultra among children with presumptive pulmonary TB in Southwest Ethiopia.

Methods: A prospective cross-sectional study was conducted between May and November 2025 at Bonga Gebretsadik Shawo General Hospital, Southwest Ethiopia. Children aged 1–15 years presenting with presumptive pulmonary TB were enrolled. Sociodemographic and clinical data were collected, and paired stool and respiratory samples were tested using Xpert MTB/RIF Ultra. Gastric aspirate Xpert MTB/RIF Ultra served as the primary microbiological reference standard, supplemented by a composite reference standard (CRS).

Results: A total of 110 children were enrolled, of whom 18 (16.4%) were diagnosed with pulmonary TB based on microbiological and/or clinical criteria. Fourteen children (12.7%) were microbiologically confirmed by both gastric aspirate and stool Xpert Ultra, while two children (1.8%) tested positive only by stool Xpert Ultra and two children (1.8%) were classified as probable TB based on clinical

and radiological evidence, and all clinically diagnosed TB cases improved with empirical anti-TB treatment despite without microbiological confirmation. The remaining 92 children (83.6%) were classified as non-TB cases. Stool Xpert Ultra demonstrated a sensitivity of 100% (95% CI: 96.38–100), specificity of 98% (95% CI: 92.96–99.76), positive predictive value of 87.91% (95% CI: 64.85–96.63), and negative predictive value of 100% (95% CI: 96.31–100). Agreement with gastric aspirate Xpert Ultra was excellent ($\kappa = 0.923$). When evaluated against the CRS, stool Xpert Ultra showed diagnostic performance comparable to gastric aspirate Xpert Ultra, with similar accuracy (98%). No rifampicin resistance was detected.

Conclusion: Stool Xpert MTB/RIF Ultra is a non-invasive diagnostic tool for childhood pulmonary TB, demonstrating excellent agreement with gastric aspirate testing. Its integration into routine pediatric TB diagnostic algorithms could facilitate earlier detection and treatment initiation.



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Enhancing Adherence and Treatment Monitoring among People Living with Drug-Resistant TB in Kisii County

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Background: People living with drug-resistant tuberculosis (DR-TB) face prolonged treatment regimens that can last 9–24 months, often complicated by medication side effects, stigma, and socio-economic barriers. In Kisii County, only 68% of people enrolled in DR-TB treatment historically complete therapy. I aimed to explore community-centered strategies to improve adherence and treatment monitoring, ensuring that people living with DR-TB complete therapy successfully.

Methods: I conducted a mixed-methods program evaluation between January and December 2025. Quantitative data were collected from 120 people living with DR-TB enrolled in treatment, including monthly pill counts, clinic attendance, and treatment completion rates. Qualitative data were collected through 6 focus group discussions and 20 structured interviews with clients receiving DR-TB treatment to understand adherence barriers and facilitators. Data were analyzed using descriptive statistics for adherence and treatment outcomes, and thematic analysis for client experiences.

Findings: Of the 120 people enrolled, 104 (87%) received structured community support, including home visits, peer counseling, and adherence reminders. Among these, 92 (88%) completed their treatment, compared to 12 of 16 (75%) who did not receive structured support. Clients reported that home visits and counseling helped them manage side effects and reduced feelings of isolation. Common barriers identified included transportation costs (reported by 42%), stigma (36%), and medication side effects (30%). The implementation of community-led adherence interventions reduced missed appointments by 60% and increased timely reporting of adverse drug events by 50%.

Discussion: These findings highlight that structured, community-led interventions can significantly improve adherence and treatment outcomes for people living with DR-TB. By integrating adherence support into daily routines, treatment completion improved from the historical 68% to 88% among supported clients. Engaging peers and community health volunteers provides practical support and fosters empowerment, making treatment monitoring more responsive and effective in low-resource settings.

Conclusion: Community-led support and person-centered adherence strategies markedly improve treatment completion and engagement among people living with DR-TB in Kisii County. From my experience, scaling these approaches can help achieve national and global targets for DR-TB control, reduce transmission, and empower affected individuals.



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Duration to Tuberculosis Diagnosis Following Completion of Tuberculosis Preventive Therapy among People Living with HIV on Anti-retro Viral Therapy in Eastern Uganda

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Background: Tuberculosis (TB) remains a major cause of illness among People living with HIV (PLHIV) whose risk of developing active Tuberculosis is 19 times higher than HIV negative people. Tuberculosis preventive therapy (TPT) reduces Tuberculosis incidence by 70-90% among PLHIV and is widely implemented in Uganda with TPT coverage of up to 88.8% among PLHIV. Despite this, TB/HIV co-infection rates remain between 40-45%. Evidence suggests that the protective effect of TPT diminishes over time and most PLHIV receive it only once leaving them vulnerable to new infections. Understanding the duration of protection following completion of TPT is essential to guide repeat dose policies for TB prevention.

Methods: This retrospective cohort study used routinely collected clinical data from Uganda's electronic medical records version 3.4.1-alpha, TB registers, and patient files at three TASO centers of excellence located in Soroti, Mbale and Tororo districts of Uganda. All PLHIV on ART who were diagnosed with tuberculosis after TPT completion between 2022 and 2024 were included. Data on demographics, HIV/TB treatment timelines, and clinical indicators were extracted and analyzed to determine the interval between completion of TPT and TB diagnosis, and to identify associated predictors.

Results: 670 patients were included. The mean time from TPT completion to TB diagnosis was 2.62 years. TASO Soroti patients had 90% lower

risk for early TB diagnosis compared to TASO Mbale. The likelihood of early TB being clinically diagnosed was 91% more compared to bacteriologically confirmed TB despite most participants (79.9%) having bacteriologically confirmed TB. Patients who had been on ART for less than 5 years were more than 3 times at a higher risk of early TB diagnosis compared to those who had been on ART for more than 10 years. Surprisingly, suppressed viral load was more strongly associated with early TB than non-suppressed viral load.

Conclusion: The findings show TB still commonly occurs after TPT completion, particularly in PLHIV on ART for less than 10 years, despite viral suppression. Clinically diagnosed TB predominance highlights challenges in TB diagnostic capacity. Continuous TB screening, re-evaluation of TPT strategies for high-risk groups and improved diagnostics are needed.



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Multi-Disease Testing Approach for Genexpert to Improve Access to Molecular Diagnostics in Wakiso District

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Background: Uganda continues to face a high burden of infectious diseases such as tuberculosis (TB) and HIV, with limited access to molecular diagnostics at peripheral and private facilities where most patients first seek care. The GeneXpert platform, initially installed for TB diagnosis, was expanded to enable multi-disease testing (HIV viral load, EID, COVID-19, HPV, HBV, etc). In Wakiso district, this innovation was coupled with optimization of the sample transport system, improving access to molecular diagnostics and equitable utilization of GeneXpert equipment.

Materials and Methods: Two hubs with an additional 8 peripheral sites equipped with GeneXpert machines serve Wakiso district's 198 health facilities. We redesigned the sample referral routing to ensure that referring facilities equitably benefited from the GeneXpert equipment across the district. Programmatic data (2022–2025) was reviewed to analyze the performance of the supported GeneXpert sites.

Results: Between Q1 2022 and Q2 2025, the GeneXpert sites increased from 10 (37 modules) to 11 (57 modules). TB samples processed per quarter rose fourfold from 4,098 to 16,830. The number of referring facilities increased from 46 to over 160, while the number of samples referred rose from 1,123 to 8,336. The total number of non-TB tests performed increased from 97 to 3,133, peaking at 6,647 in Q3 2024. Overall, this represents a more than 400% increase in TB testing and over 3,000% growth in multi-disease testing within three years. Whereas the positivity rate for TB remained constant, the proportion of Rifampicin indeterminate increased from 0% in 2022 to 29% in 2025.

Conclusions: Multi-disease testing, coupled with optimization of the sample transport network, has markedly improved access to molecular diagnostics for infectious disease diagnosis while integrating multiple services, as recommended by MOH. Sustaining these gains will require investment to procure multi-disease testing platforms and personnel to reduce the workload at hubs and optimize the use of limited resources while facilitating timely diagnosis.



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Clinically Diagnosed Pulmonary TB and Its Association with Mortality in Zambia: A Secondary Data Analysis of a Prospective Diagnostic Cohort

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Background: Clinically diagnosed pulmonary TB (PTB) accounts for a substantial proportion of global TB notifications. In Zambia, factors influencing clinical diagnosis and its relationship with mortality are not well-characterized. We aimed to identify factors associated with clinically diagnosed PTB, estimated mortality rates among these patients, and assess the association between clinical diagnosis and mortality.

Methods: Secondary analysis of data from a prospective well-characterized TB diagnostic cohort that evaluated the performance of artificial intelligence software in detecting TB and COVID-19 using digital chest X-rays (dCXRs) among adults at two general hospitals and a clinic. Participants diagnosed with TB were initiated on a standard course of anti-TB chemotherapy, with outcomes documented one year after treatment initiation. Analysis was restricted to participants with PTB. PTB was classified as either bacteriologically confirmed (positive smear/Xpert MTB/RIF and/or culture) or clinically diagnosed (diagnosis despite negative bacteriological test results). Logistic regression (diagnostic factors) and Cox proportional hazards regression analysis (mortality factors) were used.

Results: Among 582 PTB patients, median age was 36 years (IQR: 28–45), 70.6% were male, and 40.6% were HIV positive. Half (50.3%) were clinically diagnosed. Compared to bacteriologically confirmed patients, clinically diagnosed patients were older (median 38 vs. 34 years, $p < 0.001$), had a higher prevalence of previous TB (37.5% vs. 14.2%, $p < 0.001$), had a shorter median symptom duration (14 vs. 22 days, $p = 0.004$), and a higher frequency of dCXRs classified as 'TB likely' (90.4% vs. 80.3%, $p = 0.002$). Previous TB history (aOR 3.31, 95% CI 2.13–5.13, $p < 0.001$), older age ($p = 0.037$), shorter symptom duration (0.030) and a dCXR interpretation of 'TB likely' ($p = 0.001$) were independently associated with a clinical TB diagnosis. Overall mortality rate was 4.25 (95% CI 2.52–7.2) per 1, 000 person months and was similar between the two groups. Clinically diagnosed TB was not associated with risk of mortality (aHR 0.93, 95% CI 0.33– 2.67).

Conclusions: Half of TB diagnoses were clinically diagnosed in a high burden setting with onsite availability of molecular TB testing. While mortality was not increased in this group, there is an urgent need for strategies to improve TB confirmation to enhance diagnostic accuracy and ensure appropriate treatment.



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Expanding the TB Drug Arsenal: Repurposed Compounds from Underexplored Pharmacological Classes

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Introduction: Mycobacterium tuberculosis (Mtb) causes over 10.6 million cases and 1.6 million deaths annually. Its persistence through immune evasion and drug tolerance complicates treatment, which is lengthy, toxic, and increasingly compromised by resistance. Repurposing FDA-approved drugs with antimycobacterial and host-directed immunomodulatory properties offers a promising, cost-effective strategy to improve TB therapy and antimicrobial stewardship.

Objectives: To evaluate the antimycobacterial activity, synergy, and host-directed effects of selected repurposed drugs against Mtb to support novel combination therapies.

Methods: MICs of 29 repurposed drugs were determined against Mtb H37Rv via broth microdilution in a BSL-3 lab. Synergy was assessed by checkerboard assays, with bactericidal effects evaluated by time-kill kinetics. Transcriptomic profiling of treatments was performed using RNA sequencing and bioinformatic analysis (STAR, DESeq2), with RT-qPCR validation.

Results: Eighteen compounds showed activity, including miconazole (MIC 0.98 µg/mL), sulfameter, and 4-(Trifluoromethyl)phenylboronic acid. Synergistic drug pairs maintained bacteriostatic effects for up to 18 days at reduced doses, demonstrating potential for enhanced TB treatment.

Conclusion: Repurposed drug combinations offer a promising, accelerated route to effective TB therapies, aligning with global infection control goals and addressing resistance in high-burden, resource-limited settings.



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Strengthening HIV/TB Service Integration: TB Screening, Diagnosis, and Preventive Therapy Uptake among PLHIV in Masvingo Province, Zimbabwe: April–September 2025

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Tuberculosis (TB) remains the leading cause of HIV-related mortality in Zimbabwe, underscoring the urgent need for strengthened HIV/TB service integration within routine HIV care. The WHO recommends intensified TB case finding and universal provision of TB preventive therapy (TPT) for people living with HIV (PLHIV). Jf Kapnek Zimbabwe, in collaboration with OPHID and the Ministry of Health and Child Care, implements the TASQC Program to support comprehensive HIV/TB services. As part of routine care, healthcare workers screen PLHIV for TB at every visit using standardized symptom screening tools, initiate eligible clients on TPT, and monitor progress to treatment completion. However, evidence on the performance of integrated TB/HIV service cascades in routine program settings remains limited. This study assessed TB screening, diagnosis, treatment initiation, and TPT uptake among PLHIV attending TASQC-supported facilities in Masvingo Province.

We conducted a retrospective analysis of routine DHIS2 data reported through the Monthly Progress Return Form from TASQC-supported facilities in Masvingo Province between April and September 2025. The study population included all PLHIV in care during the study period. Descriptive analyses were used to assess TB screening coverage, presumptive TB yield, diagnostic evaluation rates, TB positivity, treatment initiation, and TPT uptake.

From April to September 2025, 113,595 PLHIV were screened for TB (98% coverage). Of these, 4,749 (2.4%) were presumptive cases, with higher

rates among males than females (2.9% vs. 2.2%). Overall, 57.5% underwent diagnostic investigation, higher among males (61.3% vs. 54.5%). Active TB was confirmed in 314 individuals (17% positivity), with higher rates among males than females (22% vs. 14%). Among those diagnosed with TB, 310 PLHIV were initiated on treatment (99%), with similar linkage among males and females (99% vs. 98%). Of the 1,764 PLHIV initiated on TPT, 1,742 (99%) completed treatment, with comparable completion rates by sex (98% vs. 99%).

Integrated HIV/TB services in Masvingo Province achieved high screening, strong treatment linkage, and excellent TPT completion, demonstrating effective integration. Existing health systems can deliver sustained TB prevention when adequately resourced. However, diagnostic gaps among females and higher TB burden among males require targeted, gender responsive strategies to support national scale-up and TB/HIV elimination.



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Mapping the Pathway to Care: Uncovering System-Level Bottlenecks and Demographic Disparities in Tuberculosis Case Finding in Southwestern Nigeria

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Background: Nigeria faces a heavy TB burden, with a significant gap between estimated incidence and TB case notifications. In 2024, the Nigeria TB Reach Integration and Impact Project (N-THRIP), coordinated by the Institute of Human Virology Nigeria, scaled up TB public-private mix (PPM) activities nationwide to close this gap. This study conducted a deep system-level analysis of the TB patient cascade across five southwestern states comprising Lagos, Ogun, Ondo, Osun, and Oyo to identify precise points of attrition and equity barriers, informing targeted interventions for more efficient and just health systems.

Materials and Methods: An analysis of programmatic data from Lagos, Ogun, Ondo, Osun, and Oyo states was conducted across the four quarters of 2024. The TB cascade (screened → presumptive → diagnosed → notified) was reviewed for each state. A binomial generalized linear model analyzed diagnostic yield, controlling for state, quarter, and a sex-age (0-4, 5-14, ≥15) interaction term to test for intersectional disparities. Bayesian posterior intervals complemented the analysis.

Results: Analysis revealed significant system inefficiencies and equity concerns. The yield from screening to presumptive case varied dramatically (8.1% in Ogun to 23.8% in Osun). The diagnostic yield declined significantly over the year ($p=0.001$). Notification was a major bottleneck in Lagos (74%) versus other states (>98%). A significant sex-age

interaction ($p=0.018$) revealed female children aged 0-4 had 58% lower odds of diagnosis than males (OR: 0.42, CI: 0.30–0.58). The childhood TB share also varied significantly by state ($p<1e-9$).

Conclusion: Aggregate success masks sub-national failures. The declining diagnostic yield and notification gaps demand investigation into supply chains and data linkage protocols. The systemic under-diagnosis of young girls represents an urgent equity failure. We propose an implementation science framework where these data trigger targeted actions: real-time alerts for yield decline, gender-sensitive mentorship, and state-specific task forces. This model provides a replicable blueprint for strengthening global health systems to be both efficient and equitable.



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Re-Imagining TB Surveillance: Patent Medicine Vendors as the Hyper-Efficient Core of Community-Based Case-Finding in Nigeria

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Background: Tuberculosis remains a major public health challenge in Nigeria. Weak health systems and gaps in public health sector have fostered reliance on the private sector. The NTP's Private Public Mix (PPM) strategy is operationalized through a "Hub and Spoke" model by the Institute of Human Virology Nigeria (IHVN), where private health facilities act as "Hubs" for diagnosis and treatment, and community providers; Patent Medicine Vendors (PMVs), Community Pharmacies (CPs), Standalone Labs (SALs), and Traditional Birth Attendants (TBAs) act as "Spokes", conducting symptom screening and referral. This study evaluates the efficiency of this model in five southwestern states (Lagos, Ogun, Ondo, Osun, Oyo) to identify the most effective frontline for TB case-finding.

Materials and Methods: A cross-sectional analysis of programmatic data from the Nigeria TB/HIV Reach Integration and Impact Project was conducted for Q1 - Q4 2024. The analysis compared the TB screening and notification cascade between the Hubs and the different spokes. Key efficiency metrics were calculated: Number Needed to Screen (NNS) and Number Needed to Test (NNT). A chi-square test was used to compare the proportion of notifications contributed by PMVs versus all other Spoke providers combined.

Results: The Hub and Spoke model screened 1,222,208 people. PMVs were the most pivotal Spoke provider, screening 356,532 individuals and notifying 6,804 TB cases, constituting 54.5% of all

Spoke-source notifications. PMVs demonstrated three times more efficiency than hub facilities (NNS: 52.4 vs. 158.3). The NNT for PMVs was 14.0, indicating a high yield from referrals. Statistically, PMVs contributed a significantly greater proportion of Spoke notifications than all other Spoke types combined ($\chi^2 = 5,285.56$, $p < 0.001$).

Conclusions: The effectiveness of the PPM approach lies in its alignment with patient preferences and the structural realities of the health system. Within the hub-and-spoke model, PMVs function as pivotal components of community-based TB surveillance. Evidence shows PMVs are often the first point of care for vulnerable groups. Strengthening TB control in Nigeria therefore requires a resilient, community-centered surveillance system that strategically integrates PMVs at its core, supported by policy mechanisms that capacitate their role as frontline contributors to TB case-finding and overall health system strengthening.



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Institutionalizing Local Innovations: CAST+ as a Flagship Model for Integrated Community TB and Other Comorbidities Programming in Uganda

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Background: The COVID-19 pandemic and related emergencies significantly disrupted Uganda's progress in delivering the minimum health care package at community level. In response, the National Tuberculosis and Leprosy Programme (NTLP) designed and implemented an innovative approach in 2022 known as CAST+ (Community Awareness, Screening, Testing, Prevention and Treatment of TB and other conditions). CAST+ was designed to restore and strengthen community-based service delivery while improving health-seeking behavior, case notification and integrated multi-disease response.

Intervention: The NTLP convened national consultative meetings with donors, civil society organizations (CSOs), districts, ministries, departments and agencies (MDAs) to design, plan and budget for CAST+. These engagements were conducted physically, virtually, or in hybrid format for the mobilization of resources resulted in the development of standardized implementation package, VHT toolkits, procurement of medical supplies and commodities and household health education materials.

CAST+ is implemented twice annually (March and September) over five days nationwide using three strategies of door-to-door household visits by community health workers (VHTs), hotspot screening and contact investigation by health workers. Funding is provided by the Government of Uganda, the Global Fund, and other development partners. Due to strong results, institutions increasingly allocate financial, human and in-kind resources to support implementation.

The model integrates services for TB, HIV, malaria, malnutrition, WASH and maternal & child health.

Results/Impact: More than 26 partners supported CAST+, enabling implementation across 146 local governments, 71,564 villages, 2,175,792 households reached, 13,760,942 individuals received integrated health messages. Key outcomes include: 20,611 drug susceptible TB, 73,798 children below 5years screened and had fevers, 63,473 received mRDT, 31,693 confirmed malaria, 28,014 started on ACTs, while 135,793 conducted self/assisted HIV test, 1,659 had positive results and 828 confirmed by national algorithm with 89.6% linkage to care, 4% (6,686/166,297) children & 4% (1,477 / 38,504) pregnant mothers had moderate malnutrition and 287 leprosy cases.

Conclusions: CAST+ demonstrates the power of coordinated, community-led health interventions in delivering integrated services and improving health outcomes. Through strategic partner alignment and grassroots engagement, Uganda strengthened its community systems and advanced toward universal health coverage. The model offers a scalable framework for multi-disease surveillance and response in resource-limited settings.



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Scaling Digital TB Reporting in Nigeria Using a DHIS2–ETL Architecture Under Global Fund Grant Cycle 7

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Background: Under Global Fund Grant-Cycle 6 (GC6), TB program reporting in Nigeria relied on multiple Excel-based tools across 23 states and approximately 3,000 PPM hub facilities. This resulted in fragmented datasets, prolonged reporting timelines, and inconsistent data quality. With expansion under Grant Cycle-7 (GC7) to all 36 states and the Federal Capital Territory, covering over 20,000 organizational units including PPM hubs and community screening spokes, a scalable, interoperable digital reporting architecture was required to support timely TB Monthly Summary submissions while ensuring data governance and quality.

Methods/Intervention: The Institute of Human Virology Nigeria (IHVN), as Principal Recipient, migrated over 450 TB indicators and consolidated four legacy reporting forms into DHIS2 with enhanced disaggregation and automated validation rules. DHIS2 was configured to support approximately 4,000 PPM hubs and over 10,000 community TB screening spokes. To address limited direct DHIS2 access and high data-entry volumes, a metadata-driven Extract–Transform–Load (ETL) architecture was implemented. Standardized Excel templates aligned with DHIS2 metadata structures (data elements, category options, reporting periods, and organizational units) were developed with embedded first-level validation rules. State-level users uploaded validated files through a secure ETL portal, where automated transformation converted datasets into DHIS2-compliant JSON payloads and synchronized them via API-based batch processing. DHIS2 applied second-level validation for completeness and consistency. Capacity building included virtual induction and clustered in-person trainings,

onboarding over 1,000 TB program users nationwide.

Results/Impact: The DHIS2–ETL architecture significantly improved TB reporting performance. Report generation and submission time decreased from 16 working hours and 5–7 days to less than 5 minutes and 20–60 minutes for full-state uploads. Timely state submissions increased from 20% to over 90%, while data inconsistencies declined by 70%. First-level Excel validation improved data accuracy from 40% to over 90%, with DHIS2 validation further strengthening completeness. Over 80% of trained users demonstrated independent proficiency in DHIS2 analytics and dashboards, reducing reporting workload and staff burnout across hub-and-spoke facilities.

Conclusion: A metadata-driven DHIS2–ETL architecture enabled scalable, high-quality digital TB reporting across Nigeria's expanded GC7 footprint. The approach demonstrates feasibility and scalability for large, decentralized TB programs and offers a model for strengthening national surveillance systems in high-burden settings.



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Trends in Tuberculosis Case Notification in Zanzibar: A Retrospective Analysis of Routine Data, 2019-2024

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Background: Tuberculosis (TB) is a leading cause of death accounting for 1.3 million deaths globally with majority occurring in Africa. In Tanzania mainland and Zanzibar, TB remains a public health priority. TB case notification is crucial for assessing the country's burden of TB, planning and evaluating the effectiveness of TB programs. Evidence on temporal, sex-specific, and regional trends in TB case notification is needed to inform targeted TB control strategies.

Methods: We conducted a retrospective analysis of routine TB notification data in Zanzibar from 2019 to 2024. Annual TB case notifications were summarized by demographic, clinical, service and diagnostic-related characteristics. TB case notification rates per 100 000 population were calculated, and temporal trends were assessed using Average Annual Percentage change (AAPC).

Results: A total of 6,618 TB cases were notified over the six-year period, with annual notifications increasing from 966 (14.6%) in 2019 to 1 278 (19.3%) in 2024. Adults aged 15-34 years (31.5%) and 35-54 years (32.7%) accounted for the largest proportion of cases. Males had a higher share of notifications than females (62.1% vs 37.9%; $p=0.04$). The proportion of HIV-positive TB cases declined from 14.1% to 6.9% ($p<0.001$). Pulmonary TB predominated (86.1%), while use of GeneXpert MTB/RIF increased from 47.7% to 86.9% ($p<0.001$). Community referrals also increased from 10.0% to 28.3% ($p<0.001$). The overall TB notification rate fluctuated, declining from 64.2 in 2020 to 56.4 per 100 000 population in 2022 before increasing again in 2024, with an overall

AAPC of -0.51%. Notification rates were higher in Unguja than Pemba, with regional variations. Throughout the study period, Mjini Magharibi reported highest numbers of TB case notifications, while Kusini had the least proportion.

Conclusion: TB notification in Zanzibar decreased slightly but considerable temporal and regional heterogeneity. TB primarily affects adult males and urban populations. The low proportion of bacteriological confirmation underscores the need to strengthen diagnostic services, address barriers to TB notification, and implement targeted, region-specific TB control interventions.



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Age and Sex Inequities Across the Pediatric TB Cascade Identified During Nigeria's National Childhood TB Testing Week

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Background: Children and adolescents remain underdiagnosed for tuberculosis (TB), with persistent gaps across the pediatric-TB care-cascade. Large-scale screening campaigns provide opportunities to identify inequities and guide targeted innovations. In September 2025, the Institute of Human Virology Nigeria, in collaboration with the National TB Program and State TB Programs, implemented a National Childhood TB-Testing Week across the Country, targeting children and adolescents aged 0–18 years in schools, health-facilities, congregations, and hard-to-reach communities. This analysis assessed age- and sex-based inequities across the pediatric-TB cascade.

Methods: A nationwide outreach was conducted from 21–27 September 2025. Children and adolescents were screened for TB-symptoms, presumptive cases were tested, and diagnosed cases were initiated on treatment. Data were stratified by age-group (0–4, 5–9, 10–14, ≥15 years) and sex to evaluate inequities in screening, presumptive identification, testing, diagnosis, treatment initiation, and HIV status ascertainment.

Results: A total of 359,612 children and adolescents were reached; 52.7% were female. Adolescents aged 10–14 years constituted the largest group reached (33.9%), while children under-5 years were the least reached (13.3%). Presumptive-TB identification was highest among adolescents aged 10–14 years (17.7%) and children aged 5–9 years (17.1%), compared with 11.8% among children under-5 years. Overall

testing coverage exceeded 92%, but was lowest among children under 5 years (87.1%).

A total of 3,232 TB cases were diagnosed. TB-positivity was highest among older adolescents (≥15 years, 8.7%), followed by children aged 0–4 years (6.5%). Males accounted for 52% of diagnosed TB cases despite representing 47% of those reached, indicating higher disease burden among males. Treatment initiation exceeded 91% across all age groups, with the highest among children aged 0–4 years (96.2%) and lowest among adolescents aged 10–14 years (91.2%). HIV positivity among pediatric TB cases was 0.4%, but HIV status was unknown for 14.2% of cases, particularly among adolescents aged 10–14 years.

Conclusion: Significant age- and sex-based inequities exist across the pediatric TB-cascade. Adolescents had the highest screening and diagnostic yield but gaps in treatment linkage and HIV status ascertainment. Children under-5 years remained under-reached despite high TB-positivity, and males bore a disproportionate TB burden. Targeted adolescent-focused TB-services, improved under-5 diagnostic access, and integrated HIV-testing strategies are critical to closing pediatric TB-gaps and accelerating case detection



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Missed Prevention Opportunities Prior to TB Disease: Low Uptake of Tuberculosis Preventive Treatment among People Living with HIV Diagnosed with TB in Eswatini

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Background: Tuberculosis Preventive Treatment (TPT) is a main pillar of the End TB Strategy and is strongly recommended by the World Health Organization (WHO) for eligible people living with HIV (PLHIV) following negative TB screening. Despite high tuberculosis (TB) burden among PLHIV in Eswatini, TPT uptake remains sub-optimal. This study evaluated prior TPT uptake among PLHIV diagnosed with TB and explored factors influencing its uptake.

Methods: A cross-sectional study was conducted at three high-volume TB treatment sites in Eswatini: Raleigh Fitkin Memorial Hospital, Manzini TB Centre, and Luyengo Clinic. Adults living with HIV and receiving TB treatment were conveniently recruited during clinic visits. Structured telephonic interviews were conducted by trained data clerks to assess prior TPT uptake before TB diagnosis, knowledge, and attitudes toward TPT. Data were analyzed using SPSS version 26. Descriptive statistics summarized participant characteristics. Bivariate logistic regression was performed to identify factors associated with TPT uptake, with statistical significance set at $p < 0.05$.

Results: A total of 138 participants aged 19–62 years were enrolled. Although 65% had heard of TPT, only 49% reported taking TPT prior to their TB diagnosis. Overall knowledge of TPT was poor which was <50%, despite generally positive attitudes, with 73.6% indicating willingness to recommend TPT to others. Reported side effects were a key deterrent, cited by 24% of those

unwilling to recommend TPT. Notably, 3% reported developing TB while on TPT. Enabling factors for uptake included family support and synchronized clinic appointments for ART and TPT services.

Conclusion: TPT uptake among PLHIV in Eswatini remains sub-optimal and is largely influenced by limited knowledge despite favourable attitudes. Strengthening health education, addressing concerns about side effects, and improving service integration may enhance TPT coverage and reduce TB incidence among PLHIV.



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Using Routine Data Intelligence to Unlock Childhood TB Detection in High-Burden LGAs of Kano State, Nigeria

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Background: Childhood tuberculosis (TB) remains under-detected in Nigeria. In Kano State, children accounted for only 5% of total TB notifications in Q2 2025, far below the national target of 15%, reflecting significant diagnostic, access, and service integration gaps. Conventional blanket screening approaches yielded limited improvement. This intervention applied a routine data-guided micro-targeting strategy to identify missed childhood TB hotspots and optimize service delivery within existing health platforms.

Methods: Routine TB surveillance data were analyzed to identify local government areas (LGAs), health facilities, and service delivery points with low pediatric TB yield. Targeted interventions included: (1) community microplanning with religious and opinion leaders supported by radio messaging; (2) integration of TB screening into child health platforms, including Community-Based Management of Acute Malnutrition (CMAM), routine immunization, and school health services; (3) strengthening specimen referral systems and child-friendly sample collection; and (4) provider capacity building using the Treatment Decision Algorithm. Weekly dashboards and performance review meetings guided adaptive implementation and corrective action.

Results: Within one implementation quarter, children's contribution to TB notifications increased from 5% in Q2 2025 to 8% in Q3 2025 across the focal LGAs. Facilities previously reporting zero childhood TB cases began contributing pediatric notifications following integration into child health service points. Enhanced data visibility enabled rapid

identification of underperforming sites and targeted supervisory responses.

Conclusion: Transforming routine surveillance data into actionable micro-planning intelligence can significantly reduce childhood TB detection gaps without needing new infrastructure. Incorporating TB screening into existing child health programs offers a scalable, health-system-integrated approach to improve pediatric TB detection in high-burden settings.



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Digital Tools as Enablers of Quality Improvement in TB Screening Services: Nationwide Implementation of MATS Mobile App

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Background: High-quality TB screening and timely referral are critical for TB control, yet conventional paper-based systems limit coverage, timeliness, and data-driven decision-making. Between January and April 2024, monthly Mobile Application for Tuberculosis Screening (MATS) platform screenings ranged from 61,054 to 90,412 individuals, with relatively low evaluation and diagnosis outputs, indicating suboptimal utilization across private health facilities, private providers, Patent Proprietary Medicine Vendors, and community spokes.

Intervention: The Mobile Application for Tuberculosis Screening (MATS) is a digital health tool deployed nationwide in 2022 to support real-time TB screening, referral, and program monitoring among private providers. It captures patient demographics, risk assessment, screening outcomes, and referral data, consolidating information into dashboards for managers to identify gaps and implement corrective actions. Offline functionality ensures uninterrupted data capture in low-network and hard-to-reach areas. In April 2024, a comprehensive platform optimization strategy was implemented to accelerate adoption and improve workflow efficiency. Key measures included intensive health worker capacity building, enforcement of mandatory system use, onboarding additional frontline personnel, continuous virtual technical support, database and application module optimization, rapid technical issue resolution, strengthened supervision, and enhanced program coordination.

Impact/Results: Following these interventions, MATS utilization increased sharply. Monthly screenings rose from 90,412 in April to 138,718 in May 2024 (+53%) and reached 231,013 by September (+156% from April). Presumptive identifications increased from 10,666 to 49,302 (+362%), evaluations from 642 to 5,877 (+816%), and TB diagnoses from 122 to 639 (+424%) over the same period. Real-time dashboards enabled early identification of under-screened populations, delayed referrals, and operational bottlenecks, supporting targeted continuous quality improvement. Adoption expanded across all service delivery points, strengthening linkage from screening to evaluation and diagnosis.

Conclusion: MATS demonstrates how a well-supported mobile digital health tool can transform TB screening and case detection. Coordinated interventions targeting workforce capacity, technical support, system optimization, and operational enforcement drove rapid adoption and proportional gains in screening, evaluation, and diagnosis. By enabling real-time, offline-capable data capture and actionable program insights, MATS enhances evidence-based decision-making, program efficiency, and TB detection, especially in underserved and hard-to-reach populations.



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H37Rv Reference Strains: How Many Passages Are Too Many? A Gleam on Genetic Variations at KEMRI -TB Reference Laboratory

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Introduction: H37Rv is the most widely used Mycobacterium tuberculosis strain, it remains an essential organism for quality control in TB laboratories, It serves as a benchmark for drug-susceptibility testing, molecular assay validation, and laboratory proficiency, and its genome is globally recognized as the M. tuberculosis reference sequence. However, long-term subculturing of H37Rv can introduce genomic alterations that may affect experimental reproducibility and compromise strain authenticity. As the M. tuberculosis complex continues to evolve—particularly in genes associated with drug resistance—monitoring the stability of reference strains remains essential since those genetic variations threaten tuberculosis disease control efforts. To evaluate genomic consistency and potential divergence from the original H37Rv reference genome, we analysed archived serial passages using the DeepLx-MycoTB Illumina targeted sequencing platform.

Methodology: Archived sequential passages of H37Rv maintained at the KEMRI-TB Reference Laboratory were subjected to targeted sequencing with the DeepLx-MycoTB Illumina platform. Analyses focused on variants in drug-resistance-associated genes, uncharacterized and variants of uncertain significance, SNP-based phylogenetic lineage determination, and the presence of potential mixed infections.

Results: Most genomic regions remained highly conserved across serial passages. However, a small but consistent number of mutations accumulated over time. Detected variants were predominantly located within drug-resistance-associated loci, including *rpoB*, *katG*, *inhA*, *gyrA*, *embB*, *pncA*, *tlyA*,

rrs, and *gidB*, along with additional uncharacterized and uncertain-significance mutations. No evidence of mixed infection was identified.

Conclusion: Although H37Rv demonstrates strong overall genomic stability, extended laboratory propagation can introduce subtle yet meaningful genetic variations. Routine genomic verification is therefore recommended to maintain reference strain fidelity and support reproducible experimental and quality-assurance practices.



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Optimizing Molecular Testing for Tuberculosis Diagnosis through Stakeholder Engagement in Delta State, Nigeria

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Background: Molecular testing is critical for timely diagnosis of tuberculosis (TB) and subsequent linkage to treatment. However, in many settings, many people with TB are still missed due to delays in testing, weak coordination or broken referral systems. Engaging stakeholders across the health system offers an opportunity to close these gaps and ensure that every presumptive TB case is evaluated efficiently. This study assessed the impact of stakeholder engagement on TB case detection and molecular testing in Delta State, Nigeria.

Methods: A structured stakeholder engagement strategy was implemented in Delta State bringing together state TB program officers, laboratory personnel, community TB teams, private health facilities and other implementing partners to provide supportive supervision and problem-solving sessions. A retrospective study was conducted using aggregated program data in Delta State from January 2024 to June 2025 to analyse the trends in TB screening, presumptive TB identification and molecular testing.

Results: Over the 18-month period, 190367 people were screened for TB, of whom 44350 were identified as presumptive cases. The proportion of presumptive TB cases identified increased every six months, from 21.6% to 23.4% to 25.4%, showing progressive improvement in case detection. Molecular testing was performed for 21253 evaluations, giving an overall diagnostic coverage of 47.9%. Diagnostic coverage by

molecular testing fluctuated with six-monthly coverage from 34.2% to 58.7% to 50.2%, reflecting the impact of stakeholder engagement. The mean turnaround time for molecular test results decreased from 7 days to 5 days, allowing clients to start treatment sooner.

Conclusions: Engaging stakeholders to optimize molecular TB testing strengthened diagnostic utilization, reduced delays in TB diagnosis and improved client linkage to care in Delta State. This approach shows that scaling up structured stakeholder engagement will offer a practical pathway to enhance TB diagnosis in similar resource-limited settings.



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Burden of Non-TB Cardiopulmonary Disease Among Individuals Identified as Presumptive TB in Nigeria

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Background: Under the Global Fund–supported Public–Private Mix (PPM) TB project in Nigeria, chest X-rays (CXR) are provided for individuals identified as presumptive TB cases who remain negative on molecular testing. While patients with TB-suggestive radiologic findings are routinely followed up, there is no structured pathway for individuals with non-TB abnormalities requiring further clinical care. This study quantified non-TB findings among TB presumptive clients to inform the development of an integrated referral model.

Methods: A retrospective review of 6,745 CXR records of presumptive TB clients referred for imaging between January 2022 and December 2025 was conducted. Radiologist impressions were classified as normal, TB-suggestive, or non-TB cardiopulmonary abnormalities. The prevalence and distribution of non-TB conditions were analyzed using descriptive statistics. An independent samples t-test was performed to compare the mean age of clients with normal versus abnormal CXR findings. Statistical significance was set at $p < 0.05$. In addition, pilot tracking and referral efforts were initiated for a subset of recent non-TB cases to explore feasible linkage mechanisms.

Results: Of the 6,745 CXR records reviewed, 2,900 (43%) were normal, while 3,845 (57%) showed radiologic abnormalities. Among abnormal findings, only 26% were TB-suggestive. The remaining 74% reflected other clinically significant conditions, including hypertensive cardiovascular changes (32%), chronic obstructive pulmonary disease (14%), pneumonia (12%), congestive

cardiac failure (10%), post-primary TB sequelae (5%), and lung lesions (1%).

Statistical analysis demonstrated a significant association between advancing age and the presence of radiologic abnormalities. The mean age of clients with abnormal CXR findings (49.8 years) was significantly higher than that of those with normal findings (32.3 years) based on an independent samples t-test ($p < 0.0001$).

Conclusion: The substantial burden of non-TB cardiopulmonary conditions identified through TB screening highlights a critical gap in continuity of care. Establishing a formal “TB-Plus” referral linkage system is necessary to transition from disease-specific screening toward integrated, patient-centered primary healthcare. Leveraging existing TB diagnostic platforms to strengthen referral pathways for non-communicable and chronic respiratory diseases offers a practical and scalable approach for high-burden settings.



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Prior TB Treatment, HIV Co-Infection, and Young Age Predict Rifampicin Resistance among People Diagnosed with Tuberculosis across Three High Volume Facilities in Freetown, Sierra Leone: Evidence for Pre-XDR TB Circulation

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Background: Drug-resistant tuberculosis (DR-TB) undermines TB control globally, yet risk factor data to guide targeted screening remain scarce. Sierra Leone (TB incidence: 314 per 100,000) has scaled up GeneXpert MTB/RIF nationwide and introduced reflex MTB/XDR testing for extended resistance profiling. No analysis has previously linked clinical characteristics to rifampicin resistance or documented fluoroquinolone resistance prevalence in the country. We aimed to identify predictors of rifampicin resistance and determine pre-XDR TB frequency among people with rifampicin-resistant disease.

Methods: We retrospectively analysed routine laboratory and clinical data from 3 high volume facilities in Freetown (January 2022–December 2025). Initial sputum specimens from people with presumptive TB tested by GeneXpert MTB/RIF were included; repeat specimens from the same individual were excluded. People with rifampicin-resistant results underwent reflex MTB/XDR testing for fluoroquinolone and second-line injectable resistance. Covariates—age, sex, HIV status, prior TB treatment, and district—were selected a priori. Multivariable logistic regression identified predictors of rifampicin resistance, reporting adjusted odds ratios (aOR) with 95% confidence intervals (CI). Model fit was assessed using the Hosmer-Lemeshow test. Missing HIV status was analysed as a separate category.

Results: Among 1,542 people with GeneXpert-confirmed TB, rifampicin resistance was detected in 89 (5.8%; 95% CI: 4.7–7.1). On multivariable analysis, prior TB treatment (aOR 3.8; 95% CI: 2.1–6.9), confirmed HIV co-infection (aOR 2.4; 95% CI: 1.3–4.5), and age <25 years (aOR 1.9; 95% CI: 1.1–3.4) independently predicted rifampicin resistance (Hosmer-Lemeshow p=0.62). Overall, 1,054 (68.4%) were male, median age 34 years (IQR: 25–46). Among 72 people with rifampicin-resistant TB undergoing MTB/XDR testing, fluoroquinolone resistance (pre-XDR TB) was identified in 11 (15.3%) and second-line injectable resistance in 4 (5.6%).

Conclusions: People previously treated for TB had nearly four-fold higher odds of rifampicin resistance, supporting prioritised molecular screening of this population. Detection of pre-XDR TB in 15.3% of people with rifampicin-resistant disease demonstrates that reflex molecular testing within existing GeneXpert networks can serve as a scalable surveillance platform for emergent resistance. Expanding drug susceptibility testing capacity, including for Group A drugs (bedaquiline, linezolid), is essential to fully characterise DR-TB and inform treatment policy across Sierra Leone.



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A Cost-Effectiveness Analysis: Pooling Sputum Testing to Diagnose Tuberculosis Using Xpert MTB/RIF Ultra in Public Hospitals

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Background: The World Health Organization (WHO) recommends diagnosing tuberculosis (TB) using molecular tests, such as Xpert MTB/RIF (MTB/RIF). These tests are expensive and resource-consuming, and cost-effective methods are needed for larger coverage.

Methodology: We evaluated the cost-effectiveness of pooling sputum samples for TB testing using a fixed amount of 300 MTB/RIF or Ultra cartridges in which four different samples were pooled in one cartridge. We used the number of people with TB detected as the indicator for cost-effectiveness. Cost-minimization analysis was conducted from the healthcare system perspective and included the costs to the healthcare system using pooled and individual testing.

Results: There was no significant difference in the overall performance of the pooled testing using MTB/RIF (sensitivity, 93.9% vs. 97.6%, specificity 98% vs. 97%, p-value > 0.1 for both). The total cost across all studies to test 300 samples singly was Ksh. 1.26M for the individual testing and Ksh. 315,000 for the pooled testing, resulting in a savings of Ksh.945,000 in all the 300 sample tests performed (a 75% decrease). From the total 75 pools tested, 10 pools turned positive with 15 individual samples confirmed TB positive by individual testing. The mean unit cost per bacteriologically confirmed TB case was Ksh. 168,000 individual testing and Ksh. 42,000 for the pooled testing (25% decrease). Cost-minimization analysis indicates savings are directly associated with the proportion of positive samples. If the TB prevalence is $\geq 50\%$, pooled testing is not cost-effective.

Conclusion: Pooled sputum testing can be cost-effective for diagnosing TB, resulting in significant resource savings. This approach could increase testing capacity and affordability in resource-limited settings and support increased testing towards achieving the WHO End TB strategy.



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Integrating Urine TB LF-LAM and TB LAMP Screening for Rapid Tuberculosis Diagnosis among People with Advanced HIV Disease in Northwest Nigeria

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Background: Tuberculosis (TB) is the leading cause of death among people with Advanced HIV Disease (AHD). In high-burden, low-resource settings like Katsina State, Nigeria, the long diagnostic delays for TB using smear microscopy contribute to high mortality. The WHO-recommended LF-LAM urine assay is a game-changer for diagnosing TB in this vulnerable population. This study evaluates a novel, facility-based model that integrates point-of-care (POC) HIV testing, POC CD4 screening, and immediate urine LF-LAM testing to diagnose and triage the sickest individuals at their first point of contact with the health system in Northwest Nigeria.

Methods: From November 2024 to November 2025, integrated TB/HIV testing was implemented across health facilities in Katsina State, Nigeria. All clients received HIV testing, and those testing positive underwent point-of-care CD4 testing. Clients with CD4 ≤ 200 cells/ μ L or WHO danger signs received urine TB LF-LAM testing. LF-LAM-positive clients were prioritized for same-day TB treatment and expedited ART. Selected clients underwent sputum-based TB LAMP/GeneXpert testing. Data were captured, and the R software was used to analyze the Data.

Results: A total of 1,422 newly enrolled HIV clients underwent CD4 testing, with 1,421 (99.9%) successfully screened for Advanced HIV Disease

(AHD). Overall, 206 clients (14.5%) were identified with AHD (CD4 ≤ 200 cells/ μ L). Among these, 204 clients (99.0%) received urine TB LF-LAM testing, demonstrating high uptake of TB screening among eligible individuals.

Urine TB LF-LAM yielded 80 positive results, corresponding to a positivity rate of 39.2% (80/204), indicating a high burden of TB among people with AHD. Of those tested, 43 clients underwent follow-up on sputum-based molecular testing using TB LAMP/GeneXpert, with 30 cases confirmed as *Mycobacterium tuberculosis* positive. The combined diagnostic approach identified TB cases that may have been missed using sputum-based testing alone, particularly among severely immunocompromised clients with small-volume sputum or those unable to produce sputum.

Conclusion: Overall, these findings demonstrate that integrating urine TB LF-LAM and molecular TB testing enabled rapid identification of TB among people with AHD, strengthened the TB diagnostic yield, and reduced delays to treatment by supporting timely clinical decision-making in a high TB/HIV burden setting.



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Breaking Barriers: Community-Based Portable Digital X-Ray Innovation for TB Case Detection in Lagos, 2025

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Introduction: In Lagos, Nigeria, TB poses a considerable public health threat, disproportionately affecting vulnerable and underserved communities. Traditional facility-based diagnosis often misses cases, perpetuating transmission. This study examines the effectiveness of deploying community-based Portable Digital X-ray (PDX) units for active TB case finding in Lagos' underserved communities in 2025.

Methods: From April to December 2025, 5 PDX units were deployed to support the WHO 4 TB Symptoms screening through mobile teams. This activity was conducted through House-to-House case findings and outreaches in the Hard-to-reach areas of Lagos state. Outreach locations were selected using EPCON Hotspot mapping and historical data.

Results: Key Findings:

Through 338 outreaches, 25,701 individuals were screened for TB, identifying 3,367 presumptive TB cases (CAD4 TB score ≥ 40), and yielding 985 confirmed TB cases. This contributed to the total of 3,134 TB cases detected in the community. The community-based PDX approach detected 31% of all community cases, with a TB yield of 29% (vs 10% for house-to-house verbal screening).

Conclusion: Deploying more PDX units into routine TB screening programs and expanding into other high-burden areas can accelerate case finding and reduce TB transmission.



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Diagnosis Approach and Treatment of Tuberculosis among Children under 15 Years in Zanzibar: Insight from Zanzibar Electronic TB and Leprosy Dataset, 2019-2024

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Background: Childhood tuberculosis (TB) remains a significant cause of morbidity and mortality in children. Zanzibar is a high TB burden setting within the United Republic of Tanzania, yet limited data describe the epidemiology and outcomes of childhood TB. This study evaluates diagnostic approaches and treatment outcomes for children with TB using national surveillance data.

Methods: We conducted a retrospective cohort study using secondary individual-level TB surveillance data from the Electronic TB and Leprosy Register (eTL). Children aged below 15 years with TB who were notified across all five regions of Zanzibar from January 2019 to December 2024 were included. Descriptive statistics were used to summarize demographic characteristics, diagnostic methods, and treatment outcomes.

Results: From January 2019 to December 2024, a total of 838 children diagnosed with TB were notified and treated. The median was 4 (IQR: 1-9) years, 474 (56.6%) were males, and 34 (4.1%) were children living with HIV. Overall, 260 (31.0%) were assessed by microbiological test, while 578 (69.0%) were not tested by any microbiological test. Bacteriological confirmation was achieved in 56 (6.7%), with children with confirmed TB being predominantly older (median age 12 years) than children without confirmed TB (median age 12 years). In children with confirmed TB, Xpert

MTB/Rif was the common bacteriological confirmation test (91.1%), while in children with clinical diagnosis, chest X-ray accounted for 65.5%, and the TB score chart 31.4%. GeneXpert use increased over time, alongside declining reliance on clinical score charts. Treatment outcomes were excellent, with 98.1% treatment success, low mortality (1.5%), and minimal loss to follow-up (0.4%), irrespective of diagnostic confirmation status.

Conclusion: We observed a very low rate of bacteriological confirmation, particularly among younger children. Reliance on clinical diagnosis methods and decreased access to the WHO-recommended rapid molecular tests reflect persistent challenges of TB diagnosis in children, highlighting the need for increased scale-up of molecular tests for TB in children, improving child-appropriate sample collection methods, and referral networks to enhance early and accurate diagnosis. Despite low rate of bacteriological confirmation, treatment outcomes were excellent, indicating strong programmatic performance.



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Gut Microbiome Disruption in Tanzanian Pulmonary Tuberculosis Patients: Links to Treatment, Nutritional Status, and Host Immunity

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Background: Tuberculosis (TB) and its treatment disrupt the gut microbiome, potentially impacting immune regulation and treatment outcomes. However, the mechanisms by which the microbiome modulates immune responses in TB disease are not fully understood, and data from Sub-Saharan Africa remain limited and need strengthening. We investigated gut microbiome alterations associated with pulmonary TB and treatment in a Tanzanian cohort, while exploring interactions associated with host immunity and clinical factors.

Methods: In this cross-sectional study, we analyzed stool samples from newly diagnosed TB patients, TB patients treated by the standard of care for two months, and healthy controls at Kibong'oto Infectious Diseases Hospital, Tanzania. Gut microbial profiles were assessed using 16S rRNA sequencing, and cytokine levels (IFN γ , TNF α , IL-1 β , IL-6, IL-10) were quantified by Luminex assay. Alpha diversity (Shannon, Chao1) between groups, beta diversity (Bray-Curtis) of communities, and differential taxon abundance (DESeq2) across clinical statuses. Lastly, we examined the microbiome associations with inflammatory cytokines, nutritional status, and antibiotic history.

Results: Patients on treatment had significantly reduced alpha diversity ($p=0.002$) and distinct beta diversity ($p=0.002$) compared to newly diagnosed

patients, alongside a depletion of Euryarchaeota and Cyanobacteria. Compared to healthy controls, these treated patients also showed reduced alpha diversity and increased abundance of Fusobacteria and Tenericutes. In contrast, the gut microbiome structure of newly diagnosed patients did not differ significantly from that of controls.

Malnutrition was more prevalent among newly diagnosed patients than those on treatment (40% vs. 15%, $p=0.02$). Additionally, newly diagnosed patients exhibited higher levels of inflammatory cytokines than both patients on treatment and healthy controls ($p \leq 0.0018$). Within this group, the abundance of microbial taxa varied significantly based on nutritional status and prior exposure to empirical non-antituberculous antibiotics. Notably, Spirochaetes were enriched in newly diagnosed patients with high IFN γ and low IL-6 levels, suggesting the presence of cytokine-specific microbial patterns.

Conclusion: TB treatment significantly alters the gut microbiome and suggest complex interactions between gut microbial populations, host inflammation, nutrition, and treatment history. This study also underscores the need for more microbiome research in Sub-Saharan Africa to better understand immune-microbiome dynamics in TB.



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Burden of Post-Tuberculosis Lung Disease in a Nationally Representative Survey in Namibia

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Background: Post-tuberculosis lung disease (PTLD) presents as chronic respiratory abnormality attributable, at least in part, to previous TB. In high-burden settings, persistent radiological abnormalities after treatment may mimic active TB, leading to misdiagnosis and unnecessary retreatment. Namibia lacks nationally representative data on PTLD. We estimated the burden and characteristics of PTLD using data from the national TB prevalence survey.

Methods: We analysed data and chest radiographs from the 2018–2019 Namibia TB Prevalence Survey, which enrolled adults ≥ 15 years from 68 clusters using stratified sampling. Individuals with bacteriologically confirmed TB ($n=123$) and incomplete data ($n=1$) were excluded. Prior TB was self-reported. Chest X-rays (CXR) were read in the field and centrally reviewed by a radiologist. CAD4TB scores were analysed as a marker of structural abnormality. Multivariable logistic regression assessed factors associated with prior TB and radiological abnormalities.

Results: Among 29,371 participants, 2,952 (10.1%) reported previous TB treatment. Compared to those without prior TB, participants with prior TB had lower median BMI (20.6 vs 22.0 kg/m², $p<0.001$) and markedly higher median CAD4TB scores (48 vs 28, $p<0.001$). HIV prevalence was substantially higher among those with prior TB (32.9% vs 11.4%, $p<0.001$). Radiological abnormalities were common: 39.9% of those with prior TB had field CXR findings suggestive of TB versus 9.5% without prior TB ($p<0.001$). On central review, 54.0% of prior TB participants had significant abnormalities consistent with TB, while only 25.6% had normal CXRs. In adjusted analysis, higher CAD4TB score

(aOR 1.05 per unit increase; 95%CI 1.04–1.05) and HIV infection (aOR 2.60; 95%CI 1.94–3.51) were independently associated with prior TB.

Conclusion: Approximately 40–54% of individuals with prior TB in Namibia have persistent radiological abnormalities consistent with PTLD. The high prevalence of TB-like radiographic changes underscores the need for clear clinical guidelines to distinguish PTLD from recurrent active TB and prevent inappropriate retreatment.



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Improving Tuberculosis Treatment Enrolment through Data-Driven Initiatives: Evidence from the TB Situation Room in Akwa Ibom State, Nigeria

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Background: Persistent gaps between tuberculosis (TB) diagnosis and treatment initiation continue to undermine TB control in high-burden settings. Pretreatment loss to follow-up is often driven by weak drug logistics management, limited use of routine data for decision-making, and inadequate frontline capacity. In Akwa Ibom State, Nigeria, a surge in TB diagnoses in 2025, combined with drug stock-outs and poor quantification practices, resulted in a low TB treatment enrolment rate of 48% in Q2 2025. This intervention aimed to improve treatment enrolment by strengthening routine data use and implementing system-level corrective actions.

Methods: The Akwa Ibom State TB Programme applied the TB Situation Room (SR) methodology to conduct an in-depth analysis of routine surveillance and logistics data. A 12-week data-driven quality improvement intervention was implemented and monitored through bi-weekly SR meetings using digital data platforms. Key interventions included strengthening drug quantification skills among DOTS officers and local government TB and Leprosy Supervisors; enhancing accountability of community TB workers; validating TB case and logistics data; improving case tracking; and optimizing drug redistribution and supply advocacy.

Results: TB treatment enrolment among diagnosed cases increased from 48% in Q2 2025 to 127% in Q4 2025. This reflected improved linkage of newly diagnosed patients to treatment, as well as enrollment of previously diagnosed patients whose initiation had been delayed due to drug

availability and system gaps. Enhanced data validation, logistics coordination, and accountability mechanisms were key to these improvements.

Conclusion: Strategic use of routine data to enhance accountability and improve drug logistics management can significantly boost TB treatment enrolment, even in resource-limited settings. The TB SR approach offers a scalable, data-driven model for closing diagnosis-to-treatment gaps and strengthening TB program performance.



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Data to Action: Leveraging a TB Situation Room to Improve Contact Investigation Coverage in Lagos State, Nigeria

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Background: Tuberculosis (TB) remains a significant public health issue in Nigeria, with Lagos State representing a substantial portion of the national TB burden. Contact investigation (CI) is a key strategy for preventing TB transmission and identifying individuals eligible for preventive and early treatment. However, analysis of routine program data over five consecutive quarters showed consistently low CI coverage in Lagos State, well below the WHO-recommended target of 90%, highlighting notable gaps in implementation and accountability. This intervention aimed to enhance CI performance in Lagos through improved routine data use and targeted program actions.

Methods: The Lagos State TB Programme implemented a TB Situation Room (SR), a technology-enabled structured mechanism for routine data review, performance tracking, and accountability. Routine TB surveillance data were analyzed through in-depth SR data dives to identify local government areas (LGAs) and health facilities that contributed most to low CI coverage. Targeted capacity building was provided to DOTS officers and local government TB and Leprosy Supervisors, focusing on intensified facility- and community-based contact investigations. Bi-weekly SR meetings were held to review rapid-implementation data, assess progress, and strengthen accountability at the state, LGA, and facility levels.

Results: CI coverage increased from 2.8% in Q1 2025 to 41% in Q3 2025, marking a significant improvement in identifying and screening household contacts of index TB cases. Gains in performance were linked to stronger supervision, frontline capacity-building, better documentation

tools, improved partner-supported community contact investigation, and ongoing performance review through bi-weekly data-use meetings. While four LGAs achieved higher CI coverage, six LGAs lagged, highlighting differences in context and operations. Some DOTS officers' reluctance to submit rapid CI data, due to a traditional quarterly reporting culture, remained a key challenge.

Conclusion: Integrating structured routine data review, accountability mechanisms, and frontline capacity-building within TB programs can significantly enhance contact investigation performance in high-burden areas. The TB SR allowed for quick identification of implementation gaps and effective use of data for action, resulting in notable improvements in CI coverage in Lagos State. This strategy provides a scalable, context-appropriate model for strengthening TB prevention and surveillance in similar African urban health systems.



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Using TB Situation Rooms to Strengthen Subnational Performance Management and Data-to-Action for Tuberculosis Control in Nigeria

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Background: Nigeria's TB burden remains one of the highest globally, with ongoing gaps in case detection, routine data use, and performance management at subnational levels. Although TB surveillance systems produce large amounts of data, timely translation into coordinated action at the state and local government levels is often limited. To fill this gap, the U.S. Government-funded Data for Implementation (Data.FI) project supported the implementation of an innovative TB Situation Room (SR) Methodology in five states to enhance real-time data use, accountability, and decision-making among multiple stakeholders.

Methods: The TB SR used a structured, data-driven approach to performance management. Routine TB surveillance data from national reporting platforms were turned into state-specific dashboards and scorecards that covered key cascade indicators, including presumptive identification, case notification, treatment initiation, treatment outcomes, and contact investigation. Bi-weekly SR meetings brought together State TB Programme teams, monitoring and evaluation (M&E) officers, implementing partners, and decision-makers to validate data, identify performance gaps, conduct root-cause analyses, and develop time-limited corrective actions with clear accountability. Qualitative feedback and session documentation helped evaluate adoption and usability.

Results: The approach improved data quality, reporting timeliness, and routine use of surveillance data across the five states. States demonstrated enhanced tracking of underperforming local government areas, quicker identification of missed opportunities along the TB care cascade, and more responsive corrective actions. Collaboration among programme, M&E, and partner teams improved intervention alignment. Several states showed upward trends in TB case notification and contact investigation coverage. Key challenges included variable data literacy, infrastructure limitations, and the need for sustained ownership by local leadership.

Conclusion: The TB SR is an effective, scalable solution for enhancing subnational TB program performance. Incorporating structured data review, accountability, and action tracking into daily management can boost program responsiveness and help close TB detection and treatment gaps in high-burden areas.



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Assessment of Early Outcomes from Integrated Tuberculosis, HIV, and Malaria Interventions during World Aids Day

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Background: Tuberculosis (TB), HIV, and malaria remain major causes of morbidity and mortality in Nigeria, with limited access to testing and treatment in many communities, particularly outside formal health facilities. Missed opportunities for early diagnosis persist. World AIDS Day offers a high-visibility platform to deliver integrated multi-disease services and public health messaging to large community audiences. This abstract describes the implementation and early outcomes of an integrated TB, HIV, and malaria outreach conducted during the 2025 World AIDS Day commemoration in Kano State, Nigeria.

Methods: To mark World AIDS Day 2025, the Institute of Human Virology Nigeria supported integrated TB, HIV, and malaria outreaches conducted from 2–4 December 2025. In Kano State, community health volunteers, mentor mothers, community TB/HIV workers, DOT officers, and malaria focal persons carried out community mobilization and service delivery in 12 high-volume public locations across six local government areas. Services included TB symptom screening, HIV testing, and malaria rapid diagnostic testing for individuals presenting with malaria-like symptoms. Data were extracted from preliminary program reports and analyzed descriptively.

Results: Overall, 2,697 individuals were reached with the integrated outreach package. Among them, 857 (32%) individuals, including 298 pregnant women, underwent HIV testing, and one new HIV positive case was identified. TB screening yielded 169 presumptive TB cases; all provided sputum samples for laboratory evaluation, of which 15 were confirmed as TB. In addition, 667

participants reported malaria like symptoms; 149 (22%) received malaria rapid diagnostic tests, 85 (57%) tested positive, and all confirmed cases were treated with artemisinin-based combination therapy in accordance with national guidelines.

Conclusion: World AIDS Day–driven integrated outreach enabled rapid identification of TB, HIV, and malaria cases within a short period, demonstrating its value as a platform for multi-disease case finding and linkage to care. Institutionalizing this integrated model during future campaigns could strengthen community-level disease control efforts and accelerate progress toward national TB, HIV, and malaria targets.



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Beyond Gender-Blindness: Operationalizing Male-Responsive TB Care to Close the Notification Gap in High-Burden Settings

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Background: Men account for the majority of incident tuberculosis (TB) cases and TB-related deaths globally, yet remain disproportionately underserved by traditional health services. This gap between disease burden and programme reach reflects structural service-delivery failures rather than biological susceptibility alone and contributes to ongoing transmission and avoidable mortality.

Methodology/Approach: We synthesised evidence from over 45 peer-reviewed articles, national surveillance datasets, and programme reports published between 2010 and 2024. Using a health-systems and gender-analysis lens, we examined sex-disaggregated outcomes across the TB care cascade to identify critical points of attrition and to assess operational service-delivery adaptations relevant to TB programme implementation in high-burden settings.

Results: Findings demonstrate a persistent gender disparity across the TB care cascade. Despite a male-to-female TB prevalence ratio of approximately 1.6:1, men consistently account for a smaller proportion of TB notifications and treatment completions. Diagnostic delays are longer for men, with the most pronounced losses occurring between TB testing and treatment initiation, where pre-treatment loss to follow-up reaches approximately 20 to 30 percent in many high-burden programme settings. Structural barriers, particularly clinic hours that conflict with employment, transport costs, and inflexible appointment systems, interact with gender norms that discourage early care-seeking. Evidence indicates that workplace-based screening, extended clinic hours, peer-led support, and differentiated adherence strategies can improve

male engagement, but these approaches remain peripheral and inconsistently implemented across national TB programmes.

Lessons Learned: Gender-neutral TB services often function as gender-blind, effectively excluding working-age men whose socio-economic realities conflict with conventional service models. Innovation in TB control requires shifting the burden of change from individual patients to the health system.

Recommendations: Closing the TB gender gap requires moving from rhetoric to operationalisation. Priority actions include integrating sex-disaggregated cascade leakage metrics into routine programme dashboards, scaling flexible service models such as after-hours, mobile, and workplace-based care, and investing in pragmatic implementation research to identify cost-effective, male-responsive interventions within existing programme budgets.



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IFN- γ and IL-2 Asses the Therapeutic Response in Anti-Tuberculosis Patients at Jamot Hospital Yaounde, Cameroon

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Background: Tuberculosis (TB) remains a leading infectious disease globally. While interferon-gamma (IFN- γ) release assays (IGRAs) are established diagnostic tools, they cannot distinguish active TB (ATB) from latent TB infection (LTBI). This study evaluated IFN- γ and interleukin-2 (IL-2) as markers for monitoring anti-tuberculosis treatment response.

Methods: A cross-sectional study was conducted at Jamot Hospital, Yaoundé, from May to August 2021. Sixty-one participants were enrolled after informed consent and divided into four groups: resistant TB (n=13), active TB (n=19), cured TB (n=16), and presumed healthy controls (n=13). Sociodemographic data were collected, and 5 mL blood samples were obtained. Cytokine levels were measured using indirect ELISA. Statistical significance was set at $p < 0.05$, with analysis performed using SPSS version 22.0.

Results: Males comprised 31.8% (14/61) of infected participants, predominantly in active and resistant TB groups. Mean age was 41.3 ± 13.1 years (95% CI: 38.2-44.7), with highest infection rates in the 31-40 age group. Mean IL-2 and IFN- γ levels were: active TB (327.6 ± 160.6 pg/mL and 26.6 ± 13.0 pg/mL), resistant TB (251.1 ± 30.9 pg/mL and 21.4 ± 9.2 pg/mL), cured TB (149.3 ± 93.3 pg/mL and 17.9 ± 9.4 pg/mL), and healthy controls (15.1 ± 8.4 pg/mL and 5.3 ± 2.6 pg/mL), respectively ($p < 0.0001$). Significant differences were observed between all groups.

Conclusion: Monitoring serum IFN- γ and IL-2 levels, particularly in combination, may enhance evaluation of anti-tuberculosis treatment response and improve diagnostic accuracy beyond routine examinations.



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PBPK Modeling to Recommend AINUOVIRINE Dosing in HIV and HIV-TB Co-Infected Patients: Leveraging Enzyme Auto-Induction and Drug Interactions

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Background: Tuberculosis remains a major opportunistic infection among HIV-infected individuals. AINUOVIRINE is a novel non-nucleoside reverse transcriptase inhibitor for treatment of HIV-1 infection, primarily metabolized by CYP2C19, exhibits enzyme auto-induction in its pharmacokinetics. These complexities are further exacerbated in HIV-TB co-infected patients, where AINUOVIRINE is often co-administered with rifampicin/isoniazid-based anti-tuberculosis therapies. Rifampicin, a strong CYP2C19 inducer, and isoniazid, a moderate CYP2C19 inhibitor, create intricate drug interactions that challenge optimal AINUOVIRINE dosing strategies, leading to clinical uncertainty.

Methods: We developed a physiologically based pharmacokinetic model for AINUOVIRINE that incorporated enzyme autoinduction for CYP2C19, and verified in healthy and HIV-infected individuals. The model was subsequently expanded to explore DDIs with antitubercular agents, including rifampicin and isoniazid, to evaluate their impact on AINUOVIRINE PK. Finally, the developed PBPK models were applied to evaluate dosing regimens for AINUOVIRINE-based antiretroviral therapy and concomitant rifampicin-based and isoniazid-based treatments. All models were developed using the PK-sim (version12).

Results: The simulated showed good agreement with observed clinical data with the ratio of parameters simulated (C_{max}, AUC) to actual measured values ranges between 0.5 and 2, confirming the accurate parameterization in the AINUOVIRINE PBPK model. The simulated DDIs between AINUOVIRINE and rifampicin, showed good

agreement with observed clinical data with the simulated C_{max} and AUC was 1.53 and 1.23-fold of the observed values under co-administration scenarios, confirming the accurate parameterization of CYP2C19 induction in the AINUOVIRINE PBPK model. The simulated concentration points for intravenous and oral administration in the isoniazid monotherapy model fell within the 90% confidence interval. The C_{max} and AUC values observed when combined with omeprazole (a CYP2C19 substrate) were close to the actual parameters, demonstrating the reliability of the isoniazid model for DDI simulation.

Conclusion: Simulation results indicate that the standard AINUOVIRINE regimen (150mg once daily) requires adjustment to AINUOVIRINE BID when combined with rifampicin and isoniazid. Specifically, during triple therapy, AINUOVIRINE is administered at 75mg, and the other dose is 150mg. After initiating the triple therapy, when rifampicin and isoniazid are discontinued, maintain the AINUOVIRINE dosage at 150mg twice daily for two days, after which the AINUOVIRINE dosage can be adjusted to 150mg once daily.



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Leveraging Epcon Geo-Spatial Intelligence to Optimize Targeted Deployment of Portable Digital X-Ray Machines for Community TB Screening: Insights from the Impact Project in Oron District, Akwa Ibom State, Nigeria

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Background: Effective tuberculosis (TB) control in high-burden settings requires innovative, data-driven approaches to identify cases and optimise resource allocation efficiently. Sparse data and fragmented coordination of community active case finding undermine the effectiveness of targeted TB screening interventions, limiting the ability to identify high-burden areas and efficiently allocate resources accurately. We aim to assess the impact of EPCON Geo-Spatial Intelligence in guiding targeted deployment of portable digital X-ray machines for improved TB case finding.

Method: EPCON identifies TB hotspots and high-risk populations, using AI-driven predictive analytics to detect patterns, forecast trends, and guide efficient resource allocation. Through the Global Fund CPPM project, implemented by KNCV Nigeria in collaboration with IHVN, the platform was deployed to Oron district, comprising Oron, Mbo, Okobo, Urue-offong/Oruko and Udung Uko LGAs in May 2025, with implementation aligned to all steps of the TB care cascade, which informed the strategic deployment of portable digital X-ray machines to these high-burden areas. A team comprising a trained radiographer, data assistant, and community testing workers were organised and deployed to map hotspots, conducting house-to-house and outreach screening activities. Data on TB testing coverage and positivity yield were

collected before and after the implementation of EPCON to evaluate the impact of the targeted intervention.

Result: Analysis of data from the five-month pre- and post-deployment periods showed a notable improvement in TB yield in Oron District. Between December 2024 and April 2025 (pre-deployment), 3,462 individuals were screened, identifying 476 presumptive cases (14% presumptive yield) and diagnosed 55 TB cases (11% TB yield). Following deployment, 4,214 individuals were screened, 648 presumptive cases (15% presumptive yield) identified, and 145 TB cases (22% TB yield) diagnosed. The TB positivity yield increased from 11% to 15%, demonstrating improved targeting of high-burden areas. The strategic deployment of portable digital X-ray machines enhanced diagnosis and linkage to treatment.

Conclusion: EPCON's geo-spatial intelligence and hotspot targeting, significantly improved community-based TB active case finding. It demonstrated that innovation and precision can transform TB program implementation, especially in resource-limited settings. By enabling evidence-based hotspot targeting, Akwa Ibom State improved ACF and set a model for scalable, data-driven ACF interventions nationwide.



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Coverage and Yield of Tuberculosis Contact Investigation and Preventive Treatment in Zanzibar: A Retrospective Program Review, 2019 – 2023

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Background: Contact tracing has long been recommended as a key component of Tuberculosis (TB) control, as it supports early identification and treatment of infectious cases and enables eligible individuals to receive Tuberculosis Preventive Treatment (TPT). Although the World Health Organization (WHO) and national guidelines endorse household contact investigation, implementation in high TB-burden settings remains suboptimal, partly due to limited evidence on program effectiveness. This study aimed to assess the coverage and yield of household TB contact investigation and the uptake of TPT in Zanzibar.

Methods: A retrospective program review was conducted using routine TB program data from 2019 to 2023 in Zanzibar. Household contacts (HHCs) of index TB patients were traced, investigated for active TB, and offered TPT for children under 5 years. Descriptive statistics were used to analyze and describe the data.

Results: Among 6618 index TB cases, 2098 (31.7%) had at least one household contact (HHC) traced, yielding 8,340 HHCs with a median of 4 (IQR: 3–7) contacts per index case, of whom 7,918 (94.5%) were investigated. Among 1,300 HHCs aged <5 years, 25 (1.9%) were diagnosed with active TB, of those <5 years without TB, 1,215 (96.3%) initiated TPT. Household contact (HHC) tracing increased substantially from 7 in 2019 to 2,931 in 2024. The yield of TB among investigated contacts ranged from 0.7% to 1.4%, while among children under five years it ranged from 1.1% to 3.5%, with consistently high TPT uptake (93.5%–98.8%).

Conclusion: Household TB contact investigation in Zanzibar demonstrated high investigation coverage and TPT uptake among eligible young children, with a modest but consistent yield of active TB among contacts. Further expanding contact tracing coverage could substantially enhance TB control efforts in this setting.



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Optimization of Early Warning Outbreak Recognition System (Ewors) in Improving Community TB Case Finding in Plateau State, Nigeria

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Background: Tuberculosis (TB) remains a significant public health threat in Nigeria and continues to be one of the leading causes of mortality. Despite improvements in treatment coverage, substantial gaps persist in screening and in identification of true presumptive clients which results in missed or undiagnosed tuberculosis cases.

The CommTB app is designed for tuberculosis screening in communities, collecting and analyzing data to enhance disease detection and response, thereby empowering and improving public health system. The app is part of a broader initiative that includes EWORS AI which helps to flag TB hotspots real time providing outbreak detection and monitoring. There was some resistance in the use of the app due to some network glitch challenges but was fine tuned for easy adoption and optimization.

Method: The Global Fund Grant Cycle 7 (GC7 N-THRIP) grant, with Institute of Human Virology Nigeria (IHVN) as the principal recipient and Leprosy and Tuberculosis Relief Initiatives (LTR) as a subrecipient instituted TB hot spot analysis using InStrat Global Health Solutions' EWORS to inform community mass TB screening interventions in the identified communities in the 17 LGAs of Plateau state, Nigeria. Data was collected retrospectively from 2024 and 2025.

Results: In 2024, a total of 7020 persons were screened using the CommTB app, presumptives

identified and evaluated among screened persons was 2410 and confirmed TB cases diagnosed was 278. While in 2025 following better adoption and optimization of the app, a total of 11885 persons was screened, presumptives identified and evaluated was 1952 and confirmed TB cases diagnosed was 490. Number needed to test was 9:1 and 4:1 in 2024 and 2025 respectively. Presumptive cases identified were evaluated for TB using one of the following diagnostic tools; GeneXpert, TB lamp, Truenat or chest X-ray. Confirmed TB cases were linked to treatment.

Conclusion: With the optimization of EWORS, the precision of diagnosing TB among presumptive cases increased steadily, and the number needed to test to diagnose TB case decreased. The use of the app yielded more cases due to its precision thereby ensuring efficiency of resources and minimized missing potential TB cases.



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Resistance Patterns of Bedaquiline and Clofazimine among MDR-TB Isolates in Nigeria: Implications for Treatment Strategies

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Background: The rising burden of multidrug-resistant (MDR) and extensively drug-resistant (XDR) tuberculosis (TB) has driven the incorporation of new and repurposed drugs, notably Bedaquiline (BDQ) and Clofazimine (CLZ), into TB treatment regimens. Nigeria adopted these agents in 2020, highlighting the importance of resistance surveillance to support effective patient management. This study evaluated the phenotypic resistance patterns to BDQ and CLZ among Mycobacterium tuberculosis (Mtb) isolates resistant to Rifampicin (RIF) and/or Isoniazid (INH) across Nigeria.

Methods: A total of 49 Mtb isolates with confirmed resistance to RIF and/or INH were collected from six geopolitical zones in Nigeria. Isolates were selected based on molecular drug susceptibility testing results. Phenotypic drug susceptibility testing for BDQ and CLZ was conducted using the MGIT 960 system at the National Tuberculosis Reference Laboratory, Zaria, Nigeria, in 2022. Descriptive analysis was performed using Microsoft Excel.

Results: Phenotypic drug susceptibility testing revealed diverse resistance patterns among the isolates. Resistance to INH, RIF, and BDQ was identified in 6.1% (3/49) of isolates, while 2% (1/49) showed combined resistance to INH, RIF, and CLZ. Additionally, 2% (1/49) of isolates demonstrated resistance to RIF and BDQ, INH and BDQ, INH and CLZ, as well as concurrent resistance to INH, RIF, BDQ, and CLZ. Notably, 32.7% (16/49) of isolates were classified as MDR-TB but remained susceptible to both BDQ and CLZ. Furthermore,

40.8% (20/49) were RIF-resistant yet susceptible to BDQ and CLZ, while 10.2% (5/49) exhibited INH resistance with retained susceptibility to BDQ and CLZ.

Conclusions: Although the majority of drug-resistant Mtb isolates remained susceptible to Bedaquiline and Clofazimine, the detection of resistance in a subset of isolates underscores the need for routine phenotypic surveillance. Continuous monitoring of resistance trends is essential to safeguard the efficacy of these critical drugs and to guide individualized treatment strategies for MDR-TB in Nigeria.



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Precision of Community-Based Tuberculosis Case Finding in Four Nigerian States: Analysis of Number Needed to Test (NNT) Using CommTB Data (2024–2025)

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Background: Nigeria's tuberculosis (TB) control program increasingly leverages technology for active case finding. Key innovations include the Early Warning Outbreak Recognition System (EWORS), an AI-powered tool that maps real-time TB clusters to identify community hotspots, and the CommTB App for digital monitoring of community activities. Despite deployment across four high-burden states (Edo, Delta, Benue, and Taraba), the precision of case finding across community settings remains under-evaluated. We analyzed program data to determine the Number Needed to Test (NNT), the number of presumptive cases evaluated per confirmed TB case, as a measure of efficiency.

Methods: A retrospective cross-sectional analysis of CommTB backend data was conducted for community TB screening activities implemented in the four states during 2024-2025. Interventions were grouped into six settings: Outreach, House to House, Internally Displaced Persons (IDP) settlements, Slum communities, Nomad populations, and "Other settings", a composite category covering targeted interventions for specific groups such as men and women in markets, workplaces, and social venues. The analysis focused on reliably entered data for presumptive cases evaluated and bacteriologically/clinically confirmed TB cases. Primary outcomes included NNT and testing yield (confirmed cases divided by presumptive-TB evaluated).

Results: Overall, 38,197 presumptive TB cases were evaluated, resulting in 5,611 confirmed cases (mean NNT 7; yield 15%). Efficiency varied across settings. The highest precision was observed in Other settings (NNT 3; yield 39%) and Slum communities (NNT 4; yield 24%). Large-scale interventions contributed most confirmed cases but demonstrated lower precision. House to House activities accounted for 47% of confirmed cases (NNT 6; yield 16%), while Outreach contributed 50% (NNT 7; yield 14%). IDP settlements showed the lowest efficiency among active interventions (NNT 8; yield 12%). Nomad populations yielded no confirmed cases despite screening efforts.

Conclusion: Technology-enabled community case finding has expanded TB detection across four Nigerian states; however, precision varies by setting. High-yield settings, particularly Slum and Other targeted interventions, appear underutilized. Integrating EWORS hotspot data to stratify risk within Outreach and House to House models could further improve NNT.



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Monitoring Treatment Outcomes of Community Detected Tuberculosis Cases in Delta State, Nigeria

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Background: Tuberculosis case finding has increased access to the diagnosis and treatment of tuberculosis in high burden and hard to reach areas. However, there is limited evidence on the treatment outcomes among people with tuberculosis who were identified through community implementation. This study aims to investigate the treatment outcome of tuberculosis patients identified in the community in Delta State.

Methods: This study is a retrospective study design using aggregated program data among people with tuberculosis identified in Delta State between January and December 2024 and initiated on treatment. The treatment outcomes were assessed in 2025 using standard national definitions with the outcomes classified into cured, treatment completed, died, treatment failure, loss to follow-up, not evaluated and removed from the tuberculosis registry. Outcomes were disaggregated by sex and age-group. Descriptive and inferential statistics were done using Microsoft Excel and R to summarize findings.

Results: Over the study period, a total of 2359 people with tuberculosis were initiated in treatment. Of these, 98.4% were new TB cases, 0.4% were relapse cases, 0% (none) had unknown treatment history and the remaining 1.2% were classified as other retreatment. Those who were cured were 1274 (54.0%) with treatment completed for 841 people (35.7%) giving an overall treatment success of 89.7%. Mortality during treatment was 3.2% while 6.7% were lost to follow-up with no treatment failure. A small

proportion (0.5%) were not evaluated or removed from the TB registry (0.0%). Treatment success was higher in females (91.1%) compared to males (88.7%) and 5-14 years age group (97.3%) compared to the 0-4years age group (80.0%).

Conclusion: There was acceptable level of treatment outcomes with high treatment success among people with tuberculosis identified through community-based implementation in Delta State. These findings highlight the effectiveness of community TB interventions and the need for sustained follow-up to optimize treatment outcomes and reduce loss to follow-up and mortality.



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Financial Sustainability of the National TB Control Program in Nigeria

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Background: Low- and middle-income countries, including Nigeria, depend on donor funding to achieve national tuberculosis control goals. Despite declining external aid, the Government of Nigeria has made limited progress in increasing domestic TB financing. We explored the contextual factors influencing the financial sustainability of Nigeria's National TB Control Program (NTP).

Design/Methods: We conducted a descriptive qualitative study between July and October 2024 using document reviews (n=28) and semi-structured interviews with purposively selected national and subnational stakeholders (n=23). Data were analysed thematically using a health financing framework comprising revenue generation, pooling, and purchasing.

Results: Despite improved fiscal space at national and subnational levels, domestic public funding for TB is low. TB is not visible in the government's medium-term expenditure framework. An unapproved financial sustainability plan, a lack of multisectoral planning, low budget prioritisation, historical arbitrary allocations, and unused service-wide vote constrain TB revenue generation. Financial protection for TB is low due to slow integration into universal coverage schemes. Although social health insurance remains nascent, the Vulnerable Group Funds could support insurance premiums for TB patients through pro-health taxes. TB is not prioritised in social protection schemes. There was no government expenditure on TB drugs between 2019 and 2023. Budget release is tied to a cash plan. Still, line-item budgeting, unclear budget access conditions and procedures, low funding for TB-related public health interventions, and limited TB expenditure tracking hinder the strategic purchasing of TB goods and services. Additionally, domestic procurement prices exceed international pool procurement prices, and TB expenditures lack transparency.

Conclusions: Our study highlights that substantial increases in domestic resource mobilisation, inclusive and sufficient budgeting, efficient resource use, strategic purchasing, and TB-sensitive financial protection schemes are imperatives for scaling up the financial sustainability of the TB control program in Nigeria.



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Improving TB Case Detection among Pregnant Women through Community-Based Integrated TB/HIV Screening in Southeast Nigeria: Lessons from a Global Fund-Supported Project

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Background: In many high-burden settings, tuberculosis screening among pregnant women remains limited, leading to missed diagnoses and poor maternal and neonatal outcomes. Although pregnancy increases vulnerability to adverse TB related complications, this group is often excluded from routine active case-finding efforts. Contributing factors include low clinical assessment, weak integration of TB screening within maternal health services, and limited community-level engagement. This study examines preliminary outcomes from a community-based intervention integrating TB and HIV screening for pregnant women in Southeast Nigeria.

Intervention: Under a Global Fund-supported TB/HIV project, an integrated community-based screening initiative was implemented from January 2024 to December 2025 across Enugu, Ebonyi, Imo, and Abia States in Southeast Nigeria. The intervention aimed to strengthen TB and HIV case detection among pregnant women by leveraging community and informal maternal health platforms.

A total of 370 Community Volunteers and 576 Traditional Birth Attendants were trained. Community Volunteers conducted household visits and community outreach activities to screen for TB symptoms, provide HIV testing, and refer pregnant women to antenatal care services. Traditional Birth Attendants incorporated routine TB

symptom screening and HIV testing into their maternal care services, embedding TB/HIV activities within existing maternal health delivery points.

Results and Impact: Over the 12-month implementation period, 188,278 pregnant women were screened. Of these, 16,945 (9 percent) were identified as presumptive TB cases and referred for molecular testing. A total of 596 TB cases were diagnosed. 500 (84 percent of those diagnosed) were initiated on treatment.

A key implementation challenge was treatment hesitancy. Some pregnant women expressed concerns about the safety of anti-TB medications during pregnancy, leading to delayed treatment initiation in a subset of cases.

Conclusion: Community-based integrated TB/HIV screening can improve TB case detection among pregnant women in high burden, low-access settings. However, optimizing treatment uptake requires structured counselling approaches that directly address maternal concerns about drug safety and reinforce confidence in the benefits of timely TB treatment during pregnancy.



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Evaluation of MATS Uptake and Utilizations Following Technical Support Visits in Southern Nigeria

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Background: Nigeria remains among the highest TB-burden countries globally, with persistent gaps in screening, diagnosis, and treatment completion. The Mobile Application for TB-Screening (MATS) was introduced to improve digital TB-surveillance, real-time case notification, and referral-tracking. However, uneven adoption, suboptimal system use, and variable implementation fidelity across states limited its effectiveness. Targeted technical support (TS) visits were implemented to strengthen adoption, optimize workflows, and reinforce adherence to standard operating procedures. This evaluation assessed the impact of TS visits on MATS utilization and TB-cascade performance in six southern Nigerian states (Cross River, Enugu, Lagos, Ogun, Osun, and Oyo).

Intervention/Response: A pre–post evaluation using routine MATS data compared monthly averages before and after TS visits conducted between June and December 2025. Six-indicators were assessed: number screened, presumptive TB cases identified, clinical evaluations, bacteriologically confirmed TB diagnoses, treatment completion, and system utilization (active hubs and service delivery points). The TS intervention focused on on-site mentoring, user retraining, system troubleshooting, workflow optimization, and reinforcement of SOPs to improve implementation fidelity and provider adoption. Descriptive analyses quantified changes across states.

Impact/Results: Following TS visits, MATS adoption and TB-cascade performance improved across all states. Screening volumes increased, with Lagos (+423%) and Osun (+94%) showing the largest gains. Presumptive-TB identification increased by 0.5%–1,192%, while presumptive

evaluation increased by 197%–3,719%, indicating improved diagnostic cascade completion and system fidelity. Cross River recorded a major increase in confirmed TB-diagnoses (8 to 777 cases/month) and treatment completion (8.4% to 87.0%). Lagos diagnoses increased from 24 to 201 cases/month, with treatment completion rising from 29.3% to 87.1%. Ogun, Osun, and Oyo also demonstrated notable improvements, while Enugu showed modest gains due to limited post-intervention follow-up. System utilization expanded substantially, with increases in active hubs and spokes in Lagos (+251%), Enugu (+200%), and Cross River (+120%), indicating improved platform adoption and scalability potential.

Conclusion: Targeted technical support strengthened implementation fidelity, increased provider adoption of MATS, and improved TB-screening, diagnosis, and treatment outcomes. Focused supervision, workflow optimization, and continuous capacity strengthening are critical for maximizing digital TB-surveillance tools. Scaling structured TS models nationally could enhance early TB-detection, improve notification rates, and strengthen Nigeria's digital TB reporting system.



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Characterization of Genetic Mutations Associated with Fluoroquinolone Resistance in Mycobacterium Tuberculosis in 14 Counties in Western Kenya

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Fluoroquinolones (FQs) are vital second-line drugs in WHO-recommended MDR-TB regimen. However, emerging resistance complicates treatment, prolongs illness, increases mortality and healthcare costs. In Western Kenya, managing FQ-resistant *M. tuberculosis* is hindered by limited molecular diagnostics. This study sought to characterize *gyrA* and *gyrB* mutations associated with FQ resistance, determine its prevalence among first-line drug-resistant TB cases, and identify factors associated with resistance. We employed a retrospective cross-sectional study design.

Biobanked sputum sediments and culture isolates from samples collected from presumptive TB patients in 14 counties in Western Kenya between January 2021 and December 2023 for the MOH MDR diagnosis were used. Purposive sampling was employed to select 139 MDR/RR TB samples. Following the extraction of genomic DNA, areas of interest in the *gyrA* and *gyrB* genes which are linked to FQ resistance were amplified using polymerase chain reaction (PCR). Genotype MTBDRsl V2.0 (Hain Lifescience, Nehren, Germany) was used for genotypic drug susceptibility testing (DST) to identify specific mutations. Descriptive statistics was used to analyze socio-demographic characteristics.

Bivariate analysis was employed to understand factors associated with resistance to FQ. Patients were predominantly male (74.1%), with a mean age of 36.3 years, and 41.7% were HIV positive.

The overall prevalence of FQ resistance among the analyzed samples was 5.8%, with specific prevalence rates of 7.5% among isoniazid (INH) monoresistant cases, 4.6% among rifampicin (RIF) monoresistant cases, and 4.6% among multidrug-resistant (MDR) patients. Most FQ-resistant cases were linked to mutations in the *gyrA* gene, particularly at codon 94 (D94G), which is associated with high-level resistance to moxifloxacin. No *gyrB* mutations were detected in this study. Bivariate analysis showed that FQ resistance was significantly higher among patients with a history of treatment failure with first-line drugs ($p=0.0021$). No statistically significant associations were observed between FQ resistance and patient age, sex, or HIV status.



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Beyond Cough: Symptom Clustering and Demographic Predictors of Xpert-Confirmed Tuberculosis in Routine Screening, Nigeria

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Background: Tuberculosis (TB) case detection remains suboptimal in North Central Nigeria, partly due to non-specific symptom screening and limited risk stratification. Identifying symptom clusters and demographic characteristics associated with Xpert-confirmed TB could enhance targeted screening and improve diagnostic yield in routine care settings. This study aims to determine symptom patterns and demographic predictors distinguishing Xpert Ultra MTB-positive from MTB-negative individuals during routine TB screening.

Methods: We analyzed data from 1,705 adults who were screened using standardized symptom questionnaires and Xpert Ultra testing at healthcare facilities in North Central Nigeria. Nine TB symptoms were assessed. MTB status was defined by Xpert Ultra result. Symptom burden was calculated as the total number of reported symptoms. Demographic variables included age, sex, and body mass index (BMI). Differences were compared using means and proportions.

Results: MTB prevalence was 9.5% (162/1,705). Compared with MTB-negative participants, MTB-positive individuals were younger (mean 34.9 vs 39.1 years), predominantly male (71.0% vs 45.4%), and had lower BMI (19.3 vs 22.8). While cough was nearly universal among MTB-positive cases (100% vs 94.2%), constitutional symptoms demonstrated stronger discriminatory patterns: weakness (79.6% vs 60.0%), weight loss (67.3% vs 41.0%), and night sweats (42.0% vs 31.0%). MTB-positive participants reported a higher mean symptom count (5.3 vs 4.4)

Conclusion: In routine facility-based screening, Xpert-confirmed TB clustered among younger

males with lower BMI and a higher constitutional symptom burden. Although cough alone showed limited discriminatory value, symptom clustering improved differentiation between MTB-positive and negative individuals. These findings support refinement of screening algorithms toward risk-based prioritization while underscoring the need to strengthen detection of less symptomatic TB



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Implementation of 3HP Tuberculosis Preventive Therapy among Clients on ART at Francistown Tebelopele Centre, Botswana

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Background: Tuberculosis remains a leading cause of morbidity and mortality among people living with HIV, despite expanded access to antiretroviral therapy. Tuberculosis preventive therapy (TPT) is a core intervention for reducing TB incidence in PLHIV. However, longer isoniazid-based regimens have been associated with suboptimal uptake and poor completion, largely due to pill burden and prolonged treatment duration. To address these challenges, Francistown Tebelopele Centre introduced the shorter 3HP regimen, consisting of weekly isoniazid-rifapentine for three months, integrated into routine HIV services to strengthen TB prevention and improve outcomes among ART clients.

Method: A retrospective programmatic evaluation of TPT delivery among ART clients at Francistown Tebelopele Centre was conducted. Two periods were compared: 2021–2022, when isoniazid-based TPT was used, and 2022–2024, following the introduction of weekly isoniazid–rifapentine (3HP). All ART clients were screened for TB using standard symptom and clinical assessment, and those eligible were offered TPT. Routine ART and TPT registers were reviewed to assess eligibility, initiation, completion, and reasons for non-completion. Descriptive comparative analysis was performed.

Results: During 2021–2022, 584 clients were enrolled on ART. Of these, 368 (63.0%) were eligible for INH-based TPT, and 199 (53.8%) were enrolled. Among those initiated, 143 (71.8%) completed the regimen, 56 (28.1%) did not. Non-completion was mainly due to pill burden in 49 clients (87.5%), 7 clients (12.5%) discontinued by personal-choice.

2022 to 2024, 864 clients were receiving ART, 708 (81.9%) were enrolled on 3HP, 156 (18.1%) were not eligible at screening. Among those initiated, 687 clients (97.0%) completed the regimen. Eighteen clients (2.5%) discontinued due to side effects, which were identified early and managed according to clinical guidelines, and three clients (0.4%) stopped by personal choice. Up to the time of reporting, no cases of active TB were recorded among ART clients.

Conclusions: Transitioning from INH-based TPT to the 3HP-regimen significantly improved TPT uptake and completion. Integrating 3HP into routine ART services is feasible, acceptable, and strengthens TB–HIV integration, supporting progress toward national and global TB and HIV targets.



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Impact of Public - Private Partnerships on TB Case Notification: Effectiveness of Chest X-ray Screening versus ICF Symptom Screening at Kiswa HC III

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Tuberculosis (TB), caused by *Mycobacterium tuberculosis*, remains a major public health challenge in Uganda, one of the 30 high TB burden countries globally. Approximately 94,000 TB cases are diagnosed annually, corresponding to a prevalence of 213 per 100,000 population, with an estimated 245 new infections and 30 TB-related deaths each day. In Kampala Region, public health facilities serve a large proportion of the population but often lack essential diagnostic equipment such as chest x-ray machines, which are predominantly available in private facilities. Evidence indicates that chest x-ray screening has a higher diagnostic yield compared to symptom-based intensified case finding (ICF). In the context of constrained and fluctuating funding, innovative and cost-effective public - private partnership models may enhance TB case detection and notification.

This study aimed to determine TB prevalence at Kiswa HC III and compare the effectiveness of chest x-ray screening versus ICF symptom screening. A retrospective quantitative study was conducted at Kiswa HC III between 2023 and 2025. Through a public - private partnership arrangement, two private facilities provided chest x-ray services for presumptive TB cases, with subsidized rates negotiated for referred patients. Outcomes from chest x-ray screening were compared with ICF guide based community and facility screening.

Among 129 presumptive TB cases aged 0 - 14 years screened using chest x-ray, 72% (92) had pathological radiological findings, and 32% (42) were clinically diagnosed with TB. In contrast, ICF symptom screening in the same age group identified only 3 TB cases out of 251 presumptive

cases. Chest x-ray screening demonstrated a substantially higher diagnostic yield compared to symptom-based screening alone.

Public - private collaboration facilitating access to chest X-ray screening significantly improves TB case detection among children. Scaling up public - private partnership - supported diagnostic models could strengthen TB notification and accelerate progress toward ending TB in Uganda by 2030



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Predictors of TB Treatment Outcomes among Drug-Sensitive Patients in Zanzibar: Evidence from Electronic TB and Leprosy Register Data

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Tuberculosis (TB) remains the deadliest infectious disease globally, with sub-Saharan Africa experiencing a disproportionate burden due to high HIV co-infection, weak health systems and social determinants of health. The United Republic of Tanzania (which includes Zanzibar) is one of the 30 high TB burden countries and continues to face challenges in achieving equitable treatment outcomes. Zanzibar has made notable progress in TB control, aligned with the WHO End TB Strategy, however disparities in treatment outcomes across patient subgroups and regions persist. This study aimed to estimate the rates of treatment outcomes and identify predictors of unfavorable outcomes among drug-sensitive TB patients in Zanzibar.

We conducted a cross-sectional study using Tanzania electronic TB and Leprosy registry data. Socio-demographic, clinical and treatment outcome data were extracted for all drug-sensitive TB patients registered between 2019 and 2023. Treatment outcomes were classified according to WHO standard definitions as favorable (cured or treatment completed) and unfavorable (death, treatment failure, or lost to follow-up). Logistic regression was used to identify predictors of unfavorable outcomes, including demographic, clinical and geographic variables. Variables with $p < 0.2$ in bivariate analysis were included in multivariable model, restricted to complete patients.

A total of 5,301 patients were analysed, 61.5% were male and the median age was 38 years (IQR: 25-52). Most of the patients were newly treated (94.1%) and had pulmonary TB (85%). HIV co-infection was documented in 9.6% of patients. Majority of the patients, 95.7% had favorable outcomes while 4.3% had unfavorable outcomes. In multivariable analysis, HIV-positive status (adjusted odds ratio [aOR]: 2.55; 95% CI: 1.78–3.64), history of previous TB treatment, including relapse (aOR: 2.03; 95% CI: 1.17–3.53), treatment after loss to follow-up (aOR: 2.43; 95% CI: 1.21–4.88) and treatment after failure (aOR: 3.74; 95% CI: 1.06–13.11) were significantly associated with unfavorable outcomes. Geographic variation was also observed, with patients from Kusini Unguja and Kusini Pemba regions having increased odds of unfavorable outcomes.

TB treatment success was high, however, HIV co-infection, previous treatment history, and geographic disparities predicted unfavorable outcomes. Interventions addressing high-risk groups and regional health system audits are essential to improve outcomes.



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TB-LON 3 Project Experience in Southwest Nigeria: Enhancing Multidrug-Resistant Tuberculosis Interventions in Nigeria

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Background and Challenges to Implementation: Nigeria ranks sixth globally for TB, HIV-associated TB (TB/HIV), and multidrug-resistant TB (MDR-TB), and has the fourth-highest HIV burden. HIV, second only to malnutrition as a TB risk factor, complicates TB control by increasing the risk of reactivation and poor outcomes, especially in MDR-TB cases.

The rising MDR-TB prevalence demands stronger health systems, improved TB/HIV diagnostics, integrated care, consistent drug supply, and better-trained healthcare workers. Effective monitoring and evaluation are also critical as poor enrolment to treatment been the major challenge. This paper highlights the results of targeted interventions aimed at strengthening MDR-TB control in Nigeria through strategic healthcare improvements and integrated service delivery approaches.

Intervention or Response: The Institute of Human Virology, Nigeria (IHVN) TB-LON 3 project supported the reactivation and decentralization of drug-resistant tuberculosis (DR-TB) outpatient department (OPD) clinics across the project states, ensuring integration of other services including TB/HIV care. All the states commenced expansion of their DR-TB clinics, baseline initiation and follow-up investigations, including antiretroviral therapy (ART) provision for TB/HIV coinfecting patients. Currently, Lagos has 6 DR-TB OPD clinics, Ogun 8, Osun 7, and Oyo 5 DR-TB OPD clinics.

Results/Impact: Across all TB interventions in the TB-LON 3 project, 385 DR-TB cases were identified; 320 (83%) of these were enrolled in FY23 (October 2022–September 2023). In FY22, 79% (289 of 367 cases) began treatment after diagnosis, while in

FY21 68% (180 of 264 cases), indicating an increasing improvement over the previous years. Osun State has the highest improvement from 46% FY21 to 86% in FY23 of cases enrolled on treatment (18 of 39 FY21, 27 of 45 FY22 and 48 of 56 FY23).

Conclusions: Reactivation and decentralization of DR-TB OPD clinics, combined with integrated TB/HIV care, have drastically reduced the turnaround time for enrolment, improved access to care, and strengthened the continuum of treatment for TB and TB/HIV patients.



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Timeliness of TB Treatment Enrollment after Diagnosis across Four Nigerian States

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Background: Delayed initiation of tuberculosis (TB) treatment remains a major challenge to TB control efforts. Understanding the timeliness of treatment enrollment after diagnosis is critical for improving patient outcomes and reducing transmission. This study assessed the time to treatment enrollment among TB patients across four Nigerian states supported by RedAid Nigeria.

Methods: This was a retrospective analysis of routine TB line-list data from Edo, Delta, Taraba, and Benue states in 2025. Variables extracted included age, sex, HIV status, date of TB diagnosis, date of enrollment on treatment register, diagnosing facility, and enrolling hub facility. Time to treatment enrollment was calculated as the number of days between diagnosis and enrollment. Descriptive statistics and comparative analyses across states were conducted using Microsoft Excel.

Results: A total of 9453 TB patients were included. 3814(40%) were female with an overall median age of 40 years (IQR, 51-30). The median time from diagnosis to treatment enrollment was 2 days (IQR: [2-1]). Delays beyond 7 days were observed in 3% of patients (259). Timeliness (Average number of days between diagnosis and enrollment) varied across states, with the highest observed in Benue State (1.91). Patients diagnosed at spoke facilities had higher average enrollment days (2.91 days) compared to those diagnosed at hub facilities (1.64days).

Conclusion: The median time to TB treatment enrollment across the four Nigerian states was 2 days, demonstrating relatively prompt linkage to care. However, 3% of patients experienced delays beyond 7 days, indicating room for improvement. Geographic variation exists, with Benue State showing longer enrollment times. Patients showing longer enrollment times. Patients diagnosed at spoke facilities faced nearly double

the delay compared to hub facilities, highlighting the need for strengthened referral systems and decentralized treatment initiation. Targeted interventions focusing on spoke facilities and high-delay states are essential to ensure same-day or next-day treatment enrollment for all TB patients, thereby reducing transmission risk and improving treatment outcomes.



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TB Detection Outcomes among Presumptive TB Clients Screened through Routine Case Finding in Malawi

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Background: Tuberculosis (TB) remains a major cause of illness and death in sub-Saharan Africa. Timely bacteriological testing among people with presumptive TB is central to case detection and treatment initiation. We assessed the coverage of bacteriological testing and examined factors associated with active tuberculosis among clients with presumptive TB in Southern Malawi.

Methods: We conducted a retrospective analysis of routine TB case identification data from 13 EGPAF-supported facilities across Blantyre, Chiradzulu, Thyolo, and Mwanza districts. We included all clients documented as presumptive TB cases between January and December 2024. Data were abstracted from facility presumptive cases TB registers. Presumptive TB was defined as the presence of at least one of the following symptoms: cough of any duration, fever, night sweats, or weight loss. We summarized bacteriological testing coverage and TB prevalence using descriptive statistics and applied regression models to examine factors associated with bacteriological testing and TB diagnosis.

Results: Overall, 8,390 participants with presumptive TB were included (51.6% male) with median age of 35 years (IQR: 21-48), and 5,552 (66.2%) were from primary health facilities. Approximately 7,774 (92.7%) of the clients performed bacteriological (sputum microscopy or Xpert MTB/RIF) test. Bacteriological testing coverage was lower among hospitalized clients and ART clinics than those in Outpatient Department [Adjusted risk ratio (ARR) 0.69 (95%CI: 0.66–0.73) and ARR 0.88 (95%CI: 0.86–0.92), respectively], and in hospitals than in health centres [ARR 0.88 (95%CI: 0.86–0.90)]. Prevalence of active TB among presumptive TB clients was

8.9%. In a multivariate analysis, females were 65% less likely to be diagnosed with TB than males (95%CI: 0.30–0.43). The odds of active TB were higher among clients presenting to hospitals than in health centres (adjusted odds ratio [AOR] 4.16, 95%CI 3.34–5.16), in rural than in urban facilities (AOR 8.72, 95%CI: 5.85–12.99), and among people living with HIV than HIV-negative clients (AOR 1.74, 95% CI: 1.45–2.08).

Conclusion: Bacteriological testing coverage was high overall, but important gaps remain among hospitalized clients, ART clinic attendees, and hospital settings, indicating missed opportunities for timely TB diagnosis. Strengthened strategies to improve TB testing and targeted quality improvement initiatives are needed to address these gaps.



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Non-Tuberculous Mycobacteria in Suspected TB Patients: A Four-Year Retrospective Study in Namibia

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Globally the numbers of nontuberculous mycobacteria (NTM) isolated from humans are increasing; however, their clinical relevance in Namibia remains uncertain. This study retrospectively investigated the epidemiology of NTM species in Namibian clinical samples.

Data from presumptive TB patient samples, which were cultured using the BACTEC™ Mycobacteria Growth Indicator Tube system and identified as NTM species using the GenoType Mycobacterium assay (CM/AS; Hain Life science, Germany), were obtained from the Namibia Institute of Pathology. A total of 163 patient samples had NTMs identified, 77% of which were sputum samples. Patients aged 0-5 years (n=41, 25%) as well as males (n=100, 62%) had a higher incidence of NTMs characterized in their samples, compared to other groups. Mycobacterium avium complex (MAC), particularly Mycobacterium intracellulare, accounted for 59% (n=95) of the NTMs, followed by Mycobacterium scrofulaceum (n=16, 10%) and Mycobacterium abscessus (n=9, 6%). No associations were found between age or sex in relation to NTM species (p values of 0.969 and 0.832 respectively).

Although the diagnostic criteria for NTM infection according to the American Thoracic Society were not met (lack of necessary clinical data), the results concur with global trends citing MAC species as the most frequently isolated NTM from pulmonary samples. This emphasises the need for comprehensive testing and investigation into the role of NTMs in clinical disease in Namibia and highlights the species distribution in our setting.



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Performance Analysis of the Public-Private Mix (PPM) Strategy for TB Control: Assessing the Patient Pathway from Clinic Attendance to Treatment Notification in Nigeria

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Background: Nigeria employs a Public-Private Mix (PPM) strategy to integrate private providers into its National Tuberculosis (TB) Program, aiming to enhance case detection and notification. A detailed assessment of the patient pathway—from clinic attendance to treatment notification—is critical to measure program effectiveness and identify gaps in the TB care cascade. This analysis aimed to quantify attrition across the PPM cascade, evaluate the engagement and performance of private providers, and identify key bottlenecks in diagnosis and notification in Nigeria during 2024.

Materials and Methods: The study utilized national and state-level quarterly TB program data from PPM and community-based interventions. Key performance indicators included presumptive rates, diagnostic yield, notification rates, and treatment referral rates. Data were analyzed descriptively and across time-series to evaluate trends, state-level variations, and partner performance.

Results: National presumptive rates declined from 35.7% (Q1) to 30.9% (Q4), while diagnostic yield remained consistently low (7.8–8.1%). A critical drop in notification rates was observed, falling from 98.6% in Q1 to 83.8% in Q4, with states such as Kano (49.2%) and Akwa Ibom (42.0%) exhibiting severe notification gaps. Partner performance varied significantly, with Catholic Caritas Foundation of Nigeria and Association for

reproductive and family health achieving $\geq 94\%$ notification rates, whereas Damien Foundation (DFB) Nigeria, and Leprosy and Tuberculosis Relief Initiative averaged below 85%. High community-based detection was noted in northern states like Zamfara (97.8% of diagnoses) but was coupled with catastrophic treatment referral failure (10% in Q4). Southern states, including Lagos, faced low diagnostic yield despite high screening volumes.

Conclusion/Recommendation: The PPM strategy successfully engages private providers for TB screening, but significant attrition occurs at the diagnosis-to-notification stage, undermining program impact. Systemic and reporting bottlenecks, particularly in the second half of the year, require urgent intervention. Recommendations include strengthening real-time data reconciliation, enhancing notification systems in high-gap states, and implementing partner-specific support to improve linkage to treatment and reporting completeness.



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Equity in Community TB Screening: Reaching Underserved Populations through CBO Interventions in Taraba State, Nigeria

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Background: Ensuring equitable access to tuberculosis (TB) services for underserved and high-risk populations remains a core Global Fund priority. Under the Global Fund GC7 grant, REDAID Nigeria supported community-based organizations (CBOs) to implement targeted TB screening interventions across diverse community settings in Taraba State. This study examined the reach, yield, and equity of community TB screening activities.

Methods: A descriptive analysis of 2025 routine CBO quarterly community reports was done. Key indicators for analysis included number of persons screened for TB, number of presumptive TB cases identified, number evaluated for TB, and number of TB cases diagnosed. Diagnosed TB cases were disaggregated by community intervention type: House-to-House (H2H), Internally Displaced Persons (IDP) camps, slums, nomadic settlements, and outreach locations. Data were analyzed using descriptive statistics.

Results: A total of 106,676 individuals were screened for TB across community settings. Among those screened, 37,561 (35.2%) were identified as presumptive TB cases, all of whom were evaluated for TB. Overall, 4,127 TB cases were diagnosed, representing a diagnostic yield of 3.9% among those screened. Of the diagnosed TB cases, 2,450 (59.4%) were identified through outreach activities, 1,638 (39.7%) through H2H interventions, 27 (0.7%) among nomadic populations, 7 (0.2%) in IDP camps, and 5 (0.1%) in slum settlements. Outreach and H2H strategies accounted for over 99% of all TB cases detected,

demonstrating their critical role in reaching underserved populations.

Conclusion: CBO-led community TB screening significantly contributed to equitable TB case detection in Taraba State, with outreach and H2H interventions yielding the highest number of diagnoses. Strengthening targeted community strategies is essential for addressing inequities in TB detection and advancing inclusive TB programming under the Global Fund GC7 grant.



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Predictors of Delayed TB Treatment Enrollment: Analysis of Routine Data from Four Nigerian States

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Background: Delays in TB treatment enrollment increase disease transmission and poor outcomes. Identifying factors associated with delayed enrollment is essential for targeted program improvements in high-burden settings like Nigeria. This study assessed predictors of delayed TB treatment enrollment using routine programmatic data from four Nigerian states.

Methods: We conducted a retrospective analysis of TB line-list data from Edo, Delta, Taraba, and Benue states for 2025. Delayed enrollment was defined as treatment initiation occurring more than 5 days after diagnosis. Independent variables included age, sex, HIV status, state, and facility type (hub facilities serving as central diagnostic and treatment centers versus spoke facilities at peripheral sites). Using SPSS, Multivariable logistic regression analysis was performed to identify independent predictors of enrollment delay.

Results: Among 9,453 TB patients (40% female, median age 40 years [IQR, 30-51]), only 184 (2%) experienced delayed enrollment. The median time from diagnosis to treatment initiation was 2 days (IQR, 1-2). In multivariable analysis, factors significantly associated with delayed enrollment included diagnosis at spoke facilities (adjusted odds ratio [AOR]: 3.3, 95% CI: 2.10-5.24) and HIV-negative status (AOR: 2.10, 95% CI: 1.20-3.70). Age, sex, and state of residence were not significant predictors of enrollment delay.

Conclusion: Delayed TB treatment enrollment was uncommon (2%), suggesting effective overall program performance in these four Nigerian states. However, patients diagnosed at spoke facilities faced three-fold higher odds of delay,

indicating a need for strengthened diagnostic and referral capacity at peripheral health facilities. The finding that HIV-negative patients experienced twice the odds of delayed enrollment compared to HIV-positive patients was unexpected and may reflect programmatic prioritization of HIV-positive patients for expedited treatment initiation, possibly due to integrated TB-HIV services. These results suggest that targeted quality improvement interventions at spoke facilities, along with strategies to ensure equitable treatment access regardless of HIV status, could further optimize TB treatment initiation and reduce the small but important delays that persist in routine practice.



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Progress and Gaps in Tuberculosis Preventive Treatment Completion among People Living with HIV: National Programme Trends in Mozambique, 2025

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Background: Mozambique has approximately 2.4 million people living with HIV, with an adult prevalence of 12.4% and a disproportionate burden among women (15%) compared to men (9.5%) (INSIDA 2021). The country also ranks among those with the highest global burden of tuberculosis (TB), TB/HIV co-infection, and multidrug-resistant TB, with a TB prevalence of 334 per 100,000 population. Strengthening TB prevention among people living with HIV remains a national priority.

Since 2016, the Ministry of Health has implemented a national HIV Quality Improvement (QI) Guideline, currently operational in 887 health facilities. Tuberculosis Preventive Treatment (TPT) indicators were integrated into routine QI cycles and monitored monthly through Intensive Monitoring (IM) using the national electronic system (SESP).

Methods: We conducted a descriptive analysis of routine national programmatic data from 2025 to assess trends in TPT initiation and completion, disaggregated by age group and province.

Results: TPT initiation remained consistently high throughout 2025, ranging from 95% to 97% monthly and exceeding national targets across all quarters. This sustained performance reflects effective TB/HIV integration, systematic screening, and structured performance monitoring within the QI framework.

In contrast, TPT completion showed initial underperformance, fluctuating between 57% and 64% during the first semester, with a low of 57% in June. From July onwards, completion improved steadily, reaching 77% in August and 81% in

December. Despite this second-semester recovery, a persistent gap of 15–20 percentage points remained between initiation and completion. Age-disaggregated analysis revealed disparities. Individuals aged ≥ 15 years achieved completion rates of 77–82% by year-end, while children aged 01–14 years remained lower (69–72%), indicating vulnerability to treatment interruption. Provincial variation was evident, with Gaza and Maputo provinces achieving $\geq 90\%$ completion, while several central and northern provinces lagged behind.

Conclusion: Mozambique demonstrates strong national performance in TPT initiation supported by institutionalized QI and Intensive Monitoring. However, retention and treatment completion—particularly among children—remain critical gaps. Strengthening paediatric-focused retention strategies and sustaining data-driven quality improvement are essential to close the initiation–completion gap, enhance TPT effectiveness, and accelerate reductions in TB-related morbidity among people living with HIV.



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Enhancing TB Surveillance through Digital Innovation: Evaluating the CommTB App's Early Impact in Abia State, Nigeria

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Background: Robust surveillance systems are essential for early detection and timely response to infectious diseases like tuberculosis (TB). In 2024, Nigeria launched the Community TB (CommTB) mobile application under the Global Fund GC7 N-THRIP grant to strengthen digital surveillance, streamline referrals, and activate early warning systems. This abstract explores the implementation experience and effectiveness of CommTB in Abia State.

Objective: To assess the impact of the CommTB app on TB case detection and surveillance effectiveness, with specific focus on its Early Warning and Response System (EWORS) features.

Methods: Full deployment began in June 2024 across all 17 LGAs in Abia State, involving 9 Community-Based Organizations (CBOs), 17 Community Volunteers (CVs), and 196 Community TB/HIV Workers (CTHWs). The app was used to digitally capture TB screening, presumptive case identification, referral, and diagnosis data. EWORS features were used to flag high-burden areas and support real-time data visualization and decision-making.

Results: Between June and September 2024, 65,090 individuals were screened. Of these, 19,980 (31%) were identified as presumptive TB cases and referred for evaluation. 1,903 individuals were diagnosed with TB, yielding a 9.5% detection rate among presumptives. The EWORS dashboard facilitated rapid identification of geographic hotspots and improved responsiveness of supervisory teams.

Challenges: Implementation was hindered by poor internet connectivity in rural areas, limited digital literacy among CVs, and sync delays due to the app's partially functional offline mode. Although the app allows data entry offline, delayed syncing when network is restored remains a challenge. Targeted capacity-building and peer support mechanisms are helping to mitigate these issues.

Conclusion: The CommTB app, with its EWORS integration, has strengthened TB surveillance, improved visibility into community-level trends, and enhanced responsiveness. Despite operational hurdles, its early success in Abia State highlights the promise of mobile-based surveillance tools in resource-limited settings. Optimizing offline capabilities and real-time data synchronization will be critical for scale-up and sustainability.



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Enhancing Tuberculosis Preventive Therapy through 3HP Regimen: Evidence from Routine Program Implementation in Akwa Ibom State, Nigeria

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Background: Tuberculosis preventive therapy (TPT) is critical for reducing the risk of latent TB progressing to active disease, particularly among high-risk populations. At the second United Nations high-level meeting on TB in 2023, a new global target for TPT coverage was set at 90% coverage among people at high risk of developing TB disease by 2027. In Nigeria, TPT coverage among eligible high-risk populations remains far below the 90% global target. The lengthy nature of conventional TPT regimens with a duration of 6-9 months, coupled with challenges in their availability and patient adherence, hinders progress toward these targets. The 3HP regimen, combining once-weekly Rifapentine and Isoniazid for 12 weeks, offers a shorter, more convenient alternative. This study evaluates the impact of 3HP on TPT uptake and completion in Akwa Ibom State, Nigeria.

Method: In December 2024, with support from the State TB Program, KNCV Nigeria initiated a targeted scale-up of 3HP Regimen across the State, aiming to improve uptake and completion of TPT among eligible contacts. This intervention was structured around three strategic pillars:

1. Adoption of a shorter course 3HP regimen, weekly Rifapentine + Isoniazid for three months.
2. Strengthening service delivery systems, including commodity logistics.
3. Expanding access through community-based TPT provision beyond conventional clinics.

Key strategies focused on ensuring timely drug availability through direct 3HP distribution to contact tracers (CTs), capacity building of CTs on 3HP administration and management, and strengthening data reporting systems. Contact Investigation data was extracted from DHIS2 and analysed to evaluate the impact of the targeted intervention.

Result: Between Jan-Dec 2025, of 19,742 eligible contacts for TPT initiation, 18,007 (91%) were enrolled in TPT (3HP = 7699, 3HR = 5204, 6H = 3230, 1HP = 1874) and 12426 (70%) completed treatment (3HP = 99%, 3HR = 42%, 6H = 34%, 1HP = 80%). The 3HP regimen was well-tolerated, with minimal adverse events reported when compared to 1HP, 3HR and 6H.

Conclusion: The 3HP regimen effectively improved TPT uptake and completion, showing that convenient regimens can accelerate progress toward national and global TB prevention targets, including achieving 90% TPT coverage among high-risk populations.



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Comparative Performance of Public–Private Mix and Community-Based TB Detection Strategies in Nigeria: Implications for Case Detection and Treatment Cascade Optimization

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Background: Tuberculosis (TB) control programs utilize both facility-based Public-Private Mix (PPM) and community-based case detection strategies. Understanding their relative efficiency, diagnostic yield, and contribution to national notification is crucial for optimizing resource allocation and strengthening overall program performance. This analysis aimed to: Systematically compare the performance of PPM and community-based strategies using key process indicators and evaluate their respective contributions to the national TB notification cascade.

Materials and Methods: A secondary analysis of national and state-level programmatic data from 2024 was conducted. Key Performance Indicators (KPIs) including presumptive rate, diagnostic yield, notification rate, and treatment referral rate were calculated separately for PPM and community data streams. Time-series analysis tracked quarterly trends, and performance was compared across states

Results: The analysis revealed distinct profiles for each strategy. The national diagnostic yield for PPM was stable (~7.8-8.1% quarterly). In contrast, community-based yields showed extreme variability, from very low (e.g., Lagos, 2.3%) to very high (e.g., Zamfara, ~56%), indicating inconsistent screening specificity or diagnostic access. Community contributions exceeded 50% of total diagnoses in several northern states (Zamfara

97.8%, Katsina 86.2%, Borno 88.2%), demonstrating its critical role in high-burden areas. However, the community pathway exhibited severe downstream bottlenecks, with the national treatment referral rate dropping to 78% in Q4 and collapsing to 10% in Zamfara. Both strategies were affected by a systemic notification breakdown in late 2024, though the gap between diagnosed and notified cases was more pronounced within the PPM stream in specific states like Kano (49% notification rate).

Conclusion/Recommendation: Community-based strategies are indispensable for case finding in high-burden regions but suffer from catastrophic treatment linkage failures and variable yield. PPM provides more consistent diagnostic yield but faces significant notification bottlenecks. Recommendations are: Investing in digital tools and standardized protocols to improve data flow and referral tracking from community to facility. Continue supporting community outreach in high-burden northern states but pair it with reinforced treatment linkage systems. Enhance PPM quality in southern states to address notification gaps.



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An Assessment of the Effectiveness of Community-Based Mobile Chest Xray TB Screening in a State in Southwest Nigeria

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Background and Challenges to Implementation:

Nigeria is ranked sixth in TB burden in Africa with a 40% gap in TB case notification. There has been a progressive decline in the gap between estimated and notified cases from 2017 till 2024 due to the deployment of several innovative strategies such as the Computer Aided Detection enabled mobile x-ray for mass screening.

Intervention or Response: This was a collaboration between the USAID TBLON 3 and the Global Fund Grant Cycle 7 project. Active case-finding targeted at hotspots for TB key and vulnerable populations (TB KVP) were conducted using a computer-aided detection enabled digital x-ray, fitted in a van for ease of movement and operation. The x-ray van has on-site 2 radiographers and other support staff for logistics support while a radiologist remotely reviews the digital radiographs as necessary. Prior engagement and mobilization of the target populations was done to ensure good turnout and acceptance. All clients were screened using a parallel screening algorithm that included the WHO four-symptom screening (W4SS) and CAD4TB score with threshold set at 40. All identified persons presumed to have TB were evaluated with GeneXpert, and bacteriologically negative results had their digital x-ray films and symptoms sent for radiologist review for clinical diagnosis.

Results/Impact: A total of 16 LGAs and average of 77 communities in each quarter were covered between July 2024 to December 2025. 18,628 persons were screened during this period while 1,029 persons were presumed to have TB were

evaluated. A total of 269 TB cases were diagnosed out of which about two thirds were clinically diagnosed. The number-needed-to screen and number-needed-to test were 69 and 4 respectively.

Conclusions: This intervention was found to be very efficient as evidenced by the low NNS and NNT compared to W4SS only from other studies. The proportion of sub-clinical TB detection also increased.



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Implementation Challenges of Isoniazid Preventive Therapy among Contacts of Pulmonary Tuberculosis in Raipur District of Chhattisgarh Province: Central India

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Background: For prevention, care, and control of tuberculosis, isoniazid preventive therapy (IPT) is recommended for the treatment of latent infection among contacts. Adherence to this regime is vital for obtaining good results.

Objectives: To ascertain the determinants of the implementation status of IPT among contacts of pulmonary tuberculosis patients in the study area

Material and Methods: This cross-sectional observational study was conducted using predesigned pretested semi-structured questionnaire among TB cases/caregivers in randomly selected 4 out of 8 TUs of Raipur district during June 2022 to May 2024 to know the determinants of the implementation status of IPT.

Results: Among 142 enlisted cases, 1422 family contacts were identified. Of them, 280 contacts were interviewed. Coverage of IPT was 57%. Drug supply was uninterrupted in 78.6% cases. Some respondents (77; 29.7%) reported lack of information or awareness about the necessity of IPT. They were not informed about it by the health care providers. For prevention of spread of TB infection, majorly (203;72.5%) of participants advocated avoidance of contact with patients, adherence to IPT and use of mask. There were significantly less chances of receiving age appropriate IPT in study participants who were aged less than 5 yrs, illiterates, residing in families with more than 5 members and unemployed; Similarly, illiterate, male <5 yrs, from upper middle class were significantly less likely to get complete duration of IPT ($p < 0.05$).

Conclusion: IPT coverage in the study was unsatisfactory due to ignorance of the cases/ family members about its need, inadequate screening facilities, poor health seeking behaviour, illiteracy, interrupted supply of IPT and socio-cultural practices in the study.



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Demand Creation of Tuberculosis Preventive Therapy Uptake in Plateau State, Nigeria: An Effective Strategy for Its Uptake among Close Contacts of Index Cases

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Background: Tuberculosis preventive treatment (TPT) is a key intervention for reducing TB incidence and mortality, particularly among people living with HIV and household contacts of TB patients. Nigeria remains one of the highest TB burden countries globally, with Plateau State identified as a high-burden setting. Despite national policy prioritizing contact tracing and TPT, uptake among eligible close contacts in Plateau State remained suboptimal, limiting the impact of TB prevention strategies.

Intervention/Response: Baseline program data showed that TPT uptake among eligible contacts was 20.3% between January and March 2024. To address this gap, intensified demand creation activities were implemented with support from USAID and the Global Fund through implementing partners, including Breakthrough ACTION. Strategies included multi-channel communication campaigns (e.g., “Check Am” campaign and USSD *3340# platform), radio jingles, social media and web-based messaging, community and religious leader advocacy, and training of community health workers to deliver targeted TPT sensitization messages.

Results/Impact: Following implementation of the demand creation strategy, TPT uptake increased steadily across 2024. Uptake rose from 20.3% (January–March) to 36.5% (April–June), 37.3%

(July–September), and reached 66.5% by December 2024, demonstrating substantial improvement in acceptance and initiation of TPT among eligible contacts.

Conclusion: Demand creation interventions significantly improved TPT uptake among close contacts of TB index cases in Plateau State. Multi-channel communication, community engagement, and frontline worker capacity building were critical to increasing awareness, addressing misconceptions, and promoting preventive care-seeking. These findings highlight the importance of integrated social and behavior change strategies to accelerate TPT scale-up in high-burden settings.



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Effectiveness of CBO-Led Interventions for Improved DR-TB Linkage and Follow-up Outcomes in RedAid Nigeria Supported States, 2024 -2025

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Background: Tuberculosis (TB) remains a significant global public health challenge, particularly in low- and middle-income countries. Drug-resistant tuberculosis (DR-TB) is estimated to cause 13% of all antimicrobial resistance-attributable deaths worldwide and is driven by both ongoing resistance acquisition and person-to-person transmission. This poses a significant public health challenge, with high loss to follow-up (LTFU) rates and limited treatment options. Community engagement is crucial in the global fight against TB. Community-based Organizations (CBOs) make it easier for all TB patients to access medications and treatment support and for TB treatment to be less disruptive to their lives. RedAid Nigeria (RAN) supports community public-private mix TB programs in four states of Nigeria (Benue, Edo, Delta and Taraba) with funding from Global Fund through Institute of Human Virology Nigeria (IHVN), ensuring case identification and management. This study assesses the effectiveness of CBO-led interventions in optimizing linkage to care and follow-up outcomes among DR-TB patients in these States, 2024-2025.

Methodology: CBOs in four RAN-supported states championed the linkage and adherence sustenance for DR-TB patients. A retrospective review of DR-TB data from the DHIS-2 platform was analyzed using Microsoft Excel. Count and proportions were used to determine notified DR-

TB cases, started on treatment, died, Loss To Follow-up and denial to treatment.

Results: In Benue State, 100% (27/27) of DR-TB patients were linked to treatment in 2024, and 90% (19/21) in 2025. Delta State reported 88% (23/26) linkage in 2024 and 82% (18/22) in 2025. Edo State achieved 84% (16/19) linkage in 2024 and 94% (16/17) in 2025. Taraba State reported 100% (4/4) linkage in 2024 and 56% (5/9) in 2025. Overall, linkage to care was 92% in 2024 (5% mortality, 3% LTFU) and 84% in 2025 (12% mortality, 3% LTFU, 1% denial).

Conclusion: Patient-centred approaches involving socio-economic support by CBOs are crucial for improving linkage to care, treatment adherence, and follow-up outcomes. The CBO-led intervention achieved a high linkage rate (84-92%), reducing pre-treatment LTFU and improving treatment outcomes. This approach has proven effective in addressing DR-TB in resource-limited settings like Nigeria.



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Leveraging Community TB Detection Networks to Strengthen Maternal HIV Testing and Early Linkage to Care in Delta State, Nigeria

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Background: Maternal HIV testing and timely linkage to care remain critical for prevention of mother-to-child transmission of HIV (PMTCT). However, in many resource-limited settings, pregnant women do not consistently access routine facility-based HIV testing services, resulting in missed opportunities. Community tuberculosis (TB) case finding platforms often reach out to large numbers of pregnant women and represents an entry point for integration. This study assessed the use of community TB platforms to improve maternal HIV testing and linkage to care in Delta State, Nigeria.

Methods: An implementation strategy was introduced in Delta State, Nigeria in which existing community tuberculosis platforms were trained and supported to provide integrated HIV testing to pregnant women encountered during TB screening activities. A retrospective analysis was conducted using aggregated secondary program data generated from the Community Public-Private Mix (CPPM) TB program in Delta State over an 18-month period (January 2024 to June 2025). Descriptive analyses were performed using R and Microsoft Excel on data related to the pregnant women reached, number tested for HIV, HIV positivity yield and linkage to care.

Results: Following implementation of integrated screening, increasing numbers of pregnant women were reached through community TB outreach activities. Over the 18-month period, a total of 175990 pregnant women were reached with a

progressive six-monthly increase from 43789 to 64552 to 67649 respectively. All (100%) pregnant women reached in the community were tested for HIV. Of those diagnosed in the community, all were escorted to the facility for confirmation, and 635 positive pregnant women were confirmed during this period with a positivity yield of 0.4%. All (100%) were successfully linked to antiretroviral medications.

Conclusions: Leveraging established community TB platform to ensure integrated maternal HIV testing strengthened early HIV case detection and timely linkage to care among pregnant women. Scaling up and intensifying this integration may reduce missed testing opportunities and support progress towards PMTCT goals in similar settings.



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Leveraging AI in Optimized Detection of TB Infections Using Predictive Modelling with Multivariate Patient Data

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Tuberculosis (TB) is the leading cause of mortality by a single infectious disease. We are exploring the use of deep learning and machine learning models, including decision trees, SVM, and deep learning frameworks for forecasting TB prediction and infection. These models integrate factors including chest x-rays, age, socioeconomic status, comorbidities, and radiological findings to improve diagnostic processes, especially in settings with restricted resources where traditional diagnostic techniques are less available. Furthermore, the inclusion of explainable artificial intelligence in the model is expected to improve prediction clarity and interpretability elements that are likely to increase clinician trust in the model's applicability.

Albeit an AI guided diagnostics is already in use globally, we envisage a potential limitation of its application in West Africa which is home to *M. africanum*, responsible for about 50% of TB in some countries and whose disease presentation potentially differs from TB caused by *M. tuberculosis* whose dataset was used to train the model. We are optimizing the algorithms to be more inclusive and applicable to data generated in West Africa which require extensive studies for validation, and consideration for their inclusion into the National Tuberculosis Control Programs.

The current model is trained and tested with 4,800 chest x-ray images with an Accuracy of 99%, Precision of 100% for TB class, F1 Score ~0.9787, AUC Score: ~0.9989. The model uses

the ResNet50 architecture without the top fully connected layers, allowing for custom classification layers to be added. The architecture consists of Global Average Pooling layer, Dense layer with 512 neurons and ReLU activation, Dropout layer for regularization and Output layer with a sigmoid activation function for binary classification. This study is looking forward in future directions to train and improve the model with epidemiological features to improve the prediction rate for the world AI in diagnostic for TB



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Determinants of TB Chemotherapy in the Littoral Region of Cameroon: A Meta-Analysis of Cure Rate between 2014 and 2016

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Background: Tuberculosis (TB) represents a public health concern, especially in resources-constrained countries like Cameroon. TB drug resistance is a major obstacle to control and prevention of tuberculosis.

Subject and Method: Data from 2014-2016 on the outcome of anti TB treatment in the Littoral Region were reviewed manually and using for meta-analysis. The rates of treatment success (TS) and treatment failure (TF) was the primary outcomes used for this study. The heterogeneity statistics (I²) was computed to orientate the choice of the best statistical model (binary fixed effect or random) to compute pooled value of TS and TF. I² = 63.55% in 2014; I² = 78.76% in 2015; I² = 53.51% in 2016. Chi-square test was used to compare the anti-TB therapy cure rates between HIV-positive and HIV-negative individuals with regard to the year of follow-up.

Results: Using an intention-to-treat analysis, the pooled proportions of HIV-uninfected TB patients successfully cured from TB were low and slightly decreased between 2014 and 2016 ranging from 79% (95%CI: 73%-85%) to 78% (95%CI: 72%-84%). These cure rates were strongly and negatively correlated with the rates of patients lost to follow-up regardless of the year. In HIV-infected patients, the pooled values ITT analysis-based treatment success were 73%, 71% and 68% respectively. The rates of coverage with both cotrimoxazole (CTX) and antiretroviral (ARV) therapy, both gradually increased over year ranging from 70.98% in 2014 to 94.17% in 2016. Coverage rate for ARV therapy was 60.06% in 2014 against 90% in 2016. A positive and statistically significant correlation was found between the success of the anti-TB therapy in HIV-infected patients and coverage rates with CTX and ARV.

Conclusion: An improvement in the reduction of percentage of lost to follow-up and coverage with CTX and ARV therapy could greatly increase chances to efficiently control TB in Cameroon.

Keywords: Tuberculosis, anti TB therapy outcomes, loss to follow-up, deaths, cotrimoxazole, antiretroviral therapy, Cameroon



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Advancing the Who End TB Strategy through Community-Level TB Screening: Experience from COWLHA, Malawi

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Background: Malawi remains among the high TB and TB/HIV burden countries, with delayed diagnosis contributing to ongoing transmission and mortality. In line with the WHO End TB Strategy, which emphasizes early diagnosis, community engagement, and patient-centred care, Coalition of Women Living with HIV/AIDS (COWLHA) implemented community-based TB screening to complement facility-based services.

Objective: To demonstrate the contribution of community-level TB screening by COWLHA to improved TB case detection and linkage to treatment in underserved communities in Malawi.

Methods: Between 2022 and 2024, COWLHA trained community health volunteers conducted door-to-door TB symptom screening, health education, referral, and follow-up in selected districts of Chiradzulu, Mwanza, Phalombe, Mangochi and Mzimba. Program monitoring data were analysed to assess screening coverage, presumptive TB identification, diagnostic testing uptake, confirmed TB cases, and treatment initiation. Qualitative feedback from community members, volunteers, and health workers informed implementation insights.

Results: Approximately 15,000 community members were screened for TB symptoms. Of these, 12% were identified as presumptive TB cases, with 75% successfully referred for diagnostic testing. A total of 280 TB cases were confirmed, representing a significant increase in case detection compared to routine facility-based reports. Timely treatment initiation improved to 85%, supporting the End TB Strategy goal of early diagnosis and prompt treatment. Community engagement reduced stigma, improved TB awareness, and strengthened trust between communities and health services.

Conclusion: Community-based TB screening by COWLHA effectively operationalized key pillars of the WHO End TB Strategy by bringing services closer to communities, improving early case detection, and strengthening linkage to care. The approach is scalable and offers a practical model for accelerating progress toward national and global TB elimination targets.

Take-Home Message: Community-level TB screening, when aligned with the WHO End TB Strategy, is a practical and scalable approach to improving early case detection, strengthening linkage to care, and accelerating progress toward TB elimination in high-burden settings like Malawi.



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Surveillance for TB Resistance in Grande Comore Using an Extended tNGS Platform Directly on Sputum

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Background: In the context of a trial on post-exposure prophylaxis of leprosy using bedaquiline and rifampicin, nationwide surveillance was initiated in the Comoros using samples from persons diagnosed with tuberculosis, including areas where no prophylaxis was implemented. Alternative clinical sample types were evaluated to assess whether TB patients unable to produce sputum could still be microbiologically confirmed.

Methods: Sputum, nasal-, tongue- and tongue scrape swabs were preserved in ethanol at room temperature and shipped to ITM for DNA extraction. We determined the presence of *M. tuberculosis* DNA using IS6110 qPCR. For the sputum extracts an extended panel of targets for bedaquiline (Deeplex XL, Genoscreen, FR), was used. The tNGS results were compared with the WHO mutation catalogue V2, and mutations $\geq 3\%$ in tier 1 genes (*rpoB* for rifampicin, and *Rv0678*, *atpE*, *pepQ*, *Rv1979c* for bedaquiline) were analyzed.

Results: A total of 86 patients were included; five lacked samples and were excluded. Among 81 patients with at least one specimen, 63 sputum samples were analysed, of which 81.0% were IS6110-positive (14.3% PCR inhibition; mean Cq 24.02 ± 4.68). Alternative samples showed lower detection rates (46.4% tongue scrapings, 56.8% tongue swabs 26.7% nasal) without PCR inhibition. 37 sputum samples were processed with Deeplex MycLep XL. For 23 samples, *M. tuberculosis* complex lineages were identified: L1 (8/23; 34.8%), L2 (2/23; 8.7%), L3 (9/23; 39.1%), and L4 (4/23; 17.4%). One sample revealed heteroresistance to rifampicin and resistance was

detected in 3/37 (8.1%) to isoniazid, 2/37 (5.4%) to pyrazinamide, 3/37 (8.1%) to streptomycin, and 2/37 (5.4%) to ethionamide. No high-confidence tier 1 mutations were identified in bedaquiline-associated gene targets, although mutations of unknown significance were observed in *ahpC-556*, *atpE-340*, *pepQ-1205*, and *mmpS5-651*.

Conclusion: *M. tuberculosis* in the Comoros is caused by lineages L1-4 and INH resistance is limited to L4. Deeplex XL provides many targets yet interpretation of 'unknown' mutations in tier 1 genes is complicated without phenotypic correlation.



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Church-Led Integrated Disease Screening Initiative: Leveraging Faith to Enhance TB Case Finding in Akwa Ibom State, Nigeria

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Background: Nigeria accounts for a significant burden of TB in Africa, with 25% of estimated cases still undetected. TB and NTDs, especially leprosy, often overlap geographically and share similar challenges related to transmission and diagnosis. Akwa Ibom State in Nigeria is among the top TB-notifying states and is endemic to NTDs, including leprosy. Religious leaders play a vital role in shaping community health behaviors. Leveraging RedAid Nigeria (RAN)'s partnership project with local churches on active case finding of skin-NTDs in Etinan Local Government Area (LGA) of Akwa Ibom State, community members were mobilized, sensitized, screened and diagnosed for TB in the church-led integrated disease screening program. This study assesses the impact of the church-led integrated disease screening initiative on TB case finding in the LGA.

Methodology: This retrospective study analyzed TB case finding data from church-led NTD and TB outreach programs in Etinan LGA. Community members were screened for TB, skin-NTDs, and other health conditions. Data on TB screening, suspect evaluation, case detection, and notification were analyzed.

Results: TB case finding increased from 70 to 100 in Q3 and from 96 to 149 in Q4 of 2025. The initiative contributed 3% (Q3) and 30% (Q4) of notified TB cases, with a 43% increase in case detection rates in Q3 and a 55% increase in Q4. Faith leaders' involvement enhanced community engagement, turn-out, screening uptake, and case detection.

Conclusion: This faith-based intervention effectively improved TB case found in Akwa Ibom State, demonstrating the potential of leveraging faith leaders to enhance community engagement and health outcomes. By integrating TB and NTD screening, this approach optimized resource use in weak health systems, offering a promising strategy for addressing TB and NTDs in co-endemic regions.



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Progress and Gaps in Tuberculosis Preventive Treatment Completion among People Living with HIV: National Programme Trends in Mozambique, 2025

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Background: In Mozambique, almost 2.4 million people are living with HIV (Spectrum 6.29). According to the recent population-based survey, the estimated prevalence of PLHIV is 12.4%, being higher in women 15% compared to men 9.5% (INSIDA2021). Mozambique's Ministry of Health began implementing the Quality Improvement (QI) Guideline in 2016 and it is currently being implemented in 887 HF. Health Facilities that implement MQHIV cycles and have an Electronic System (SESP) carry out monthly collection and discussion of QI data, known as Intensive Monitoring (IM). Intensive Monitoring is one of the strategies aimed at contributing to monitoring the implementation of QIHIV action plans, which has been implemented institutionally since 2021.

Description: In 2024, indicators related to GeneXpert test requesting and result delivery, as well as timely treatment initiation for all individuals with positive results, were incorporated into the annual Quality Improvement cycles. This aimed to strengthen tuberculosis screening and diagnosis among people living with HIV, thereby reducing morbidity and mortality. Following the inclusion of tuberculosis-related indicators in the HIV Quality Improvement Action Plans, notable improvements were observed along the TB diagnostic and treatment cascade among people living with HIV. The proportion of PLHIV presumptive for TB who had a molecular test (Xpert/Truenat) requested at the first clinical visit increased from 36% to 51.9%. Timely receipt of molecular test results within seven days of request improved from 80% to 86.7%. Additionally, same-day initiation of TB treatment among PLHIV diagnosed with TB increased from 38% to 48.9%.

These improvements highlight the contribution of quality improvement interventions to strengthening HIV–TB integration and reducing delays in diagnosis and treatment.

Lessons Learned: Monitoring GeneXpert processes reduces delays and strengthens HIV–TB service integration. Quality Improvement cycles enable rapid identification and correction of service delivery gaps.

Conclusions/Next Steps: The inclusion of tuberculosis indicators in HIV Quality Improvement Action Plans led to measurable improvements in TB testing, result turnaround time, and timely treatment initiation among people living with HIV. Quality Improvement approaches proved effective in strengthening HIV–TB integration, reducing delays across the care cascade, and contributing to improved health outcomes.



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The Antimycobacterial Potentials of Selected Medicinal Plants *Dacryodes Edulis* and *Trichocypha Acuminata* on Multi-Drug Resistant Isolates of *Mycobacterium Tuberculosis*

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Background: Tuberculosis (TB) is a public health concern. *Mycobacterium tuberculosis* drug resistance is a major obstacle in the fight against tuberculosis worldwide.

Objectives: To evaluate the factors affecting tuberculosis Treatment Success Rate (TSR) in the Littoral Region from 2014 to 2018, determine the proportion of Rifampicin resistance using GeneXpert/RIF Ultra, to assess others first lines drugs resistance and second lines by microdilution broth assay and to assess the antimycobacterial properties of *Dacryodes edulis* and *Trichocypha acuminata* on Multi-Drug Resistant (MDR) strains Mtb.

Method: In retrospective study, records were reviewed electronically and analyzed using chart review method. samples clinically suspected were screened for TB using GeneXpert MDR/RIF. The susceptibility profile to first and second lines drugs using two-fold dilution in microplate assay was done. The chi-square test was used to detect their association. In the experimental study, *Dacryodes edulis* and *Trichoscypha acuminata* plants were collected, on (MDR) strains using the microdilution broth assay with alamar blue revelator. The percentage of sensivity and resistance of plants were calculated.

Results: The proportion of HIV-uninfected TB patients successfully cured of tuberculosis in different trimesters was stagnant with differents break down points between 2014 and 2016. The HIV-infected patients Treatment Success Rates decreased, and increased regarding of years. The prevalence of Rifampicin resistance was 8.5%,

using GeneXpert and 9.59% in culture. A significant antituberculosis actions was noted with all the extracts of *Dacryodes edulis* on MDR strains were (88.23%) for Ethanolic fractions of *Dacryodes edulis* and 34.78% for Methanolic extract.

Conclusion: This study revealed factors that can affect the TSR, like deaths, loss to follow up and transferred patients. Phenotypic resistance of MTB was also provided. The efficacy of medicinal plants on MDR strains was confirmed and equally the discrepancy of Rifampicin resistant strains.



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Rifampicin Résistance among Mycobacterium Tuberculosis Infected Individuals Using Genexpert MTB/RIF Ultra a Hospital Based Study of Douala Cameroon

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Background: High cure rates for susceptible TB can be achieved with treatment regimens consisting of a 2 month 'intensive' phase, where Isoniazid (INH), Rifampicin (RIF), pyrazinamide, and ethambutol are administered, followed by a 4 month 'continuation' phase with only INH and RIF. Tuberculosis (TB) is a public health concern. Mycobacterium tuberculosis drug resistance is a major obstacle in the fight against tuberculosis worldwide.

Objective: To determine the prevalence and risk factors associated with rifampicin (RIF)-resistant tuberculosis using GeneXpert technology.

Methods: A cross-sectional study was conducted from April 2018 to November 2019 among tuberculosis (TB)-infected Cameroonian patients in the Littoral Region using records from patients presenting with clinically suspected or documented TB. The patients were screened for TB using GeneXpert MDR/RIF ultra. Data were documented with an ad hoc survey form and analysed with SPSS version 22.

Results: 153 patients were included in the study. 64.1% were males; mean age was 37.9%. Most patients were new cases (76.4%). Relapses accounted for 8.5% and recurrences for 2.6%. Pulmonary TB was diagnosed among 98.7% patients using mostly sputum samples (85%). The prevalence of RIF resistance was 6.7% (95% CI: 3.4%–12.7%). This prevalence was significantly higher in samples of mucus and mucopurulent aspect (P-value = 0.04). RIF-resistant M. tuberculosis strains were significantly more frequent among relapses than new cases (23.1% vs. 2.3% P-value < 0.0001). A statistically

significant association was found between GeneXpert-based quantification results and type and aspect of samples.

Conclusion: This study confirms the circulation of RIF-resistant M. tuberculosis strains in the Littoral region. There is a need for extensive studies in other parts of the country. keywords Tuberculosis, rifampicin resistance, prevalence, associated factors, Cameroon.



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Rv1985c, A Novel Nucleoid Associated Protein of Mycobacterium Tuberculosis

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A pivotal facet of tuberculosis (TB) pathogenesis lies in the adaptive prowess of the causative agent, *M. tuberculosis*, enabling it to persist within the varied intracellular milieus of the host organism. During instances of environmental stress, the regulation of gene expression becomes paramount for the survival of the bacterium. Delving into the intricacies of how *M. tuberculosis* orchestrates its survival within the host ecosystem is imperative for the development of prophylactic and therapeutic vaccines, alongside innovative treatments and disease markers. Conventionally, nucleoid-associated proteins (NAPs) play a pivotal role in facilitating bacterial resilience amidst an array of environmental or host-induced stresses.

A comparative analysis between *Mycobacterium tuberculosis* and *Escherichia coli* underscores a disparity in the abundance of nucleoid-associated proteins (NAPs) within *Mtb*, notwithstanding the similarity in genome sizes between the two species. Merely eight NAPs have been characterized in *Mtb* thus far. In our pursuit of as yet uncharacterized NAPs, we present evidence that Rv1985c functions as a sequence-independent DNA architectural protein, exerting control over DNA topology through mechanisms involving bending and looping. However, the function of Rv1985c in physiology and pathogenesis of *M. tuberculosis* has not been studied yet.

In this study, we demonstrated the role of Rv1985c in stress adaptation and disease pathogenesis of *M. tuberculosis*. Interestingly, deletion of *rv1985c* impairs the *in vitro* bacterial growth and also the intracellular survival of knockout strain in guinea pig infection model. We reported the increased sensitivity of *Mtb* upon exposure to oxidative stress, acidic environment and nutritional starvation in *rv1985c* knockout strain. Notably, RNA sequencing analysis revealed that Rv1985c regulates the expression of genes

involved in metal ion transport, lipid metabolism and virulence.

Our collective findings unveil Rv1985c as a novel nucleoid-associated protein, the pivotal role of which in nucleoid reorganization serves as a fundamental mechanism for transcriptional regulation, thereby harmonizing genetic responses during the adaptation of *M. tuberculosis* to dynamic environmental shifts.



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Does AI Enabled Portable Digital X-Ray Have Answer for Children in Nigeria; Innovative Use of AI Enabled Digital Chest X-Ray to Improve Childhood TB Diagnosis in South West, Nigeria

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Background: The World Health Organization (WHO), in 2021, issued recommendations for the use of A.I, confirming that the technology could be used instead of human readers for the interpretation of chest radiographs for tuberculosis (TB). The current WHO guidelines on A.I to interpret CXR does not include children aged below 15 years. Children with TB are missed in far greater proportions than adults, with current estimates indicating that around half of incident TB cases are being missed, which directly contributes to high mortality among children [3, 4]. This study, therefore, highlights the efficacy of Childhood TB diagnosis through the deployment of A. I enabled portable digital CXR across the Southwest States in Nigeria.

Material and Methods: The Implementation of PDX for Active TB Case Finding in Nigeria (IMPACT Project) is a three-year Global Fund-supported grant implemented under the leadership of the National Tuberculosis, Leprosy and Buruli Ulcer Control Program (NTBLCP) to strengthen Nigeria's capacity for early and accurate Tuberculosis (TB) detection through the optimization and operationalization of 411 PDX at the community level. This provided an avenue to screen Orphans and vulnerable children (OVC), aged fourteen (14) years and below, from Q2 2024 – Q3 2025.

Training of PDX

Radiographers and Data Entry Clerks was conducted, followed by PDX machine deployment. Awareness creation and community engagement using Community-Based Organisations (CBOs) were done. EPCON tool was used to map TB

hotspots targeting OVC, Data were captured using Kobo Collect. Radiographs were uploaded on XMAP database for Radiologist's report.

Results: A total of 6,749 children were provided free TB screening with PDX systems, 528 presumptive (CAD4TB \geq 32) presumptives were identified and evaluated, 42 confirmed TB cases were recorded, with 25 (60%) bacteriologically confirmed and 17 (40%) clinically diagnosed, while 40(95%) were started on treatment.

Conclusions: A.I. enable CXR has aided in childhood TB diagnosis. Therefore, expanding the deployment of AI-enabled PDX that could support childhood TB diagnosis in communities could potentially be a huge step forward in improving access to lifesaving TB prevention and treatment among OVC in Nigeria, where TB diagnosis in children is concentrated in selected hospitals, with available Pediatricians.



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Burden of Tuberculosis and Screening Practices among Paediatric Patients on Immunosuppressive Therapy at a Tertiary Centre in Zambia

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Background: Children undergoing immunosuppressive therapy are at heightened risk for tuberculosis (TB), particularly in high-burden regions. The World Health Organization (WHO) recommends screening for latent TB infection prior to initiating such therapies. However, local efforts for tuberculosis screening in this risk group are suboptimal.

Objectives: We aimed to assess the prevalence of TB among children receiving immunosuppressive therapy, and to evaluate adherence to recommended TB screening protocols prior to treatment initiation.

Material and Methods: A retrospective review using hospital records, TB registers, and immunosuppressive therapy logs spanning 2014 to March 2025 at University Teaching Hospitals-Children's Hospital in Lusaka, Zambia. Included were patients aged 0–18 years who received high-dose immunosuppressive therapy for at least two months. Data on TB diagnosis, screening methods, and timing relative to therapy were analysed.

Results: Among 105 paediatric records reviewed [median age interquartile range (IQR) of patients: 11 (5-17 years)], underlying diagnoses included Juvenile Idiopathic Arthritis (29), nephrotic syndrome (25), aplastic anaemia (23), and others (28). Prednisolone was the most common immunosuppressant (72; 68.6%), with 19 (18.1%) on methotrexate combination therapy and 14 (13.3%) on other regimens (tacrolimus, mycophenolate mofetil, cyclosporin, or methotrexate monotherapy). TB screening was documented in 76 (72.4%) using clinical

assessment and chest X-ray; 29.5% had Xpert MTB/RIF testing. 11 (10.5%) children had presumptive TB; 4 (3.8%) were diagnosed—two before and two after starting immunosuppression. Post-initiation cases included a 4-year-old male (pulmonary TB, Urine lipoarabinomannan (LAM) positive, no prior screening) and an 8-year-old female (extrapulmonary TB on mycophenolate and prednisolone). None of patients in this cohort were screened with TST or IGRA or received tuberculosis preventive therapy (TPT).

Conclusion: This study reveals suboptimal screening practices among paediatric patients on immunosuppressive therapy and under-implementation of TPT in this cohort. These findings highlight the urgent need to strengthen adherence to TB screening and preventive measures in line with existing guidelines.



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Uptake of Tuberculosis Preventive Therapy among Children Living with HIV (CLHIV) Compared to Children Who Are Household Contacts of TB (CAHHCTB) Cases in Two Health Facilities in Abuja

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Background: Tuberculosis Preventive Therapy (TPT) is a proven intervention for reducing the risk of progression to active TB among children and adolescents, particularly those living with HIV (CLHIV) or exposed to TB in households (CAHHCTB). Although the World Health Organization (WHO) recommends universal TPT for children living with HIV and contacts of TB cases, implementation gaps remain common across many settings. Understanding facility-level disparities in TPT access between DOTS and antiretroviral clinics is essential towards integrating pediatric and adolescent TB prevention services.

Methods: A cross-sectional study was conducted from November to December 2025 at the ART and DOTS clinics of two district hospitals in Abuja. Sociodemographic, TPT offer, TPT initiation, adherence, perceived barriers were collected using REDCAP database. Descriptive statistics and comparative analyses (chi-square and t-tests) were conducted using STATA version 18.

Results: A total of 73 participants (29 CAHHCTB & 44 CLHIV) were included in the analysis. The CAHHCTB were younger than CLHIV (10.3year vs 12.5years; $p=0.04$). The caregivers of CAHHCTB were mainly males (62.1%) compared to mainly females (88.6%) among CLHIV. A higher proportion of CAHHCTB were tested for TB in the last 2 years (75.9% vs 9.3%; $p<0.01$). Consequently, 89.7% of CAHHCTB compared to 63.6% of CLHIV were offered TB preventive treatment. Despite this, there was 100% uptake of TPT among CAHHCTB and CLHIV. In terms of regimen, 46.2% of

CAHHCTB were on 3HP compared to 3.6% of CLHIV. As a result, adherence was 100% among CAHHCTB compared to 75% among CLHIV. Reported side effects was 0% among CAHHCTB compared to 25% among CLHIV. Key barriers to TPT uptake reported were drug stock out among CAHHCTB (62.1%) and lack of information from health providers among CLHIV (53.6%).

Conclusion: There is good uptake of TPT despite low access among CLHIV. Interventions to address drug stockouts, improve provider engagement, and standardize TPT delivery practices across facilities are essential to achieving optimal pediatric and adolescent TB prevention outcomes.



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Integrating Community and Civil Society Perspectives into Target Access Profiles Using Modified Delphi Approach

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Background: Target Access Profiles (TAPs) are an emerging strategic tool that establish benchmarks for equitable access to new and emerging tuberculosis medicines and diagnostics. Analogous to Target Product Profiles, which define the desired technical characteristics of health commodities, TAPs articulate goals across the broader access pathway.

To fulfill their intended role, engagement of civil society and community (CCS) input is essential. This study seeks to strengthen the development of TAPs by incorporating structured input from diverse stakeholders, particularly CCS, to reinforce measurable access commitments across the product lifecycle.

Materials and Methods: The drafting of the TAP methodology began following the October 2024 meeting, where partners from affected communities, national programs, industry, procurement bodies, and global health institutions identified the need for a more structured, lifecycle-oriented approach to access planning for emerging tuberculosis medical tools. The concept was refined through a series of virtual and in-person consultations. Further, TAP literacy-building sessions were to build a shared understanding of TAP concepts prior to formal consultation.

A structured survey using a modified Delphi methodology will then be administered to solicit input from CCS stakeholders. Participants will include representatives of TB-affected CCS and national stakeholders from low- and middle-income countries and high TB burden settings. Respondents will assess proposed TAP domains and priority access conditions, ranking their agreement on a 5-point Likert scale and providing qualitative feedback on gaps and barriers.

Results: Based on iterative engagement, five core categories were identified. Based on inputs, each bucket was further split into categories, including

- Innovations and availability: Populations, indications, drug-susceptibility testing, formulations, research knowledge and data
- Quality: Regulatory approvals
- Affordability
- Supply and delivery: intellectual property, licensing strategy, supply security, and supply model.
- Demand and adoption: Early access programs, manufacturing volumes, introduction, national transition, and financing

Under each category, there is an access target at introduction, at scale and with an expanded indication.

Further nuance will be incorporated following structured CCS input to ensure the framework reflects practical realities and priority access concerns across diverse settings.

Conclusions: Embedding structured community engagement into TAPs would strengthen legitimacy, accountability, and practical relevance across the product lifecycle.



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Profiles of Caregivers in Pediatric Tb-Exposed Households Compared with Those of Children and Adolescents Living with HIV: A Comparative Analysis in Abuja, Nigeria

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Background: Effective Tuberculosis (TB) contact management in children and adolescents depends on their caregivers. This study aimed to profile and compare caregivers of Children and Adolescent Households with TB (CAHHCTB) and Caregivers of Children and Adolescent living with HIV (CLHIV), to inform integrated TB/HIV service delivery.

Methods: A cross-sectional study was conducted from November to December 2025 at ART and DOTS clinics in two district hospitals in Abuja. Data on socio-demographics, TB preventive therapy (TPT) offer, initiation, adherence, and perceived barriers were collected using RedCap. Descriptive statistics and chi-square tests were performed in STATA version 18.

Results: Among 73 caregivers (29 for CAHHCTB; 44 for CLHIV), significant differences were observed. Caregivers for CAHHCTB were predominantly male (62.1%), whereas caregivers for CLHIV were overwhelmingly female (88.6%, $p < 0.001$). HIV positivity was nearly universal among CLHIV caregivers ($\approx 90\%$) but rare among CAHHCTB caregivers ($< 4\%$, $p < 0.001$). TB testing history was reported by 82.8% of CAHHCTB caregivers, compared to 0% among CLHIV caregivers ($p < 0.001$). Most caregivers in both groups were self-employed (51.7% vs. 63.6%, $p = 0.04$) and over 40 years old.

Conclusions: Caregiver profiles differ markedly between TB-affected and HIV-affected pediatric households, particularly in gender, HIV status, and TB testing history. These findings highlight the need for tailored, gender-sensitive, and integrated

TB/HIV interventions that address the distinct needs and contexts of each caregiver group.



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Trends and Challenges in TB Diagnostic Approaches in Zanzibar, Evidence from 2019 - 2024 Routine Data

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Background: Tuberculosis (TB) remains a major public health challenge in Zanzibar despite the scale-up of World Health Organization (WHO) recommended molecular diagnostic tools. Although GeneXpert MTB/RIF has improved access to rapid TB diagnosis, bacteriological confirmation remains suboptimal. This study assessed trends of TB diagnostic approaches in Zanzibar between 2019 and 2024.

Methods: A retrospective cohort analytical study was conducted using secondary data from the Electronic TB and Leprosy Register of the Zanzibar Integrated HIV, Hepatitis, TB and Leprosy Program. All notified TB cases from January 2019 to December 2024 were included. Variables included patient demographics, clinical characteristics, and diagnostic methods-GeneXpert MTB/RIF, smear microscopy, culture, and radiological or clinical diagnosis. Descriptive statistics were used to assess diagnostic trends. Associations between bacteriological confirmation and patient characteristics were examined using chi-square tests and multivariable regression analysis. statistical significance was set at $p < 0.05$.

Results: During 2019-2024, a total 6,618 TB cases were notified in Zanzibar, of which 30.4 % cases were from Pemba and 69.6% cases from Unguja. The use of GeneXpert MTB/RIF as the primary diagnostic tool increased substantially from 47.7% in 2019 to 86.9% in 2024. While the proportion of Bacteriological confirmed TB declined from 62.3% in 2019 to 36.1% in 2024. Overall bacteriological confirmation was achieved in 34.1% of cases, higher in Unguja (41.3%) than Pemba (17.6%).

Smear microscopy declined sharply from 27.6% in 2019 to 0.7% in 2024. Use of chest radiography (CXR) increased from 54.6% in 2019 to 60.6% in 2024. The use of the pediatric TB score chart declined from 43.5% in 2019 to 15.9% in 2024. Previous retreated TB patients had an increased likelihood of bacteriological confirmation (AIRR = 1.28, 95% CI 1.14–1.44) while patients with extrapulmonary TB and HIV-positive status were less likely to bacteriological confirmation (AIRR = 1.94, 95% CI 1.75–2.14).

Conclusion: TB diagnostic practices in Zanzibar have shifted substantially toward molecular testing over the past six years. However, the limited improvement in bacteriological confirmation highlights persistent diagnostic gaps. Targeted interventions to strengthen TB diagnosis are needed to optimize the impact of molecular diagnostics.



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Burden and Distribution of TB–HIV Coinfection among Notified TB Patients in Four Nigerian States

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Background: Co-infection of Mycobacterium tuberculosis and HIV poses a major public health challenge in sub-Saharan Africa, where delayed diagnosis leads to increased morbidity and mortality. Despite Nigeria's high TB and HIV burden, subnational data on TB-HIV coinfection patterns remain limited. Understanding the demographic and geographic distribution of coinfection is critical for resource allocation and service delivery planning. This study examined the prevalence, demographic characteristics, and geographic distribution of TB-HIV coinfection across four Nigerian states using routine program data to identify gaps in case detection and inform targeted interventions.

Methods: We analyzed routine TB line-list data from RedAid-supported facilities in Edo, Delta, Taraba, and Benue states from January to December 2025. All bacteriologically confirmed and clinically diagnosed TB patients with documented HIV test results were included. Variables extracted included patient demographics (age, sex), HIV status, geographic location (state, diagnosing facility), and enrolling hub facility. Using Excel, we conducted descriptive and comparative statistical analyses. Chi-square tests were used to compare proportions between coinfecting and non-coinfecting patients.

Results: A total of 9,453 TB patients were included: 3,814 (40%) female, median age 40 years (IQR, 30-51), and 809 (9%) HIV-positive. TB-HIV coinfection prevalence varied substantially by state, with the highest prevalence in Benue (644 patients, 7%) and lowest in Taraba (24 patients,

0.3%), representing a 23-fold geographic difference. Among coinfecting patients, females were overrepresented (407, 50.3% vs. 40% overall), and the majority were aged 36-50 years, reflecting the peak reproductive and economically productive age group. Notably, coinfecting patients were disproportionately diagnosed at hub facilities (601, 74%) compared to non-coinfecting patients (3,730, 44%).

Conclusion: TB-HIV coinfection affected 9% of TB patients, with substantial geographic variation across states and concentration among females and those aged 36-50 years. The marked disparity in coinfection diagnosis between hub and spoke facilities indicates critical gaps in integrated service delivery at peripheral sites. These findings highlight the need for enhanced integrated TB-HIV services at spoke facilities, strengthened routine HIV testing across all TB treatment points, and targeted interventions in high-burden states like Benue to ensure comprehensive and equitable care for all TB patients regardless of facility type or geographic location.



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Completion and Outcomes of Tuberculosis Preventive Therapy (TPT) among Household Contacts in Delta State, Nigeria

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Background: Tuberculosis (TB) is a highly infectious disease which can be transmitted from an infected person to others especially household contacts. This necessitated the introduction of tuberculosis preventive therapy (TPT) to reduce the transmission and progression from latent TB to active disease. This study aimed to assess the completion of TPT and the treatment outcomes among household contacts in Delta State, Nigeria.

Methods: A retrospective analysis of aggregated program data was conducted among household contacts of TB patients placed on TPT between January and December 2024. Treatment outcomes assessed in 2025 included treatment completed, died, developed active TB, loss to follow-up, TPT discontinued due to toxicity and not evaluated. Outcomes were disaggregated by age-group and regimen given. Data analysis was done using Microsoft Excel to reveal descriptive statistics and summarize findings.

Results: During the study period, a total of 1655 household contacts were initiated on TPT. Majority (92.7%) received 6H (6-month Isoniazid) while the remaining 7.3% received 3HR (3-month Isoniazid plus Rifampicin). Overall treatment completion was 99.0% with the remaining 1.0% being loss to follow-up. No contact was among the remaining recognized treatment outcomes. Treatment completion was higher among children aged 0-5 years (100.0%) compared to 5 years and above (99.0%). Completion rates were highest among contacts receiving 6H (99.1%) compared to 3HR (98.3%).

Conclusion: Treatment completion among household contacts receiving TPT in Delta State

was high overall especially among those who are less than 5 years. This highlights the need for continued monitoring and targeted support for younger children as this will further improve completion and treatment outcomes.



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The Role of Private Sector Engagement in TB Case Finding and Treatment in South Western Nigeria

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Background: Private healthcare providers play a critical role in tuberculosis (TB) detection and treatment, especially in high-burden countries where a significant proportion of individuals with TB symptoms seek care in private facilities. However, weak linkages between private providers and national TB programs (NTPs) often result in underreporting and missed opportunities for early diagnosis and treatment. This study examines the impact of private sector engagement strategies on TB case finding and treatment outcomes.

Methods: A review of TB case notification and treatment data was conducted across selected private hospitals, pharmacies, and patent medicine vendors (PMVs) participating in a public-private mix (PPM) model for TB care. Key interventions included:

1. Training private providers on TB screening, sputum collection, and referral pathways.
2. Incentivizing case notification through performance-based financing and diagnostic subsidies.
3. Deploying digital TB case reporting tools for real-time linkage to NTPs.
4. Strengthening referral networks between private facilities and DOTS centres for seamless treatment initiation.

Key performance indicators assessed were TB case notification rates, treatment initiation, and adherence outcomes before and after private sector engagement.

Results: Private sector engagement led to a 24% increase in TB case notifications, with pharmacies

and PMVs accounting for 63% of new referrals. The use of digital reporting tools improved case documentation and linkage to treatment centres, reducing diagnostic delays. Challenges included provider hesitancy due to low awareness of TB guidelines and the need for sustained financial and technical support to maintain engagement.

Conclusion: Harnessing the private sector in TB case finding and treatment enhances case detection, improves reporting, and strengthens patient referral systems. Expanding PPM models through incentives, digital health solutions, and regulatory support can optimize TB control efforts in high-burden settings. Future research should explore cost-effectiveness and long-term sustainability of private sector integration in TB programs.



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Leveraging Traditional Birth Attendants to Deliver Integrated TB, HIV, Syphilis, and Hepatitis B Screening in Rural Katsina State, Nigeria

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Background: In Nigeria, over one-third of pregnant women (PW) miss antenatal care (ANC) due to socio-cultural barriers, health worker strikes, insecurity, and commodity stockouts, limiting facility-based prevention of mother-to-child transmission (PMTCT) services. Community-based actors, including mentor mothers (MMs), traditional birth attendants (TBAs), community health volunteers (CHVs), and community TB/HIV workers bridge this gap by generating demand and delivering HIV testing services (HTS) in non-facility settings. This analysis evaluates their contribution to PMTCT under the Institute of Human Virology Nigeria's (IHVN) Community Public-Private Mix project from January 2024 to October 2025.

Description: From January 2024–October 2025, community actors through outreaches, house-to-house visits, and traditional birth homes to identify PW not attending ANC at communities. The community teams screened eligible PW using HIV/syphilis dual test kits, escorted HIV-reactive cases to comprehensive ART sites for confirmatory testing and treatment initiation, and provided follow-up support through delivery, early infant diagnosis, and 18-month HIV-exposed infant outcomes.

Lesson Learnt: Between January 2024–October 2025 Community teams identified 1,266,690 PW eligible for testing across Nigeria's 36+1 states and 774 LGAs through community outreaches, house-to-house visits, and at traditional birth homes. Using HIV/syphilis dual test kits, 1,205,278 PW (95% coverage) were screened in non-facility settings, identifying 2,828 HIV-reactive cases

(0.23% positivity yield). Mentor mothers provided peer education and escort services, achieving 100% referral success in comprehensive ART sites for confirmatory testing and treatment initiation.

Conclusion/Next Steps: Community-based actors effectively bridged facility-based PMTCT gaps despite socio-cultural barriers, insecurity, and health system disruptions, achieving high testing coverage and complete linkage to care across Nigeria. Formal integration into national PMTCT guidelines, sustained commodity supplies, incentives, and strengthened referral systems will ensure scalability and resilience of this community-led model.



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From Research to Policy: Integrating Post-TB Lung Disease (PTLD) into National Care in Eswatini

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While TB cure remains the primary programmatic goal, over half of TB survivors develop Post-TB Lung Disease (PTLD), resulting in reduced quality of life and increased mortality. In Eswatini, a high TB/HIV-burden setting, the burden of PTLD was previously unquantified, and no formal care framework existed. We aimed to characterize post-TB lung impairment and translate findings into national policy and programmatic guidance.

Methods: Stakeholder sensitization with National TB Program (NTCP) and Non-Communicable Disease (NCD) Program began in May 2023, followed by broader engagement in October 2023. Health workers from six facilities were trained on spirometry between November 2023 and February 2024. During development of the National TB Strategic Plan (2024–2028), PTLD was incorporated to support a programmatic approach.

A prospective cohort study (December 2023–2025) enrolled 201 bacteriologically confirmed TB patients across six facilities. Pulmonary function tests (PFTs) and chest X-rays were conducted at baseline, 6 months (end of treatment), and 12 months. Regular updates were provided to NTCP and NCD stakeholders. A multi-sector engagement strategy, including over 24 consultative meetings, culminated in a national consensus meeting in November 2025.

Results: Spirometry was successfully performed in 83% (167/201) participants at baseline, 92% (182/201) at 6 months, and 81% (163/201) at 12 months, demonstrating feasibility in clinical settings. At 6 months, nearly half (49%) of

participants exhibited impaired lung function: 29% obstructive, 13% restrictive, and 7% mixed patterns. While younger patients showed better recovery, 50% of participants developed visible fibrosis by month 6, up from 22.1% at baseline, indicating structural damage persists or progresses despite successful treatment.

These findings directly informed national policy. The 2025 Eswatini National Integrated TB Management Guidelines now advise PFT screening at month 2 and at treatment completion, with defined referral pathways for pulmonary rehabilitation and integrated TB/HIV/NCD care.

Conclusion: PTLD represents a significant and previously under-recognized public health burden in Eswatini. Spirometry is feasible within a clinical study and with appropriate investments in training and resources could be rolled out in routine care. Translating research into policy demonstrates the value of coordinated TB/NCD collaboration to ensure TB survivors not only complete treatment but achieve long-term respiratory health.



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Implementing Integrated Tuberculosis and Other Lung Disease Services in Two Southern Nigeria States: Challenges and Lessons Learnt in Hard-To-Reach Communities and Facilities

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Background: Integrating tuberculosis (TB) and other lung disease services into routine health systems is critical to improving comprehensive respiratory care in Nigeria. This study examined challenges and lessons learned from implementing integrated TB and other lung disease services across two Southern Nigeria states.

Methods: An implementation-focused assessment was conducted between April and December 2025 in selected health facilities and communities delivering integrated TB and lung disease services. Data were collected using structured questionnaires, supportive supervision observational checklists, and routine supervision reports. The assessment evaluated service readiness, provider capacity, diagnostic availability, data systems, and referral mechanisms. Supervisory findings were complemented by qualitative feedback from healthcare workers and program implementers. Data were analyzed to identify key implementation challenges, adaptive strategies, and lessons for scale-up.

Results: A total of 50 implementers participated, with 35 (70%) females. Key challenges included shortage of health workers to manage non-TB lung diseases (n=20), inadequate diagnostic tools beyond TB (n=10), weak referral linkages for advanced respiratory care—particularly in hard-to-reach communities (n=15), and low community awareness of non-TB lung diseases (n=5). Adaptive responses involved targeted capacity building and task-shifting, introduction of simplified screening

algorithms, phased deployment of basic respiratory diagnostics, modification of digital reporting tools to capture multiple lung disease indicators, and intensified community engagement. Continuous supportive supervision facilitated real-time problem-solving, improving provider confidence, service uptake, and continuity of care.

Conclusion: Integrating TB and other lung disease services within Nigeria's health system is feasible when guided by structured monitoring and adaptive supervision. Strengthening workforce capacity, expanding access to respiratory diagnostics, improving referral networks, optimizing digital reporting systems, and sustaining community engagement are essential for effective and sustainable scale-up of integrated respiratory services.



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Trends and Determinants in TB Case Notification Rates and the Proportion of Previously Treated Cases Tested for Drug-Resistant-TB (MDR)

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Background: Zambia remains among the high tuberculosis (TB) burden countries globally, with significant challenges related to case detection and drug-resistant TB (DR-TB). The TB case notification rate (CNR) is a key indicator of national TB program performance, reflecting access to diagnostic and treatment services. Previously treated TB patients are at elevated risk of developing drug resistance, and routine drug-resistance testing is recommended under Zambia's National TB and Leprosy Programme (NTLP) guidelines. However, limited evidence exists on long-term trends in case notification and the determinants influencing DR-TB testing among high-risk groups.

Objective: To assess trends in TB case notification rates and the proportion of previously treated TB cases tested for drug-resistant TB in Zambia, and to identify factors associated with these outcomes.

Methods: A retrospective analytical study will be conducted using routinely collected NTLP surveillance data from 2022–2026. Annual TB case notification rates per 100,000 population will be calculated using national population estimates. The proportion of previously treated TB patients tested for drug resistance using GeneXpert or other molecular diagnostic methods will be determined annually. Trend analysis will be performed using chi-square test for trend and time-series analysis. Multivariable logistic regression will be used to identify demographic (age, sex), clinical (HIV status, treatment history), and health system factors (province, facility level, availability of diagnostic tools) associated with DR-TB testing and variations in notification rates. Expected outcome.

The study expects to demonstrate an overall increase in TB case notification rates and improved

coverage of drug-resistance testing among previously treated cases, particularly following expansion of GeneXpert services across provinces. However, disparities may persist between rural and urban areas and across facility levels.

Conclusion: Findings will provide critical evidence to inform Zambia's TB strategic planning, strengthen surveillance systems, and enhance equitable access to drug-resistance testing. Addressing identified determinants will support targeted interventions to improve TB case detection and DR-TB control in Zambia



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Yield of TB Cases among Pregnant Women in Four RedAid-Supported States

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Background: Tuberculosis (TB) remains a significant public health concern, particularly among vulnerable populations such as pregnant women. In Nigeria, there is a paucity of data on TB prevalence in pregnancy. However, a 2018 study in South West Nigeria reported TB prevalence of 0% among pregnant women. Diagnosing TB in pregnant women is crucial for maternal and neonatal health. This study assesses the yield of TB cases among pregnant women from community outreaches in Benue, Delta, Edo, and Taraba states of Nigeria in 2024.

Methods: A retrospective desk review was conducted using TB screening and diagnostic data from pregnant women in the four states. The dataset covered a 12-month period from January to December 2024 and included the number of pregnant women identified, screened for TB, categorized as presumptive TB cases, evaluated, and diagnosed with TB. Using MS Excel, descriptive statistics was used to determine the proportion of TB cases among pregnant women identified in the community.

Results: A total of 52,292 pregnant women were identified, out of which 49,050 (93.80%) were screened for TB. Among those screened, 388 (0.79%) were classified as presumptive TB cases and underwent further evaluation. Of these, 14 (3.6%) cases were confirmed to have TB (13 DS-TB and 1 DR-TB). This amounts to 29 TB cases per 100,000 pregnant women screened.



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Leveraging Solid Stool Culture in Diagnosing Tuberculosis in Children: An Experience from TB Reference Laboratory Kano, Nigeria

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Background: Despite advances in molecular diagnostics, tuberculosis (TB) diagnosis in children remains challenging due to difficulty in obtaining quality sputum samples. While stool specimens offer a non-invasive alternative for GeneXpert testing, many results return negative, complicating diagnosis. Stool, which may contain swallowed sputum, can support detection of *M. tuberculosis* using both molecular and culture techniques. Although molecular methods are widely adopted, culture remains the gold standard for TB diagnosis. This study assesses the diagnostic value of solid stool culture in children with GeneXpert-negative results to improve TB case detection.

Methodology: Retrospective analysis of solid-stool culture results from children under-15years, was conducted at the Northwest TB Reference Laboratory in Kano State, Nigeria. A total of 41 stool samples were identified from the laboratory register, between January-June 2024. All children had previously undergone initial stool testing using GeneXpert-MTB/RIF assay, with negative results. Subsequently, stool-specimen collection was repeated for each child, and the new specimens were cultured on Lowenstein-Jensen media. The bacilli in the stool specimens were first concentrated using normal saline then then decontaminated using the standard NALC-NaOH (2%) method. Data was analyzed using Microsoft Excel, with simple frequencies and percentages.

Results: Of the 41 stool samples, 27(65.9%) were from female and 14(34.1%) from males. Culture results showed 2 samples (4.9%) positive for

Mycobacterium TB, 6(14.6%) were contaminated and 33(80.5%) were negative. Compared to the initial GeneXpert results, which were all negative, the stool culture demonstrated a higher recovery rate. This may be attributed to the high sensitivity and lower detection threshold of culture methods compared to molecular diagnostics.

Conclusions: The findings support the use of solid stool culture as an alternative to stool GeneXpert in a situation where GeneXpert results turn out negative. However, the relatively high contamination rate (14.6%) also underscores the need for improved specimen processing techniques to ensure accuracy and reliability.



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Climate Change and Its Impact on Tuberculosis Burden

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Background: Climate change is increasingly recognized as a critical factor affecting global health, yet its impact on tuberculosis (TB) remains underexplored. Rising temperatures, extreme weather events, and population displacement contribute to TB transmission and hinder control efforts.

Methods: This study analyzed data from the Global TB Report 2024 and reviewed climate-sensitive TB risk factors, including malnutrition, air pollution, and healthcare disruptions due to extreme weather events. Epidemiological trends were assessed to determine the correlation between climate-related vulnerabilities and TB incidence.

Results: Findings indicate that regions with high climate variability experience an increase in TB incidence due to weakened immunity, overcrowded living conditions, and disrupted healthcare services. Additionally, malnutrition and food insecurity exacerbate TB severity, leading to poor treatment outcomes.

Conclusion: Integrating climate adaptation strategies into TB control programs is essential. Policies should focus on strengthening healthcare resilience, improving access to TB diagnostics and treatment, and addressing social determinants of health linked to climate change.



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Adaptation du Modèle Communautaire «Salle Rose» Pour Améliorer la Prévention et L'Adhésion Thérapeutique Dans la Prise en Charge de la Tuberculose au Bénin: ÉTude Pilote

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Introduction: La tuberculose (TB) demeure un problème majeur de santé publique, avec des défis persistants tels que l'abandon thérapeutique et la stigmatisation. La santé mentale des patients, souvent affectée par la dépression et l'anxiété, influence fortement l'adhésion au traitement. Les interventions biomédicales seules sont insuffisantes pour garantir le succès des programmes TB. La Salle Rose, modèle communautaire intégré initialement conçu pour la prévention de la dépression post-partum, pourrait être adaptée à la prévention et à la prise en charge de la TB.

Méthodes: Type d'étude: pilote quasi-expérimental avant et après intervention
 Population: patients nouvellement diagnostiqués TB dans un centre de prise en charge
 Intervention: adaptation du modèle Salle Rose comprenant:
 Dépistage systématique des symptômes dépressifs (PHQ-9)
 Espace d'écoute individuel et en groupe
 Éducation thérapeutique intégrée (TB + santé mentale)
 Implication communautaire et réduction de la stigmatisation
 Évaluation: test de dépression et mesure de l'adhésion thérapeutique avant et après l'intervention
 Analyse: comparaison des scores et indicateurs avant/après pour mesurer l'effet de l'intervention

Résultats Attendus: Diminution des symptômes dépressifs

Amélioration de l'adhésion au traitement
 Réduction de l'abandon thérapeutique
 Diminution de la stigmatisation perçue
 Renforcement du soutien social des patients
 Satisfaction accrue des patients

Discussion: La Salle Rose offre un modèle intégré combinant prévention, accompagnement psychosocial et éducation thérapeutique. Son adaptation à la TB représente une approche innovante et répliquable, susceptible d'améliorer l'adhésion thérapeutique, de réduire la stigmatisation et de renforcer la qualité des soins dans des contextes à ressources limitées. Ce protocole constitue une solution centrée sur la santé mentale, pouvant servir de référence pour des programmes similaires dans d'autres régions.



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Closing the Gap: Impact of Digital Screening Tools and Private-Sector Engagement on TB Case Notification in Urban Nigeria

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Background: Nigeria remains the highest TB-burden country in Africa, with a significant portion of "missing millions" seeking initial care in the unregulated private sector. In high-density urban settings, traditional facility-based screening fails to capture presumptive cases early. This study evaluates an innovative Private-Public Mix (PPM) model utilizing AI-powered handheld X-ray technology to accelerate case detection in Lagos, Nigeria.

Methods: A 12-month implementation study was conducted across 45 private clinics and community pharmacies. We deployed ultra-portable digital X-ray devices equipped with Computer-Aided Detection (CAD) software. Community Health Workers conducted active outreach, screening people presumptive for TB at the point of care. Data were integrated into the national MATS (Mobile Application for TB Screening) reporting system.

Results: A total of 12,450 individuals were screened. The use of digital AI screening resulted in a 34% increase in TB notifications compared to the previous year's baseline. Notably, 22% of confirmed cases were Pediatric TB, a demographic previously under-reported in this region. Linkage to treatment was achieved for 96% of identified people with TB within 48 hours of diagnosis.

Conclusion: The integration of portable digital diagnostics within Nigeria's private health sector significantly reduces the diagnostic delay. This innovation offers a scalable blueprint for high-burden African nations to reach "missing" populations. To achieve the 2030 End TB goals,

Nigeria must transition from passive facility-based models to technology-driven community interventions.



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Intensified Tuberculosis Surveillance in Private Hospitals in India: Transforming the Incidental Screening Pathway with Computer-Aided Detection

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Background: Public-private partnership is pivotal to Tuberculosis (TB) care delivery and management. In 2023, India reported 2.55 million cases of TB, of which 33% were notified by private sectors. NMP+ (Network of Maharashtra People with HIV), a community-based organization, implements the patient provider support agency (PPSA) initiative in alignment with the National Tuberculosis Elimination Programme (NTEP), engaging private-sector doctors for effective TB care delivery. However, systematic screening of all chest X-rays taken at such facilities is challenging and faces limitations

Methods: All the chest X-rays taken at the six, private, multi-speciality hospitals (with X-ray capabilities) within the PPSA network were systemically screened for radiological TB signs, regardless of clinical symptoms, using CAD software (qXR v4 and qTrack, Qure.ai) from December 2024 to March 2025. The TB presumptive patients identified by CAD with a TB probability score (range: 0-1; threshold: 0.5) above the threshold (0.5), were promptly referred for confirmatory testing as per NTEP protocols.

Results: Out of the 4522 chest X-rays screened at all the hospitals, 542 (11.9%) were identified as TB presumptive by CAD. 308 (56.8%) cases were tested further and 34 (11.03%, 95%CI: 7.77%-15.08%) were confirmed of the disease. The distribution of CAD probability scores in 34 TB positives (age range: 23-80 years; 61.8% male) was found to be 0.908±0.12 (mean ± standard deviation). Compared to a historical baseline

(December 2023 to March 2024), the percentage of total TB case notifications increased by over 400%. Furthermore, the percentage of clinically diagnosed cases has also improved from 18.18% to 49.12%.

Conclusions: CAD was integrated within the PPSA initiative to facilitate intensified TB case finding in private hospitals. It has resulted in improving TB notifications of these facilities, thus showing promise for scale up at national level to improve yield and patient outcomes.



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Acceptability and Feasibility of an AI-Powered Care Coordination Tool in Tuberculosis Management in Patient Provide Supporter Agency (PPSA) Service Implementation Model in India: Qualitative Insights

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Background: The Network of Maharashtra People with HIV (NMP+) functions as a Patient Provider Support Agency (PPSA) service implementation model under India's National TB Elimination Program (NTEP), supporting Tuberculosis (TB) detection by operationalizing specimen transport, laboratory coordination, and longitudinal follow-up across private healthcare providers.

Methodology: A mixed-method of qualitative study was purposively conducted among 10 regular users (9 NMP+ field staff and 1 project officer) of the platform. In-depth, semi-structured questionnaires with open-ended questions were used to assess the acceptability and feasibility of the platform. The responses were then analyzed using Visual Anthropac 4.9 to identify key themes, categories, and salience scores (an indicator of frequency and cognitive importance of a participant response) regarding barriers and facilitators in TB workflow integration.

Operational Pathway: Patients visiting the hospital undergo chest X-ray and clinical assessment. The X-ray is analyzed using an AI tool to identify presumptive TB cases in real time. Upon identification, a field officer promptly coordinates sputum sample collection. The sample is transported to the laboratory by a designated agent, and test results are uploaded into the digital system. Field staff and hospital teams receive results simultaneously through a mobile application. Program managers monitor presumptive cases, sample collection status, and

diagnostic outcomes across centres through a centralized dashboard, ensuring timely follow-up and case management.

Results: Thematic analysis of open-ended responses confirmed the platform's utility in patient tracking and data collation, with high frequency (70–80%) and salience score (0.5–0.8), well above the relevance threshold of 0.087. 90% participants suggested that the real-time notification feature is highly useful to track TB presumptive patients. Participants also noted that the AI tool enabled a real-time surveillance system, enhancing sputum collection tracking through immediate access to patient data. Additionally, 70% found data management easier, 60% reported improved care coordination, 60% reported simplified patient tracking, and 30% noted a reduction in errors. Satisfaction with AI training and usability was uniformly positive.

Conclusion: AI-enabled tools strengthen TB surveillance and patient management by optimizing existing workflows, improving real-time care coordination, and operational efficiency across PPSA agencies and the NTEP, without requiring additional infrastructure investments.

