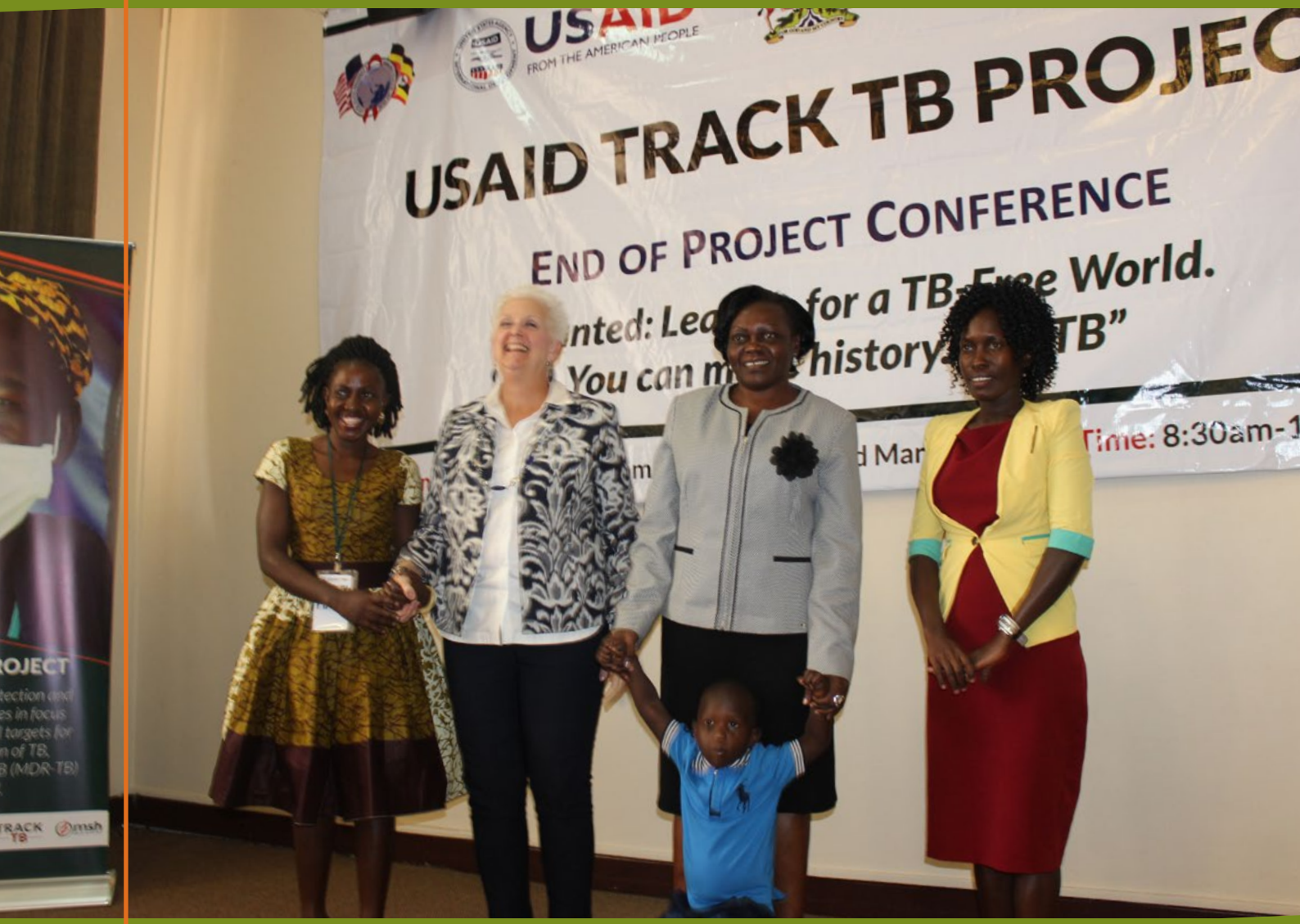
TRACK TB



END OF PROJECT REPORT

JANUARY 1, 2013–DECEMBER 31, 2017

TRACK TB

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Sub-Partners	AIDS Information Centre (AIC) University of California, San Francisco, Curry International Tuberculosis Center (UCSF/CITC)
Funding Source	US Agency for International Development (USAID)
Cooperative Agreement Number	AID-623-A-13-00003
Project Dates	January 2, 2013–March 31, 2018
Reporting Period	January 1, 2013–December 31, 2017
Submission Date	June 30, 2018
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Submitted to	USAID Uganda
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Disclaimer

Funding was provided by the United States President's Emergency Plan for AIDS Relief (PEPFAR) and USAID under Cooperative Agreement No. AID-623-A-13-00003.

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Cover Photo

Minister of State for Health and the US Ambassador in Uganda with MDR-TB survivors during the end of TRACK TB project conference.

Photo: Dr. Samuel Kasozi

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ACRONYMS

ACSM	Advocacy, communication, and social mobilization
AIC	AIDS Information Centre in Uganda
ART	Antiretroviral treatment
ASSIST	Applying Science to Strengthen and Improve Systems Strengthening project
CHAI	Clinton Health Access Initiative
CHC	Communication for Health Communities
CLF	Community linkage facilitator
CPT	Co-trimoxazole preventive treatment
CQI	Continuous quality improvement
CUAMM	Collegio Universitario Aspiranti Medici Missionari
DHIS 2	District Health Information System 2
DOT	Directly observed treatment
DOTS	Directly observed treatment, short course
DR-TB	Drug-resistant tuberculosis
DST	Drug sensitivity testing
DTLS	District TB and Leprosy Supervisor
DTU	Diagnostic and treatment unit
ECG	Electrocardiogram
ECHO	Extension for Community Healthcare Outcomes
EH	Ethambutol and isoniazid
EQA	External quality assurance
FIND	Foundation for Innovative New Diagnostics
FUF	Follow-up facility
FY	Fiscal year
GFATB	Global Fund to Fight AIDS, Tuberculosis, and Malaria
GOU	Government of Uganda
HIV	Human immunodeficiency virus
HMIS	Health management information system
IC	Infection control
ICF	Intensified case finding
IDI	Infectious Diseases Institute
IEC	Information, education, and communication
INH	Isoniazid
IR	Intermediate Results
IPT	Isoniazid preventive therapy
KCCA	Kampala Capital City Authority
KCTF	Kampala City Tuberculosis Task Force
LTFU	Loss to follow-up

M&E	Monitoring and evaluation
MDR-TB	Multidrug-resistant tuberculosis
MIS	Management information system
MOH	Ministry of Health
MOST	Management and Organizational Sustainability Tool
MSH	Management Sciences for Health
NCC	National Coordination Committee for TB
NSP	National Strategic Plan
NTLP	National TB and Leprosy Program
NTRL	National TB Reference Laboratory
P-BC	Pulmonary bacteriologically confirmed
P-CD	Pulmonary clinically diagnosed
PLHIV	People living with HIV
PMDT	Programmatic management of DR-TB
PMP	Performance monitoring plan
PMTCT	Prevention of mother-to-child transmission
PPM	Public-private mix
RPMT	Regional Performance Monitoring Team
PTP	Presumptive TB patient
PY	Project year
RH	Rifampicin and isoniazid
RHITES	Regional Health Integration to Enhance Services in Eastern Central Uganda
RRH	Regional referral hospital
SIAPS	Systems for Improved Access to Pharmaceuticals and Services
SMC	Senior Management Committee
SOA	Short oral abstract
SOP	Standard operating procedure
STAR-E	Strengthening Tuberculosis and HIV & AIDS Response in Eastern Uganda
STAR-EC	Strengthening Tuberculosis and HIV & AIDS Response in East Central Uganda
STAR-SW	Strengthening Tuberculosis and HIV & AIDS Response in Southwest Uganda
SUSTAIN	Strengthening Uganda's Systems for Treating AIDS Nationally
TA	Technical assistance
TASO	The AIDS Support Organization
TB	Tuberculosis
TSR	Treatment success rate
TWOS	TB Web-Based Ordering and Reporting System
UCSF/CITC	University of California, San Francisco, Curry International TB Center
UHSC	Uganda Health Supply Chain
USAID	US Agency for International Development
USTP	Uganda Stop TB Partnership
WHO	World Health Organization

EXECUTIVE SUMMARY

In 2013, the TRACK Tuberculosis Activity Project (TRACK TB), funded by the President's Emergency Plan for AIDS Relief (PEPFAR) and the US Agency for International Development (USAID), was established to support the effort of the Government of Uganda (GOU) to address health system challenges and reduce the TB burden. At this time, there was weak leadership of the National TB and Leprosy Program (NTLP) and insufficient technical capacity for the effective management of TB control programs. Kampala Capital City Authority (KCCA), with a population of over 3 million during the day and 1.5 million at night, had only 38 facilities that reported TB cases to Kampala City authorities and notified only 8,344 TB patients, while only 6.1% of these patients were on directly observed treatment (DOT). In KCCA, the treatment success rate (TSR) among new smear-positive TB patients was 69%, with a cure rate of 42% and a high loss-to-follow-up (LTFU) rate of 21%. TB/HIV integration in KCCA was suboptimal, with 78% of the TB patients tested for HIV, 93% of the co-infected being started on co-trimoxazole prophylactic treatment (CPT), and 52% started on antiretroviral treatment (ART).

Uganda was notifying only 310 drug-resistant TB (DR-TB) cases annually, with only 63 of the estimated 1,010 DR-TB cases enrolled on treatment, while approximately 300 DR-TB patients who had been diagnosed over the previous four years (2008–2012) were on the treatment waiting list. The TSR for multidrug-resistant TB (MDR-TB) was only 50% despite the small number of DR-TB patients on treatment. In regions supported by implementing partners, there was a high burden of TB coupled with a low case detection rate (CDR) of 49% among new smear-positive TB cases and a TSR of 83.4%.

Management Sciences for Health (MSH) implemented the five-year TRACK TB project under cooperative agreement AID-623-A-13-00003 with two sub-partners: the AIDS Information Centre in Uganda (AIC), and the University of California, San Francisco, Curry International Tuberculosis Center (UCSF/CITC). The project aimed to increase TB case notification and TSR in Kampala and 50 districts under USAID partner support to meet national targets for reducing the burden of TB and MDR-TB and improving TB and HIV service integration.

At the project's inception, there was a smooth transition of activities from the TB CARE I project to TRACK TB. A first-year implementation plan, budget, branding and marking strategy and plan, and performance management plan (PMP) were simultaneously developed and submitted to USAID, and subsequently approved. Alongside the development of project plans and budgets, the project core team embarked on engaging partners and stakeholders to introduce the new project and launch its work. After USAID approved the budget and work plan, the team recruited additional project staff and conducted a baseline assessment. The team also established baseline targets per the project PMP framework. A patient-centered approach that combines improved quality and expanded access to care was employed throughout the project.

The TRACK TB project's goal was to increase the CDR and TSR in focus areas to meet national targets for reducing the burden of TB, MDR-TB, and TB/HIV. TRACK TB result areas

were: (1) enhanced leadership and technical capacity of the NTLP for effective TB control; (2) implementation of an effective urban directly observed treatment, short course (DOTS) model for Kampala; (3) implementation of a high-quality MDR-TB program; and (4) improved coordination and implementation of DOTS, TB/HIV, and MDR-TB interventions.

To ensure that TRACK TB was on course in meeting its goals, objectives, and targets, the project had two formative evaluations, one internal and one external.

This report covers the technical activities implemented by TRACK TB over the five years of the project from January 2, 2013, to December 31, 2017. This project received approval of additional funding of $831,869, thereby increasing the project budget from $12,275,135 to $13,107,004, the total life of the project by three months (from December 31, 2017, to March 31, 2018), and its performance period from 60 months to 63 months.

RESULT AREA 1: ENHANCED LEADERSHIP AND TECHNICAL CAPACITY OF THE NTLP FOR EFFECTIVE TB CONTROL

Major achievements in this result area include:

1. **Coordination increased:** The project provided technical assistance (TA) to the Ministry of Health (MOH) to hold four National Coordination Committee (NCC) for Tuberculosis meetings, through which the MOH achieved a high level of regular oversight of the TB control program with increased accountability by the NTLP.
2. **Plans, policies, and guidelines formulated:** TRACK TB provided TA for the revision, printing, and dissemination of several policy documents and guidelines as well as standard operating procedures (SOPs): (1) NTLP strategic plan (2015/16–2019/20) to incorporate findings and programmatic implications of the TB prevalence survey, the End TB Strategy, and several program review recommendations; (2) NTLP TB Manual; (3) SOPs and the TB screening and diagnostic algorithm to increase sensitivity in TB case finding; (4) district TB action plans; and (5) a national action plan for public-private mix (PPM) DOTS.
3. **Resources mobilized:** The project provided TA during the development of the Global Fund joint TB/HIV grant application 2018–2020, including responding to the Technical Review Panel's comments and assisting during the grantmaking process; a total of $21 million was approved for TB control for 2018–2020. Furthermore, the project supported the implementation of Global Fund activities during 2015–2017 to reprogram activities and improved funds utilization from 72% to 92% by December 2017.
4. **Management of TB services strengthened:**
   a. ***Laboratory capacity to diagnose TB through the NTLP improved:*** Installed 19 GeneXpert machines and power backup systems, increased MTB/RIF machines installed in the country from 24 to 131, and improved GeneXpert utilization from 2 to 6 tests per day. From 2016 to September 2017, 168,013 sputum samples were tested and 2,071 MTB cases were detected, of which 539 were rifampicin resistant. GxAlert

electronic reporting improved from 0% in 2015 to 40% by the end of 2017, and MDR-TB patient linkage improved from 80% to 95% in the same period. External quality assurance (EQA) was decentralized to four regional referral hospitals (RRHs)—Gulu, Arua, Hoima, and Mbarara. Trained 42 laboratory staff. Procured EQA equipment: desktop computers, laser printers, and cartridges, internet modems fully loaded for three months, digital weighing scales, power backups, Olympus microscopes, drying racks, staining racks, gas cylinders, and printing paper. The proportion of labs with EQA errors decreased from 12.2% in 2012 to 8.5% in 2016.

b. ***Monitoring and evaluation (M&E) capacity of the NTLP strengthened:*** Supported the NTLP with a server to host TB databases (TB, MDR-TB, and the GxAlert databases), developed and supported the use of the DR-TB management information system (MIS), and provided TA through an M&E officer to support analysis and program reporting. Trained 75 officers from NTLP, the Regional Performance Monitoring Team (RPMT), and partners and 1,101 health workers in seven regions and eight districts on District Health Information System 2 (DHIS 2) integration, and coordinated regional performance review meetings. This reduced discrepancies between DHIS 2 and paper-based data from 20% to 5%.

c. ***Continuous quality improvement (CQI) capacity built at the NTLP:*** Provided TA to the program in the development of CQI strategies; supported a full-time CQI staff; developed, printed, and disseminated a TB CQI manual; and integrated TB CQI activities at national and subnational levels.

d. ***TB/HIV integration:*** Supported a full-time staff at the program for TB/HIV activities, facilitated two technical retreats that finalized SOPs on TB/HIV integration and a training manual for the one-stop-shop model, and trained over 180 health workers on the updated pediatric TB prevention of mother-to-child transmission (PMTCT) guidelines and SOPs.

e. ***DR-TB management at NTLP strengthened:*** Seconded a senior MDR-TB advisor to support the program in the development, printing, and dissemination of the DR-TB guidelines, including the protocol for the MDR-TB short regimen; assessed quality of MDR-TB care at 15 DR-TB facilities; and mentored facility teams to implement quality improvement projects and address gaps in care.

5. **Implementation science advanced:** Produced seven operational research papers, against a target of three. With the NTLP, the project expects to have four articles published in international journals.

LESSONS LEARNED: Capacity building for NTLP through consistent mentorship and coaching requires ongoing dialogue with existing staff to realize the achievements.

CHALLENGES AND RECOMMENDED NEXT STEPS: Continuous capacity building of health workers to report accurate and timely data through DHIS 2 is required. Further strengthening of the NCC for TB will improve coordination and TB programming in Uganda.

RESULT AREA 2: AN EFFECTIVE URBAN DOTS MODEL FOR KAMPALA IMPLEMENTED

TRACK TB worked in collaboration with KCCA and the Kampala City Tuberculosis Task Force (KCTF) to implement the Urban DOTS Model to improve TB case notification, TB and HIV service delivery, and patient follow-up to achieve the set targets. Key achievements include:

1. **TB case finding and notification:** A total of 39,243 (87%) out of the set target of 45,301 TB patients of all forms were notified over the life of the project, of whom 26,139 (67%) were pulmonary bacteriologically confirmed (P-BC) cases. Of the 39,243 cases notified, contact tracing contributed 1,138 TB cases (2.9%). Despite the overall decline in TB case notification, the number of TB cases diagnosed clinically (P-CD) progressively increased, from 24% in project year (PY) 3 to 32% in PY5. Pediatric TB cases notified progressively increased as well, from 5% at baseline to 10% in PY5 and 12% in PY6Q1. The "Lucky Specials" film was launched to build demand for TB services and 250 copies in different languages were disseminated via 50 long-distance buses and TV broadcasts at health facilities across the country.

2. **TB treatment outcomes, monitoring, and CQI:** Patient coverage with DOT improved from 6% at baseline (2013) to 92% in PY5; the cure rate improved from 42% at baseline to 77% (target 85%); and the TSR improved from 69% to 86% in PY4 and 85% in PY5 (target 90%). The proportion of new P-BC patients monitored by sputum examination at month two improved from 49% at baseline to 75% in PY5.

3. **TB/HIV integration:** HIV counseling and testing among TB patients improved from 93% at baseline to 99% by the end of PY5, and TB/HIV co-infection rates declined by almost 10% during this period. CPT and ART coverage improved from 93% and 52% at baseline to 99% and 95% by the end of PY5, respectively.

4. **M&E and coordination of TB control activities:** The project provided TA to support coordination of TB control services in KCCA. In addition, the project developed the e-TB register that is being used to record and report on all TB patients in authority. This has helped in timely recording and reporting through DHIS 2 in Kampala. TRACK TB also supported quarterly performance reviews in which feedback was provided to health facility teams and lessons shared with all 97 health facilities.

5. **Access to TB diagnostic services using X-rays:** Twenty health workers from 20 high-volume facilities and 10 community linkage facilitators (CLFs) from Kawempe Division were oriented on the use and operation of the X-ray machine for community TB screening. The X-ray machine was used to investigate a TB outbreak in a secondary school in Mukono, with a total of 2,550 school members screened for TB and 36 diagnosed with TB, yielding a prevalence of 1,412/100,000, which is nearly six times the national prevalence of 253/100,000.

6. **Support for a smear microscopy EQA program:** EQA activities began in PY4 with assistance to District TB and Leprosy Supervisors (DTLSs) to collect slides from 97 diagnostic laboratories. The number of errors declined in PY5 as compared with PY4; false positives dropped from 22 to 5, and false negatives decreased from 11 to 4.

LESSONS LEARNED: Community-based DOT is feasible in an urban setting and can achieve desired patient outcomes despite high population mobility. To have effective referrals of presumptive TB patients (PTPs) from the community, it is necessary to incentivize community leaders (mobilizers) and to provide sample transportation for PTPs. Moreover, effective coordination of TB care and prevention services in a city is best achieved through involvement of all key players. An effective PPM DOTS program requires engaging and closely supervising private health facility owners and understanding their operational challenges related to TB patient care while exhibiting a high degree of flexibility in working with them. Another lesson was that consistent mentorships of clinicians at the facility level increased clinical diagnosis of TB.

CHALLENGES AND RECOMMENDED NEXT STEPS: A number of challenges remain despite the great strides made in TB control in urban settings like Kampala.

1. X-ray services for both TB screening and diagnosis remain inaccessible to patients.

2. Gaps in TB symptom screening at health facilities still exist. Therefore, it is necessary to employ staff motivation mechanisms and to maintain CQI approaches as drivers for quality TB services at health facilities in Kampala, as well as to improve TB case notification.

3. Stock-outs of TB medicines, GeneXpert cartridges, and microscopy reagents can be averted by having commodity buffer stocks and managing procurement and distribution of TB commodities using the TWOS, developed by the USAID UHSC project.

4. Breakdowns of GeneXpert machines can be managed by bundle pricing to bring about timely and efficient maintenance.

5. Despite the improvement in the hub system, the turnaround time for results remains too long, and EQA and use of GxAlert data are needed to improve the quality of laboratory services to shorten the turnaround time for results.

6. Addressing high levels of stigma that affect TB patients requires close collaboration with the USAID Communication for Health Communities (CHC) project to improve community awareness of TB and build community support structures.

7. Gaps in TB IC practices will require multi-sectoral engagement and formulation of enabling policies.

8. Implementation of IPT has been greatly compromised by insufficient supplies of INH, posing challenges for initiation of eligible patients and completion among initiated patients. Improving implementation of IPT requires improving IPT stocks and mentoring facility staff as well as strengthening strategic information for TB at all levels, including integrating TB data into DHIS 2.

9. Having a large mobilized and motivated private health sector for TB care and prevention in Kampala requires working with the Uganda Health Care Federation to implement an effective PPM DOTS model.

RESULT AREA 3: QUALITY PROGRAM FOR THE MANAGEMENT OF MDR-TB

TRACK TB provided technical support to the NTLP through UCSF to implement a country-specific DR-TB mixed model of care and to improve quality of programmatic management of DR-TB (PMDT) through the provision of a minimum package of DR-TB services. Staff from UCSF/CITC made 11 short-term TA missions to Uganda. Key achievements include:

1. **Improved physical access to treatment for patients:** TRACK TB supported the expansion of MDR-TB treatment initiation sites from 3 at baseline to 15 by the end of the project.

2. **Strengthened human resource capacity through training:** The project developed PMDT training materials, including materials for the introduction of new drugs such as bedaquiline and delamanid and the short treatment regimen. In addition, the project sponsored a series of workshops and, with support from other implementing partners, trained more than 693 healthcare workers. Other modes of training included mentorships, expert panel meetings, cohort reviews, continuing medical education sessions, telephone hotlines, provision of literature, CQI learning sessions, and ECHO (Extension for Community Healthcare Outcomes) conferencing. ECHO is a videoconference learning network introduced to link 15 MDR-TB sites to ease discussion of complex cases by national experts and other consultants, conduct cohort reviews, and seek solutions for emerging challenges.

3. **Established follow-up facilities (FUFs):** The project employed a mixed model strategy where patients were initiated and hospitalized for less than two months and then referred to FUFs near their homes for DOT. The project printed 350 training guides that were used for standardized monthly mentoring to build the capacity of FUF staff.

4. **Strengthened community awareness of MDR-TB and enhanced treatment adherence:** To enhance treatment adherence among DR-TB patients, expert clients were used to educate and encourage patients to complete treatment. By the end of the project, each site had at least one expert client supported using funds from the Global Fund to Fight AIDS, Tuberculosis, and Malaria (GF).

5. **Strengthened TB IC:** The project supported all sites to make IC plans and revise them regularly and supplied respirators and surgical masks to 6 supported sites until the NTLP took over in PY4 by supplying the equipment to all 15 sites. TRACK TB constructed or remodeled four MDR-TB wards in Mbarara, Hoima, Lira, and Soroti RRHs in accordance with World Health Organization (WHO) TB IC standards.

6. **Strengthened recording and reporting using a DR-TB management information system:** The project supported the NTLP to develop a DHIS web-based electronic register with dashboards and supported training of users at various levels through two trainings with a total of 55 participants, of whom 22 were trained as national trainers. This improved data quality and management of patients as well as timely reporting to the NTLP.

7. **Strengthened treatment adherence through the provision of enablers and incentives:** TRACK TB distributed 22,380 packets of instant enriched porridge received from TB CARE I to DR-TB patients and the project provided monthly transport refunds to patients throughout PY1–PY4 to cover daily transport to the FUF for DOT and to the treatment initiation site for monthly clinical reviews. To ensure susceptibility, the provision of enablers and incentives to all MDR-TB patients in all MDR-TB sites was taken over by NTLP in PY5 using GF resources

8. **Improved DR-TB surveillance and detection:** The project supported the installation of 19 GeneXpert machines procured by USAID, bringing the total number of machines to 131. TRACK TB also supported the distribution of new diagnostic algorithms to the diagnostic and treatment units (DTUs) and provided mentoring, maintenance, and quality assurance for GeneXpert machines. These efforts improved the average utilization of the machines from two tests in 2016 to six tests per day in September 2017, with 168,013 sputum samples tested and 22,071 MDR-TB cases detected, of which 539 were rifampicin resistant. GeneXpert reporting improved from 0% in 2015 to 40% by the end of 2017, and linkage of MDR-TB patients to treatment through quick identification of newly diagnosed patients rose to 80% and then to 95% in 2017.

9. **MDR-TB contact tracing:** The project carried out MDR-TB contact tracing to increase MDR-TB notification. Overall, a total of 11,498 contacts of MDR-TB patients were screened, among whom 2,296 symptomatic cases were identified. Of the 2,296 symptomatic contacts, 2,182 were tested using GeneXpert. One hundred and nine TB patients were diagnosed, of whom 33 were rifampicin resistant cases. The overall yield from contact tracing was 1,235 cases per100,000 population, which is five times the national TB prevalence of 253/100,000.

10. **DR-TB enrollment:** Due to construction of more bed space (from 45 initially to 172 beds) and expansion of the number of DR-TB sites from 3 at baseline to 15, the cumulative DR-TB patient enrollment improved from 49 at baseline to 1,411 patients in PY5 and to 1,519 patients by the end of PY6Q1, thereby exceeding the project target of 1,322 patients.

11. **Treatment monitoring, continuum of care, and CQI:** Of the active patients on treatment at the end of PY5, 16.7% were admitted patients, 73.1% were receiving DOT on an ambulatory basis from FUFs, and 10.2% were on DOT on an ambulatory basis from treatment initiation sites. The project procured and distributed audiometers to 13 treatment initiation sites. The audiometers were used to monitor hearing among DR-TB patients who were regularly receiving injectable second-line drugs. During PY5, 925 tests out of the 935 eligible patients were screened for hearing loss. Of those, 474 tests (51.2%) were found to have normal hearing, 369 tests (39.9%) were found to have mild to moderate hearing loss, 44 tests (4.8%) were found to have moderate hearing loss, 20 tests (2.2%) were found to have severe hearing loss, and 16 (1.7%) were identified with profound hearing loss. For patients who were detected early in the course of treatment, it was possible to adjust doses of aminoglycosides or to change treatment to either capreomycin or bedaquiline to prevent further hearing

loss. In PY5, the project procured two electrocardiogram (ECG) machines; one was placed at Mulago TB Unit, while the second was rotated among sites to support patients starting on bedaquiline. By the end of PY5, 100 ECG tests had been conducted on 27 patients. At the same time, the Strengthening Uganda's Systems for Treating AIDS Nationally (SUSTAIN) Project had procured another four ECG machines, bringing the total number of ECGs to six. To support regular use of monitoring tests, the project printed and distributed laminated charts showing at which stage of the treatment each of the needed tests had to be done.

12. **Secondment of staff to DR-TB sites:** Since DR-TB management is labor intensive, TRACK TB seconded 25 staff to six TRACK TB supported DR-TB sites: 5 doctors, 3 clinical officers, 11 nurses, 2 counselors, 1 lab technician, and 3 data entrants.

13. **DR-TB treatment outcomes:** The project achieved a high TSR of 74% in both the 2013 and 2014 cohorts. The death rate dropped from 18% in the 2013 cohort to 11% in the 2014 cohort; the rates were likely high due to enrollment of a large number of patients who had been on the waiting list for over four years. LTFU remains unacceptably high, at 7% in the 2013 cohort and 11% in the 2014 cohort.

14. **DR-TB/HIV integration:** HIV testing improved from 90% at baseline to 97% in PY5, while the percentage of HIV positivity increased from 33% to 55%, respectively. CPT uptake improved from 91% at baseline to 95% in PY5 while ART similarly improved from 91% to 92% in the same period.

LESSONS LEARNED: Private health facilities, especially private for-profit facilities, can play a critical role in providing DOT to DR-TB patients but need close supervision to ensure full DOT and proper accountability for drugs. A sure way to track and link all diagnosed DR-TB patients requires the use of the National Identification Number as the unique identifier. Web-based electronic records such as the DR-TB MIS greatly improve the completeness, accuracy, and timeliness of data.

CHALLENGES AND RECOMMENDED NEXT STEPS: While the diagnosis of patients using GeneXpert has increased, the linkage of patients to treatment centers needs further refining, and unique identifiers are needed to avoid an initial LTFU. Mulago and Lira hospitals, which have large numbers of patients, need dedicated vehicles for supervision, drug distribution, and patient transport. Bundle pricing contracts with Cepheid, including training of "superusers," can ensure regular maintenance of the GeneXpert machines. Having a one-year buffer stock and managing procurement and distribution of TB commodities using TWOS will prevent TB commodity stock-outs. Ensuring adequate lab monitoring requires the establishment of a sustainable means of obtaining supplies and equipment, including robust maintenance plans. Other challenges include lack of a constant supply of enablers, failure by the NTLP to conduct regular cohort reviews to assign treatment outcomes, and lack of local government capacity to maintain DR-TB facilities. Addressing these challenges requires continued advocacy for more resources.

RESULT AREA 4: IMPROVED MECHANISMS FOR PARTNER COORDINATION FOR THE IMPLEMENTATION OF DOTS, TB/HIV, AND MDR-TB INTERVENTIONS

TRACK TB was mandated to coordinate all US Government partners and to provide TA to the NTLP to coordinate all stakeholders in TB. The project often provided TA to the NTLP during NCC for TB meetings. Since NCC is composed of many TB partners, it was used to discuss the achievements, plans, and challenges of the NTLP. This coordination mechanism reduced duplication of activities and better utilization of TB resources. Through this mechanism, and in collaboration with the Centers for Disease Control and Prevention, Makerere University Walter Reed Project, and the NTRL, the project scaled up GeneXpert utilization and decentralized EQA in the four regions of Arua, Gulu, Hoima, and Mbarara RRHs.

1. The project coordinated a number of planning meetings with US Government TB partners to disseminate several NTLP guidelines, the strategic plan, and SOPs, and to have priority activities of the NTLP (e.g., scale-up of IPT at facility level; GeneXpert utilization and reporting) included and implemented in partners' plans. The project also provided TA to USAID regional partners (SUSTAIN; Strengthening Tuberculosis and HIV & AIDS Response in East Central Uganda, Eastern Uganda, and Southwest Uganda [STAR-EC, STAR- E, STAR-SW]) on the management of MDR-TB at initiation sites. The project coordinated with USAID UHSC to strengthen the supply chain management of drugs despite the continued drug stock-outs due to delays from the Global Drug Facility. The project also coordinated the development and dissemination of TB information, education, and communication (IEC) materials, including the GeneXpert communication strategy, with USAID CHC. This coordination led to increased awareness of TB at the community level.

2. Lastly, the project provided TA to US Government partners in TB/HIV integration. A total of 29,576 people living with HIV (PLHIV) and 2,940 under-five-year-old contacts of TB patients were enrolled on IPT between January 2015 and June 2017. The project provided TA for the finalization, dissemination, and utilization of guidelines and tools, SOPs, and the TB/HIV training manual for implementation of the one-stop-shop model of TB/HIV services.

LESSONS LEARNED: Sustained coordination and engagement of partners at all levels is key in achieving rapid and standardized implementation of national priorities, while the use of multimedia communications, including social media, increases partner notification and feedback about coordination activities. TA is most appreciated by implementing partners when new approaches to TB control are introduced.

CHALLENGES AND RECOMMENDED NEXT STEPS: Bureaucratic GOU financial systems often slow or prevent rapid and efficient absorption of funding from the GF. An overallocation of GF resources for non-commodity TB activities unnecessarily affected TB case finding and treatment due to lack of TB commodities. Moving forward, it will be necessary to work with the Country Coordinating Mechanism to ensure a balanced allocation of GF funds. It is also important to involve NCC more in tracking

resources available for TB and improving MOH and partner coordination, including optimization of GF and PEPFAR resource allocations, to optimize utilization of the resources allocated for TB in the country.

Partner priorities are often aligned with those of funding agencies rather than the NTLP's priorities. Most health funding is from PEPFAR, which is an HIV fund. Therefore, HIV priorities often overshadow critical TB interventions. As a result, the quality and coverage of dissemination of specific TB guidelines (e.g., TB/HIV, TB IC guidelines) have been inadequate. Therefore, increased engagement of funders is required to agree on priorities. It is also important to develop online databases and dashboards to monitor partner performance in the scale-up of priority TB interventions and to track the extent of dissemination of TB guidelines, SOPs, and IEC materials and tools.

Lack of adequate stocks of TB commodities to implement IPT guidelines requires use of a TB web-based system for ordering to track commodities and engagement of the Parliamentary TB Caucus to advocate for commodity funding as well as improving overall coordination and transparency between MOH, the National Drug Authority, and the National Medical Stores.

BACKGROUND

BASELINE ASSESSMENT AND SITUATION ANALYSIS

In 2012, TB was a major public health problem among Uganda's 36 million residents, and WHO had ranked Uganda 18th among the 22 countries with the highest burden of TB. Although the NTLP had reported improvements in TB case detection and management, national program implementers continued to face a number of health system-related TB control challenges. In 2013, TRACK TB, funded by PEPFAR and USAID, was established to support the efforts of the GOU to address these health system challenges and reduce the burden of TB.

From June to August of 2013, TRACK TB worked with the NTLP and conducted an assessment of TB control and service delivery in the project-supported areas. This assessment was designed to: establish baseline values for indicators included in the project's PMP, obtain information to guide project planning, provide a yardstick for measuring the effects of the project at different stages of implementation, identify gaps and opportunities for improving TB control in Uganda, assess the organization and delivery of TB and TB/HIV services in health facilities in KCCA, and determine patients' perceptions and practices when seeking healthcare for TB. This assessment was conducted using a mixed methods design that included reviews of key NTLP documents, key informant interviews, a health facility assessment questionnaire, and a patient survey. Respondents in the key informant interviews included health providers from 42 health facilities in KCCA; TB managers at national, district, and zonal levels; staff from USAID-supported implementing partners; and the NTLP central unit. A survey was conducted among a sample of 575 TB patients who had been on TB treatment for at least one month at the project-supported health facilities.

CHALLENGES AND CONSTRAINTS IDENTIFIED

There was weak leadership and technical capacity for the effective management of TB control programs in Uganda, as evidenced by the NTLP's failure to monitor work plan implementation; disseminate program reports; absorb funding from GF; and to develop a national TB database to guide planning, decision-making, and reporting. The proportion of districts submitting timely TB reports to the NTLP was 87.2%. Similarly, gaps in the quality of data and delays in reporting to the central MOH affected the country's TB program performance. At the same time, the NTLP was faced with challenges of weak systems for health service delivery, limited financial resources, and inadequate human resources at national and subnational levels. Supervisors—Zonal TB/Leprosy Supervisors and DTLSs—were underperforming due to lack of skills, insufficient funding, and heavy workloads. Shortage of health workers and lack of skilled supervisors affected the NTLP's ability to conduct supportive supervision and mentoring and to provide health facility staff with feedback, hampering capacity building for effective TB control.

The NTLP strategic plan had not been finalized and there was no comprehensive annual operation plan to engage partners. Failure

to engage and involve all key stakeholders in the planning process resulted in poor coordination of implementing partners, whose priorities were not being aligned with national priorities. Consequently, there was inconsistent implementation of country policies and priorities. At the community level, few civil society organizations were involved in TB prevention and care, which contributed to weak community engagement in TB control activities. In addition, there were delays in adopting new policies such as the shift from the ethambutol and isoniazid (EH)-based regimen to the rifampicin and isoniazid (RH)-based regimen, use of IPT, and the one-stop-shop model for TB/HIV services.

There was a high burden of TB in the regions supported by the implementing partners, coupled with a low CDR; over half (53.5%) of the estimated new smear-positive TB cases were not detected. The TSR in the regions supported by the implementing partners was 83.4%. The districts in northern Uganda that were supported by the Northern Uganda–Health Integration to Enhance Services project had the highest number TB cases of all forms.

THE ORGANIZATION AND DELIVERY OF TB AND TB/HIV SERVICES IN KCCA HEALTH FACILITIES AT BASELINE

Kampala City, with a population of over 3 million during the day and 1.5 million at night, was underserved, with only 56 TB DTUs and only 38 facilities that reported TB cases to Kampala City authorities. Although it was known that TB diagnosis and treatment took place in other facilities, especially in the private sector, these facilities were not reporting to the NTLP. The low number of DTUs and reporting facilities resulted in a low TB CDR. Prior to TRACK TB implementation (2012), a total of 8,344 TB patients were notified, of whom 3,839 (46%) were sputum-smear positive. Approximately 9% of these were previously treated cases. TB case notification in Kampala has persistently been above 100%, as more than 30% of the TB patients registered in Kampala come from other districts. DOT coverage was low; facility-based DOT stood at 6.1%, while community-based DOT was 6%. Low DOT coverage in KCCA meant that many TB patients were not monitored for treatment adherence, resulting in low TSRs. For example, in 2012, the TSR among new smear-positive TB patients in KCCA was 69%, with a cure rate of 42% and one of the highest LTFU rates in the country—estimated at 21% among all patients initiated on treatment.

Of the 42 health facilities assessed at baseline in the five KCCA divisions, 64% (27/42) were not using DOT to monitor patients on TB treatment, 50% (21/42) did not have an IC committee, 50% (21/42) did not regularly provide masks and/or tissues to patients presumed to have TB, and 45% (19/42) had no IEC materials on TB. In addition, 14% (6/42) of the facilities run by government and private, not-for-profit agencies did not have streptomycin.

TB/HIV integration in KCCA was also suboptimal. From October 2011 to September 2012, 78.3% of TB patients were tested for HIV. Ninety-three percent of TB/HIV co-infected patients were receiving CPT, and 52% of TB/HIV co-infected patients were on ART.

TB PATIENTS' PERCEPTIONS AND PRACTICES AT BASELINE

Most patients (94%) identified cough as a symptom of TB, however, only 39% of patients sought treatment for cough at a public health facility. The most common factors that influenced patients' choice of facility to attend for TB treatment included accessibility

(32%) and confidence in the facility's ability to cure them (28%). Forty percent of the respondents reported that they were not willing to be supervised during TB treatment.

DRUG-RESISTANT TB

At the beginning of the TRACK TB Project, the NTLP had begun preparations for the start of PMDT. National PMDT guidelines as well as a PMDT operations and expansion plan had been developed and disseminated, Mulago ward for MDR-TB had been remodeled to WHO TB IC standards, three treatment initiation MDR-TB sites had had their staff trained on MDR-TB (Mulago, Arua, and Kitgum), and second-line drugs to cover the intensive phase of treatment for approximately 400 patients had been secured through GF and the National Medical Stores. However, the country was grappling with an unreliable second-line drug management system.

The burden of MDR-TB in Uganda was estimated at 1.4% among all new TB cases and 12.1% among previously treated TB cases. Uganda was notifying 310 DR-TB cases annually, but due to poor linkage of the diagnosed patients and poor access to DR-TB treatment, only 63 of the estimated 1,010 DR-TB cases had been enrolled on treatment while approximately 300 DR-TB patients who had been detected over the previous four years were on the waiting list. The TSR for MDR-TB in Uganda was only 50, despite the small number of DR-TB patients on treatment. There was a lack of appropriate isolation spaces and only three sites (Mulago, Kitgum, and Arua, whose ward was a temporary structure) possessed admission facilities. Lack of treatment for the vast majority of DR-TB patients perpetuated ongoing transmission of DR-TB strains, posing a major threat to the community around these patients. Worse still, interventions to prevent MDR-TB were extremely weak or lacking in many MDR-TB facilities.

The NTLP was still grappling with lack of a nationally agreed-on DR-TB scale-up plan. There was limited access to drug sensitivity testing (DST), with no tracing of contacts of index DR-TB cases and limited expertise in DR-TB management. Furthermore, there were low levels of sputum follow-up examinations, high loss of specimens during transportation, lack of medicines, weak M&E capacity, and limited funding at both the NTLP central unit and district levels. High stigma toward DR-TB patients, due in part to limited community sensitization, and high mobility of populations were associated with high LTFU of DR-TB patients.

OVERVIEW OF THE TRACK TB PROJECT

The TRACK TB project was a five-year project established in 2013 to support the GOU's efforts to address the challenges described above and to reduce the burden of TB in Uganda. Specifically, the project was designed to:

- Enhance the NTLP's leadership and technical capacity for effective management of TB
- Implement an urban DOTS model for Kampala
- Implement an effective program for the management of MDR-TB
- Improve mechanisms for partner coordination for the Implementation of DOTS, TB/HIV, and MDR-TB Interventions

The project was implemented by MSH and two sub-partners: AIC and UCSF/CITC. In July 2017, the project received approval of additional funding of $831,869, thereby increasing the project budget from $12,275,135 to $13,107,004; its total life of

project by 3 months, from December 31, 2017, to March 31, 2018; and its performance period from 60 months to 63 months.

TRACK TB PROJECT START-UP AND IMPLEMENTATION

BASELINE PREPARATIONS AND PROJECT START-UP

Starting in June 2013, the TRACK TB core project staff embarked on securing office space and developing a first-year implementation plan; a budget for the period from January 14 to September 30, 2013; a branding strategy and marking plan; and a PMP, all of which were submitted to USAID for approval as required in the cooperative agreement. Alongside the development of project plans and budgets, the project core team embarked on engaging partners and stakeholders in order to introduce the new project and launch its work. After USAID approved the budget and work plan, the team recruited additional project staff. During the same time, the project coordinated a smooth transition of activities from the TB CARE I project (the bridging project between TB CAP and TRACK TB), which was implemented by the KNCV TB Foundation, based in the Netherlands. The main transition activities and process included supportive supervision, coordination of activities, quarterly TB review meetings, MDR-TB program implementation, engagement of an architect for renovation of MDR-TB sites, and absorption of MDR-TB treatment site personnel supported by TB CARE I. From June to August of 2013, the project worked with the NTLP to conduct an assessment of TB control and service delivery in the project-supported areas, as described above.

ROLES AND RESPONSIBILITIES OF PARTIES INVOLVED IN THE IMPLEMENTATION OF THE PROJECT

TRACK TB entered into a memorandum of understanding with the NTLP/MOH and KCCA. Again, since MSH was the principal agent in implementing the TRACK TB project, originally in conjunction with three sub-partners (AIC, Makerere School of Public Health, and UCSF/CITC), MSH entered into sub-agreements with these sub-partners before activity implementation. The sub-agreements stipulated roles and responsibilities, clear and detailed annual deliverables and targets, and reporting and funds disbursement modalities. However, MSH canceled the agreement with Makerere School of Public Health in PY3 due to issues of noncompliance.

TRACK TB PROJECT IMPLEMENTATION APPROACH

PROGRAM DESIGN PRINCIPLES.

TRACK TB was designed to manage all activities with a focus on improving quality of results and achieving set objectives while ensuring coordination and partnership; sustainability; involvement of TB patients and PLHIV; gender equity; collaborating, learning, and adapting; Global Health Initiative principles, including country ownership; prevention of corruption and fraud; and cost-effectiveness.

The project planned to achieve results by building on the successes of USAID's TB projects in Uganda and worldwide. MSH managed the project with a high level of flexibility and continuously adapted interventions in alignment with evidence and opportunities. The project built the leadership and technical capacity of the NTLP in Uganda to increase the CDR in USAID-supported districts while achieving a TSR of 85% in Kampala and other USAID-supported districts.

CONCEPTUAL FRAMEWORK: PROJECT APPROACHES AND STRATEGIES

Throughout the project implementation period, TRACK TB employed the Patient-Centered Approach, which combines the elements of improved quality and expanded access to make treatment effective (see Figure 1).

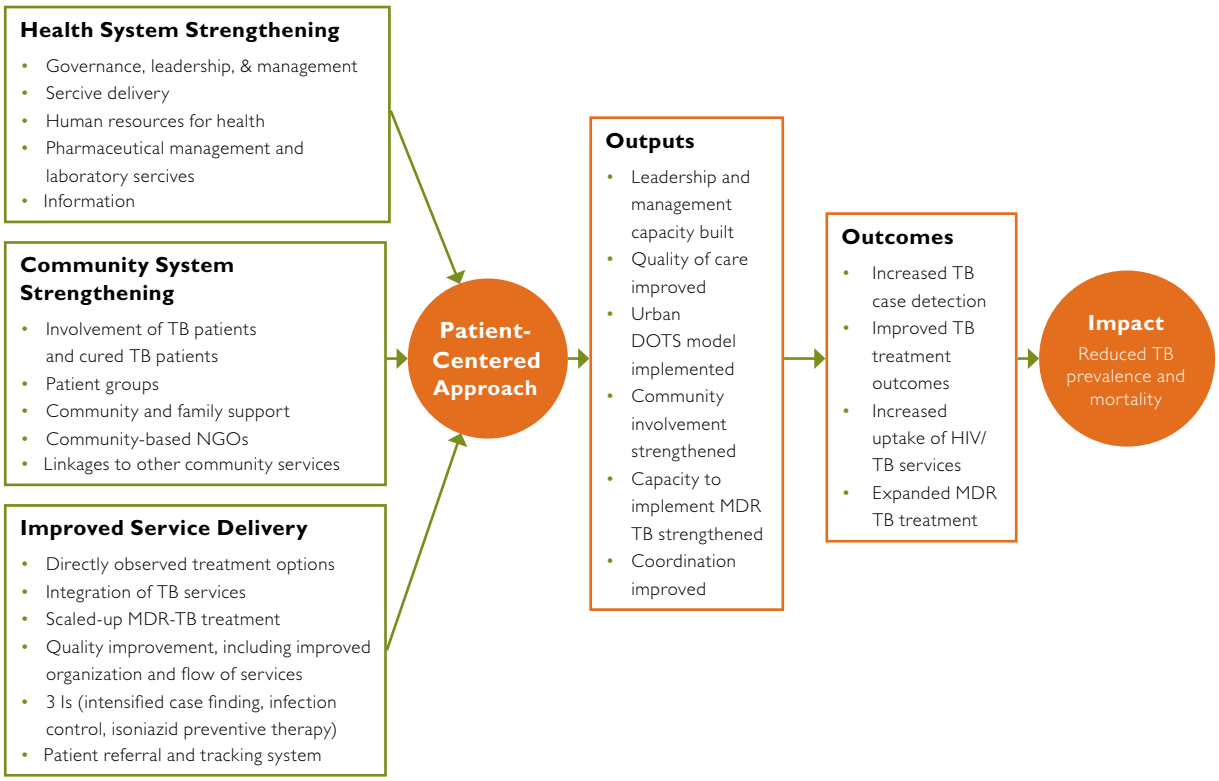
TRACK TB PROJECT VISION

Through work in the four results areas, the project envisioned all beneficiaries receiving patient-centered, high-quality TB care that leads to improved TB case detection and treatment success. Those outcomes, as well as increased uptake of TB/HIV services and expanded MDR-TB treatment, contributed to meeting national targets for reducing the burden of TB, TB/HIV, and MDR-TB.

GEOGRAPHIC FOCUS AND BENEFICIARIES

The TRACK TB project was designed to implement activities in Kampala and to provide specific support to the central unit of the NTLP. The project was to provide TA and coordination functions to 50 districts supported by USAID in the four regions (eastern, east central, southwestern, and mid-north) covered by the district-based TA partners, but it did not conduct direct implementation of activities there. The implementing partners included the Regional Health Integration to Enhance Services in Eastern Central Uganda-East (RHITES-East) project, working in 11 districts; RHITES-Eastern

Figure 1: Conceptual framework: project approaches and strategies



Central, working in 11 districts; RHITES-Southwest, working in 13 districts; and the Applying Science to Strengthen and Improve Systems (ASSIST) project, working in 15 districts in northern Uganda. The TRACK TB project provided direct TA and logistical support to the six MDR-TB treatment initiation sites (Mulago, Lira, Kitgum, Mbarara, Hoima, and Soroti) and indirect TA support to partner-supported sites.

TRACK TB PROJECT MONITORING, EVALUATION, AND PERFORMANCE

A PMP framework was developed to track progress in the implementation of TRACK TB planned activities; systematize the collection, collation, analysis, and use of data at various levels of project implementation; outline indicators to measure the overall performance of the project toward achievement of the set objectives and goals; outline the reporting requirements at various levels (project, national, and global levels); help management to focus their attention; facilitate evidence-based planning, decision-making, and review processes through use of findings derived from project implementation and M&E activities; and facilitate documentation and communication of successful interventions, challenges, and constraints encountered during project implementation. Table 1 summarizes the overall performance of TRACK TB in relation to the 2012 baseline and end-of-project targets; see Annex I for details. Under Intermediate Results area (IR) 1, it can be seen that only 7 out of the planned 11 operational research papers were developed. This is because the contract for Makerere School of Public Health, a sub-recipient assigned to lead this effort, was revoked due to noncompliance issues. In IR2, whereas 87% (39,243/45,301) of the targeted cumulative TB cases were notified in KCCA, TB case notification of all forms declined from 8,344 cases in 2011–2012 to 7,672 cases in 2016–2017; this represents a decline of 8.1% and is attributed to good ART coverage among HIV-infected patients, which reduced the proportion of patients with low immunity required for the development of active TB disease. Again, the targeted performance of 85% for cure and 90% for TSR were not achieved due to failure of health workers to obtain patient sputum samples for treatment monitoring. Under IR4, although the achieved DR-TB TSR of 74% in both 2013 and 2014 was above the global average of 50%, it fell short of the set target of 90%. This was due to high death rates—18% in the 2013 and 11% in 2014. The high death rates are attributed to: 1) enrollment of a large number of patients who had been on the waiting list for over four years, and 2) high LTFU, at 7% in the 2013 and 11% in 2014. Under IR4, CDR improved decimally from 49% to 50%, thereby falling short of the 70% target. This was mainly because most regional implementing partners focus on HIV as their primary mandate.

To ensure that the project was on course to meet its goals, objectives, and targets, the project had two formative evaluations—one internal and one external. These two evaluations provided guidance on the needed reprogramming, thereby contributing to the successful implementation of this project.

Table 1: TRACK TB overall project performance against targets

PMP Indicators	Baseline	Target	Achieved
IR1: NTLP leadership and technical capacity for effective TB control enhanced			
1.1.1. NTLP annual work plan developed and implemented	0	70%	83%
1.1.2. Districts submitting timely reports to NTLP (by 28th of next month)	87%	100%	94%
1.1.3. No. of quarterly and annual NTLP reports produced and disseminated	0	19	19
1.2.1. No. of OR papers produced and disseminated with NTLP/ TRACK TB support	0	11	7
IR2: Urban DOTS model in Kampala implemented			
2.1.1. Case notification (all TB types) in KCCA (cumulative)	8,344	45,300	43,801
2.1.2. TSR–new smear-positive TB cases in KCCA	62%	90%	86%
2.1.3. Cure rate–new smear-positive TB cases in KCCA	42%	85%	77%
2.1.4. % new smear-positive TB patients with sputum exam at 2nd month in KCCA	49%	80%	75%
2.1.5. Proportion of category II patients with sputum culture/ GeneXpert test result	25%	100%	64%
2.1.6. No. of registered health facilities providing TB services in KCCA	38	100%	97
2.2.1. % TB patients tested for HIV	78%	100%	99%
2.2.2. % TB/HIV co-infected patients who received CPT/dapsone in KCCA	93%	100%	99%
2.2.3. % TB/HIV co-infected patients who received ART in KCCA	52%	100%	95%
2.3.1. % TB patients under DOT in KCCA	6%	80%	92%
IR3: Quality program for the management of DR-TB implemented			
3.1.1. NTLP PMDT annual work plan developed and implemented	0	100%	91%
3.1.2. No. of quarterly and annual MDR-TB reports produced and disseminated	0	19	18
3.1.3. No. of MDR-TB treatment initiation sites	3	15	15
3.2.1. No. of confirmed MDR-TB cases enrolled on treatment (cumulative)	63	1,322	1,411
3.2.2. TSR–MDR-TB cases	50%	90%	74%
3.2.3. Cure rate–MDR-TB cases	0	70%	69%
3.2.4. % MDR-TB patient contacts traced and screened for TB symptoms	0	100%	100%

PMP Indicators	Baseline	Target	Achieved
IR4: Coordination, implementation of DOTS, TB/HIV, and DR-TB interventions improved			
4.4.1. CDR–new smear-positive TB cases in partner-supported sites	49%	70%	50%
4.4.2. Case notification–all forms of TB in partner-supported sites	15,901	89,520	71,437
4.4.3. TSR–new smear-positive TB cases in partner-supported sites	83%	90%	85%
4.4.4. % TB patients tested for HIV in partner-supported sites	88%	100%	99%
4.4.5. % TB/HIV co-infected patients on CPT/dapsone in partner-supported sites	94%	100%	99%
4.4.6. % TB/HIV co-infected patients who received ART in partner-supported sites	46%	100%	94%

LESSONS LEARNED FROM PROJECT START-UP AND IMPLEMENTATION

Capacity building for NTLP requires ongoing dialogue with existing staff to realize achievements. Continuous and sustained quality improvement through mentoring and coaching of multi-disciplinary teams at the regional, district, and health facility levels is critical for capacity building and team motivation for improved quality of TB care. CQI approaches achieve better results and ownership than traditional supportive supervision.

Community-based DOT in an urban setting is feasible and can achieve desired patient outcomes despite high population mobility. However, to have effective referrals of presumptive TB patients (PTPs) from the community, it is necessary to incentivize community leaders (mobilizers) and provide transport refunds so the PTPs can reach diagnostic laboratories for further evaluation. In addition, effective coordination of TB care and prevention services in a city is best achieved through involvement of all key players from government, civil society, and the private sector.

To have an effective PPM DOTS program requires engaging private health facility owners and understanding their operational challenges related to TB patient care while exhibiting high degrees of flexibility when working with them. These private health facilities, especially the private for-profit facilities, play a critical role in providing DOT to both drug sensitive-TB and DR-TB patients. However, close supervision to ensure full DOT and proper accountability and storage for drugs is required. It has also been proven that management of DR-TB patients needs to be coordinated within districts and local authorities to ensure that diagnosed patients are linked to care and those lost to follow-up are traced, put back on treatment, and counselled to maximize adherence. Better still, using the National Identification Number as a unique identifier in the national database can help prevent patients from changing names when they leave one treatment site and reappear at another. Sustained coordination and engagement of partners at all levels are key in achieving rapid and standardized implementation of national priorities and policies as well as achieving TB/HIV targets.

APPLICATION OF INNOVATIVE TOOLS AND APPROACHES

Some innovations that help TRACK TB and its partners to achieve results are described below.

THE URBAN DOTS MODEL. In Kampala, a customized urban DOTS model for TB control improved TB treatment outcomes. The Urban DOTS Model is a framework for a harmonized approach that involves implementation of a comprehensive spectrum of TB control interventions: strengthening providers' skills; improving community TB awareness, referral, and linkages through engagement of CLFs; and applying CQI approaches to improve TB control at all levels, in line with WHO recommendations. Implementation of this model was overseen by the KCTF. The Track TB project served as the secretariat of the KCTF and provided strategic, technical, and operational guidance toward improved coordination, planning, supervision, supply chain management, and reporting at the district and municipality levels. In addition, the task force supported development, updating, review, and dissemination of the national tools for DOTS implementation. Other members of the KCTF included the Infectious Diseases Institute (IDI), AIC, the CHC project, the NTRL, the International Union Against Tuberculosis and Lung Disease, the Foundation for Innovative New Diagnostics (FIND), DTLS, and community supervisors.

TECHNICAL ASSISTANCE TO IMPROVE MANAGEMENT OF MDR-TB. The quality of PMDT, enrollment rates, and treatment outcomes improved with implementation of an MDR-TB mixed model of care that involves brief periods of hospitalization followed by a long period of ambulatory/clinic-based care. Patients who are severely ill or not within the immediate catchment area of the treatment initiation hospital were admitted for 1–8 weeks and thereafter were transferred for ambulatory care to a DOT FUF near their homes. In addition, an effective MDR-TB minimum package included strengthening of healthcare providers' skills, improved access to patient investigation/treatment monitoring, patient psychosocial support, food and transport support, availability and improved management of TB commodities, a health management information system (HMIS; provision of tools, training, and computers), strengthening of TB IC practices, facilitation of the ambulatory care model, and general hospital administrative support (air time, internet connectivity, and office supplies). Capacity building was further enhanced with the addition of the ECHO platform, a videoconference learning network that was introduced to link a network of 15 MDR-TB sites to ease discussion of complex cases by the national expert panel and other consultants, conduct cohort reviews, and seek solutions for emerging challenges. Technical support was provided by UCSF/CITC during the implementation period.

DR-TB MANAGEMENT INFORMATION SYSTEM (MIS). TRACK TB championed the development of the Uganda DR-TB MIS, a web-based platform that allows data access from anywhere. This platform was rolled out in all MDR-TB sites and greatly improved the timeliness, completeness, and accuracy of DR-TB data. This DR-TB DHIS 2 module mirrors the individual DR-TB patient treatment card, and all variables from the paper recording form are included in the electronic system. In addition, the system includes forms to record programmatic management activities such as household assessment, contact tracing, adherence interventions, and use of enablers. Other project innovations are described under their respective technical results areas below.

RESULT AREA 1: ENHANCED NTLP LEADERSHIP AND TECHNICAL CAPACITY FOR EFFECTIVE TB CONTROL MANAGEMENT

BASELINE PERFORMANCE GAPS AND CHALLENGES

At TRACK TB project's inception in 2013, the NTLP faced numerous challenges. There was weak leadership and technical capacity for effective TB control. The NTLP lacked capacity to monitor work plan implementation and dissemination of program reports. In addition, there was poor absorption of GF funds and a weak data system, resulting in lack of information to guide planning and decision-making. Similarly, gaps in the quality of data and delays in reporting to the central MOH affected the country's TB program performance. The proportion of districts submitting timely TB reports to the NTLP was 87.2%. At the same time, the NTLP was faced with challenges of weak systems for health service delivery and inadequate financial and human resources at both the national and subnational levels. Zonal TB/Leprosy supervisors and DTLS were underperforming due to lack of skills, insufficient funding, and heavy workloads. A shortage of health workers and lack of skilled supervisors affected the NTLP's ability to conduct supportive supervision and mentoring, restricting its ability to build capacity for effective TB control.

As discussed above, the NTLP strategic plan had not been finalized and lack of a comprehensive annual operation plan to engage partners resulted in poor coordination of implementing partners and inconsistent implementation of country policies and priorities. At the community level, few civil society organizations were involved in TB prevention and care interventions, which contributed to weak community engagement in TB control activities. In addition, there were delays in adopting new policies. The TRACK TB project strengthened the leadership and technical capacity at the NTLP to effectively coordinate the national TB response and ensure a harmonized approach in implementation through the following strategic interventions.

PRIORITY INTERVENTIONS AND STRATEGIES

- Provide TA to strengthen the NTLP's leadership and its capacity by functionalizing the NCC for TB and advocating for the necessary human resources for TB control
- Build NTLP leadership capacity through implementation of the Management and Organizational Sustainability Tool (MOST) for TB for action planning
- Provide TA to the NTLP in planning and performance reviews, including revision and dissemination of the NTLP strategic plan

- Provide TA to GF-funded activities, ensuring optimal absorption and efficient use of GF resources for TB control
- Assist the NTRL to decentralize EQA for TB diagnostic services to four RRHs
- Provide TA for scale-up and application of CQI methodologies by the NTLP and partners
- Support the NTLP in implementing the one-stop-shop model of care for TB/HIV co-infected patients; promote implementation of TB IC and IPT at the national level; and integrate TB into reproductive, maternal, newborn, and child health and diabetic clinics
- Provide TA to the NTLP's M&E unit to integrate TB reporting into DHIS 2 and support analysis of data from DHIS 2 to increase the timeliness and accuracy of TB reports

KEY ACHIEVEMENTS

SUPPORT NTLP LEADERSHIP AND CAPACITY ENHANCEMENT IN TB CONTROL

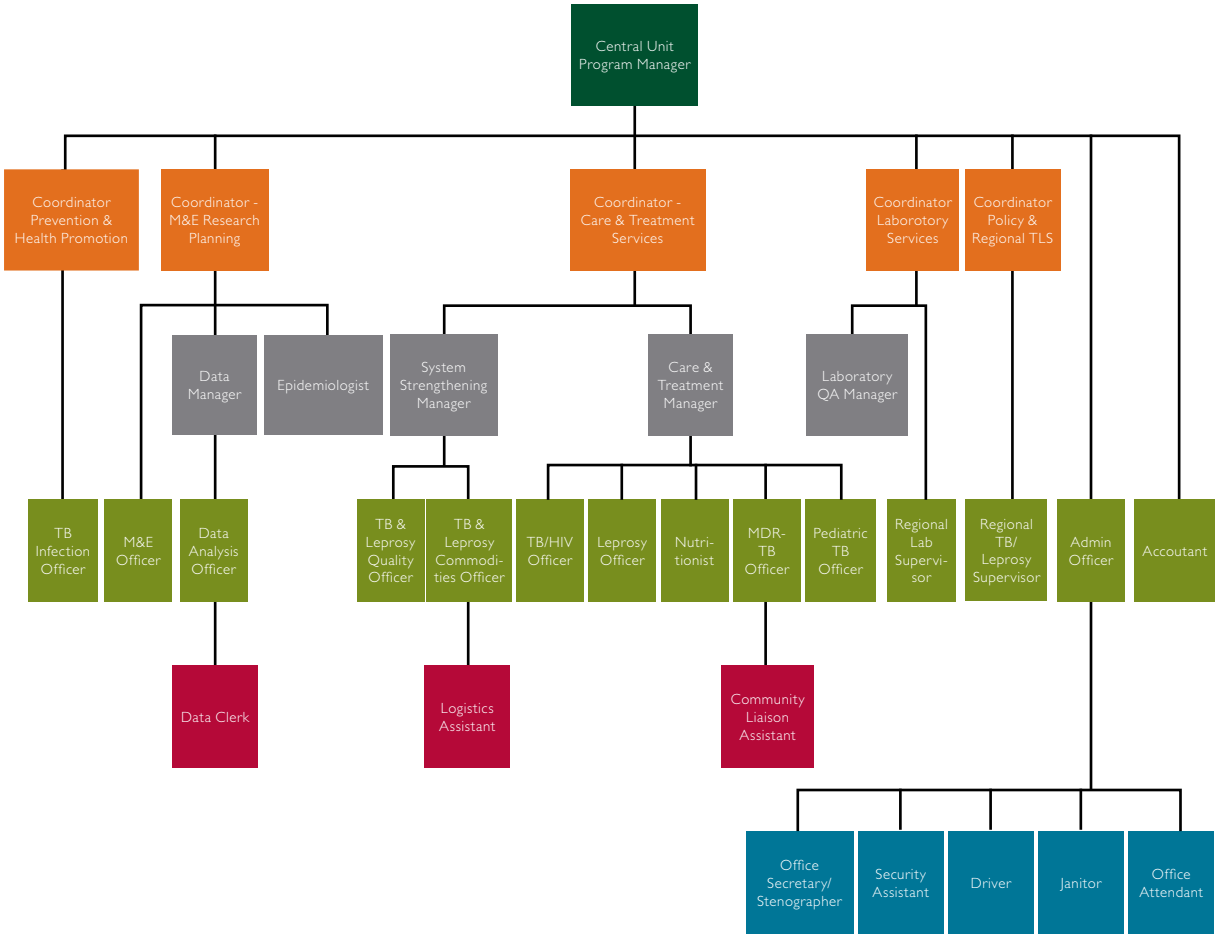
TRACK TB provided TA to the NTLP to functionalize the NCC for TB to advocate for additional funding and the necessary human resources for TB control, as well as implement the MOST for TB action plans.

Established the NCC for TB. The project provided TA to the MOH to establish the NCC for TB. The MOH, through the NCC, achieved high level and regular oversight of the TB control program and increased accountability by the NTLP. This resulted in the national level dissemination of the TB prevalence survey results and the development of district action plans for TB based on the TB survey results, among other achievements

Strengthened human resources for health. TRACK TB, in collaboration with the Strengthening Human Resources for Health Activity, supported the NTLP in revising its structure to effectively deliver on its mandate. The project advocated for the MOH's approval and disseminated the revised structure to high-level decision-makers in the MOH, public service, and Ministry of Finance, as well as development partners and key stakeholders to commit resources to fill the proposed staffing positions (figure 2). The advent of this new structure brought about an increase in the number of NTLP staff from 3 in 2012 to 42 (71.2 %) in 2017 out the 59 positions in the revised structure (figure 2 and annex 7).

Applied the MOST for TB tool to improve NTLP leadership, planning, and implementation. TRACK TB, in collaboration with the NTLP Central Unit, conducted stakeholder workshops during which the MOST for TB action plans were developed, including identification of new priorities. Following the review of the MOST for TB action plan, stakeholders identified priority management components to be addressed in the subsequent financial year. These include strategic planning, M&E, supervision, human resource management, supply chain management, advocacy, and communication and social mobilization. A review of the MOST for TB action plan shows that almost all (29/31 or 93%) of the priority activities in the MOST for TB action plan for 2016–2017 were implemented (annex 2). TRACK TB shared findings of the review with the NTLP and stakeholders.

Figure 2: The revised NTLP staffing structure



SUPPORT PROGRESS IN IMPLEMENTATION OF THE MOST FOR TB ACTION PLAN

Progress was made in six areas:

1. **Strengthened strategic planning:** The final draft of the strategic plan was printed, launched, and disseminated.

2. **Strengthened M&E:** Electronic registers were introduced in KCCA and the DR-TB MIS at MDR-TB facilities. The NTLP now conducts regular data quality audits and quarterly regional data cleaning, with support from the Monitoring & Evaluation of the Emergency Plan Progress project. In addition, the project supported TB data integration into DHIS 2, which contributed to the reduction in discrepancies between DHIS 2 and paper-based data from 20% to 5%.

3. **Strengthened supply chain management:** The stock status reports from DR-TB initiating facilities are now available and the NTLP has rolled out the web-based ordering system for TB medicines at the national level. This will facilitate timely commodity ordering and ascertainment of stock status at all levels, including at the National Medical Stores. The TB order form was integrated into the web-based ordering system.

4. **Strengthened human resource management:** Two of the four areas of improvement were initiated by end of May 2015. Functional analysis, job analysis, and capacity assessment were done. This assessment resulted in the creation of a revised NTLP structure, which has brought about an increase in the number of NTLP staff from 3 in 2012 to 42 in 2017, meaning that 71.2 % of the 59 positions in the revised structure are filled.

5. **Strengthened advocacy, communication, and social mobilization (ACSM):** A number of TB IEC materials have been developed and disseminated at the central level, with support from the CHC project. TB stakeholders were also involved in the development of the ACSM strategy.

6. **Strengthened supervision:** Progress has been achieved regarding central-level supervision activities and sharing of supervision findings and recommendations. Implementing partners supported regional and district supervision, but monitoring of this support and availability of supervision schedules at the regions and districts are limited. Currently, most implementing partners support two-day performance reviews in the regions, which have enabled the validation of district TB data and timely submission of these data to the MOH Resource Centre.

STRENGTHEN THE CAPACITY OF THE NTLP IN PLANNING AND REVIEWING PERFORMANCE IN TB AND LEPROSY CONTROL

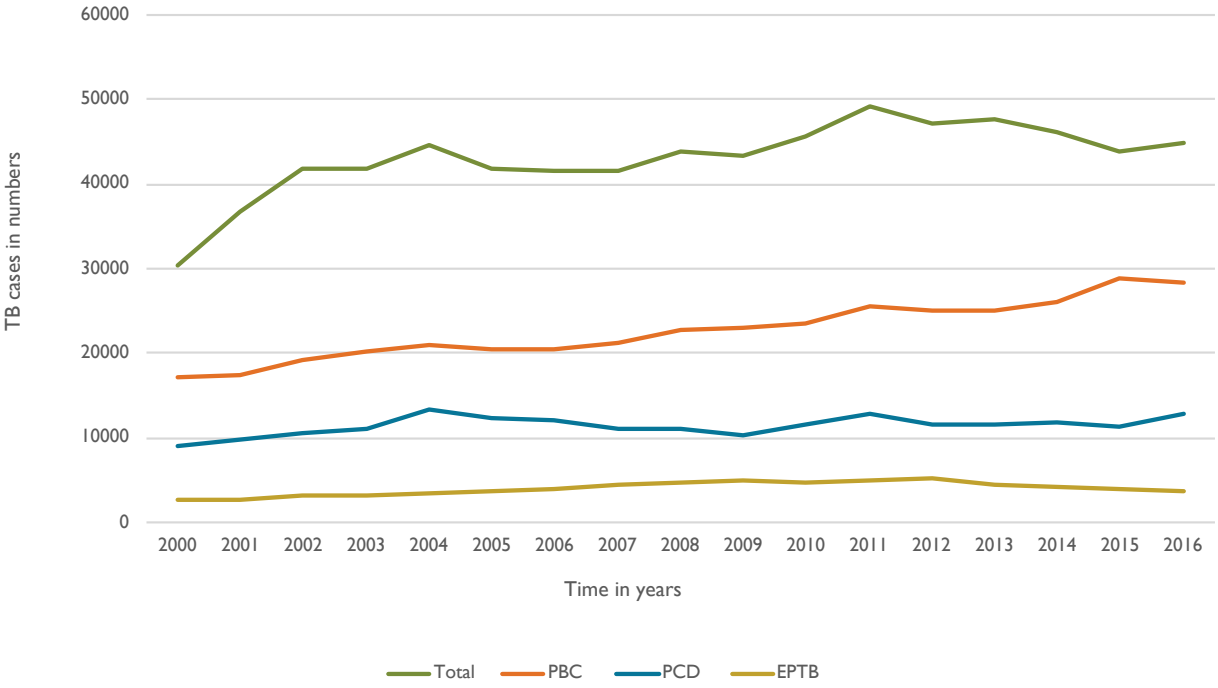
TRACK TB provided TA to the NTLP and partners to revise the strategic plan for 2015/16–2019/20 to incorporate findings of the recent national TB prevalence survey and to revise strategies and targets to address the expanded TB epidemic as well as to align the National Strategic Plan (NSP) to the WHO End TB strategy. Annual operational plans and priorities for TB control were compiled and shared with the implementing partners to guide their planning and ensure a harmonized approach in implementation. As a result, the proportion of work plans developed and implemented by the NTLP improved from 70% to 83%. The project also supported the NTLP to produce annual reports to update all TB stakeholders on progress in the implementation of TB control activities, and a total of 19 quarterly and annual reports out of the 19 targeted were produced and disseminated. In addition, the project coordinated quarterly performance reviews at the national and regional levels to discuss performance in TB control, validate TB data collected, and ensure timely reporting of quality TB data to the MOH. This coordination has improved the timeliness of reporting through DHIS 2 to 95% in 2017 from 87.2% in 2012. With support from TRACK TB, 7 out of 11 targeted operations research papers were jointly written and disseminated.

Additionally, the project coordinated supportive supervision and mentoring activities at the central level and in the districts and health facilities, in collaboration with the regional implementing partners, to improve performance of health facilities and districts in TB service delivery.

Figures 3 and 4 summarize the country's performance in TB control indictors. The national case notification rate improved steadily from early 2000 to 2011 but then declined over the next five years. The proportion of bacteriologically confirmed TB, however, increased over the same period (figure 3). This

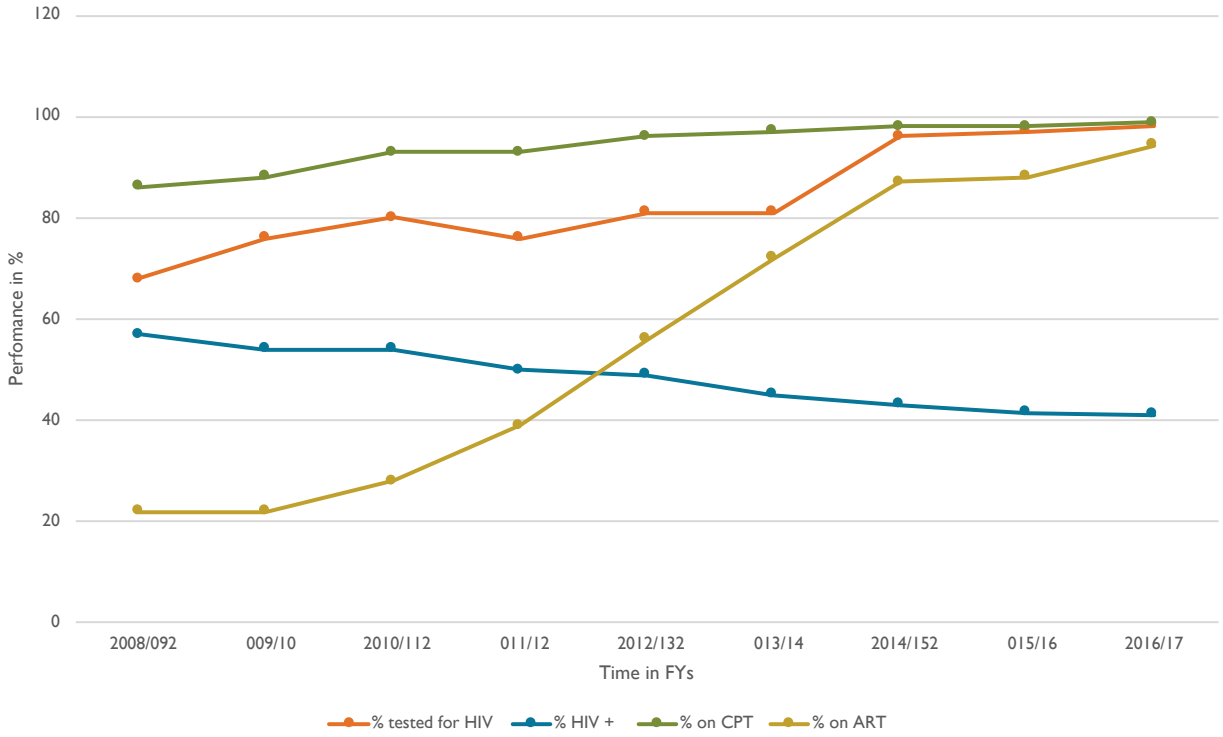
was largely due to low clinical capacity on the side of health workers coupled with poor access to diagnostic tool such as X-rays to support diagnosis of both clinically diagnosed and extrapulmonary TB. Efforts should therefore be made to improve clinical and investigative capacity to support diagnosis of extrapulmonary TB and clinically diagnosed TB to improve TB case notification. The proportions of TB patients tested for HIV and TB/HIV co-infected patients started on co-trimoxazole and ART have improved significantly over the last five years (figure 4). These efforts should be maintained to improve the quality of care for TB/HIV co-infected patients.

Figure 3: Trends in national TB notification by calendar year, 2000–2016



Data source: Unit TB registers

Figure 4: Trends in national TB/HIV service uptake by fiscal year (FY), 2008/09–2016/17



Data source: Unit TB registers

ASSIST THE NTLP TO IMPROVE RESOURCE MOBILIZATION AND OPTIMIZE USE OF GF RESOURCES FOR TB CONTROL

The TRACK TB project provided TA to the NTLP to mobilize GF resources by providing technical input during the GF joint TB/HIV grant applications for 2015–2017, responding to the Technical Review Panel's comments, and participating in the grant-making process and the follow-on grant for the period 2018–2010. As a result, the country made successful applications to the GF and a total of $21 million was approved for TB control during the respective grant periods.

The project also provided TA in implementation of the GF work plan, ensuring optimal and efficient utilization of GF resources by coordinating implementation of planned activities and contributing in compiling the performance updates and disbursement request. The project team also provided technical support in addressing pre-conditions for funding (e.g., the development of the GeneXpert expansion plan and the NTLP capacity building plan). As a result, the utilization of the GF grant has improved from 72% to 92%.

SUPPORT THE NTLP AND PARTNERS TO APPLY CQI METHODOLOGIES

The TRACK TB project provided technical support to the NTLP in development of a quality improvement system for TB care at the districts and health facilities. A quality improvement manual for TB care and accompanying tools were produced and disseminated to the RPMTs, DTLSs, and

partners to guide health workers to implement quality improvement initiatives in TB care.

In collaboration with the implementing partners, the project conducted facility assessment and mentorship at all 15 MDR-TB treatment facilities to review performance and institute CQI projects to address gaps in MDR-TB care. The facility teams were also trained in quality improvement approaches to provide them with the knowledge and skills to implement CQI initiatives in MDR-TB care. Figure 5 shows the status of quality of MDR-TB care at MDR-TB facilities during the quarter of April to June 2017.

Figure 5: Dashboard for quality of MDR-TB care at treatment initiation facilities, April–June 2017

MDR TB care performace dashboard (April—June 2017)								
Legend								
	0-59%		**60-89%**		**90-100%**		**No data**	
No. FACILITY	**Previously treated TB cases with Gene Xpert test/DST**	**Diagnosed MDR-TB patients enrolled on SLDs**	**MDR-TB patients started on treatment with baseline culture/ DST**	**MDR-TB patients in care who are adhering on treatment**	**MDR-TB patients with monthly smear and culture results**	**MDR-TB patnets with contacts traced and screened for TB**	**MDR-TB/ HIV co-infected patients in care started/ receiving ART**	**MDR-TB patients in care assessed for nutritional status**
1. Soroti RRH	100%	100%	100%	100%	100%	100%	100%	100%
2. Iganga hosp.	100%	100%	100%	100%	75%	100%	100%	100%
3. Mbarara RRH	100%	67%	100%	100%	83%	100%	100%	100%
4. Lira RRH	83%	100%	100%	100%	73%	100%	100%	100%
5. Kitgum hosp.	100%	100%	100%	67%	67%	67%	100%	67%
6. Kabale RRH	0%	100%	100%	100%	100%	100%	100%	100%
7. Arua RRH	64%	0%	92%	75%	75%	75%	100%	83%
8. Matany hosp.	100%	100%	33%	83%	83%	100%	100%	100%
9. Mulago NRH	83%	100%	71%	100%	59%	88%	90%	100%
10. Hoima RRH	67%	100%	100%	50%	75%	100%	67%	75%
11. Fort Portal RRH	75%	100%	25%	100%		100%	100%	50%
12. Gulu RRH	50%	100%	100%	67%	100%	0%	100%	100%
13. Mubende RRH	92%	0%	100%	100%	0%	100%		100%

MDR TB care performace dashboard (April—June 2017)								
Legend	**0-59%**		**60-89%**		**90-100%**		**No data**	
No. FACILITY	**Previously treated TB cases with Gene Xpert test/DST**	**Diagnosed MDR-TB patients enrolled on SLDs**	**MDR-TB patients started on treatment with baseline culture/ DST**	**MDR-TB patients in care who are adhering on treatment**	**MDR-TB patients with monthly smear and culture results**	**MDR-TB patnets with contacts traced and screened for TB**	**MDR-TB/ HIV co-infected patients in care started/ receiving ART**	**MDR-TB patients in care assessed for nutritional status**
14. Masaka RRH	42%	100%	67%	67%	33%	67%	67%	67%
15. Mbale RRH	100%	100%	50%	100%	0%	50%	0%	100%

Data source: TRACK TB project reports

SUPPORT COORDINATION AND PLANNING FOR TB/HIV INTEGRATION BY THE NTLP AND NATIONAL AIDS CONTROL PROGRAM

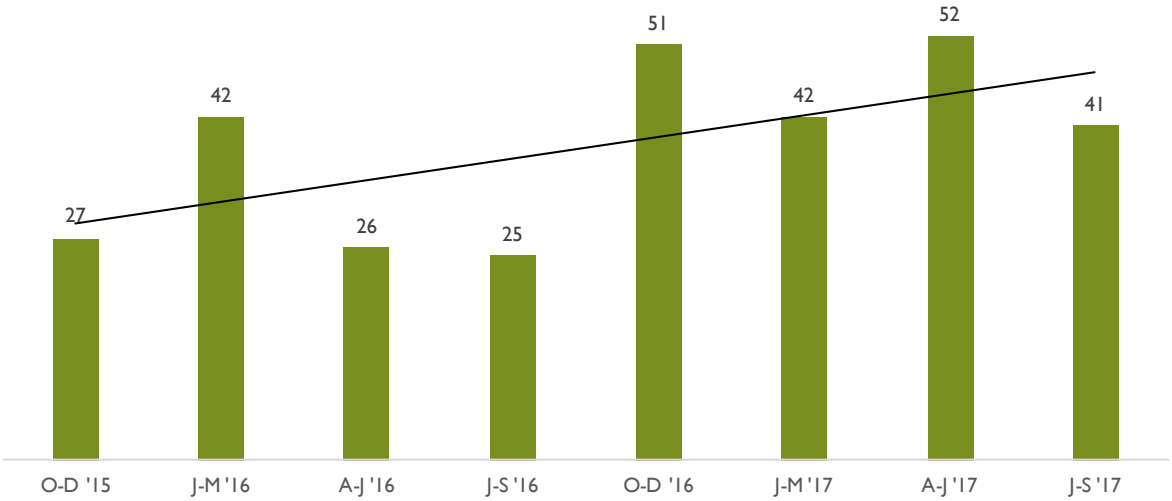
The project supported the MOH to finalize SOPs for the TB/HIV integrated model, coordinated capacity building for TB IC, and advocated for intensified TB case finding among PLHIV. The following were the achievements.

The project initiated revision of the TB/HIV training manual and developed an implementation strategy and plan for the one-stop-shop model. More than 180 health workers in Jinja, Moroto, and Mbarara regions were trained on the updated pediatric TB/PMTCT guidelines and SOPs. Of the 1,063,462 PLHIV in care, 1,037,896 (98%) were assessed for TB, 54,730 (5%) were diagnosed with TB, and of those with TB 15,605 (29%) were enrolled on TB treatment.

Health units across the 12 regions of the country that reported TB patients who were health workers (figure 6) were assessed for TB infection risk and assisted to develop IC plans. The findings showed that the health units were not prioritizing airborne IC measures. The project will support the NTLP to finalize and disseminate SOPs on TB IC to improve TB IC at health facilities.

An annual occupational assessment for TB and other chronic illnesses was also conducted for 306 health workers at MDR-TB treatment hospitals. Of those, 31 (14%) were HIV positive and 16 (7%) had TB symptoms, but none were diagnosed with TB or diabetes. In addition, 244 health workers at MDR-TB treatment hospitals were trained on respirator fit testing.

Figure 6: Quarterly national TB trends among health workers, Oct 2015– Sept 2017



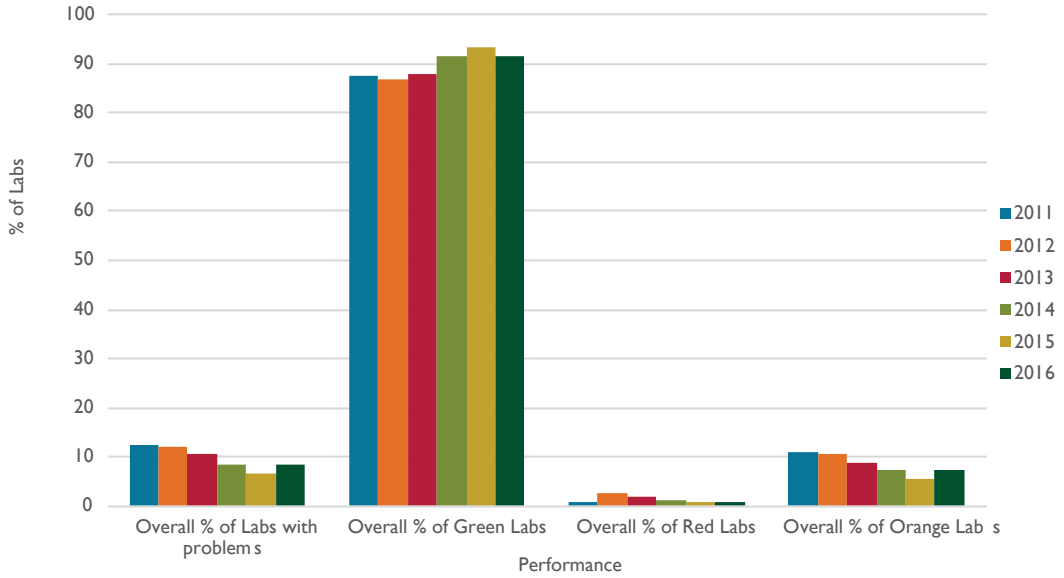
Data source: TRACK TB project reports

SUPPORT THE DECENTRALIZATION OF EQA AND GENEXPERT

In PY5, the TRACK TB project supported the regional laboratory teams to pilot decentralization of EQA in the four RRHs of Gulu, Arua, Hoima, and Mbarara. The project procured and distributed equipment to support the EQA scheme and conducted EQA trainings at the four RRHs. A total of 42 laboratory staff were trained (10 staff per facility, on average). The project also engaged the regional implementing partners in a consultative meeting on implementation of EQA decentralization in which they agreed to support regional staff to carry out quarterly supportive supervision/ mentoring of the peripheral district labs.

In addition, the project supported orientation training of the regional lab staff to carry out targeted EQA supervision and mentorship. A total of 16 RRH staff were trained (4 staff per RRH); 6 laboratory technologists of the regional implementing partners and 8 district laboratory focal persons were also trained. At least four districts and two health facilities per district in each region were visited and mentored. Figure 7 and annex 8 show EQA lab performance; red labs have four or more errors, orange labs have 2–3 errors, and green labs have 0–1 error(s). The proportion of labs with errors decreased from 12.2% in 2012 to 8.5% in 2016.

Figure 7: National EQA lab performance, 2011–2016



Year	2011	2012	2013	2014	2015	2016
Overall % of labs with problems	12.3	12.2	10.7	8.4	6.5	8.5

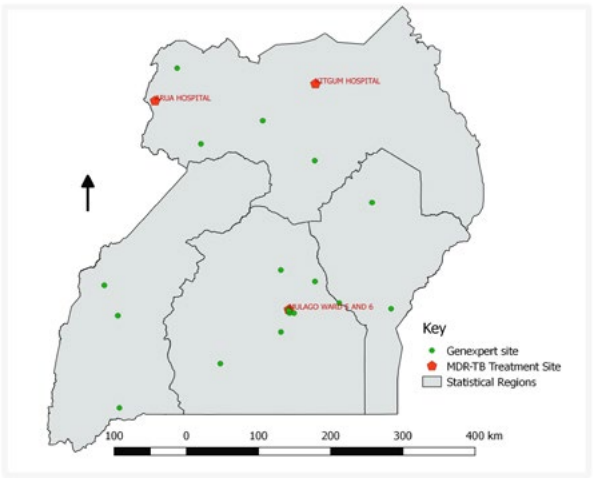
Data source: NTRL databases

SUPPORT GENEXPERT IMPLEMENTATION

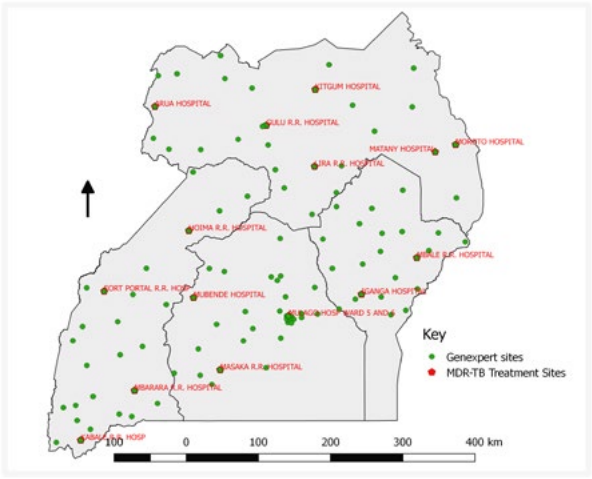
Although GeneXpert implementation was not a direct mandate of TRACK TB, the project supported surveillance efforts by encouraging the use of GeneXpert to screen previously treated patients and the linkage of diagnosed patients to treatment initiation sites. In addition, the project supported the installation of 29 GeneXpert machines and power backup systems procured by USAID, contributing to a total of 131 Xpert MTB/RIF machines installed in 2017 versus 24 in 2012 (figure 8).

Figure 8: Maps showing distribution of GeneXpert and DR-TB initiation sites in 2012 and 2017

GeneXpert and DR-TB sites in 2012



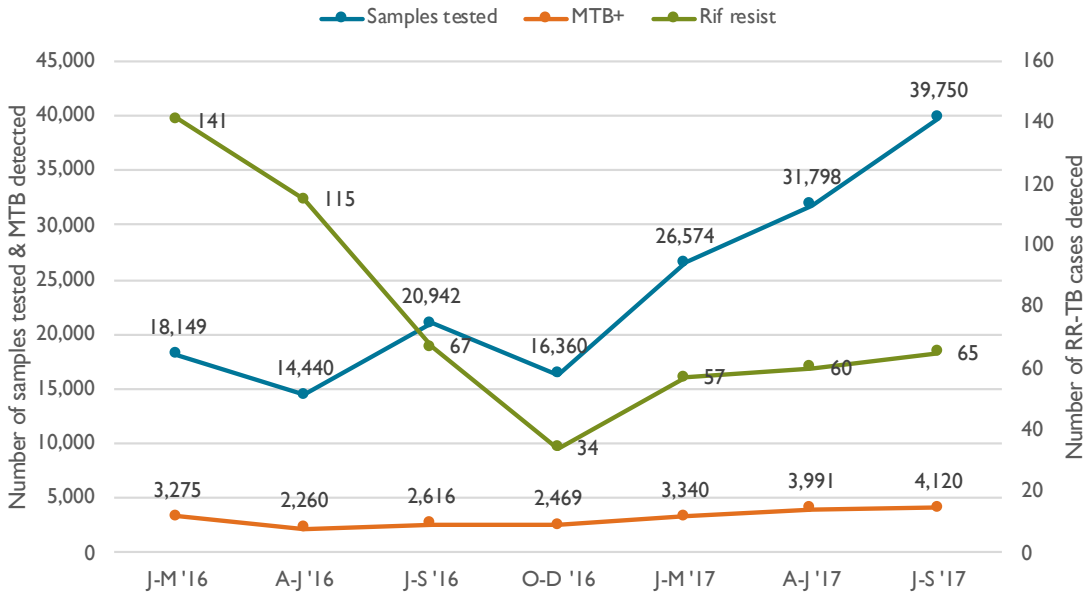
GeneXpert and DR-TB sites in 2017



Data source: NTRL databases

TRACK TB supported orientation of health workers in GeneXpert technology and reporting of GeneXpert data through GxAlert. The project also supported development and dissemination of TB diagnostic algorithms at health facilities. This led to improvements in utilization of GeneXpert utilization, which improved from two to six tests per day (figure 9). From January 2016 to September 2017, a total of 168,013 sputum samples were tested, from which 22,071 TB cases were detected, of which 539 were rifampicin resistant. GxAlert reporting of results improved from 0% to 40%, which enhanced DR-TB surveillance and linkage of patients through quick identification of newly diagnosed patients across the country. MDR-TB patient linkage also improved, from 60% during the pre-GxAlert era in 2013 to 80% following the introduction of GxAlert in 2015 and subsequently to 95% in 2017.

Figure 9: Quarterly national trends in TB diagnosis by GeneXpert, 2016–2017



Data source: NTRL databases

STRENGTHEN M&E SYSTEMS AT THE NTLP

TRACK TB has worked with the NTLP to build health workers' capacity to report through DHIS 2. A total of 75 officers at the NTLP, RPMTs, and partners were trained on DHIS 2 integration during a national training of trainers. Through collaboration with the partners, a total of 1,101 health workers in seven regions and eight districts have currently been trained in DHIS 2 integration. The project developed terms of reference and coordinated performance review meetings in collaboration with the NTLP M&E team, RTLPs, and implementing partners in the region. This has improved timeliness in reporting through DHIS 2 to 75% in 2016–2017 and allowed districts to exchange and validate TB data on treatment outcomes. Discrepancies between DHIS 2 and paper-based data were reduced from 20% to 5%. The follow-on Defeat TB project will need to follow up with regional implementing partners to ensure that all regions and districts are trained by the end of the year.

PROVIDE TA FOR OTHER ACHIEVEMENTS

TRACK TB supported the development, printing, and dissemination of the DR-TB guidelines and the development of short-regimen protocols for DR-TB. The project, in conjunction with WHO and the Uganda Stop TB Partnership, supported the NTLP in developing a national action plan to scale up PPM for TB control. The PPM DOTS activities in the National Action Plan were subsequently incorporated into the Global Fund Concept Note for 2018–2020.

LESSONS LEARNED

Capacity building for the NTLP required ongoing dialogue with staff to realize the achievements above. Consistent mentoring and coaching of multidisciplinary teams at health facilities are critical for capacity building and team motivation for improved quality of TB care.

CHALLENGES AND RECOMMENDED NEXT STEPS

Although data accuracy has improved tremendously over the project's life, there is still a 5% discrepancy in the accuracy of reports sent through DHIS 2. Discrepancies have been noted between reports directly sent by the RPMTs to the NTLP as compared to those sent through DHIS 2. TRACK TB will continue to work with the NTLP to scale up capacity building of health workers to report accurate and timely data through DHIS 2.

RESULT AREA 2: IMPLEMENTATION OF AN EFFECTIVE URBAN DOTS MODEL IN KAMPALA

BASELINE PERFORMANCE GAPS AND CHALLENGES

While Kampala City is home to 18% of the TB patients in the country, only 38 health facilities were reporting TB cases to Kampala City authorities. It was thought that TB diagnosis and treatment were taking place in 18 other facilities, especially in the private sector, that did not report to the national program. The low number of DTUs and reporting facilities resulted in a low TB CDR and low case notification. Prior to TRACK TB implementation (2012), a total of 8,344 TB patients were notified, of whom 3,839 (46%) were sputum smear-positive; approximately 9% of these were previously treated cases. TB case notification in Kampala has persistently been above 100%, since more than 30% of the TB patients registered in Kampala come from other districts.

Other challenges that affected TB care and prevention include poor laboratory performance in TB diagnostic services with high error rates and poor involvement of the private health sector. In addition, the population in Kampala, as in any urban setting, is highly mobile, which made case holding and direct observation of patients initiated on treatment (i.e., DOT) a challenge. In 2012, 6.1% of the patients were on facility-based DOT while 6% were on community-based DOT. Low DOT coverage in KCCA meant that many TB patients were not monitored for treatment adherence, resulting in a low TSR of 62%, cure rate of 42%, and one of the highest LTFU rates in the country, estimated at 21% among all patients initiated on treatment. Approximately 78% of all the TB patients had documented HIV results in the unit TB registers and 59% of those tested were co-infected with HIV. Co-trimoxazole and ART coverage among those co-infected with TB/HIV were 93% and 52%, respectively.

TB data systems and records management at both health facility and divisional levels were poor; registers were not updated in a timely manner, which led to late, inaccurate, and incomplete reporting to the district and national program. Health facilities lacked dedicated teams for TB services, which made delivery of TB/HIV services at this level very weak. The community was involved only at the household level, where TB patients were registered, and patient support activities such as DOT that happened at this level were not monitored.

Data from 42 health facilities assessed at baseline in the five KCCA divisions showed that 64% (27/42) were not using DOT to monitor patients on TB treatment, 50% (21/42) did not have an IC committee, 50% (21/42) did not regularly provide masks and/or tissues to patients presumed to have TB, and 45% (19/42) had no IEC materials on TB. In addition, 14% (6/42) of the facilities run by government and private not-for-profit agencies did not have streptomycin. TB patients' perceptions and practices at baseline indicated that most patients (94%) identified cough

as a symptom of TB; however, only 39% of patients sought treatment for cough at a public health facility. The most common factors that influenced patients' choices of which facility to attend for TB treatment included accessibility (32%) and confidence in the facility's ability to cure them (28%). Forty percent of the respondents reported that they were not willing to be supervised during TB treatment.

PRIORITY INTERVENTIONS AND STRATEGIES

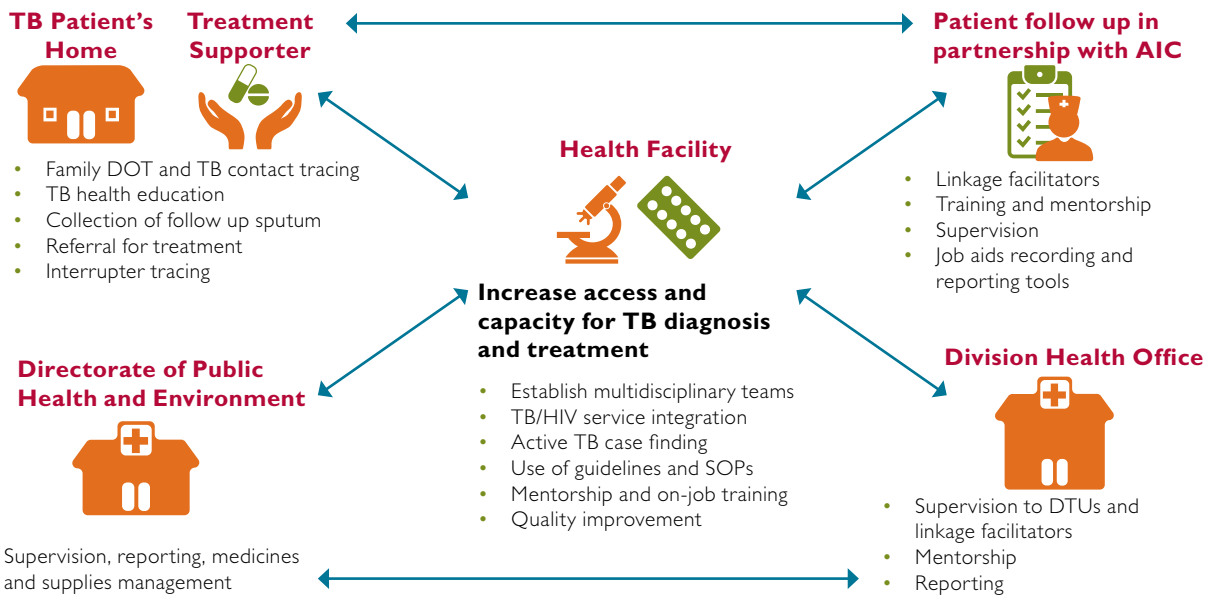
- Strengthen TB case notification
- Provide TA for intensified TB case finding (ICF)
- Strengthen TB lab service delivery to increase microscopy and GeneXpert utilization in Kampala
- Improve follow-up of TB patients on treatment to sustain high DOT coverage and achieve targets for cure and TSR
- Sustain high levels of TB/HIV integration to meet national targets of 90% for HIV counseling and testing among TB patients and 100% for CPT and ART for TB/HIV co-infected patients
- Implement IPT and TB IC
- Improve the coverage of CQI activities in Kampala
- Integrate management of MDR-TB and drug-susceptible TB to ensure timely linkage of all diagnosed rifampicin-resistant patients to care and high TSRs among MDR-TB patients

In 2013, TRACK TB began working in collaboration with KCCA and partners, together comprising the KCTF, to improve TB control by strengthening health systems and communities to provide patient-centered TB care. The project created the Urban DOTS Model (figure 10), a framework of synergistic and interrelated interventions operating at all levels of the health system to deliver quality TB care and prevention services.

The project, which served as the secretariat of the KCTF, provided strategic, technical, and operational guidance to improve coordination, planning, supervision, supply chain management, and reporting in the district and municipalities. The task force also supported development, updating, review, and dissemination of the national tools for DOTS implementation. Other members of the KCTF included the IDI, AIC, CHC, NTRL, the Union, FIND, and DTLS and community supervisors.

During the first two years of project implementation, TRACK TB, in collaboration with partners, expanded TB diagnostic and treatment services to a total of 54 health facilities from the 38 facilities that previously reported to KCCA. Overall, 14 facilities across the five municipalities were supported to improve physical access to TB services. By the end of PY2, 43 more health facilities were supported to provide TB screening and referral services. Out of the 43 health facilities providing screening and referral services only, TRACK TB supported 11 to be certified as diagnostic and treatment facilities to notify TB patients to KCCA by the end of PY5. By the end of PY5, a total of 97 health facilities were providing TB services, compared to 100 facilities targeted by the end of the project. Of these, 65 reports to the KCCA. To further expand TB screening, 65 operators of registered drug outlets and clinics in TB hot spots in Kampala were trained (annex 10). They were provided with ICF guides,

Figure 10: The Urban DOTS Model



PTP registers, TB diagnostic algorithms, and posters to facilitate TB screening. To collect sputum from PTPs, the project provided registered drug outlets with sputum collection materials such as sputum containers, Ziploc bags, absorbent cotton, and gloves. By the end of the project, approximately 150 facilities in total were conducting quality TB screening and collection of sputum from identified PTPs.

During PY2, TRACK TB developed SOPs for TB case finding to organize the flow of patients at health facilities and to minimize missed opportunities for TB screening and diagnosis. In addition, the project printed and disseminated ICF forms and posters for TB diagnosis and treatment that were displayed in all TB facilities. During PY3, guidelines for integration of TB and HIV services at health facilities developed by the NTLP were disseminated to all TB implementing partners and health facilities. The project also developed SOPs for TB contact tracing to guide implementation of this activity by both community health workers and health facility staff in tracking contacts of infectious TB patients for further evaluation.

To strengthen TB service delivery at health facilities, TRACK TB implemented mentorship using a quality improvement approach. This intervention was undertaken from PY2 up to the end of the project. Multidisciplinary teams were mentored every two months, quality gaps were identified, improvement projects were developed, and use of documentation journals was begun. TRACK TB supported biannual learning sessions for multidisciplinary teams of the different health facilities so they could share lessons, thus providing a peer learning environment.

To respond to the very low TB case finding among children under the age of 15, TRACK TB, in collaboration with experts at the Mulago pediatric TB ward, supported district teams to disseminate the pediatric TB algorithm and mentor clinical teams in TB diagnosis among this age group. The project also procured sputum induction equipment to enhance sputum collection among PTPs under the age of 5.

M&E of the program was strengthened through development of an electronic TB register at the divisional level, where patient data was entered monthly by each DTLS. This was analyzed by M&E project staff to monitor performance of the key indicators and guide teams to focus on poorly performing facilities on a monthly basis. Each of the DTLSs was trained and provided with a laptop computer to enter data from the unit TB registers. The project facilitated a team of three DTLSs for a one-month TB training in Buluba to further enhance their capacity for supervision and TB data management. Each DTLS was provided with transport every month to visit the health facilities, review data in the unit TB registers, and enter it into the electronic register. On a quarterly basis, data exchange meetings were held to harmonize TB patient transfers that had happened during the quarter and allocate correct treatment outcomes for each patient before reporting to KCCA and the NTLP.

To strengthen laboratory capacity for TB diagnosis, TRACK TB collaborated with the NTRL to build the capacity of divisional laboratory supervisors, who cascaded the skills to front-line laboratory staff at health facilities in each division. TRACK TB facilitated divisional laboratory focal persons to carry out monthly supportive supervision. In addition, the project worked closely with the NTRL to support DTLS to collect slides for EQA every quarter, identify sites with major errors, and take timely corrective action. Other areas of laboratory capacity strengthening included technical guidance on the placement of GeneXpert machines in the district, preventive maintenance of diagnostic equipment, and utilization of GeneXpert as well as reporting of GeneXpert data through GxAlert. In addition, the project procured a sputum booth for Kisugu Health Center to facilitate safe collection of sputum from PTPs, including that of patients for bacteriological monitoring for sputum conversion. A team of five was provided with motorcycles and sputum collection materials to move sputum samples from the community to diagnostic labs and from sites without GeneXpert to GeneXpert sites for testing and to return results to clinicians to make appropriate decisions on patient care.

Community-based DOTS in Kampala was one of the key deliverables of the TRACK TB project. Based on previous experiences from Tanzania and other countries, the project successfully implemented community-based TB care. Through a partnership between AIC, KCCA, and TRACK TB, a team of 52 CLFs, including 46 community supporters and 6 supervisors, was engaged, headed by a community coordinator. This team, composed for the most part of members of post-test clubs in HIV clinics, patient counselors, and expert TB patients, was trained and provided with tools to collect TB data and protective wear to visit patients' homes and communities.

The CLFs performed patient counseling, home visiting, family education, DOT, and TB contact investigation. In addition, CLFs conducted TB community education in hot spots and referred PTPs for further evaluation at the TB diagnostic facilities. They also carried out tracking of TB treatment interrupters through telephone calls or physical visits and brought them back to care before they were declared lost to follow-up. At health facilities, CLFs conducted TB screening, provided guidance to patients on where to access services such as lab tests and HIV care, and played a key role in documentation of TB data using the data capture tools at facilities. This team provided support to patients in collecting and submitting sputum for bacteriological monitoring after two, five, and six months of TB treatment. They

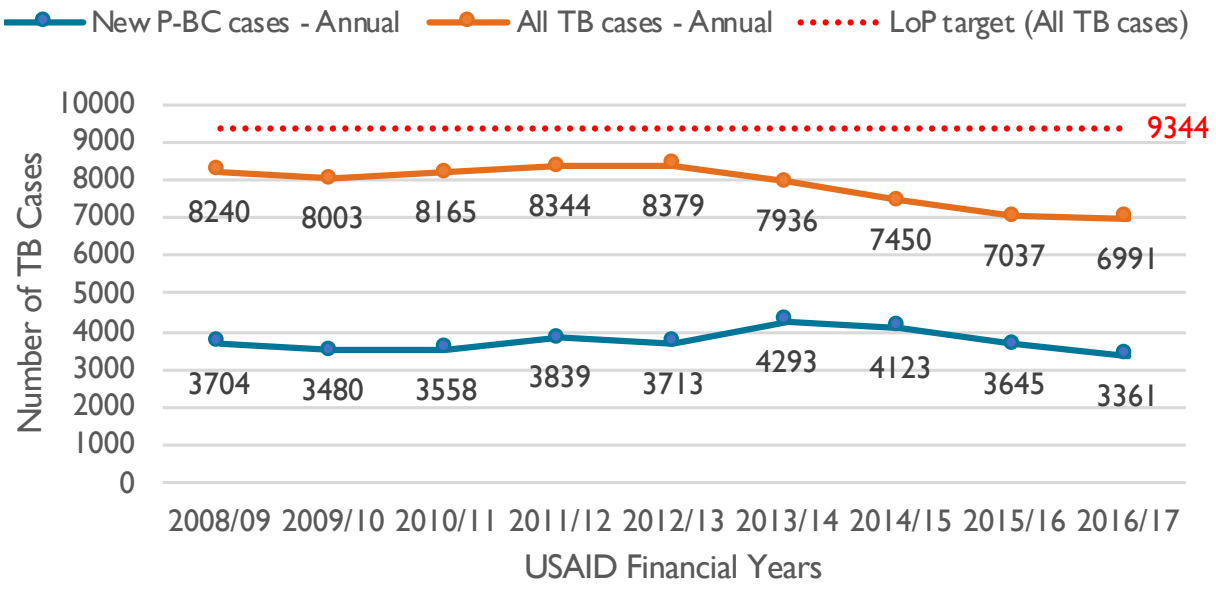
collected data on community TB prevention and care, including DOT, contact investigation, treatment interrupter tracking, and community TB awareness activities. CLFs reported monthly progress for these activities, shared successes and lessons, and proposed a way forward.

KEY ACHIEVEMENTS

TB CASE NOTIFICATION

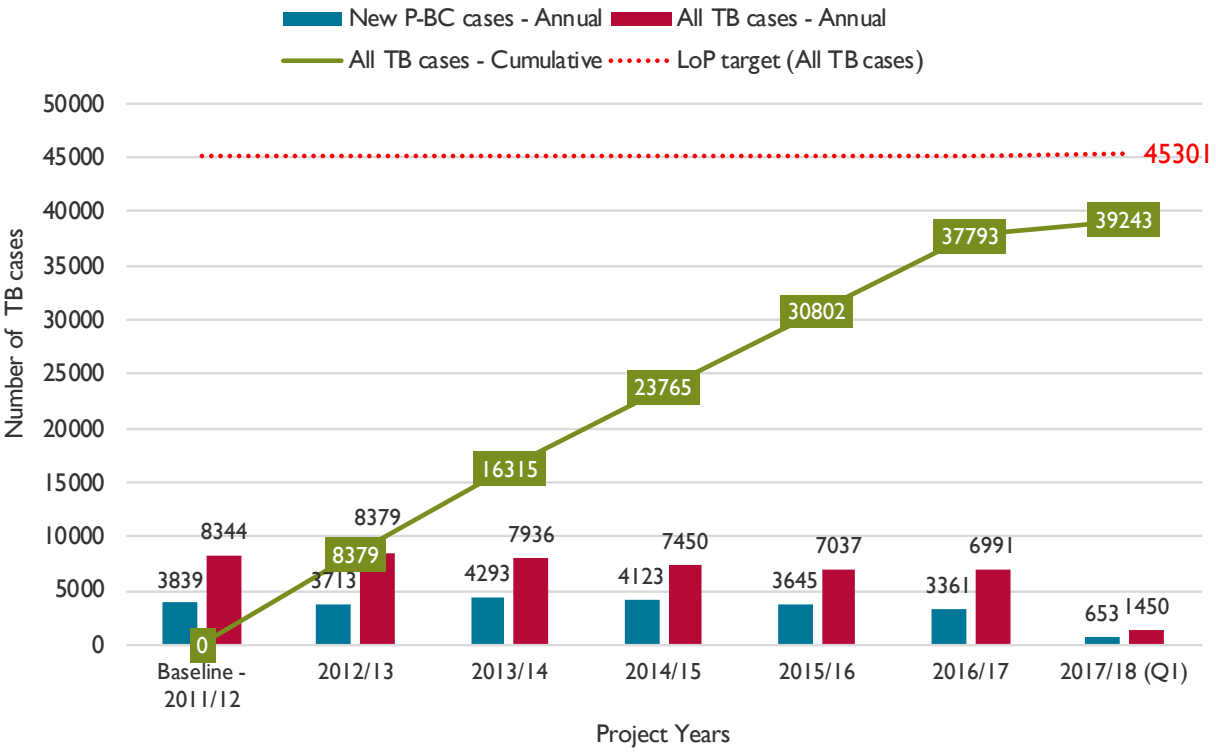
Overall, a total of 39,243 TB patients of all forms were notified during the implementation period, of whom 26,139 (67%) were P-BC cases. TB case notification of all forms declined from 8,344 cases in 2011–2012 to 7,672 cases in 2016–2017. A decline of 8.1% among all forms of TB during the project period was registered in Kampala, while PB-C cases decreased from 3,839 to 3,361, a reduction of 12.5%, in this same period. The 10% annual increase in total case notification targeted was therefore not achieved (figures 11 and 12). This decline is contrary to the findings of the population-based survey on the prevalence of TB in Uganda, which showed a TB burden twice as large as that previously estimated. However, it mirrors performance at the national level, where a similar decline has progressively been observed. The most plausible explanation for the decline is good ART coverage among HIV-infected patients in the population during the project implementation period, which reduced the proportion of such patients, whose immunity declines to the level required for the development of active TB. Annex 9 contains details on case notification in the KCCA divisions.

Figure 11: Trends in TB case notification in KCCA, 2008/9–2016/17



Data source: Unit TB registers

Figure 12: Annual and cumulative TB case notification in KCCA



Data source: Unit TB registers

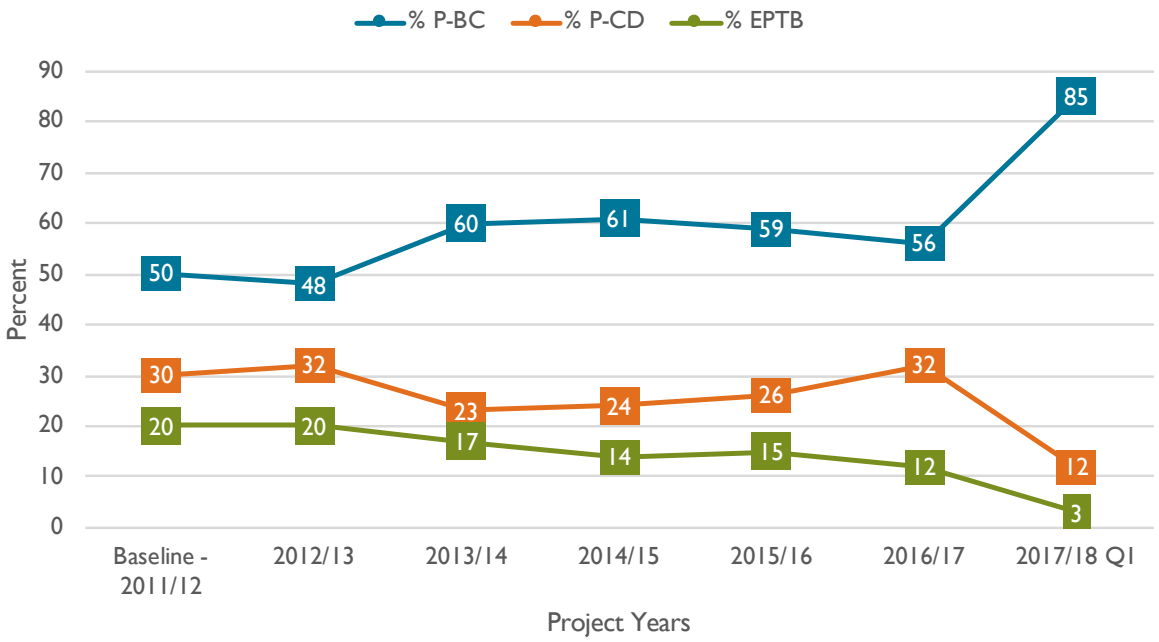
Table 2: Contact tracing cascade among TB risk groups in KCCA

Project Year	# Screened for TB	# PTPs Identified	# PTPs Investigated	# All TB Cases Diagnosed	Overall TB Yield/ 100,000 Population
PY1	0	0	0	0	0
PY2	173	173	97	24	13,873
PY3	22,638	4,341	4,341	210	928
PY4	18,532	3,281	3,281	304	2,650
PY5	24,002	4,289	3,860	600	2,500
Total	**65,345**	**12,084**	**11,579**	**1,138**	**1,742**

Tracing contributed 1,138 TB cases (2.9%) to the total notification of all TB forms, from the 65,345 contacts who were screened, with 12,084 PTPs who were identified and 11,579 PTPs investigated, making an overall TB yield of 1,742 TB cases per 100,000 population (table 2) which is 3.5 times the expected prevalence of 504/100,000 in any urban area in Uganda.

CASE NOTIFICATION AMONG P-CD TB PATIENTS. Despite the overall decline in TB case notification, the number of P-CD TB cases increased from 30% of all cases notified at baseline to 32% in PY1 and then sharply declined to 23% in PY2. Thereafter, P-CD progressively increased over the years, up to 32% in PY5. The proportion of P-BC cases declined by 12.5% in same period, although there was a sharp increase, to 85%, in PY6Q1 (figure 13). This performance probably reflects the improved capacity of clinicians, due to mentoring, to diagnose TB clinically and initiate patients on treatment. No improvement was seen in extrapulmonary TB trends over the years.

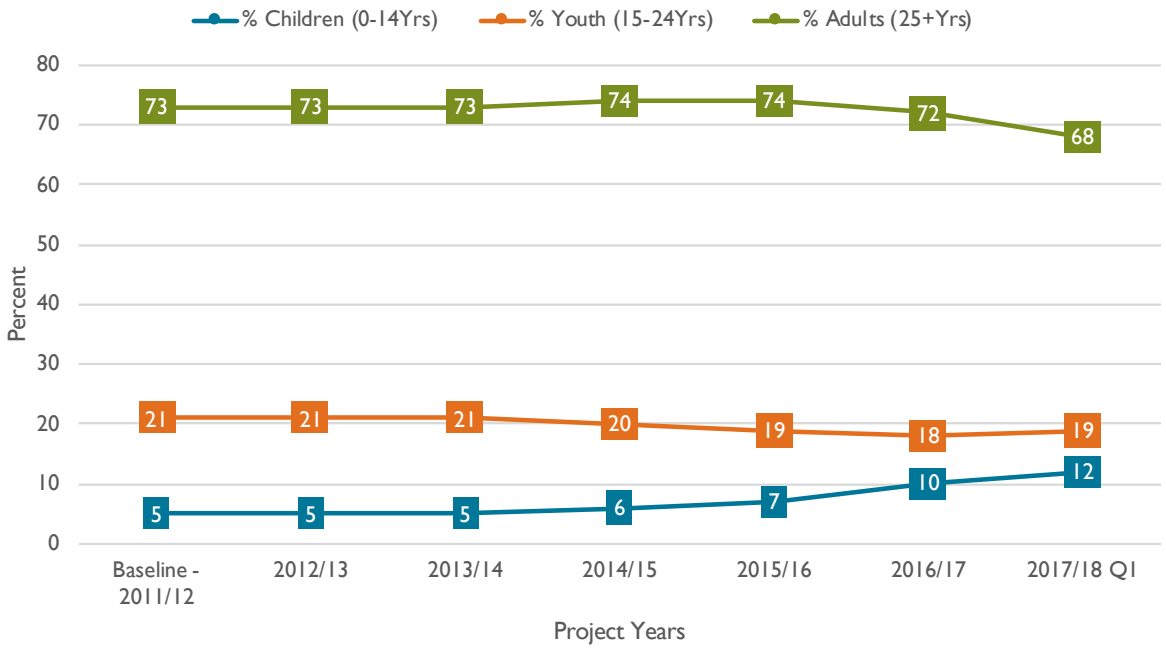
Figure 13: Trends in TB case notification in KCCA by disease category, 2011/12–2017/18



Data source: Unit TB registers

CASE NOTIFICATION AMONG CHILDREN. The proportion of pediatric TB patients among all cases notified progressively increased, from 5% at baseline to 10% in PY5 and 12% in PY6Q1 (figure 14). This increase can be mostly attributed to dissemination of the pediatric TB guidelines and diagnostic algorithm in Kampala. Although sputum induction was supported and teams were mentored to carry it out, it was not popular among the facility teams doing routine work except in research settings and its contribution to TB case finding among children was not significant.

Figure 14: Trends in TB case notification in KCCA by age category, 2011/12–2017/18

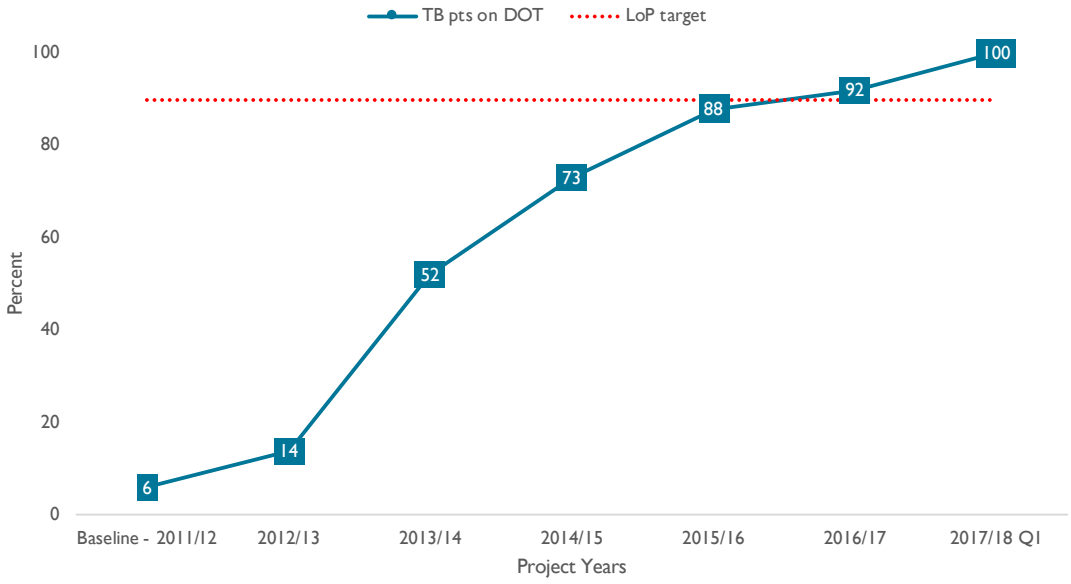


Data source: Unit TB registers

TB CONTINUUM OF CARE

DOT coverage among all patients initiated on treatment improved from 6% at baseline (2013) to 92% in PY5 (figure 15). This marked improvement in DOT has been largely attributed to the community component through engagement of CLFs to work with patients and families. Improvement in patient records, in which the DOT status of each patient was documented, also contributed to this achievement.

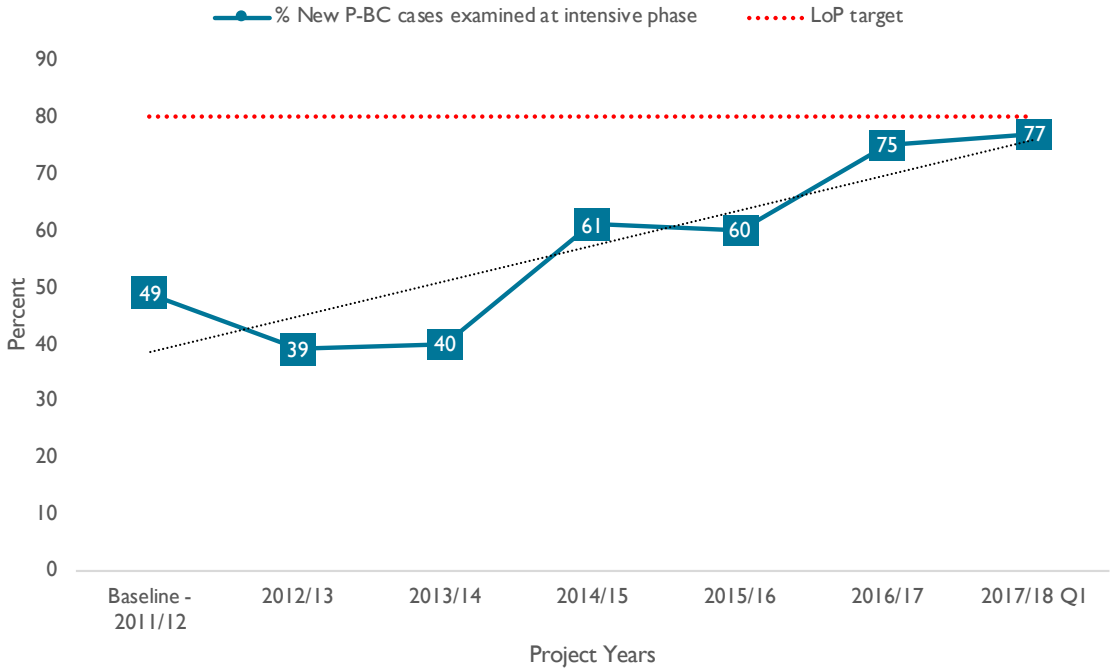
Figure 15: Trends in DOT patient coverage in KCCA, 2011/12–2017/18



Data source: Unit TB registers

The proportion of new P-BC patients whose treatment was monitored by sputum examination at month two improved from 49% at baseline to 75% in PY5 and 77% in PY6 (figure 16). This improvement in treatment monitoring contributed to improvement in cure rates, as shown below.

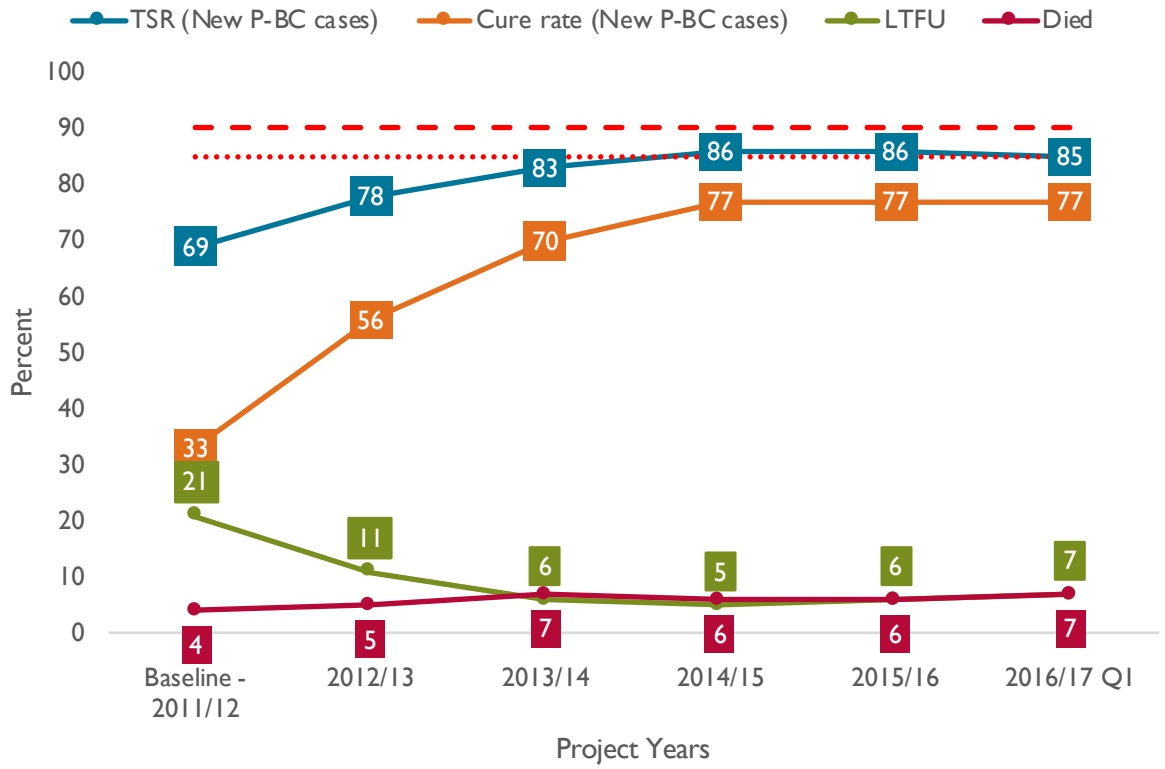
Figure 16: Trends in follow-up sputum monitoring at 2nd month in KCCA, 2011/12–2017/18



Data source: Unit TB registers

This high DOT coverage coupled with improved recording translated into improvements in the cure rate from 42% at baseline to 77% and the TSR from 69% at baseline to 86% in PY4 and 85% in PY5 (figure 17 and table 3). The targeted performance of 85% for cure and 90% for TSR were not achieved due to failure of health workers to obtain sputum samples from patients; for example, in quarter 1 of 2017/18, only 77% of the registered TB patients had sputum monitored at month two of TB treatment. However, although the overall cure and TSR targets were not achieved, tremendous improvement in both cure and treatment success were registered compared to the baseline through implementation of an effective community-based DOT model in Kampala. Consequently, the LTFU rate had an over three-fold decrease as compared to performance at baseline. Failure rates were negligible, in the range of 1-2%, but the death rate remained slightly above the 5% WHO standard, which is attributed to high TB/HIV co-infection rates in the population as well as delayed care-seeking by patients.

Figure 17: Trends in TSR, cure, and LTFU rates in KCCA, 2011/12–2016/17



Data source: Unit TB registers

Table 3: TB treatment outcomes in KCCA, 2011/12–2016/17

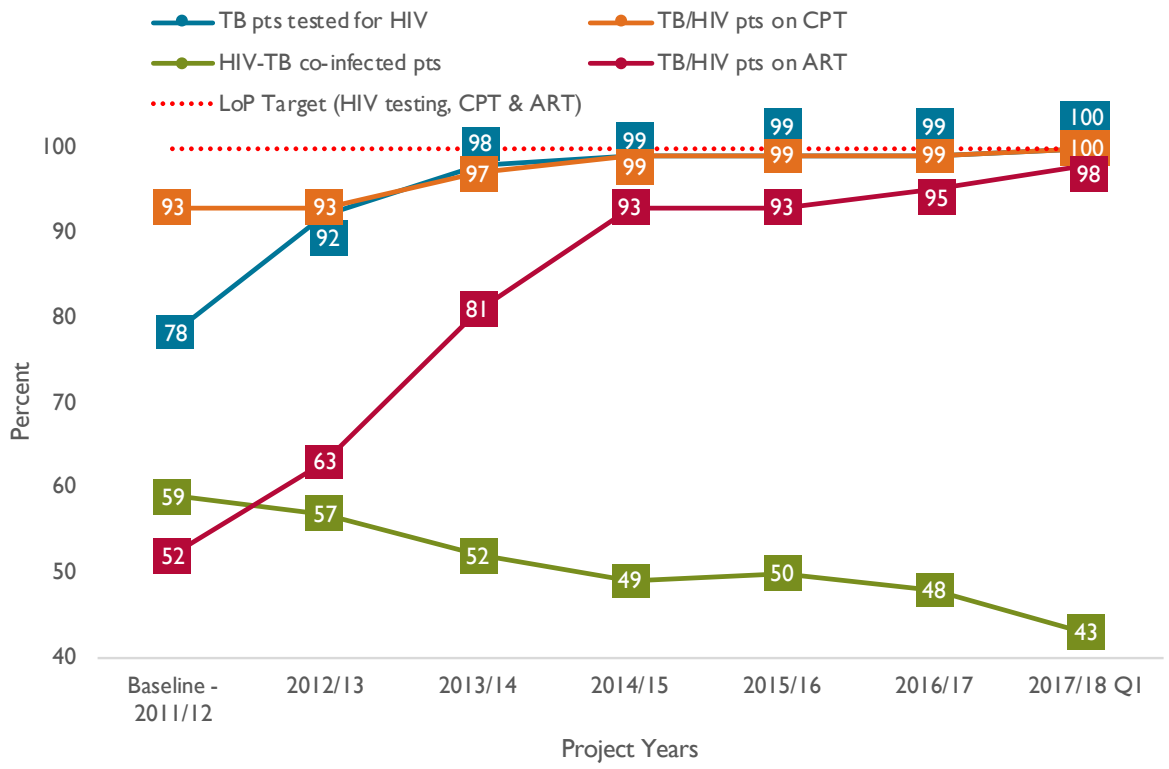
Project Years	Baseline 2011/12	2012/13	2013/14	2014/15	2015/16	2016/17 Q1
Number of new P-BC cases	3,839	3,713	4,293	4,123	3,645	812
Cured (%)	1,267 (33)	2,079 (56)	2,995 (70)	3,194 (77)	2,815 (77)	623 (77)
Treatment completion (%)	1,396 (36)	799 (22)	589 (14)	357 (9)	323 (9)	65 (8)
Lost to follow-up (%)	798 (21)	398 (11)	249 (6)	200 (5)	204 (6)	53 (7)
Died (%)	157 (4)	199 (5)	288 (7)	257 (6)	212 (6)	59 (7)
Treatment failure (%)	**34 (1)**	**77 (2)**	**67 (1)**	**56 (1)**	**63 (2)**	**5 (1)**
Unevaluated (%)	**187 (5)**	**161 (4)**	**105 (2)**	**59 (1)**	**28 (1)**	**7 (1)**
TSR (%)	2,663 (69)	2,878 (78)	3,584 (83)	3,551(86)	3,138 (86)	688 (85)

Data source: Unit TB registers

INTEGRATION OF TB AND HIV SERVICES

HIV counseling and testing among the TB patients improved from 93% at baseline to 99% by the end of PY5. TB/HIV co-infection rates declined by almost 10% during this period. Among those co-infected with TB/HIV, CPT and ART coverage improved from 93% and 52% at baseline to 99% and 95%, respectively (figure 18) by the end of PY5. Improvement in these indicators was largely a result of strengthened integration of TB and HIV services through provision of tools (TB/HIV guidelines), mentorship to multidisciplinary teams, and implementation of a one-stop-shop model for TB and HIV service delivery at health facilities.

Figure 18: Trends in uptake of TB/HIV services in KCCA



Data source: Unit TB registers

CREATION OF TB COMMUNITY AWARENESS TO INCREASE DEMAND FOR TB SERVICES

USAID, TRACK TB, and the NTLP, in collaboration with the Discovery Learning Alliance, coordinated and facilitated the launch of a groundbreaking educational film on TB and HIV in Kampala as a way of increasing public awareness of TB/HIV. The *Lucky Specials*, produced in South Africa and released in 2011 by the Discovery Learning Alliance and Quizzical Pictures in association with Tangled Bank Studios, highlights key elements of TB infection, its association with HIV, and its diagnosis and treatment, as well as its social and economic effects. At the launch, the MSH Team Lead, Nathene Morley, introduced the film while brief remarks came from the MSH/ Uganda country representative, the Deputy USAID Mission Director, and the NTLP Program

Manager. TB activist Dr. Watiti Stephen, a TB and cancer survivor living positively with HIV, shared his testimony, gave a message of hope, and reemphasized the need for love and support for TB patients. The film not only relayed useful information but also motivated personal and systemic behavior change to lower infection rates and increase access and adherence to treatment.

To reach more people infected and affected by TB and HIV, policymakers, and the general public, TRACK TB, through the CHC project, disseminated 250 copies of the film to communities through innovative approaches, including 50 long-distance buses that travel throughout the country and use of TVs at health facilities across the country. Viewership was monitored on the TV sets available at all of these health facilities. In addition, the project continues to share experiences with CHC to fine-tune the TB messages disseminated through the media. The follow-on project should continue to use this important film at both community and health facility levels.

Attendees at the launch of the Lucky Specials film

With support from the NTLP and CHC, the project developed key TB messages that were disseminated through local media stations to create community awareness around World TB Day. TRACK TB and KCCA also engaged in several media campaigns on local radio and TV stations in commemoration of World TB Day to sensitize the public about the burden of TB and guide people to places where they can access TB services. In addition, TRACK TB, in collaboration with the NTLP and KCCA, held a TB symposium. This was attended by stakeholders in TB control, which included MOH officials, the directors of health in KCCA, other partners, and members of the parliamentary caucus on TB.

M&E AND COORDINATION OF TB CONTROL ACTIVITIES

The project continued to provide support for coordination of TB control services in the districts, including supportive supervision of health facilities by divisional teams and monthly data collection. In addition, the project organized quarterly performance reviews at the regional and district levels in Kayunga and Kampala districts, in which feedback was provided to health facility teams and lessons shared with all 97 health facilities (annex 4 presents the performance of health units in Kampala providing TB, ART, and TB-ART co-treatment in PY5). Five Kampala district laboratory focal persons, biostatisticians, and CLFs were able to attend the zonal performance review meeting, while 116 participants came from health facilities. In addition, TRACK TB facilitated the participation of DTLS and community supervisors in the quarterly performance reviews at the regional level. Through engagement of the city health team, a process was initiated to certify six well-performing health facilities to provide a comprehensive package of TB services.

IMPROVED ACCESS TO AND QUALITY OF TB DIAGNOSIS

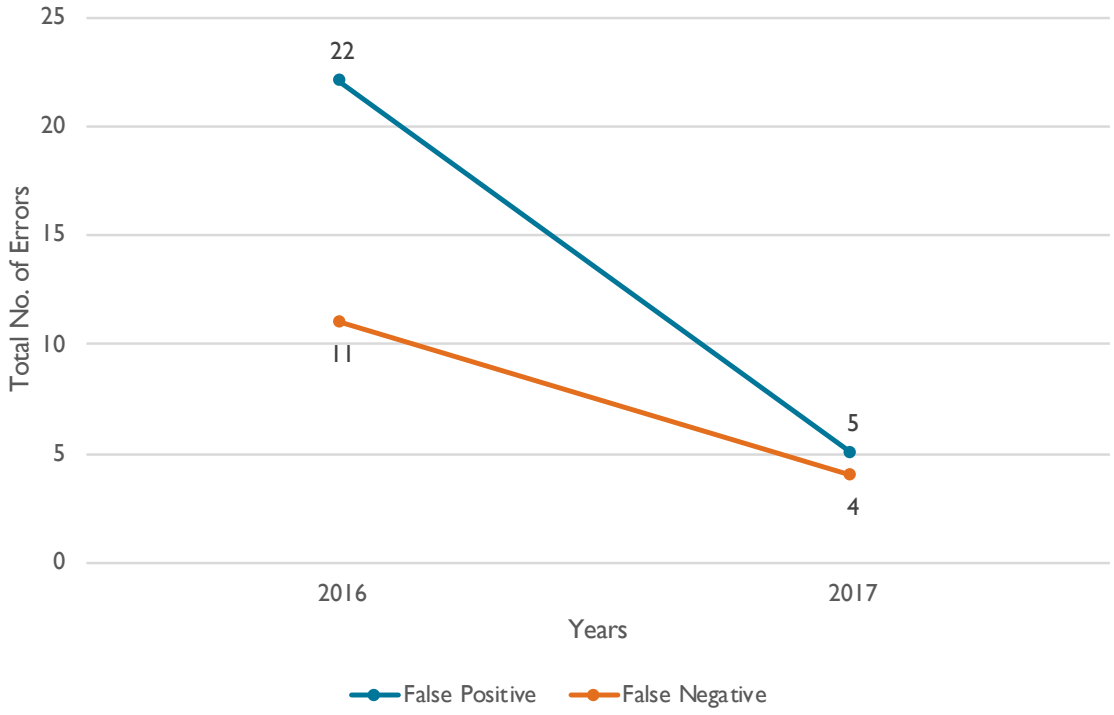
X-RAY. After procurement of a digital mobile chest X-ray machine, 20 health workers from 20 high-volume facilities and 10 CLFs from Kawempe Division were oriented on the use of the machine for community TB screening. The machine is intended to strengthen TB screening among TB contacts and support TB diagnosis at the health facility level. TRACK TB continues to mobilize the community and health facility personnel in order to support access to X-ray services and to establish a pilot of community radiography for TB screening before the project ends. TRACK TB will share the lessons from this experience with other partners in Kampala.

The X-ray machines were useful during an investigation of a TB outbreak in a secondary school in Mukono. A total of 2,550 school members were screened for TB and 36 were diagnosed with TB, yielding a prevalence of 1,412/100,000, which is nearly six times the national prevalence of 253/100,000.

Staff attending training on X-ray usage and operations

SUPPORT FOR THE NTLP'S SMEAR MICROSCOPY EQA PROGRAM. Track TB supported the sampling and collection of EQA slides by DTLS in Kampala. The project facilitated collection of slides from 97 diagnostic laboratories by the DTLS. The overall goal of the EQA program was to reduce TB diagnostic errors. Six additional private laboratories were enrolled in the EQA scheme from PY4 to PY5. There was a reduction in the number of EQA errors in PY5 as compared to PY4 (false positives fell from 22 to 5 and false negatives from 11 to 4), attributable to sustained supportive supervision of laboratory staff (figure 19). Annex 8 presents details on microscopy EQA indicators.

Figure 19: Trends in TB microscopy errors in KCCA, 2016–2017



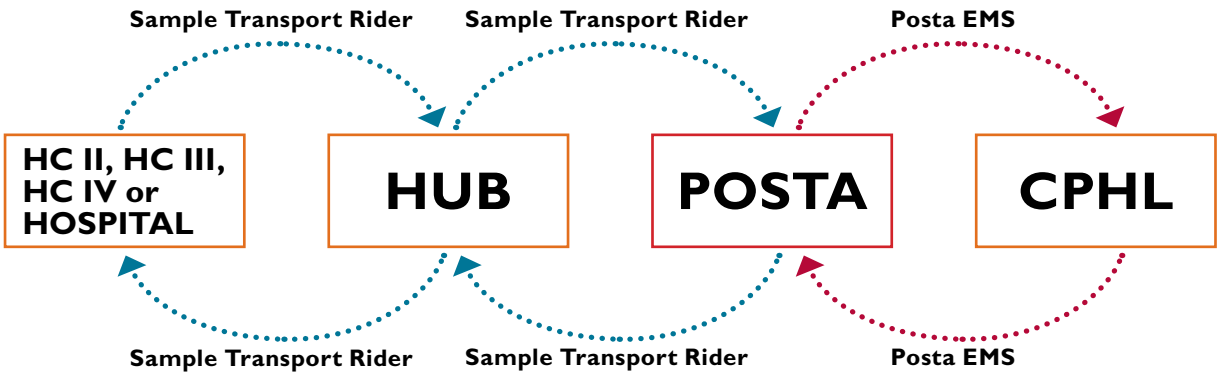
Data source: NTRL EQA reports

SPUTUM SAMPLE TRANSPORT FOR GENEXPERT TESTING. For sample transport in Kampala, healthcare workers call Posta Uganda on 0800-11-11-22 (a toll-free number) to pick up the sputum sample. For other zones, the package is delivered to the local post office repository by 3 p.m., either by a health worker or the hub sample transporter. The specimen is then registered at the post office or hub laboratory and the health facility person is given a written proof of delivery, which is securely filed. The samples for Xpert MTB/RIF are transported through the hub system to Xpert MTB/RIF sites and then to the NTRL Central Public Health Laboratory (figure 20).

The project continued to address the challenges of sputum sample movement and GeneXpert utilization to improve TB diagnosis in Kampala. Two additional hub riders were hired to carry out sputum sample referrals from TB screening sites to divisional GeneXpert sites for diagnosis. The addition of the two hub riders improved sample movement, since all five divisions in

Kampala were covered for the first time by a hub rider. For the reporting period, a total of 7,497 sputum samples were transported for analysis to diagnostic laboratories. Of these, 6,302 (84%) were tested with GeneXpert and 390 (5%) with microscopy, while 760 (10%) samples were for follow-up culture for DR-TB patients enrolled on treatment at Mulago. Sputum samples referred from drug shops contributed 644 (9%) of the total samples referred for analysis. Of the total samples transported, 580 (7.8%) tested positive and 11 (2%) of those were rifampicin resistant.

Figure 20: Flow chart of the hub sputum sample system



LESSONS LEARNED

- Community-based DOTS in an urban setting is feasible despite high population mobility and can achieve desired patient outcomes through close engagement of patients' families.
- For success of TB community sensitization activities and referrals of PTPs from the community, it is necessary to incentivize community leaders (mobilizers) and provide transport refund for PTPs to go to diagnostic laboratories for further evaluation.
- Effective coordination of TB care and prevention services in a city is best achieved through involvement of all key players from government, civil society, and the private sector.
- Sustained engagement of health facility teams through CQI achieves better results and ownership than traditional supervision.
- For an effective PPM DOTS program, engaging health facility owners, understanding their operational challenges related to TB patient care, and being flexible while working with them are very important.

CHALLENGES AND RECOMMENDED NEXT STEPS

- X-ray services remain inaccessible to patients despite their proven role in TB screening and diagnosis. In addition, gaps in symptomatic TB screening at health facilities still exist. Again, health facility teams expected extra support during the mentorship exercises, which was not allowable by the project and the donor. This affected the pace at which targets for key performance indicators were achieved. Therefore, there is a need to build capacity among multidisciplinary teams through quality improvement approaches.

- It will be necessary to maintain CQI approaches as drivers for quality TB services at health facilities in Kampala. Approaches to improve TB case notification should continue to be strengthened, including staff motivation mechanisms, systematic symptomatic screening at health facilities, and X-ray screening for eligible patients, such as close contacts of infectious patients.

- Regular shortages of laboratory supplies, such as GeneXpert cartridges and reagents for microscopy, continue to affect laboratory TB diagnosis. Moreover, recurrent breakdowns of lab equipment such as GeneXpert machines and fluorescence microscopes affect TB diagnosis and case notification, as observed in the declining TB case notification among P-BC cases during the period. The situation was occasionally worsened by stock-outs of TB medicines resulting from delayed supply from the National Medical Stores, which delayed treatment initiation and affected adherence. Furthermore, despite improvements in the hub system, the turnaround time of results remains too long for most patients, delaying initiation of treatment among diagnosed patients. This can be attributed to reluctance of lab staff to handle and process sputum samples. Sustained collaboration with the NTRL is needed for delivery of quality laboratory services through EQA and use of GxAlert data to improve the turnaround time of results, as well as bundle pricing to bring about timely and efficient maintenance of lab equipment.

- To ensure the presence of buffer stocks and manage procurement and distribution of TB commodities, the project recommends using a TB web-based tool (TWOS) developed by UHSC. This will allow visualization of stock status at all levels.

- Inadequate TB awareness at the community level contributes to high levels of stigma among TB patients, who sometimes decline to provide their correct addresses, making home visits for community support a challenge. Addressing stigma will require working in close collaboration with the CHC project to improve TB community awareness as well as community support structures (CLFs, Community Health Extension Workers, Village Health Teams, and former TB patients) to consolidate achievements made in TB patient follow-up and tracking.

- Gaps in TB IC practices, as reflected by the increase of TB disease among healthcare workers, remain a challenge. This situation has been exacerbated because many health centers that were designed to operate at a lower level (e.g., at health center III status), operate as hospitals (health center V) and serve a large population, leading to overcrowding. Many have no space nor funds to allow isolation of coughers or expansion and remodeling of work and ward spaces. Lack of space negatively impacts TB IC practices; for example, many health facilities lack designated areas for sputum collection and patients continue to collect sputum in unsafe environments, including bathrooms. IC teams at some health facilities are not fully functional, while IC plans are not consistently implemented despite TB IC trainings and mentorships. This is mainly because of understaffing and workload at most facilities. In the long term, solving TB IC challenges in Kampala will require multi-sectoral engagement and formulation of enabling policies. In the short term, continued support and mentoring of facility staff are required to implement IPT and TB IC practices, including safe collection of sputum at health facilities

- The large private health sector in Kampala is still poorly mobilized and motivated for TB care and prevention, which affected TB diagnosis and follow-up of diagnosed patients and reporting at these facilities, contributing to low case notification and LTFU. Fees are charged for sputum analysis in private laboratories, posing a barrier to access to TB diagnostic services in Kampala. The gap between the current support to private health facilities and the expected support is too wide to sustainably implement TB services in this sector. This challenge will require working in collaboration with the Uganda Health Care Foundation to implement an effective PPM DOTS model in the city to ensure that the private sector is adequately engaged, mobilized, and coordinated for TB control.

- Implementation of IPT has been greatly compromised by insufficient supplies of INH (annexes 5 and 6), posing challenges for initiation and completion of treatment. Other challenges affecting IPT implementation are poor recoding and reporting by health facilities, especially through DHIS 2. Continued support and mentorship of facility staff will be needed to implement IPT. It is also necessary to strengthen strategic information for TB at all levels, including integration of TB data into DHIS 2.

RESULT AREA 3: QUALITY PROGRAM FOR THE MANAGEMENT OF MDR-TB

BASELINE PERFORMANCE GAPS AND CHALLENGES

At the beginning of the TRACK TB Project, the NTLP had developed and disseminated national PMDT guidelines and a PMDT operations and expansion plan, remodeled Mulago MDR-TB ward to meet WHO TB IC standards, trained staff in three MDR-TB treatment initiation sites on MDR-TB (Mulago, Arua, and Kitgum), and secured second-line drugs to cover the intensive phase for approximately 400 patients through the GF and National Medical Stores. However, there was no reliable second-line drug management system.

During this time, the burden of MDR-TB in Uganda was estimated at 1.4% among all new TB cases and 12.1% among previously treated cases. Uganda was only notifying 310 DR-TB cases annually, but due to poor linkage of the diagnosed patients and poor access to DR-TB treatment, only 63 of the estimated 1,010 DR-TB patients had been enrolled on treatment, while approximately 300 DR-TB patients who had been detected over the previous four years were on the waiting list. The TSR for MDR-TB in Uganda was only 50% despite the small cohorts of DR-TB patients on treatment. There was a lack of appropriate isolation spaces, with only three sites with admission facilities: Mulago, Kitgum, and Arua, whose ward was a temporary structure. Lack of treatment for the vast majority of DR-TB patients perpetuated an ongoing transmission of DR-TB strains, thereby posing a major threat to the community around these patients. Worse still, interventions to prevent MDR-TB were extremely weak or lacking in many MDR-TB facilities.

In addition, the NTLP was grappling with a lack of a nationally agreed-on DR-TB scale-up plan and a weak healthcare system. There was limited expertise in DR-TB management and limited access to DST, with no contact tracing of contacts of index DR-TB cases. Having only three DR-TB treatment initiation facilities compelled health workers to refer DR-TB patients to those few sites. Furthermore, there were low levels of sputum follow-up examinations, high loss of specimens during transportation, lack of medicines, weak M&E capacity, and limited funding at both the NTLP central unit and district levels. Stigmatization of DR-TB patients due to limited community sensitization, and high mobility of populations, was associated with high LTFU of DR-TB patients.

PRIORITY INTERVENTIONS AND STRATEGIES

- Deliver the MDR-TB minimum package of care for DR-TB patients under the MDR-TB mixed model of care
- Provide short-term TA from UCSF/CITC
- Strengthen the management and technical capacity of the NTLP central unit to provide technical oversight and leadership for the implementation of quality PMDT

- Provide support in MDR-TB surveillance, diagnosis, and case notification
- Carry out cohort analysis
- Strengthen the provision of MDR-TB services, including IC
- Provide TA for MDR-TB recording and reporting and data management and analysis at the national and health facility levels
- Develop systems to take samples on special "clinic days" for DR-TB patients

To address the gaps and challenges discussed above, the NTLP, with support from the TRACK TB project and other partners, implemented a mixed model of MDR-TB care. This DR-TB mixed model of care involves a brief period of hospitalization (inpatient) followed by a long period of ambulatory/clinic-based care. Patients who are severely ill or not within the immediate catchment area of the treatment initiation hospital are admitted for a short period of 1–8 weeks and are thereafter transferred for ambulatory care to a prepared peripheral DOT FUF near their homes. To ensure standardized PMDT implementation, TRACK TB developed a minimum package of care for DR-TB patients that was shared with the NTLP and other implementing partners supporting PMDT. The package includes strengthening of healthcare providers' skills, improved access to patient investigation/treatment monitoring, patient psychosocial support, food and transport support, availability and improved management of TB commodities, HMIS (provision of tools, training and computers), strengthening of TB IC practices, facilitation of the ambulatory care model, and general hospital administrative support (air time, internet connectivity, and office supplies). TRACK TB also supported the NTLP to develop a minimum package of activities at the district level to ensure that the District Health Office is fully involved in the management of the patients and to clarify roles.

During implementation, MDR-TB technical support was provided by TRACK TB through UCSF/CITC. Overall, UCSF made 11 short-term TA trips to Uganda. The consultants conducted bedside mentorship of clinical/nursing teams in the treatment initiation sites, including visits to FUFs to mentor health workers there. They guided the first peer-to-peer mentorship round, which was adopted by the program and carried forward. They initiated cohort reviews and developed SOPs and electronic tools for data management for the reviews. They guided the process of revising PMDT guidelines twice, including bedaquiline guidelines and the addendum for the MDR-TB short regimen, as well as developing and revising all PMDT training materials, including training materials for FUFs. UCSF/CITC also conducted training of trainers. They guided the development of the minimum package for district level officers. In addition, they provided support for the roll-out of the ECHO platform and the introduction of the short-term regimen in the country. They also supported the development of the National Strategic Plan.

KEY ACHIEVEMENTS

IMPROVED PHYSICAL ACCESS TO TREATMENT

INCREASED BOTH GEOGRAPHIC DISTRIBUTION OF TREATMENT INITIATION FACILITIES AND ADMISSION WARD SPACE. TRACK TB directly opened treatment initiation sites at Hoima, Soroti, and Lira RRHs. As a lead implementing partner, TRACK TB also supported SUSTAIN, STAR-EC, and Doctors

with Africa CUAMM (Collegio Universitario Aspiranti Medici Missionari) to start PMDT at various hospitals; by the end of the project, 15 sites were managing DR-TB patients, up from 3 that existed at baseline. Before opening new MDR-TB sites, the project performed a facility assessment, sensitization of staff and management, training of healthcare workers, and identification of the site for the clinic, and agreed on a clinic day that would minimize encounters between DR-TB patients and other clients. In addition, the project distributed second-line medicines to avoid stock-outs.

EXPANDED ADMISSION WARD SPACE IN DR-TB FACILITIES AND IMPROVED TB IC. TRACK TB has worked with other partners to increase bed space for DR-TB patient admission and to improve TB IC. Consequently, ward construction/remodeling was carried out to create more admission space in 14 hospitals (apart from Iganga hospitals), expanding bed capacity from 45 to 172. TRACK TB carried out construction in Mbarara, Hoima, Lira, and Soroti. Remodeling of MDR-TB care spaces at Hoima and Mbarara RRHs was completed and handovers to the MOH were coordinated in August 2015, while those of Lira and Soroti took place in December 2017. Tibebe Taye, a TB IC consultant, provided the initial and final technical TB IC assessments for the renovated MDR-TB wards at Hoima and Mbarara; for Lira and Soroti, he conducted initial assessments only. The final TB IC assessments and airflow measurements for both Lira and Soroti were completed by Samuel Kasozi, the Deputy Chief of Party of the TRACK TB project. In all sites, the TB IC assessment findings were satisfactory and confirmed that all sites were constructed in accordance with WHO TB IC standards.

Representative of American Ambassador handing the Lira MDR-TB ward over to the MOH

Hoima ward handover

Soroti DR-TB ward (red roof)

Lira DR-TB ward (green roof)

Mbarara DR-TB ward

BUILT HUMAN RESOURCE CAPACITY

The project worked with UCSF to develop training materials for PMDT. The materials included a set of slides for presentation and a manual for both participant as well as trainers. These materials were first developed in 2015. However, due to changes in WHO policy concerning the introduction of new drugs, including bedaquiline and delamanid, and with the introduction of the short treatment regimen, TRACK TB sponsored a series of workshops and online meetings in 2017, during which time the old materials were revised. In addition, TRACK TB conducted a training in which 32 national trainers were trained.

TRACK TB worked with the NTLP and other partners to train healthcare workers in DR-TB management. The project trained a total of 261 participants from supported hospitals, DTLS, Regional TB Focal Persons, and NTLP and NTRL staff. In support of other partners, more than 400 additional people were trained.

Working with the Systems for Improved Access to Pharmaceuticals and Services (SIAPS) project and the NTLP, TRACK TB conducted two courses on the introduction of bedaquiline and delamanid and two courses on the introduction of the short treatment regimen. The trainings were done by UCSF and other senior clinicians and supplemented through mentorship by senior health workers, peer-to-peer mentorships, panel meetings, cohort reviews, continuing medical education sessions, telephone hotlines, provision of literature, and CQI learning sessions. Together, these mechanisms trained a large pool of skilled personnel able to manage DR-TB cases. To improve DR-TB data management, the TRACK TB project championed the development of the Uganda DR-TB MIS, a DHIS 2 web-based platform to improve the timeliness, completeness, and accuracy of DR-TB data and reporting. Before its roll-out, the project supported two trainings with a total of 55 participants, of whom 22 were trained as national trainers.

ESTABLISHED A DR-TB LEARNING NETWORK THROUGH USE OF ECHO VIDEOCONFERENCING. MDR-TB management capacity was further enhanced with the introduction of ECHO platform—a videoconference learning network that was introduced to link a network of 15 MDR-TB sites to ease discussion of complex cases by the national DR-TB expert panel and other consultants, conduct cohort reviews, and seek solutions for emerging challenges. Technical support was provided by UCSF/CITC during the implementation period. TRACK TB procured computer equipment, including speakers, cameras, and microphones, for hospitals and for the NTLP to facilitate videoconferencing. UCSF facilitated two training sessions for users and linked the program to Project ECHO, an American organization that pioneered the training approach and supporting its spread throughout the world. At least 10 such cases have been discussed since the introduction of ECHO in January 2017. It is hoped that videoconferencing will be an important training method in the future.

The team that discussed the teleconferencing roll-out

ESTABLISHED FUFS FOR AMBULATORY CARE. FUFs are health facilities ranging from hospitals to small drug shops, including public, private not-for-profit, and private for-profit facilities that provide DOT to ambulatory patients. To build capacity of FUF staff, TRACK TB worked with UCSF to develop training materials. A total of 350 flip charts were printed for health workers from treatment initiation sites to use in conducting FUF training and leave behind as reference materials.

USED EXPERT CLIENTS TO IMPROVE ADHERENCE. To further improve treatment adherence among DR-TB patients, the DR-TB sites were encouraged to use expert clients to educate patients and encourage them to complete treatment. By the end of the project, each site had an expert client providing patient support services. Expert clients at this level were trained by other implementing partners.

COORDINATED PARTNERS THROUGH MEETINGS AT DR-TB SITES

To increase PMDT coordination and provision of feedback to partners and DR-TB facility staff, TRACK TB supported partner meetings. Hospital staff and management, the District Health Office, and regional implementing partners participated in these meetings. Site-specific performance and challenges were discussed, solutions developed, and responsible persons identified to follow up on all action points. These meetings helped to improve coordination as well as clarify the roles and responsibilities of the different players involved. For example, there was a specific meeting held for District Health Officers in the Lira catchment area to discuss the PMDT situation in the region, roles, performance, and challenges. Communication was initially found to be lacking and a WhatsApp group was formed to foster continuous information sharing. The result was increased involvement of district health officials in PMDT, especially identification of FUFs, contact tracing of DR-TB contacts, and linking of newly diagnosed DR-TB patients to the initiation health facilities, as well as follow-up of patients who miss appointments.

STRENGTHENED TB IC

TB IC has been a key component of the minimum package. TRACK TB ensured that it featured strongly in training at all levels as a component of PMDT. The project supported all sites to develop IC plans and revise them regularly. TRACK TB also supplied respirators and surgical masks to the 6 supported sites until the NTLP took over in PY4 by supplying IC equipment to all 15 sites. In addition, the project constructed/remodeled MDR-TB wards in Mbarara, Hoima, Lira, and Soroti RRHs. All sites were constructed in accordance with the WHO TB IC standards, as described above. In Mulago, where the MDR-TB ward had already been remodeled by the TB Care I project, TRACK TB installed a biometric lock to restrict unauthorized visitors and to control the traffic in and out of the ward by DR-TB patients. Other activities included organization of wellness clinics in five hospitals, where health workers could be tested for hypertension, diabetes, and HIV as well as be screened for TB. No DR-TB cases were identified among health workers in these sites.

During the project period, only one health worker contracted DR-TB while working in a TB ward, and he responded well to treatment. All other health workers who contracted TB were working in other units of health facilities. Thus far, no case of TB has been identified among healthcare workers at FUFs.

STRENGTHENED DR-TB RECORDING AND REPORTING

At the start of the project, tools to support MDR-TB data collection already existed. However, the entire system was manual, time consuming, and prone to errors. As part of the revision of PMDT guidelines, data collection tools were also revised, printed, and distributed to all sites. Thereafter, TRACK TB developed an access-based electronic register. This facilitated the transmission of data to the national level. However, it did not ease data analysis at treatment sites. Consequently, TRACK TB hired a consultant who designed a web-based DR-TB MIS that updates the national database in real time. TRACK TB also procured and installed a server that hosts this database and handed it over to the NTLP. The DR-TB MIS is based on the second revision of the guidelines and tools. Before its roll-out, the project supported training of users at various levels through two trainings with a total of 55 participants, of whom 22 were trained as national trainers. A dashboard was also developed and log-in rights were granted to various stakeholders.

SUPPORTED PROVISION OF TREATMENT ENABLERS AND INCENTIVES

Enablers and incentives are essential in the management of DR-TB patients in order to improve treatment adherence, prevent catastrophic out-of-pocket expenditures, and support patients' recovery. At the beginning of the project, TRACK TB received 22,380 packets of instant enriched porridge from TB CARE I. The packets were distributed to inpatient and outpatients until the stock ran out. For a short time, TRACK TB arranged for cooked meals to be delivered to patients in Mulago. However, food supplementation was not sustainable, so the project persuaded the hospital to provide the meals, but the hospital food supply was irregular. In an attempt to have enablers provided in other sites, TRACK TB worked with Epicentre to provide meals for patients in Mbarara and with Mercy Corps to provide meals for admitted patients in Kitgum. When Hoima finally opened, the hospital management provided the food.

For severely malnourished patients, TRACK TB negotiated with Baylor Uganda to provide a high-energy, high-protein, ready-to-use therapeutic food. The Mwanamugimu Nutrition Unit provided the necessary training for the TB ward staff to conduct nutritional assessment. The project negotiated a donation of 4,000 liters of packaged UHT (ultra-high temperature processing) milk from Jesa Farm, which was distributed to patients.

As an incentive, TRACK TB provided monthly transport refunds to patients throughout PY1–PY4 as a means of preventing catastrophic out-of-pocket expenditures. The monthly amount was calculated to cover daily transport to the FUF for DOT and the monthly visit to the treatment initiation site for clinical review. In PY5, the NTLP took over the provision of enablers and incentives to all patients in all MDR-TB sites using GF resources. There was an observed improvement in patients' attendance during clinic reviews. However, by the end of PY5, GF funds had run out and, in the new GF grant, a different mechanism for supply of enablers and incentives is being worked through The AIDS Support Organization (TASO).

STRENGTHENED DR-TB SURVEILLANCE AND CASE NOTIFICATION

At the beginning of the TRACK TB project, the CDR for DR-TB was low because there were

very few sites with a GeneXpert machine to aid quick diagnosis. As the number of machines increased, TRACK TB worked with the NTLP, NTRL, and other stakeholders to revise the algorithm for TB diagnosis. The algorithm has been revised several times as policies changed and as technologies became more available. TRACK TB printed and disseminated the algorithm to the supported sites and gave the remaining copies to the NTLP to distribute to other health facilities throughout the country. At minimum of 4,000 copies were distributed.

At the same time, TRACK TB supported installation of 29 GeneXpert machines procured through USAID support, contributing to a total of 131 Xpert MTB/RIF machines currently in the country, and improved the average utilization of the machines from two to six tests per day. High-volume sites and health facilities serving as specimen referral hubs were prioritized, in consultation with stakeholders. In addition, the project supported orientation and mentoring of health workers in GeneXpert technology so that they could screen all previously treated TB cases and other high-risk PTPs for rifampicin resistance as well as report GeneXpert data through GxAlert. Workers from the treatment sites were supported to conduct continuing medical education sessions at high-volume health facilities on screening for rifampicin-resistant TB using GeneXpert technology and on referring samples for testing. Maintenance of the GeneXpert machines was also supported. These efforts contributed to the increase in the number of cases diagnosed and GxAlert reporting. From 2016 to September 2017, a total of 168,013 sputum samples were tested, from which 22,071 MTB cases were detected, of which 539 were rifampicin resistant. GxAlert electronic reporting of results improved GxAlert reporting from 0% in 2015 to 40% by end of 2017 and enhanced DR-TB surveillance and linkage of patients through quick identification of newly diagnosed patients across the country. MDR-TB patient linkage in 2013 without GxAlert was about 60%; with the introduction of GxAlert in 2015, it rose to 80% and then to 95% in 2017. As the project closes, the GxAlert software has been installed by TRACK TB at the NTLP to facilitate transmission of data to the DHIS 2-based MIS.

INTRODUCED DR-TB CONTACT TRACING

Tracing contacts of DR TB patients was one of the important activities included in the minimum package for DR-TB. TRACK TB developed SOPs and a register, which have provisions for follow-up visits up to 24 months. They were printed and distributed to MDR-TB sites, while user training was conducted during mentorship. All DR-TB sites used these SOPs to screen contacts of their patients. TRACK TB provided transport and field work allowances to facilitate these field visits. Emphasis was mainly on the first visit, which was done before or shortly after the patient started on treatment. Overall, a total of 11,498 contacts of MDR-TB patients were screened, among whom 2,296 symptomatic cases were identified. Of the 2,296 symptomatic contacts, 2,182 were tested using GeneXpert. One hundred and nine TB patients were diagnosed, of whom 33 were rifampicin resistant. The overall yield from contact tracing was 1,235 cases/100,000 populations (table 4), which is nearly five times the national TB prevalence of 253/100,000.

Table 4: Contact tracing cascade among DR-TB contacts, 2012/13–2016/17

Project Year	No. Contacts of DR-TB Patients Screened	No. Symptomatic Contacts	No. Tested with Gene Xpert	No. MTB Positive	No. Rifampicin Resistant	TB Yield/ 100,000
2012/13	0	0	0	0	0	0
2013/14	3,409	1,003	1,003	3	3	176
2014/15	2,557	308	288	15	6	821
2015/16	2,123	279	252	22	4	1,225
2016/17	3,409	706	639	69	20	2,611
Overall	**11,498**	**2,296**	**2,182**	**109**	**33**	**1,235**

Data Source: TRACK TB project reports

EXPANDED DR-TB PATIENT ENROLLMENT THROUGH A MIXED MODEL OF CARE

At the beginning of the project, driven by a shortage of bed space, TRACK TB supported the NTLP to adopt the MDR-TB mixed model of care. This model of care involves brief periods of hospitalization (inpatient) followed a long period of ambulatory/clinic-based care. Patients who are severely ill or not within the immediate catchment area of the treatment initiation hospital were admitted for a short stabilization period of one to eight weeks (to ensure that the patient improves clinically, gets used to the idea of DOT, and tolerates the drugs) and thereafter were physically transferred for ambulatory care at the prepared peripheral FUF nearest their homes. During the first visit, patients were evaluated at the treatment initiation hospital and patients who were not very sick were transferred to FUFs. The FUFs provided DOT and reminded patients to visit the treatment initiation hospital once a month for clinic review and laboratory monitoring. However, as more wards were constructed and more bed space became available (from 45 initially to 172 beds), enrollment rates improved steadily. The admission time was also used to visit the patient's home to assess TB infection risk and advise household members, screen contacts for TB, educate the family, and assess the family's nutritional situation. The treatment initiation facility remained responsible for the patient after initiation on treatment and would visit the FUF on a quarterly basis to mentor the staff there. TRACK TB supported treatment initiation sites to operate monthly clinics, which enabled planning for the deployment of human resources, follow-up phone reminders to patients, preparation of materials and supplies, and bulk transport of laboratory specimens. With increased enrollment, this changed to weekly clinics for most of the sites.

At project baseline, there was an initial increase in enrollment in PY1 due to a special search for 300 patients who had been on the waiting list for four years. This search was undertaken in collaboration with TB CARE 1 and other implementing partners. Of the 300 missing patients, 112 were traced and started on DR-TB treatment (table 5).

Table 5: Initial search for missing MDR-TB patients

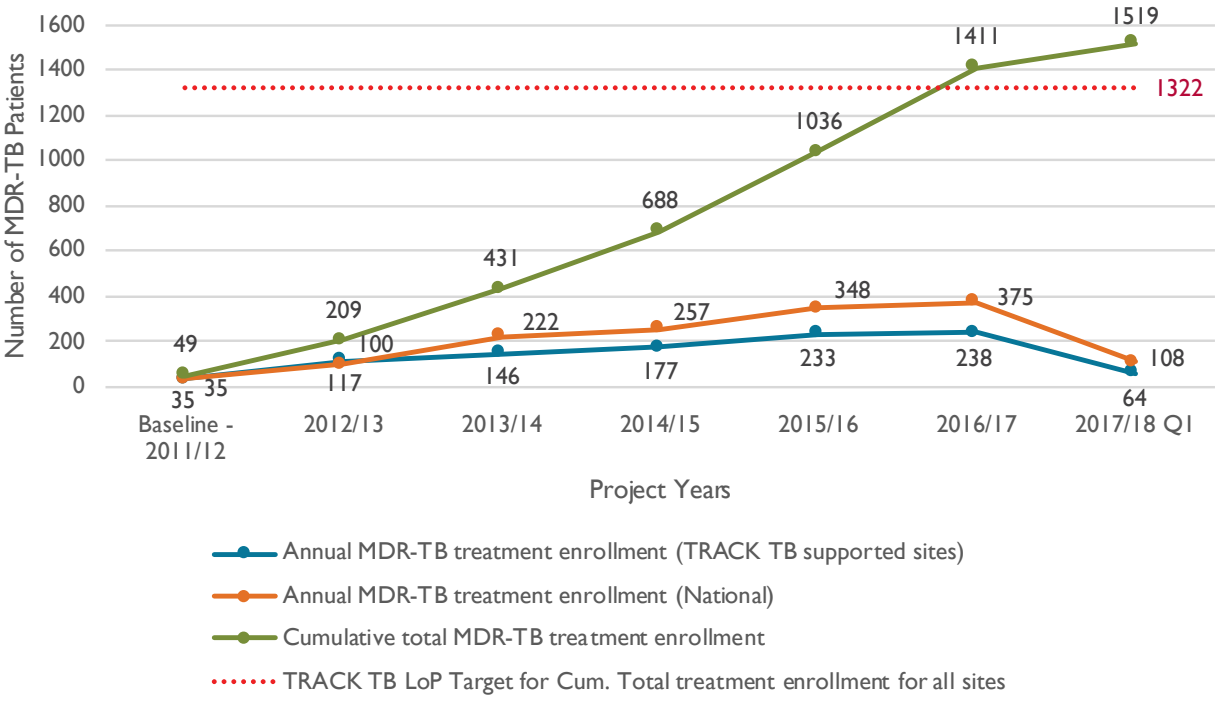
MDR-TB patient search finding	Number
Deceased	21
Lost to follow-up	24
Isoniazid mono-resistant	5
Already on treatment	12
Alive, awaiting start of treatment	50
Total	**112**

Data Source: TRACK TB project reports

In subsequent years, the linkage of patients to treatment improved as information from the GxAlert reports was shared with key players.

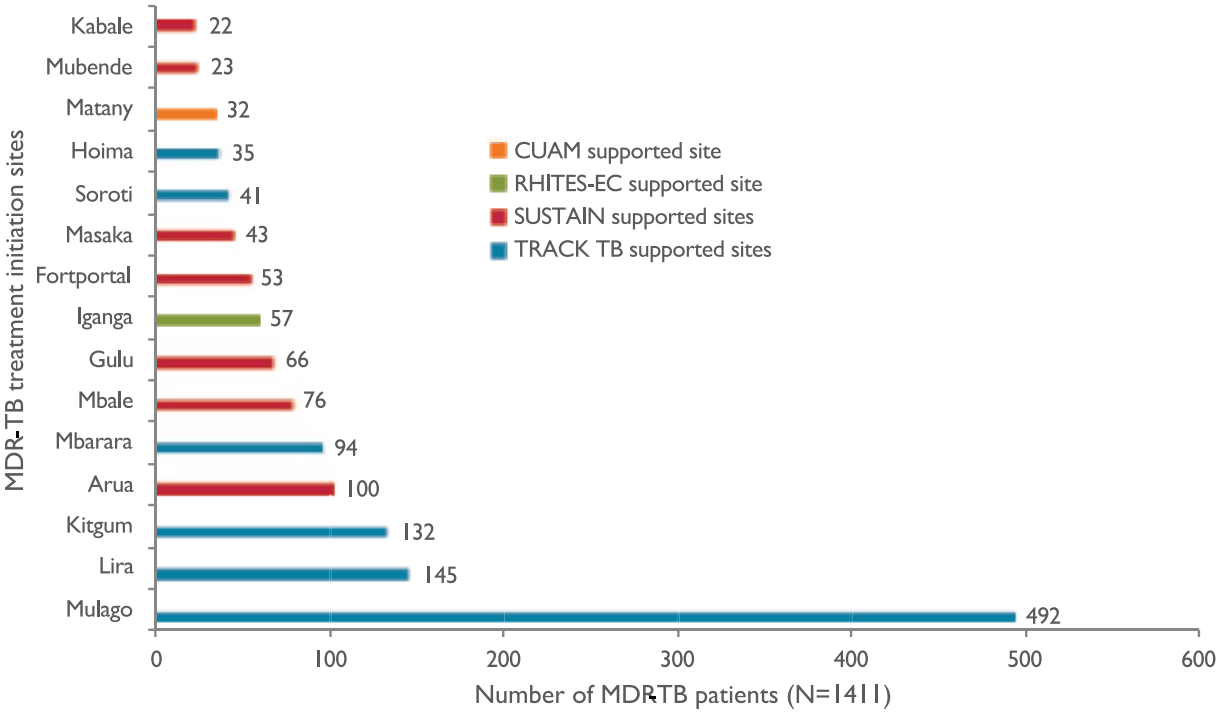
Over the project's life, DR-TB treatment initiation sites increased from 3 to 15 (figure 8) and the cumulative patient enrollment rose steadily from 49 at baseline to 1,411 patients by the end of PY5. In addition, a total of 103 DR-TB patients were enrolled in PY6 Q1, resulting in an overall cumulative enrollment of 1,519 patients (figure 21), thereby overshooting the project target of 1,322 patients. The number of children below 15 years of age among the 1,519 DR-TB cases enrolled was 46 (3%) as opposed to the expected 10-15%; in the 15–24 age range, 1,150 (76%) were enrolled and among those 25 years and above 323 (21%) were enrolled. Due to this expanded enrollment of DR-TB patients, the backlog was cleared by the end of PY2.

Figure 21: Cumulative MDR-TB patient enrollment, 2011/12–2017/18



Data source: DR TB Registers

Figure 22: Cumulative MDR-TB enrollment by MDR-TB initiation site, 2012/13–2017/18



Data source: DR-TB registers

Figure 22 shows that the largest number of patients were enrolled by Mulago Hospital. This is a result of Mulago Hospital serving a heavily populated catchment area within the largest Kampala City center in the country. It also shows that Lira, which started enrolling DR-TB patients in 2014, has the second largest number of patients, surpassing others that started before. This finding calls for research to determine why this region has such a large number of patients. Matany, which was the last center to start, already has more patients than Mubende and Kabale. Increased community mobilization and sensitization are needed to increase MDR-TB service utilization in both the Kabale and Mubende regions.

MDR-TB CONTINUUM OF CARE

Of the active patients on treatment at the end of PY5, 16.7% were admitted patients, 73.1% were getting DOT on an ambulatory basis from FUFs, and 10.2% were receiving DOT on an ambulatory basis from the treatment initiation sites. Soroti and Mubende Hospitals had no admitted patients. Lira had an abnormally large percentage (33.8%) of patients receiving DOT from the hospital on an ambulatory basis (table 6). This was due to adherence and quality issues at the FUFs, which prompted the TB Unit team to recall some patients to stay near the hospital to have their DOT properly monitored.

Table 6: Distribution of MDR-TB patients by DOT provider as of the end of PY5

Hospital	No. on DOT while Admitted	No. Getting Dot at FUF	No. Getting Dot at Rx Center on Ambulatory Basis	Total
Soroti RRH	0	11	3	14
Fort Portal	2	18	1	21
Mbarara	6	21	3	30
Gulu	2	6	4	12
Lira RRH	16	35	26	77
Matany	3	22	1	26
Hoima	1	24	0	25
Mulago	31	106	1	138
Kabale	1	8	0	9
Mbale	11	7	4	22
Masaka	0	15	0	15
Iganga	0	23	0	23
Kitgum	5	26	6	37
Arua	4	26	0	30
Mubende	0	10	1	11
Total	**82**	**358**	**50**	**490**
Percentage	**16.7**	**73.1**	**10.2**	**100**

Data Source: DR-TB facility registers

MDR-TB PATIENT MONITORING

AUDIOMETRY TESTING AND HEARING LOSS. To monitor the hearing of patients receiving injectable second-line drugs, TRACK TB procured 13 audiometers. These were distributed to 13 treatment initiation hospitals after 30 participants, 2 from each of the treatment initiation sites, undertook a five-day training in the use of the audiometers. TRACK TB provided transport for the audiologist who conducted the training to visit the treatment sites four times to mentor users on conducting audiometry. The last mentorship visit was made to Lira, where four children had been started on an amikacin-based treatment regimen. The audiologist tested the children using special equipment designed to test young children and fortunately found that none exhibited hearing loss.

Healthcare workers practice audiometry during training

During PY5, 925 tests out of 935 eligible patients were conducted to screen for hearing loss. Of those, 474 tests (51.2%) found normal hearing, 369 tests (39.9%) found mild to moderate hearing loss, 44 tests (4.8%) found moderate hearing loss, 20 tests (2.2%) found severe hearing loss, and 16 (1.7%) identified profound hearing loss (table 7). For patients who were detected early in the course of treatment, it was possible to adjust doses of aminoglycosides or to change treatment to either capreomycin or bedaquiline to prevent further hearing loss.

Table 7: Outcomes of hearing tests conducted in PY5

Treatment Center	No. Eligible for Testing	No. Tested	Normal Hearing	Mild Hearing Loss	Moderate Hearing Loss	Severe Hearing Loss	Profound Hearing Loss
Soroti	9	0	0	0	0	0	0
Fort Portal	27	27	17	4	3	2	1
Mbarara	18	18	17	1	0	0	0
Gulu	12	12	5	6	0	0	1
Lira	84	84	60	16	1	1	6
Matany	19	19	14	3	1	0	1
Hoima	18	17	4	3	7	1	0
Mulago	661	661	290	324	27	15	5
Kabale	4	4	1	3	0	0	0
Mbale	22	22	15	3	2	1	1
Iganga	15	15	7	5	3	0	0
Kitgum	46	46	44	1	0	0	1
Total	**935**	**925**	**474**	**369**	**44**	**20**	**16**
Percentage	**100**	**98.9**	**51.2**	**39.9**	**4.8**	**2.2**	**1.7**

Data Source: TRACK TB project reports

STRENGTHENED TREATMENT MONITORED BY ECG. The introduction of new (repurposed) drugs such as bedaquiline and delamanid made examination of patients' ECGs necessary to make sure they are not at risk of cardiac complications. However, no MDR-TB site had an ECG machine that could be used by MDR-TB patients. Consequently, patients were tested at private clinics. To improve ECG access, CHAI, another partner, funded some ECG tests while TRACK TB facilitated the training of clinic staff in TB IC and transportation of patients to and from the private clinic. To make ECG services more sustainable and accessible, TRACK TB procured two ECG machines. One machine was given to the Mulago TB Unit, where all patients starting on bedaquiline are supposed to be initiated and monitored. The second machine was designated to be transported from site to site based on need. User training for 14 health workers was funded by TRACK TB but conducted by the sales representatives.

The ECG machines have since been used to conduct baseline and monitoring ECG tests on patients. By the end of PY5, 100 ECG tests had been done on 27 patients and no patient had been disqualified because of an abnormal ECG.

Her Excellency the American ambassador handing over the GeneXpert and ECG machines to State Minister Sarah Opendi

However, with the preparations for use of the short treatment regimen, it became clear that two ECG machines would not be enough for the whole country. TRACK TB therefore encouraged the remaining sister projects to procure ECG machines and provided the specifications. Consequently, SUSTAIN procured four ECG machines, bringing the total to six ECGs available for MDR-TB patients. More ECGs are expected to be procured by other implementing partners and through use of GF resources.

TREATMENT MONITORING BY HEMATOLOGY AND SERUM CHEMISTRY. TRACK TB included patient monitoring in the minimum healthcare package for DR-TB patients. This included hematology and bio-chemistry tests. These were conducted by the hospitals with support from regional partners. Unfortunately, it was not always possible to conduct these tests due to of irregular availability of consumables and lack of service contracts for most of the laboratory equipment. Nevertheless, TRACK TB printed and laminated charts showing at which stage of treatment each of the tests had to be done.

BACTERIOLOGICAL TREATMENT MONITORING. Bacteriology was not the mandate of TRACK TB. However, the project supported the distribution of specimen collection tubes and supported the transportation of specimens to the post office for shipment to the NTRL.

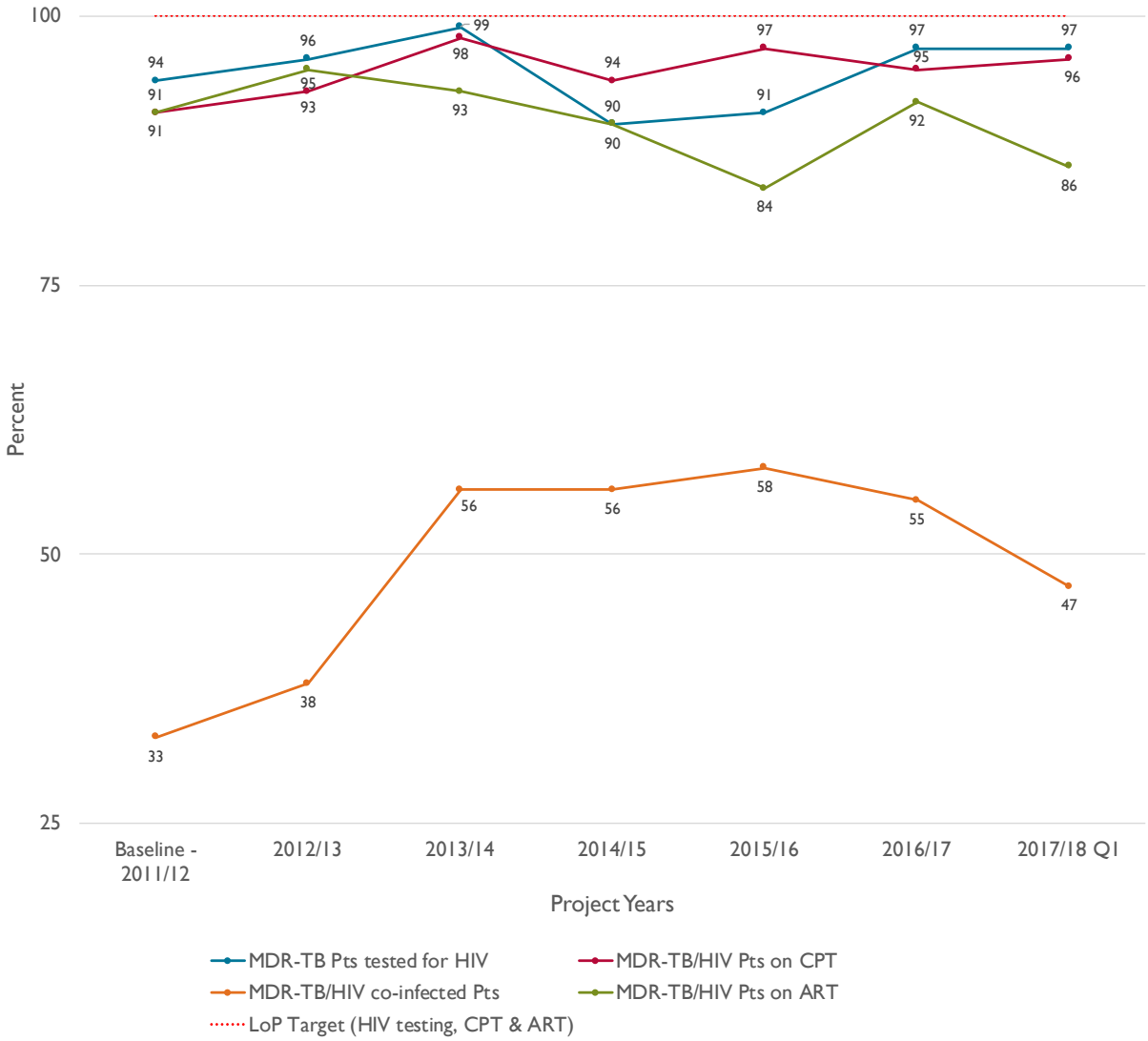
TREATMENT MONITORING BY CHEST X-RAY AND TSH. Conducting X-rays was not always possible because the supplies for X-ray machines were often out of stock and most X-ray machines were non-functional due to failure to have them serviced or repaired. This is a challenge the next project should address. It was also not possible to perform thyroid function tests for patients on para-aminosalicylic acid or ethionamide because MDR-TB hospitals did not have the needed equipment and supplies.

DR-TB/HIV INTEGRATION

TRACK TB noted that most of the patients who died were HIV seropositive. The project therefore promoted the integration of TB/HIV services and the implementation of the one-stop-shop model as recommended by the

NTLP. Through regional implementing partners supporting HIV services in the hospitals, the project encouraged staff to see co-infected patients on clinic days so that patients don't have to make another visit to the hospital for HIV services. The results of these efforts are reflected in the TB/HIV indicators for last three years of the project. HIV testing improved from 94% at baseline to 97% in both PY5 and PY6, while the percentage of HIV positivity increased from 33% at baseline to 55% in PY5 and then decreased to 47% in PY6. CPT uptake improved from 91% at baseline to 95% in PY5, while ART similarly improved, from 91% to 92%, in the same period.

Figure 23: Trends in uptake of MDR-TB/HIV services at DR-TB sites, 2011/12–2017/18



Data Source: DR-TB facility registers

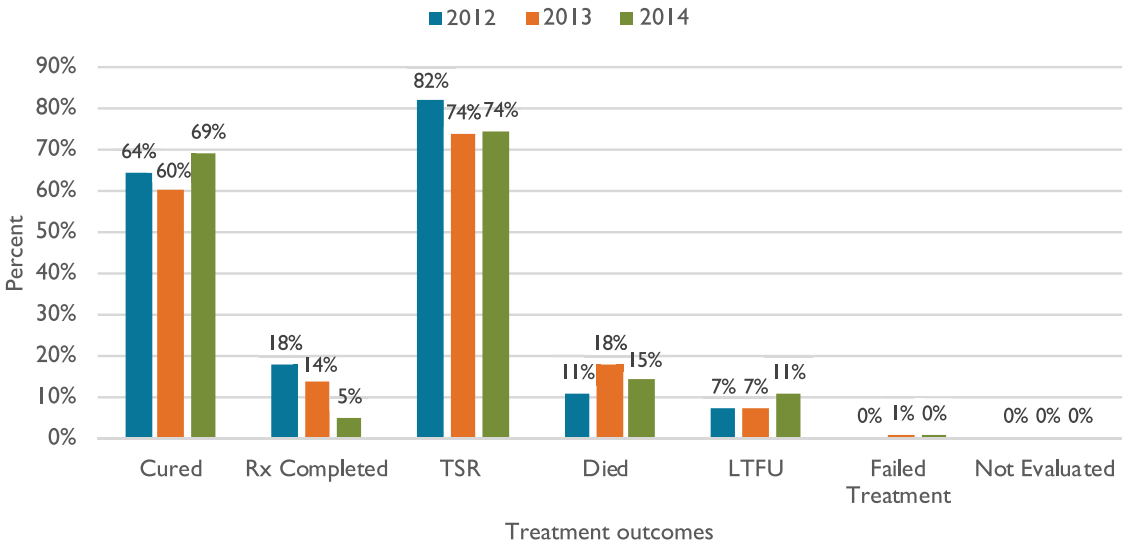
DR-TB COHORT REVIEW

Cohort reviews were introduced as a means of improving the quality of PMDT services and treatment outcomes. The cohort reviews serve several purposes. They start with a panel discussion of difficult cases, which provides a learning opportunity for participants. Second, the reviews are used to analyze the progress of each individual patient, thereby stressing providers' accountability for the quality of their care. In the process, reviews also identify programmatic roadblocks and possible solutions. The reviews give participants an opportunity to share experiences and learn from one another. The project, through UCSF/CITC, supported the NTLP to develop SOPs for the cohort reviews as well as a data presentation form. TRACK TB also supported the development of an Excel database for managing the data presented. Later, a national cohort review meeting was initiated. Since then, 11 quarterly and 3 annual reviews have been conducted. The capacity to conduct cohort reviews has been fully developed even at the regional level.

DR-TB TREATMENT OUTCOMES

Following the cohort review analyses, the treatment outcomes for three annual cohorts are presented in figure 24. On one hand, the data show a high TSR of 74% in the last two (2013 and 2014) fully analyzed cohorts. This good performance is a result of the implementation of high-quality DOT and facility CQI mentorships. On the other hand, the death rate of 11–18 % indicates that treatment started too late for some patients. This is bound to change as use of GeneXpert as a first TB test for all PTPs becomes widespread across the country, since it will bring about early and rapid case detection when the patient is still strong. As discussed above, most of the deaths occurred among HIV co-infected patients. This calls for early treatment and robust treatment monitoring of HIV co-infected patients. LTFU remains unacceptably high, at 7–11%. This requires effective counseling services and health education of patients, their families, and peer educators to encourage patients to complete treatment. In addition, district health staff and local leaders need to be involved in supporting patient linkage and tracking of treatment interrupters.

Figure 24: Final DR-TB treatment outcomes among 2012–2014 cohorts



Data Source: DR-TB facility registers

STRENGTHENED CQI IMPLEMENTATION AND PATIENT MONITORING AMONG DR-TB PATIENTS

In PY5, TRACK TB implemented the CQI process to improve the quality of PMDT. First, a set of indicators were developed and agreed upon with the NTLP. Then TRACK TB conducted mentoring of each DR-TB treatment initiation site. Data were used to develop a dashboard, which was shared with the sites. The dashboard was discussed in a three-day CQI training attended by 26 participants representing all sites except Matany. Further, data were collected and sent by the sites and an updated dashboard was drawn. The dashboard shown in figure 25 represents an improvement in the indicators.

Figure 25: Dashboard for quality of MDR-TB care at treatment facilities, April–June 2017

Legend	0-59%		60-89%		90-100%		No data	
FACILITY	Previously Treated TB Cases with Gene Xpert Test/DST	Diagnosed MDR-TB Patients Enrolled on 2nd-line Drugs	MDR-TB Patients Started on Tx with Baseline Culture/ DST	MDR-TB Patients in Care Who are Adhering to Tx	MDR-TB Patients with Monthly Smear and Culture Results	MDR-TB Patients with Contacts Traced and Screened for TB	MDR-TB/ HIV Co-infected Patients in Care Started/ Receiving ART	MDR-TB Patients in Care Assessed for Nutritional Status
Soroti RRH	100%	100%	100%	100%	100%	100%	100%	100%
Iganga hosp.	100%	100%	100%	100%	75%	100%	100%	100%
Mbarara RRH	100%	67%	100%	100%	83%	100%	100%	100%
Lira RRH	83%	100%	100%	100%	73%	100%	100%	100%
Kitgum hospital.	100%	100%	100%	67%	67%	67%	100%	67%
Kabale RRH	0%	100%	100%	100%	100%	100%	100%	100%
Arua RRH	64%	0%	92%	75%	75%	75%	100%	83%
Matany hosp.	100%	100%	33%	83%	83%	100%	100%	100%
Mulago NRH	83%	100%	71%	100%	59%	88%	90%	100%
Hoima RRH	67%	100%	100%	50%	75%	100%	67%	75%
Fort Portal RRH	75%	100%	25%	100%		100%	100%	50%
Gulu RRH	50%	100%	100%	67%	100%	0%	100%	100%
Mubende RRH	92%	0%	100%	100%	0%	100%		100%

Legend	0-59%		60-89%		90-100%		No data	
FACILITY	**Previously Treated TB Cases with Gene Xpert Test/DST**	**Diagnosed MDR-TB Patients Enrolled on 2nd-line Drugs**	**MDR-TB Patients Started on Tx with Baseline Culture/ DST**	**MDR-TB Patients in Care Who are Adhering to Tx**	**MDR-TB Patients with Monthly Smear and Culture Results**	**MDR-TB Patients with Contacts Traced and Screened for TB**	**MDR-TB/ HIV Co-infected Patients in Care Started/ Receiving ART**	**MDR-TB Patients in Care Assessed for Nutritional Status**
Masaka RRH	42%	100%	67%	67%	33%	67%	67%	67%
Mbale RRH	100%	100%	50%	100%	0%	50%	0%	100%

Data Source: DR-TB facility registers and patient files

STRENGTHENED THE MANAGEMENT AND TECHNICAL CAPACITY OF THE NTLP CENTRAL UNIT TO PROVIDE TECHNICAL OVERSIGHT OF AND LEADERSHIP FOR THE IMPLEMENTATION OF QUALITY PMDT

At the start of the TRACK TB project, the project Senior Technical Adviser for MDR-TB doubled as the acting MDR-TB Coordinator at the NTLP, a situation which lasted one year. This contributed to the seamless transition from TB CARE Ito TRACK TB because the Senior Technical Advisor had been playing a similar role in TB CARE I. As Coordinator he oversaw surveillance, linking of diagnosed patients to treatment, management of the national MDR-TB register, training, dissemination of guidelines, drug management, etc. To free the Senior Technical Adviser to carry out his TRACK TB duties, TRACK TB assisted in recruitment of the MDR-TB Coordinator at the NTLP. Before GF took over, TRACK TB facilitated a monthly meeting of the National DR-TB Technical Committee, chaired by the MDR-TB Coordinator, on behalf of the NTLP Program Manager. The committee reviewed plans and reports on the implementation of PMDT and oversaw implementation of PMDT guidelines. It was expanded to include the implementing partners supporting PMDT. TRACK TB also facilitated biweekly meetings of the national MDR-TB Panel to review, discuss, and approve DR-TB treatment as a means of improving the quality of clinical management of patients. Moreover, the project initiated national-level coordination meetings of implementing partners supporting PMDT. These were discontinued when the partners were invited to attend the Technical Committee meetings.

Since there had been policy changes since the PMDT guidelines and tools were produced in 2011, TRACK TB embarked on revising these materials as well as SOPs in 2014 to align them with the new WHO policies. This process was completed in 2015. However, a further review was done in 2017 to accommodate the new WHO recommendations on use of new drugs, including bedaquiline and delamanid, and to accommodate the short treatment regimen. After this second review, TRACK TB funded the printing and distribution of 120 copies to hospitals and key implementing partners and stakeholders. TRACK TB also worked with SURE (and later UHSC) and SIAPS to strengthen drug management. Besides the quantification process, TRACK TB participated in training on QuanTB, which facilitates forecasting of drug needs. TRACK TB also organized trainings on

use of new drugs and introduction of the short treatment regimen. Other PMDT strengthening activities already mentioned above include development and later review of training materials, training of national-level trainers for PMDT, support for videoconferencing, introduction of cohort reviews, and development of the district minimum package.

STRENGTHENED HUMAN RESOURCES FOR DR-TB

SECONDED HEALTH WORKERS AT TRACK TB-SUPPORTED DR-TB SITES. To address the shortage of human resources at the TB units in MDR-TB hospitals, TRACK TB hired an employment agency that recruited and appraised seconded staff identified by the respective hospitals at the six TRACK TB MDR-TB supported sites (table 8). From PY1 to PY4, 25 staff were seconded, until the number dropped to 23 due to staff attrition; Mulago had 2 doctors instead of 3 and Hoima had none (down from 1) up to the end of the project.

Table 8: Seconded MDR-TB staff at the six supported sites

Hospital	Doctors	Clinical Officers	Nurses	Counselors	Lab Tech	Data Officer	Total
Mulago	3	0	3	1	1	1	9
Mbarara	0	1	2	0	0	1	4
Hoima	1	1	2	0	0	0	4
Soroti	1	0	2	0	0	0	3
Lira	0	1	2	0	0	1	4
Kitgum	0	0	0	1	0	0	1
Total	**5**	**3**	**11**	**2**	**1**	**3**	**25**

Data Source: Project records and reports

STRENGTHENED SUPERVISION AND PEER MENTORSHIP. Mentorship has been a highly effective approach for improving performance in PMDT. TRACK TB worked through UCSF/CITC to conduct bedside mentoring of teams of clinicians, including nurses, at all DR-TB treatment sites. TRACK TB trained a group of peer mentors, which included agreeing on a mentorship tool. Thereafter, the trained team continuously conducted peer-to-peer mentorship with the support of senior mentors. TRACK TB-supported sites and their follow-up health facilities were mentored on a quarterly basis. TRACK TB, as the lead partner in PMDT, also conducted CQI TA quarterly visits to the rest of the DR-TB treatment sites. TRACK TB facilitated visits by mentors from the treatment initiation sites to FUFs in their catchment areas with physical transport and allowances. These visits reinforced the training that is done at the FUF when a patient is referred to the site.

In the case of Mulago, there were not enough health workers to reach all the FUFs. Therefore, TRACK TB invited health workers from other treatment initiation sites to help with the mentorship of the FUFs in the Mulago catchment area. Numerous challenges were identified and addressed. Examples included noncompliance with the rules for DOTS and mismanagement of drugs.

The Senior Technical Advisor for MDR-TB and a peer mentor from Kitgum guiding the screening of contacts at the home of a deceased patient in Mbarara

LESSONS LEARNED

Private health facilities, especially private for-profit facilities, can play a critical role in providing DOT to patients. However, the facilities need close supervision to ensure full DOT and proper accountability for drugs. It has also been proven that management of DR-TB patients need to be coordinated with district and local authorities to ensure that patients adhere to treatment. A sure way to track and link diagnosed patients and manage treatment interrupters is use of the national identification number as the unique identifier in the national database to prevent patients from changing names when they leave one treatment site and reappear at another.

CHALLENGES AND RECOMMENDED NEXT STEPS

Continuation of PMDT services faces challenges that the new team will have to address. While diagnosis of patients using GeneXpert has increased, the linkage of patients to treatment centers needs further refinement to prevent initial LTFU. Patient LTFU is still high but can be improved with continuous and regular patient education and counseling, as well as further support with regular provision of incentives and enablers. Furthermore, although the ultimate solution would be to use national IDs as unique identifiers, currently only 60% of the population possesses them. In the interim, comparing GxAlert data of diagnosed patients with those enrolled on DR-TB treatment is the most feasible approach to continue these efforts. The GeneXpert database of diagnosed patients needs to be linked to the web-based MIS to make it easier to track the treatment of all diagnosed patients.

Mulago and Lira hospitals, which have a large number of patients, need dedicated vehicles for transporting patients, supervision, and drug distribution. Regular supply of TB drugs at both the hospital and national levels is essential. Having a one-year buffer stock and managing procurement and distribution of TB commodities using TWOS will mitigate TB commodity stock-outs.

Adequate laboratory monitoring of patients is still far from adequate and a sustainable means of getting supplies and needed equipment, including robust maintenance plans, needs to be addressed with the MOH. Several steps will help to ensure regular maintenance of the

GeneXpert machines, including bundle pricing contracts with Cepheid to train "super users." Sites need supplies such as covers and surge protectors to protect GeneXpert modules from damage caused by dust and power fluctuations.

Another major problem is the high staff turnover on TB wards due to internal rotation. This needs to be regularly negotiated with hospital management as training fresh staff on TB takes a long time, particularly training on DR-TB.

Other challenges include lack of a constant supply of enablers, failure by the NTLP to conduct regular cohort reviews to assign treatment outcomes, uncompleted dashboards for the DR-MIS, lack of capacity of local governments to maintain DR-TB facilities, and lack of a ward for Iganga Hospital. Addressing these challenges will require continued advocacy for more resources.

RESULT AREA 4: IMPROVED MECHANISMS FOR PARTNER COORDINATION FOR THE IMPLEMENTATION OF DOTS, TB/HIV, AND MDR-TB INTERVENTIONS

BASELINE PERFORMANCE GAPS AND CHALLENGES

At the start of the TRACK TB project, the NTLP was not engaging all stakeholders in the planning process, which resulted in poor coordination of implementing partners and their priorities not being aligned with national priorities. Consequently, there was inconsistent implementation of country policies, programs, and priorities. In addition, there were delays in adopting new policies like the shift from EH to RH, INH prophylaxis, and use of the one-stop-shop model for TB/HIV collaborative services.

PRIORITY INTERVENTIONS AND STRATEGIES

- Strengthen mechanisms for partner coordination
- Provide TA to implementing partners
- Support the finalization, dissemination, and utilization of NTLP guidelines and tools

KEY ACHIEVEMENTS

STRENGTHENED MECHANISMS FOR PARTNER COORDINATION

During the project's lifetime, TRACK TB provided technical and operational support to the NTLP to coordinate implementation of TB, TB/HIV, and MDR-TB interventions in the country. This was done through support to the NCC for TB/HIV (see NCC meeting minutes in annex 3), and specific coordination forums such as DR-TB, GeneXpert, and IPT implementers' coordination meetings. As a result, the following achievements were realized during the era of the TRACK TB project.

A smooth transition of support for the NCC for TB/HIV from TB CARE I to TRACK TB was accomplished, and from TRACK TB to the MOH with resources from the GF. The project sustained regular partner coordination and collaboration to improve TB case finding, TB treatment outcomes, management of DR-TB, GeneXpert implementation and utilization, integration of TB reporting into DHIS 2, and stock management of TB medicines.

Regional implementing mechanisms regularly addressed similar national priorities during

the quarterly regional performance review meetings with their supported districts. The project improved efficiencies in utilization of health resources by coordinating the roll-out of the revised TB/HIV guidelines with that of the ART guidelines.

TRACK TB supported installation of 29 GeneXpert machines procured through USAID support, contributing to a total of 131 Xpert MTB/RIF machines currently installed in the country, and improved the average utilization of the machines from two to six tests per day. The project also supported orientation of health workers in GeneXpert technology and reporting of GeneXpert data through GxAlert. From 2016 to September 2017, a total of 168,013 sputum samples were tested, from which 22,071 MTB cases were detected, of which 539 were rifampicin resistant. GxAlert electronic reporting of results improved GxAlert reporting from 0% in 2015 to 40% by end of 2017 and enhanced DR-TB surveillance and linkage of patients through quick identification of newly diagnosed patients across the country.

By promoting information sharing between the National Medical Stores and the MOH and implementing partners, targeted capacity building for IPT was made possible, with 83% of health units that received INH from the National Medical Stores in 2017 having ever been trained or mentored on IPT. Details of achievements are described under each intervention below.

PROVIDED TA TO TB IMPLEMENTING PARTNERS

TRACK TB provided targeted TA to regional implementing mechanisms on implementation of IPT, PMDT, TB IC, and EQA for TB smear microscopy. The following were accomplished during the tenure of TRACK TB:

- TB/HIV integration performance indicators improved: the proportion of TB patients with a documented HIV result increased from 88% in FY 2012/2013 to 99% in FY 2016/2017; the proportion of TB/HIV co-infected patients on CPT and ART improved from 94% and 46% in FY 2012/2013 to 99% and 94% in FY 2016/2017, respectively. The HIV co-infection rate among TB patients decreased from 49% in FY 2012/2013 to 44% in FY 2016/2017.
- A total of 29,576 PLHIV and 2,940 under five-year-old contacts of TB patients were enrolled on IPT between January 2015 and June 2017.
- The cumulative enrollment of MDR-TB patients on second-line TB treatment increased from 63 in 2012/2013 to 1,411 in 2016/2017.

FINALIZED AND DISSEMINATED DR-TB GUIDELINES AND TOOLS

TRACK TB provided technical support to the NTLP to finalize development of the 2013 national guidelines for implementation of TB/HIV collaborative activities, 2014 IPT implementation guidelines, 2017 TB diagnostic algorithm, SOPs for the one-stop-shop TB/HIV integrated model, and 2016 guidelines for PMDT. The project also provided technical support toward approval of the new guidelines for pediatric TB and the TB communication strategy. In the same direction, the project facilitated and supported the dissemination and roll-out of the 2013 national guidelines for implementation of collaborative TB/HIV activities, including the 2014 IPT implementation guidelines for health workers and the 2015 PMDT guidelines to all regions of the country. Moreover, the NTLP improves utilization of the TB/HIV, IPT (annexes 5 and 6), and PMDT guidelines and laboratory SOPs at the health facility level through technical support

provided by the project. The NTLP provided technical oversight of regional implementing mechanisms and technical support to high-volume TB diagnostic and treatment units after TA from the project. A total of 5,000 TB/HIV guidelines, 5,000 IPT health worker guides, 120 PMDT guidelines, 200 NTLP manuals, and 2,000 TB diagnostic algorithms were distributed to health facilities across the country through direct or coordination support of the project.

LESSONS LEARNED

- Sustained coordination and engagement of partners at all levels is key in achieving rapid and standardized implementation of national priorities and policies as well as achieving TB/HIV and MDR-TB targets.
- Use of multimedia communications, including social media, increases partner notification and feedback about coordination activities.
- TA is most appreciated by implementing partners when new approaches to TB control are introduced.

CHALLENGES AND RECOMMENDED NEXT STEPS

Bureaucratic GOU financial systems often slow or prevent rapid and efficient absorption of GF funds. Allocation of more than enough GF resources for non-commodity TB activities resulted in fewer resources for TB commodity procurement. Moving forward, it will be necessary to work with the Country Coordinating Mechanism to ensure a balanced allocation of GF funds. We also recommend further involving the NCC for TB in tracking the resources available for TB and improving MOH and partner coordination, including optimization of GF and PEPFAR resource allocations.

There were no major hindrances in the provision of TA to regional and district implementing mechanisms, although competition among partners was a minor hindrance with implementing mechanisms preferring to receive guidance from the NTLP rather than the lead mechanism.

Whereas the country has been well mapped, with clear delineation of partner areas of support, and there is a high level of information sharing to avoid duplication of efforts and resource waste, thorough follow-through on agreed-upon actions to ensure nationwide coverage and dissemination of critical interventions remains a challenge. Partner priorities are often aligned with those of funding agencies rather than NTLP priorities. Most health funding comes from PEPFAR, which is an HIV/AIDS fund. Therefore, critical TB interventions are often overshadowed by HIV priorities. As a result, the quality and coverage of dissemination of specific TB guidelines (e.g., for TB/HIV and TB IC) have been inadequate. For example, the dissemination of the TB/HIV guidelines was not done adequately because it was over-shadowed by the simultaneous roll-out of ART guidelines, not allowing sufficient time for health worker orientation. This is evidenced by the low level of knowledge about TB management among healthcare workers (observed during supportive supervision visits to health facilities) as compared to HIV guidelines.

A major hindrance to guideline dissemination and utilization has been the lack of adequate stocks of TB commodities to implement the guidelines. This particularly affected the roll-out of the IPT guidelines and sputum sample collection among

under-fives. Hence, there is a need to use a TB web-based system for ordering to track commodities and to engage the Parliamentary TB Caucus to advocate for commodity funding, as well as improving overall coordination and transparency among the MOH, National Drug Authority, and National Medical Stores so as to improve availability of TB commodities.

Tracking the distribution of NTLP guidelines, SOPs, and tools has remained a challenge due to the lack of a mechanism to monitor distribution of the tools. There is insufficient capacity to collect, analyze, use, and display TB intervention data to inform dissemination of NTLP guidelines, SOPs, and tools. For example, the NTLP was not in a position to easily track INH health unit stock levels so as to guide the IPT roll-out. Partner resources to roll out agreed-on TB interventions to all TB diagnostic and treatment sites across the country were inadequate. Thus, it will be necessary to develop online databases and dashboards to monitor partner performance in the scale-up of priority TB interventions and to track the extent of dissemination of TB guidelines, SOPs, IEC materials, and tools. A list displayed on a public dashboard (e.g., that of viral load testing) might compel partners to allocate sufficient resources to implement agreed-on TB interventions to scale.

ADDITIONAL PROJECT UPDATES

MEETINGS AND COMMUNICATION WITH USAID

TRACK TB has continued to provide periodic updates to USAID on project progress and received guidance and support on project implementation. This has helped to maintain a common understanding of challenges and possible solutions.

SHORT-TERM TECHNICAL ASSISTANCE

In December 2016 and August 2017, TRACK TB received the MSH Senior Director of the Infectious Diseases Cluster, Dr. Pedro G. Suarez, who provided technical and managerial oversight toward acceleration of planned activities and development of the PY5 work plan. In addition, Dr. Suarez supported the NTLP in the review of the implementation of the MOST for TB action plan and provided recommendations about the draft NSP and GF concept note that were under development.

With support from USAID, TRACK TB supported the NTLP with short-term TA from an international consultant from WHO to provide technical support to local consultants during the revision of the NSP for Uganda (2017–2021). With this support, the NSP was aligned with both national and international policies and strategies and recommendations from the prevalence survey, and previous assessment reports were incorporated.

In PY5, during the first quarter of 2017, TRACK TB provided TA to the NTLP through UCSF to develop an addendum for short-term regimens (9–11 months) as part of the national PMDT guidelines that were revised in 2016. Use of short-term regimens is expected to bring about better adherence and treatment outcomes. During the same period, TRACK TB, through UCSF, facilitated a two-day workshop that planned and developed a roadmap for the introduction of the ECHO platform, which is used to link the NTLP Central Unit, National MDR-TB Panel, and 15 PMDT initiation sites to enable discussion of complex cases by the national expert panel with site teams.

To further improve the quality and capacity of the PMDT program, a second short-term TA visit by UCSF in August 2017 to the NTLP provided a PMDT program review, development of training materials, training of a national team of trainers on short-term regimens, and piloting of the videoconferencing learning network.

IMPLEMENTATION SCIENCE AND DOCUMENTATION

PEER-REVIEWED JOURNAL ARTICLES

Published

1. Wobudeya E, Sekadde-Kasirye M, Kimuli D, Mugabe F, Lukoye D. Trend and outcome of notified children with tuberculosis during 2011–2015 in Kampala, Uganda, *BMC Public Health*, Dec. 2017; 17: 963. DOI: https://doi.org/10.1186/s12889-017-4988-y.

2. Namiiro S, Wobudeya E, Colebunders R, Worodria W. Molecular tests expedite the diagnosis of multidrug-resistant tuberculosis in childhood. *International Journal of Tuberculosis and Lung Disease*, 1 March 2018; 22: 349-50(2).

To be published

1. Response to anti-tuberculosis treatment by people over age 60 in Kampala, Uganda
2. Addressing the DR-TB challenge through implementing a mixed DR-TB model of care in Uganda, 2012–2017
3. Strengthening TB service provision through urban DOTS in Kampala, Uganda, 2012–2016
4. High HIV prevalence among presumptive tuberculosis patients in an urban setting: lessons from Kampala City, Uganda
5. Implementation of TB/HIV collaborative activities from HIV units in Kampala, Uganda
6. Trends of pulmonary bacteriologically confirmed tuberculosis in Kampala, Uganda, 2012–2016
7. Assessment of GeneXpert MTB/RIF utilization in Kampala, Uganda
8. Drug-resistant tuberculosis patient mortality audit in Uganda

SUCCESS STORIES

2014

1. N. S., a multidrug-resistant TB survivor
2. Strengthening MDR-TB management in Northern Uganda
3. Scaling up of MDR-TB case detection in Lira
4. Hope and a cure for 70-year-old MDR-TB patient
5. NTLP leadership and technical capacity enhanced for effective TB control
6. TB contact screening and awareness outreaches helped to find missing cases and increase TB awareness in a city slum

2015

7. Steps towards improved TB treatment success rate in Kampala by TRACK TB
8. Improved records keeping at the TB unit in Mulago Hospital
9. Five lives saved through contact tracing
10. N.A., a hairdresser; she lives in Nansana and owns a small salon
11. Wellness screening of health workers in Hoima District
12. TRACK TB provided audiometers for screening DR-TB patients for hearing loss
13. Community linkages: saving lives, one patient at a time

2016

14. "I am cured and under a new life": former MDR-TB patient speaks out
15. New equipment to enhance electronic reporting
16. Sample collection in the communities improves access to diagnosis

2017

17. Surviving MDR-TB

18. A favorable treatment outcome registered in a pre-extensive DR-TB

TECHNICAL HIGHLIGHTS

1. Strengthening TB service provision through urban DOTS in Kampala, Uganda (2016)

2. Implementing systematic TB contact investigations in urban settings; experiences from Kampala, Uganda (2017)

3. Urban DOTS model for improved TB service delivery in Kampala, Uganda (2016)

4. Enhancing Uganda's NTLP leadership and management capacity for planning, monitoring, and implementation of TB control activities using the MOST Tool (2017)

5. Integrated performance assessment, mentorship and quality improvement approach for TB care (2017)

6. The contribution of the private registered drug dispensing outlets (drug shops, pharmacies, and private clinics) in TB case finding (2017)

7. Leveraging community linkage facilitators in data management of urban TB service delivery (2017)

CONFERENCE ABSTRACTS AND POSTERS

Tables 9–13 present the contributions of TRACK TB project staff to four international conferences over the past four years.

Table 9: Abstracts/posters presented at 45th Union Conference, Barcelona, Spain, 2014

1	The Management and Organizational Sustainability Tool (MOST) contributes to improved management and technical capacity at Uganda National TB and Leprosy Programme
2	The role of private facilities in managing drug-resistant TB patients in urban settings: experiences from Kampala, Uganda

Table 10: Abstracts/posters presented at 46th Union Conference, Cape Town, South Africa, 2015

1	Improving TB control in urban settings through engagement of community linkage facilitators: the case of Kampala City
2	Gender differences in treatment completion of tuberculosis patients in Kampala City, Uganda
3	Contact investigation in congregate settings, a key strategy for TB case finding and control: experiences from Lira prisons in Uganda
4	Improving antiretroviral therapy uptake among TB/HIV co-infected clients in care: lessons from quality improvement implementation in Kampala, Uganda
5	Contribution of the private sector to TB treatment outcomes: experiences from Kampala City, Uganda

6	Using electronic data management system leads to improved TB patient monitoring in Kampala Uganda
7	*For the MDR-TB symposium:* Improving access to MDR-TB treatment and interim outcomes using the mixed model of patient management: experience from Uganda

Table 11: Abstracts/posters presented at 47th Union Conference, Liverpool, England, 2016

1	E-Poster: Using the Management Organizational Sustainability Tool (MOST) to strengthen management systems at the National TB and Leprosy Programme in Uganda – By Raymond Byaruhanga
2	E-Poster: Contribution of GeneXpert implementation towards detection of multi-drug resistant TB in Uganda – By Enock Kizito
3	Oral Presentation: Predictors of mortality among patients registered for TB treatment in Kampala City, Uganda – By Deus Lukoye
4	Oral Presentation: Achieving rapid scale-up of MDR-TB patient treatment in Uganda using the mixed model of care – By Raymond Byaruhanga
5	Oral Presentation: Active TB case finding using contact investigation approaches is more efficient than targeted TB screening outreach – By Raymond Byaruhanga
6	Poster Presentation: Impact of concurrent mental health illness on TB treatment outcomes: a case of Butabika Hospital in Uganda – By Enock Kizito
7	Poster Presentation: Factors associated with mortality among children diagnosed with tuberculosis in Kampala City, Uganda – By Deus Lukoye
8	Poster Presentation: Integrating TB screening in routine antenatal care services through engagement of lay providers: lessons from Kampala – By Deus Lukoye
9	Poster Presentation: Improving ART uptake & treatment outcomes among TB/HIV co-infected by implementing a one-stop-shop model of care in Kampala, Uganda – By Enock Kizito
10	Poster Presentation: Yield of TB among immigrant populations: Lessons from Kyangwali refugee camp in Uganda

Table 12: Abstracts/posters presented at 20th Union African conference in Ghana, Accra, 2017

Reference No.	Title of abstract	Type of session	Presenter
OA-665-13A	A chronological analysis of causes of death among patients initiated on tuberculosis treatment in Kampala	Oral abstract session	Derrick Kimuli
PD-121-11	Findings of respirator fit testing among drug-resistant TB care teams in Uganda	Poster discussion session	Simon Muchuro
OA-625-11	Treatment outcomes among HIV co-infected multidrug-resistant tuberculosis patients in Uganda	Oral abstract session	Samuel Kasozi
PD-130-11	Data use through continuous quality improvement dashboards improves quality of TB care: best practices from Kampala City, Uganda	Poster discussion session	Ruth Kalisa
OA-666-13	Applying electronic systems to improve monitoring of DR-TB patients in low income settings: experiences from Uganda	Oral abstract session	Raymond Byaruhanga
OA-632-12	Retrospective tuberculosis contact investigation in an urban setting: what lessons do we learn from Kampala City, Uganda	Oral abstract session	Deus Lukoye
PD-122-11	Improving surveillance and early diagnosis of drug-resistant tuberculosis among previously treated TB patients at health facilities in Kampala, Uganda	Poster discussion session	Aldo Burua
PD-201-13	Retrospective studies might not be the best approach to study the risk factors for death among children initiated on TB treatment	Poster discussion session	Raymond Byaruhanga
PD-200-13	Presumptive TB is higher among females, but more males are confirmed with TB in Kampala City	Poster discussion session	Nicholas S. Kirirabwa
OA-671-13	Improvement in diagnostic capacity for DR-TB proves wide distribution of this epidemic in Uganda	Oral abstract session	Denis Sama
OA-602-11	Routine HIV screening for all presumptive TB patients improves access to HIV care services	Oral abstract session	Nicholas S. Kirirabwa

Table 13: TRACK-TB abstracts/posters presented at 48th Union Conference, Guadalajara, Mexico, 2017

#	Abstract name	Number	Author	Type of session
1	Improved utilization of Xpert MTB/RIF technology for TB diagnosis in Kampala	A-911-0014-01764	Edward Masendi	Poster session
2	Mortality predictors among drug-resistant tuberculosis patients in Uganda	A-911-0006-01629	Samuel Kasozi	Poster session
3	Mortality of TB/HIV co-infected patients in Kampala remains high despite early initiation of ART	A-911-0009-00853	Nicholas Kirirabwa	Poster session
4	The costs and challenges of setting up a customized web-based electronic health records system for DR-TB in a low income country: lessons from Uganda	A-911-0005-02168	Denis Sama	Poster session
5	Internet access is the main deterrent to online reporting of GeneXpert data in Kampala	A-911-0014-01878	Denis Sama	Poster session
6	Treatment outcomes among HIV co-infected MDR-TB patients in Uganda	A-911-0009-00868	Mable Nakawaoya	Poster session
7	Tuberculosis patients from outside Kampala City carry a higher risk of unfavorable treatment outcomes	A-911-0016-00859	Ruth Kalisa	Short oral abstract (SOA) session
8	Attaining universal access to DST for tuberculosis patients in Uganda: experience from Kampala City on strengthening systems for optimal utilization of GeneXpert MTB/RIF	A-911-0014-00928	Aldo Burua	SOA
9	Tuberculosis contact investigation contributes over 5-fold to the total cases notified in Kampala	A-911-0002-00331	Derrick Kimuli	SOA
10	Contribution of private health facilities to the management of MDR-TB: experiences from Kampala, Uganda	A-911-0006-01826	Enock Kizito	SOA
11	Comparative analysis of the EH-RH switch on treatment outcomes of tuberculosis patients in Mulago National Referral Hospital	A-911-0012-00330	Derrick Kimuli	SOA
12	High HIV prevalence among presumptive tuberculosis patients in an urban setting: lessons from Kampala City, Uganda	A-911-0009-00770	Deus Lukoye	SOA
13	Gaps in TB screening at health facilities have contributed to decline in TB case notification in Kampala city	A-911-0006-00715	Deus Lukoye	SOA

Four TRACK TB project staff participated in the 48th Union Conference on Lung Health held in Guadalajara, Mexico, where six posters and seven accepted oral abstracts were presented. Two of the TRACK TB/MSH posters were chosen as outstanding in their categories: (1) Internet access is the main deterrent to online reporting of GeneXpert data in Kampala, and (2) Improved utilization of Xpert MTB/RIF technology for TB diagnosis in Kampala.

TRACK TB LIFE-OF-PROJECT FINANCIAL PERFORMANCE – PROVISIONAL

The total life-of-project expenditure is $12,928,176 of the total estimated budget and obligated amount of $13,103,004. This is 99% of the entire budget and obligation spent in 98% of the time. The burn rate is in concurrence with the time spent on the project. The obligation remaining (pipeline) is $178,828, or 1%, of the total obligation/life-of-project budget, expected to run the project through March 2018.

COST SHARE

The total revised cost-share obligation is $1,310,701, out of which the project realized and booked $1,310,667. This is 99.99% of the total cost-share obligation. The remaining cost share will be booked during the closeout period to achieve 100% by the end of March 2018.

Compliance and Cost-Effective Utilization of Funds

The project continues to implement the risk management plan to ensure maximum compliance and efficient utilization of project resources. The plan, among other things, limits the handling of cash by project staff or other collaborators and prioritizes proper use of project assets and timely and efficient accountability of money advanced to staff. The measures in place include the use of electronic transfer of funds to intended targets through banks and mobile money transfers. The project management also works closely with the internal audit and MSH's Country Operations Management Unit to effectively manage the resources. Furthermore, the project team regularly makes visits to facilities to ensure that mentorships and meetings actually take place, especially where there are no MSH staff members carrying out activities.

Financial Snapshot (as of March 2018)

Total period of performance (years, months)	**63 out of 63 months (100%), as of March 2018**
Award ceiling	**$13,107,004**
Current obligation total	**$13,107,004**
Total expenditures and accruals	**$13,063,662.89**
Major financial commitments not yet accrued	**$157,148**
Obligation remaining after expenditures, accruals, commitments	**$88,274.60 (0.01%)**
Ceiling remaining after expenditures, accruals, commitments	**$88,274.60 (0.01%)**
Average monthly expenditures over last 3 months	**$79,704.41**
Current pipeline finalized and submitted	**Revised work plan and budget**

ANNEXES

TRACK TB | END OF PROJECT REPORT

ANNEX 1: TRACK TB PERFORMACE MONITORING PLAN, PY1—PY6, QUARTER 1

PMP Indicators	Base-line	PY1-(2012/13)			PY2-(2013/14)			PY3-(2014/15)			PY4-(2015/16)			PY5-(2016/17)			PY6 Q1-(2017/18)			LoP-(2013/18)		
		Target	Achvd	% Achv't	Target	Achvd	% Achv't	Target	Achvd	% Achv't	Target	Achvd	% Achv't	Target	Achvd	% Achv't	Target	Achvd	% Achv't	Target	Achvd	% Achv't
IR 1: NTLP Leadership and Technical Capacity for Effective Management of TB Control Enhanced																						
1.1.1. NTLP Annual Work Plan developed and implemented	0	20%	20%	100%	50%	61%	122%	70%	71%	101%	70%	83%	119%	70%	77%	109%	70%	80%	114%	70%	83%	119%
1.1.2. Proportion of districts submitting reports timely to NTLP (by 28th day of next month)	87%	90%	92%	102%	95%	97%	102%	100%	95%	95%	100%	87%	87%	100%	92%	92%	100%	95%	95%	100%	94%	94%
1.1.3. Number of quarterly and annual NTLP reports produced and disseminated	0	3	2	67%	4	4	100%	4	4	100%	4	4	100%	4	4	100%	4	1	25%	19	19	100%
1.2.1. Number of operational research reports produced and disseminated by NTLP with TRACK TB support	0	0	0	0%	2	0	0%	3	0	0%	3	0	0%	3	7	233%	3	0	0%	11	7	64%
IR 2: URBAN DOTS Model for Kampala Implemented																						
2.1.1. Case notification (all TB types) in KCCA (cumulative)	8344	8544	8,379	98%	8,944	7,936	89%	9,124	7,450	82%	9,344	7,486	80%	9,344	7672	82%	2,336	4878	209%	47,636	43801	92%
2.1.2. Treatment success rate – New smear-positive TB cases in KCCA	62%	72%	69%	96%	83%	78%	94%	85%	83%	98%	90%	86%	96%	90%	86%	96%	90%	85%	94%	90%	86%	96%
2.1.3. Cure rate – New smear-positive TB cases in KCCA	42%	44%	33%	75%	50%	56%	112%	65%	70%	107%	80%	77%	97%	85%	77%	91%	85%	77%	91%	85%	77%	91%
2.1.4. Proportion of new smear-positive TB patients who have sputum examination at 2nd month of treatment in KCCA	49%	50%	34%	68%	60%	40%	67%	70%	61%	87%	75%	60%	80%	80%	75%	94%	80%	77%	96%	80%	77%	96%
2.1.5. Proportion of category II patients who have sputum culture test result in their file	25%	100%	58%	58%	100%	64.0%	64%	100%	53%	53%	100%	50%	50%	100%	25%	25%	100%	30%	30%	100%	64%	64%
2.1.6. Number of registered health facilities providing TB services in KCCA	38	50	49	98%	62	56	90%	96	97	101%	96	97	101%	100	97	97%	100	97	97%	100	97	97%
2.2.2. Percentage of TB patients tested for HIV	78%	80%	92%	115%	100%	99%	99%	100%	99%	99%	100%	99%	99%	100%	99%	99%	100%	100%	100%	100%	100%	100%
2.2.3. Percentage of TB/HIV co-infected patients who received CPT/dapsone in KCCA	93%	94%	93%	99%	100%	98%	98%	100%	99%	99%	100%	99%	99%	100%	99%	99%	100%	100%	100%	100%	100%	100%
2.2.4. Percentage of TB/HIV co-infected patients who received ART in KCCA	52%	55%	62%	113%	100%	81%	81%	100%	93%	93%	100%	93%	93%	100%	95%	95%	100%	98%	98%	100%	98%	98%

TRACK TB | END OF PROJECT REPORT

PMP Indicators	Base-line	PY1-(2012/13)			PY2-(2013/14)			PY3-(2014/15)			PY4-(2015/16)			PY5-(2016/17)			PY6 Q1-(2017/18)			LoP-(2013/18)		
		Target	Achvd	% Achv't	Target	Achvd	% Achv't	Target	Achvd	% Achv't	Target	Achvd	% Achv't	Target	Achvd	% Achv't	Target	Achvd	% Achv't	Target	Achvd	% Achv't
2.2.5. Percentage of registered health facilities meeting set quality standards for implementing TB/HIV services	0%	60%	0%	0%	65%	0%	0%	70%	0%	0%	75%	0%	0%	80%	0%	0%	80%	0%	0%	80%	0%	0%
2.3.1. Percentage of TB patients under DOT in KCCA	6%	15%	14%	95%	30%	52%	175%	65%	73%	112%	75%	88%	118%	90%	92%	102%	90%	100%	111%	90%	100%	111%
IR 3: Quality Program for the Management of MDR-TB Implemented																						
3.1.1. NTLP PMDT Annual Work Plan developed and implemented	0	0	70%	70%	100%	100%	100%	100%	80%	80%	100%	64%	64%	100%	91%	91%	100%	91%	91%	100%	91%	91%
3.1.2. Number of quarterly and annual MDR-TB reports produced and disseminated	0	3	2	67%	4	4	100%	4	4	100%	4	4	100%	4	4	100%	1	1	100%	19	19	100%
3.1.3. Number of MDR-TB treatment initiation sites supported by TRACK TB	0	3	3	100%	6	6	100%	6	6	100%	7	6	86%	7	7	100%	6	6	100%	6	6	100%
3.3.2. Number of confirmed MDR-TB cases enrolled on treatment (cumulative)	49	100	204	204%	470	426	91%	600	674	112%	924	1022	111%	1322	1411	107%	1,322	108	8%	1322	1519	115%
3.3.3. Treatment success rate – MDR-TB cases	50%	55%	75%	136%	70%	75%	107%	75%	83%	111%	85%	42%	50%	90%	74%	82%	90%	74%	82%	90%	83%	92%
3.3.4. Cure rate – MDR-TB cases	0	25%	50%	200%	50%	32%	64%	55%	49%	89%	65%	51%	79%	70%	69%	99%	70%	69%	99%	70%	69%	99%
3.4.1. Percentage of MDR-TB patient contacts traced and screened for TB symptoms	0	100%	0%	0%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
IR 4: Coordination and Implementation of DOTS, TB/HIV, and Community-Based MDR-TB Interventions Improved																						
1. Case detection rate – New smear positive TB cases in partner supported sites	49%	50%	50%	101%	55%	39%	71%	60%	35%	59%	65%	39%	60%	70%	40%	58%	70%	39%	56%	70%	40%	57%
2. Case Notification – All Forms of TB in partner-supported sites	15,901	16,304	14719	90%	17,104	15,454	90%	17,904	13259	74%	18,704	13960	75%	19,504	14045	72%	4,876	3461	71%	94,396	74,898	79%
3. Treatment success rate – New smear-positive TB cases in partner-supported sites	83%	85%	83%	98%	87%	84%	97%	90%	85%	94%	90%	83%	92%	90%	84%	93%	90%	79%	88%	90%	84%	93%
4.4.1. Percentage of TB patients tested for HIV in partner-supported sites	88%	90%	94%	105%	100%	96%	96%	100%	97%	97%	100%	99%	99%	100%	99%	99%	100%	98%	98%	100%	98%	98%
4.4.2. Percentage of TB/HIV co-infected patients who received CPT/ dapsone in partner-supported sites	94%	98%	97%	99%	100%	99%	99%	100%	99%	99%	100%	98%	98%	100%	99%	99%	100%	100%	100%	100%	99%	99%
4.4.3. Percentage of TB/HIV co-infected patients who received ART in partner-supported sites	46%	50%	64%	128%	100%	83%	83%	100%	90%	90%	100%	94%	94%	100%	94%	94%	100%	97%	97%	100%	88%	88%

ANNEX 2: THE MOST FOR TB ACTION PLAN, PROGRESS 2013–2017

Color codes: Green: Completed **Blue:** Ongoing **Red:** Not yet implemented

Please note: Target = Target in approved TRACK TB annual work plan,
Achieved = Actual project achievement, **% Achievement** = Proportion of target achieved

Areas of Improvement as Indicated in the MOST for TB Action Plan	Base-line Score	Score in 2016	Target	Improvement Required to Move from 2014 Score to 2015 Target	Comments
Strategic Planning	**3/4**	**4/4**	**4/4**	**1. Revised the NSP (2015/16–2019/20)** **2. Printed copies of the NSP available** **3. Disseminated the NSP to all stakeholders, including dis-trict health offices and implementing partners**	**NSP was revised in light of the TB Prevalence Survey findings and End TB strategy**
M&E	**3/4**	**4/4**	**4/4**	**1. Availability of an M&E plan for the NSP and data management SOPs** **2. Orientation of stakeholders in the use of approved tools** **3. Use of program review findings to inform new plans**	**Integration of TB data into DHIS 2** **Completeness and timeliness of TB reporting improved (%)**
Supply Chain Management	**3/4**	**4/4**	**4/4**	**1. Availability of the revised facility order and report form** **2. Regular monitoring of the national supply plan** **3. Quarterly facility stock status reports for TB medicines shared with NTLP**	**Printed and distributed; upgrading it on-line** **To be done through web-based ordering**
Human Resources	**2/4**	**2/4**	**3/4**	**1. Assignment of the six coordination roles in proposed NTLP structure to staff** **2. Clarification of human resources policies and proce-dures at NTLP (job classification and appraisal)** **3. Number of NTLP central unit staff who have received capacity building to address identified capacity gaps**	**Dependent on 3 above**

Areas of Improvement as Indicated in the MOST for TB Action Plan	Base-line Score	Score in 2016	Target	Improvement Required to Move from 2014 Score to 2015 Target	Comments
Advocacy, Communication, and Social Mobilization	**2/4**	**3/4**	**3/4**	**1. ACSM focal person in place (designated by Uganda Stop TB Partnership [USTP])** **2. Minutes of quarterly ACSM technical working group meetings** **3. ACSM strategy revised and disseminated** **4. Involvement of TB stakeholders in the development of ACSM plan**	**To be officially communicated** **Did desk review and consulted people to develop TB communication strategy**
Supervision	**3/4**	**4/4**	**4/4**	**1. Orientation of district teams in TB quality improvement approach** **2. Availability of a supervision and mentorship schedule for all levels** **3. Supervision visits conducted for the various levels and findings shared at the respective forums**	**Oriented newly recruited DTLS in Bulu-ba** **Done through GF support and imple-menting partners**
Community Participation	**1/4**	**1/4**	**4/4**	**1. Conduct a rapid needs assessment of community needs and priorities for implementation of DOT** **2. Develop a community participation plan for TB control** **3. Develop a rapid assessment questionnaire and key guides** **4. Conduct community needs assessment**	**Dropped due to lack of resources to spearhead community initiatives**

ANNEX 3: MINUTES OF THE SECOND NCC FOR TB MEETING

Issue	Discussion	Action points	Timeline
Dissemination of prevalence survey report	• Dissemination should be prioritized to impact on TB control • Report currently at WHO for graphic design • To be presented to MOH Senior Management Committee (SMC) for approval • Need to present a roadmap for dissemination to NCC • Need to start with grand national dissemination event in Kampala	Get report from WHO	May 7, 2017
		Share with NCC members after SMC approval	May 28, 2017
		Present updated dissemination plan and budget to 3rd NCC	
		Hold national dissemination meeting	July 21, 2017
Reallocation of GF resources	• Reallocation for commodities was approved by Geneva during week of April 24–28, 2017 • Allocation for X-rays was not prioritized due to lack of a procurement framework under GF for X-rays	Secretariat to present breakdown of reallocation to NCC	At 3rd NCC meeting
		NCC to lobby partners to prioritize X-ray procurement and maintenance in their TB plans	
Low absorption of GF funds	• MOH's mandate is to give policy guidance and co-ordinate partners. It is the district's role to implement. Funds should be sent to the districts to increase absorption. • Need for more sub-recipients in the next grant to increase fund absorption – TB Program Man-ager • The memorandum of understanding with USTP had not been renewed following the transition of GF coordination from MOH to Ministry of Fi-nance, Planning, and Economic Development	Request for implementation funds to be disbursed to districts	Always
		MOH to request Ministry of Finance, Planning, and Economic Development–Focal Coordination Unit to select more sub-recipients	At 3rd NCC meeting
		The program with stakeholders will review and submit the USTP memorandum of understanding	
TB program briefs	• TRACK TB to coordinate with partners to give updates to NTLP	NTLP to provide summary updates on TB control to NCC	At subsequent NCC meetings

Issue	Discussion	Action points	Timeline
Unfunded NTLP priorities	• TB medicines, Xpert machines and cartridges, re-agents for microscopy, etc. • Prioritize allocation of resources to lower im-plementation levels • Could develop realistic plan to reach scale (e.g., plan for a few GeneXpert machines initially for the high-volume sites) • NTLP should show the need, what was planned for in GF grant application, and what the gap is and how much it will cost • RHITES-SW in their project year 2 planned to support several NTLP priorities worth $450,000 including expert machine maintenance, contact tracing, MDR-surveillance, etc. They committed to support the NTLP interventions in the southwest (e.g., dissemination of the prevalence survey re-sults). • NTLP should work with partners to show what priorities they are supporting and how much they are contributing • Partners should help bridge the gaps with Gen-eXpert, X-ray, program and hospital human re-sources, contact tracing, etc. • Need to show transparency with TB resources. What are GOU allocations? How much are part-ners contributing? • Capture support per region and report all contri-butions by partners • Parliament should allocate more resources for TB • Issue of tax shortfalls; health budget unlikely to increase this and next year	NTLP to prepare and present detailed unfunded gaps to NCC Partners to provide NTLP with updates on what support they are providing and how much (in monetary terms) they are contributing	May 2017
Missed cases	• Could cost needs by number of cases that would be missed or not successfully treated if resources were not made available • NTLP to keep in touch with partners to get up-dates on case finding	NTLP to list missed cases per region and district and to provide targets per district to partners	Subsequent NCC meetings

TRACK TB | END OF PROJECT REPORT

ANNEX 4: PERFORMANCE OF HEALTH UNITS IN KAMPALA PROVIDING TB, ART, AND TB-ART CO-TREATMENT IN PY5

DHIS 2	Oct to Dec 2016				Jan to Mar 2016				Apr to Jun 2016				Jul to Sep 2016				ART sites	TB Rx sites	TB-ART sites
	1st -line ARV regimen	2nd -line ARV regimen	3rd -line ARV regimen	DOT Status	1st -line ARV regimen	2nd -line ARV regimen	3rd -line ARV regimen	DOT Status	1st -line ARV regimen	2nd -line ARV regimen	3rd -line ARV regimen	DOT Status	1st -line ARV regimen	2nd -line ARV regimen	3rd -line ARV regimen	DOT Status			
Abi Clinic					43	1		1	54	1							1	1	1
Adventist Medical Center								1										2	
AIC Kampala Main Branch HC IV					767	7		9	822	7		22					2	3	2
Alive Medical Services HC III	7071	283		37	6664	258		30	6940	272		42	6958	280		35	3	4	3
Benedict Medical Centre HC IV	65	3														1	4	5	4
Bugolobi Medical Centre HC II	128	20	0	1	13	4		5								2	5	6	5
Busabala Nursing Home HC II	74			4	84			9	105				113		0	3	6	7	6
Butabika NR Hospital	1183	85			1081	56	0	28	1218	105			1292	82	0	39	7	8	7
Case Medical Centre								7				10						9	
Chandaria Medical Clinic	189	5			143	2			174	3		1	163	3			8	10	8
Equator Health Services					107		0	1	113			2	127			2	9	11	9
Family Hope Center Kampala	3082	468		2	2901	552		3	2797	648		4	2949	534	0	3	10	12	10
Galilee Community General Hospital	49			2	66	3			39				48			3	11	13	11
Good Health For Women Project Clinic	693	7		3	572	5		6	625	6		1	665				12	14	12
Hope Clinic Lukuli HC II	671	42	0		628	70	0	9	646	62		16					13	15	13
Ikan Medical Center HC II	21	2			21	15			20			2	23	2		1	14	16	14
International Medical Centre-KPC,Watoto													288	26			15		
IOM Migration Health Assessment Centre HC II								2										17	
Joy Medical Centre HC III	555	21	0	8	499	48		15	569	18		15	552	48		7	17	18	15
Jumbo Medical Clinic HC II	43	2			40	1			40	1			42	2			18		
Kadic Clinic HC II	183	10		7	177	8		6	187	9		4	176	10		5	19	19	16

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DHIS 2	Oct to Dec 2016				Jan to Mar 2016				Apr to Jun 2016				Jul to Sep 2016				ART sites	TB Rx sites	TB-ART sites
	1st	2nd	3rd	DOT Status	1st	2nd	3rd	DOT Status	1st	2nd	3rd	DOT Status	1st	2nd	3rd	DOT Status			
	-line ARV regimen				-line ARV regimen				-line ARV regimen				-line ARV regimen						
Kampala Medical Chambers HC II									121	31							20		
Kamwokya Christian Caring Community HC II	2826	285		17	2299	279	0	26	2695	191	0	25	2684	380		23	21	20	17
Kawaala Health Centre HC III	7019	304			6769	228	0	80	6951	254	0	82	7006	293	0	1	22	21	18
Kawempe Home Care Initiative CLINIC	1695	98			1599	72		19	1638	64	0		1695	71		8	23	22	19
Kibuli Hospital					388	13		15	413	14		29	431	14		28	24	23	20
Kisenyi HC III	8179	365	0	197	7393	259		164	7656	424	0	217	7847	107		223	25	24	21
Kisugu HC III	1980	60		44	1796	71	0	48	1772	72	0	40	1841	22	0	51	26	25	22
Kiswa HC III	4580	318		35	4989	302	0	42	5002	312	0	48	5006	316	0	37	27	26	23
Kitante Medical Center HC II	566	25	0	4	540	36		6	461	39		5	551	25			28	27	24
Kitebi HC III	4917	229	0	39	4907	240	0	39	4964	216	0	57	5094	229	0	40	29	28	25
Komamboga HC III	3126	189	0	41	3054	147	0	38	3171	118	0	53	2611	132	0	75	30	29	26
Kyadondo Medical Centre HC II	77				40			13	86			8	91				31	30	27
Lubaga Hospital	3449	240	0	70	3206	256	0	53	3429	235	0	43	3399	238	0	64	32	31	28
Luzira Staff Clinic HC II								17										32	
Makerere University HC III	116	14	0	2	95	10	0	3	116	16	0	4	126	11		3	33	33	29
Makerere University Walter Reed Clinic	5		0														34		
Makindye Police HC III	172	5			439	11	0	2	459	8	0	4	156	5		3	35	34	30
Maria Asumpta Clinic								1										35	
Mbuya Military Clinic (MOD Garrison)	470	18		1	476	36		1	457	35	0	2	467	18		2	36	36	31
Medik Medical Care	67				44			6	50				57			3	37	37	32
Meeting Point Kampala HC II	223	4			197	3		3	210	3		2	217	3		2	38	38	33
Mengo Hospital	5749	343		53	5407	308	0	58	5882	321	0	48	5648	334	0	66	39	39	34
Mirembe Clinic - Kawempe HC II								4										40	

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DHIS 2	Oct to Dec 2016				Jan to Mar 2016				Apr to Jun 2016				Jul to Sep 2016				ART sites	TB Rx sites	TB-ART sites
	1st	2nd	3rd	DOT Status	1st	2nd	3rd	DOT Status	1st	2nd	3rd	DOT Status	1st	2nd	3rd	DOT Status			
	-line ARV regimen				-line ARV regimen				-line ARV regimen				-line ARV regimen						
Mirembe Medical Centre - Najja HC II	70	14			76	7	0		76	9			70	14	0		40		
Mukisa Nursing Home HC II	31				20				34				28				41		
Mukwaya General Hospital	267	14			229	10			245	10			254	12		6	42	41	35
Mulago NH - Infectious Disease Institute	5431	1381	18		5882	1372	20	45	6075	1411	21	26	5570	1322	20	28	43	42	36
Mulago NH - MARPI STI Project Clinic	640	10	0		781	19	0		818	19	0		852	19	0		44		
Mulago NH - MJAP TB HIV Clinic	296	12	0	365	256	12	0	427	280	16		441	276	14	0	386	45	43	37
Mulago NH - MUJHU Clinic	2547	50	0		2928	57	0		2698	49	0		2447	49	0		46		
Mulago NH - Post-Natal Ward	2	92	0		5	125	0		3	103	0		4	91	0	32	47	44	38
Mulago NH-PIDC COE Ward 15 Mulago	6173	1182	6	37	5243	1877	5	37	5223	1936	5	25	5576	1695	6	32	48	45	39
Murchison Bay Hospital	1553	53		44	1486	53		46	1476	49		39	1650	1		67	49	46	40
Naguru Hospital - China Uganda Friendship	3809	110		65	3189			78	3389	102		29	2668	89	0	78	50	47	41
Naguru Police Clinic HC II	62				24				55				68				51		
Nakasero Hospital								4				4				16		48	
Namungoona Orthodox Hospital HC III	1248	41	0	14	1289	25	0	25	1258	27	0	14	1242	42		13	52	49	42
Nsambya Home Care Clinic								65										50	
Nsambya Police Clinic HC III	676	13		8	600	5	0	14	572	8		3	572	5		2	53	51	43
Old Kampala Hospital HC IV	46	3		1	21				44	2		2	45	3		2	54	52	44
Paragon Hospital Kampala	25	1			27	1			27	1			27	1			55		
Philomena Health Centre HC III	50	1			40	1			50	1							56		
Pillars Medical Centre								12										53	
Rapha Health Services HC II	20	10	1						16	12	1		18	13	11		57		
Reach Out - Banda Clinic	966	24	0	5	879	21	0	15	908	24	0	11	945	24	0	8	58	54	45

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DHIS 2	Oct to Dec 2016				Jan to Mar 2016				Apr to Jun 2016				Jul to Sep 2016				ART sites	TB Rx sites	TB-ART sites
	1st	2nd	3rd	DOT Status	1st	2nd	3rd	DOT Status	1st	2nd	3rd	DOT Status	1st	2nd	3rd	DOT Status			
	-line ARV regimen				-line ARV regimen				-line ARV regimen				-line ARV regimen						
Reach Out - Kinawataka Clinic	2566	134	0	27	2458	111	0	35	2525	127	0	20	2560	132	0	37	59	55	46
Reach Out - Mbuya Clinic HC II	2092	124	0	40	1884	125	0	23	1976	122	0	24	2032	122	0	40	60	56	47
Rift Valley Medical Services Centre	33	1			25	1			29	1			33	1			61		
Safeguard Nursing Home Clinic HC II												2						57	
SAREC Medical Care HC II	14	3															62		
SAS Clinic - Bugolobi	200	130		3	224	45		3	201							6	63	58	48
Sim's Medical Centre HC II					72	36	1	3	70	31	1	1	79	36	1		64	59	49
Span Medicare Centre	145	2			175	1			183				188	2			65		
St. Catherine Hospital					99	1			99	1							66		
St. Francis Nsambya Hospital	6647	808			6150	863	0	64	6200	861	0	71	6450	754	0		67	60	50
St. Joseph's Clinic - Wandegeya HC II	17	1			15	2			14	1			17	1			68		
St. Stephens Mpererwe HC III	377	19		4	276	4		6	264	6		8	292	13		2	69	61	51
TASO Mulago CLINIC	7127	395		11	7096	314		23	6986	328	0	18	7028	351		23	70	62	52
The Surgery CLINIC								5										63	
Touch Clinic - Namuwongo HC II	395			15	507	7		11	360	13			107	5			71	64	53
Uganda Cares Kira Road Clinic								42										65	
Uganda Cares Owino Clinic	6141	636	4	47	5847	277	4	45	6092	365	3	34	6038	568	4	51	72	66	54
Virgo Health Care Centre					39				20				20				73		
Wentz Medical Centre	53	1			34				32				6				74		
Zaam Clinic HC II	223				73			2	92			3	95			3	75	67	55

ANNEX 5: ISONIAZID DISTRIBUTION TO HEALTH FACILITIES AND ENROLLMENT ON IPT, JANUARY–JUNE 2017

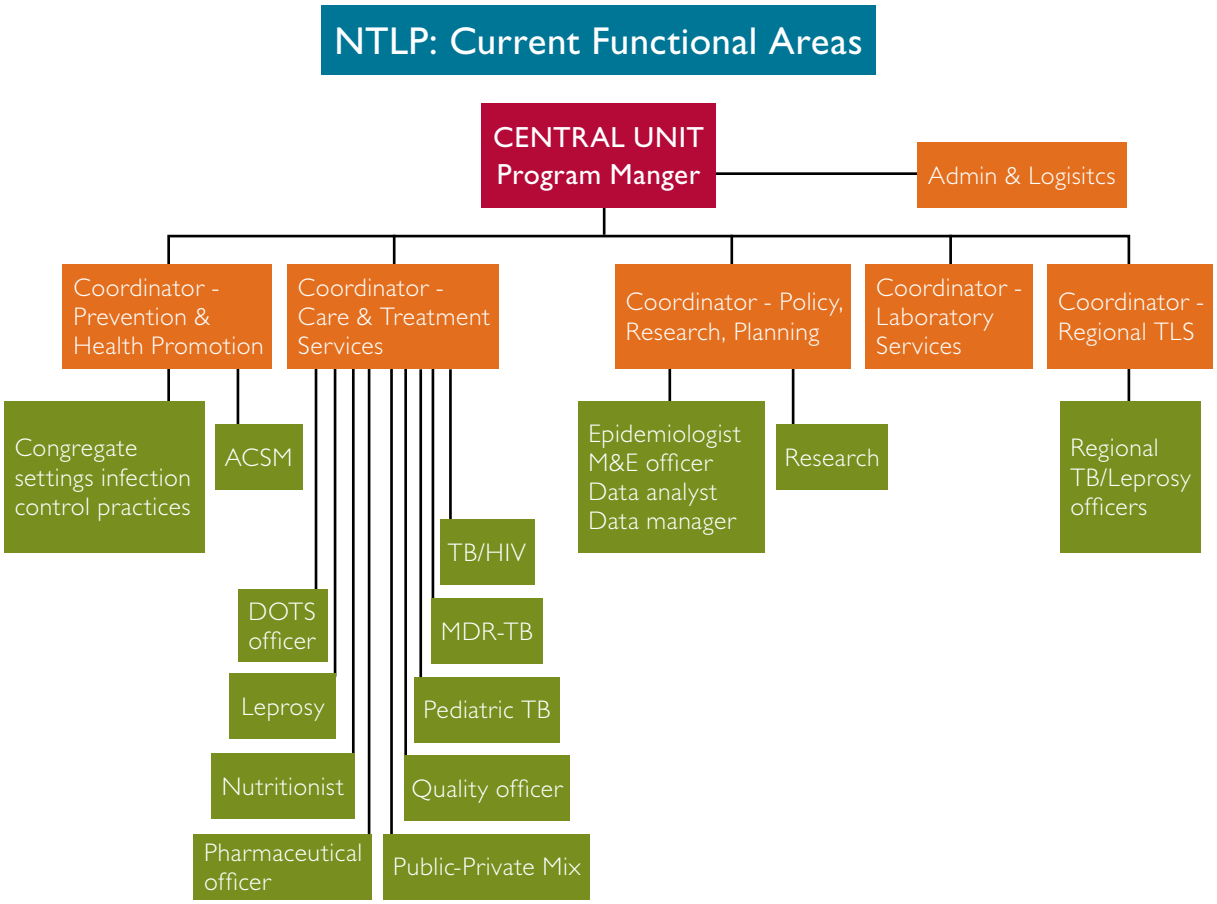
District		Jan to Jun 2017	Pre-ART	Under 5s
KARAMOJA REGION				
Abim	Nyakwae Subcounty	Nyakwae HC III	1	0
Abim	Abim Town Council	Abim Hospital	2	4
Moroto	Rupa Subcounty	Rupa HC II	0	5
Moroto	Rupa Subcounty	Rupa HC II	0	5
Moroto	Rupa Subcounty	St. Pius Kidepo HC III NGO	0	15
Moroto	Rupa Subcounty	St. Pius Kidepo HC III NGO	0	15
Moroto	Tapac Subcounty	Kosiroi HC II	2	0
Moroto	Moroto Northern Division	Moroto RR Hospital	10	39
Napak	Iriiri Subcounty	Iriri HC III	3	0
Napak	Lotome Subcounty	Lotome HC III	3	0
Napak	Matany Subcounty	Matany Hospital	39	1
Nakapiripirit	Namalu Subcounty	Amaler HC III	0	6
Nakapiripirit	Namalu Subcounty	Amaler HC III	0	6
Nakapiripirit	Nabilatuk Subcounty	Nabilatuk HC IV	0	18
Nakapiripirit	Nabilatuk Subcounty	Nabilatuk HC IV	0	18
Nakapiripirit	Namalu Subcounty	Namalu HC III	1	12
Nakapiripirit	Kakomongole Subcounty	Tokora HC IV	4	0
Regional total			**65**	**144**

District		Jan to Jun 2017	Pre-ART	Under 5s
WEST NILE				
Adjumani	Itirikwa Subcounty	Mungula HC IV	5	0
Adjumani	Adjumani Town Council	Adjumani Hospital	15	8
Arua	Ajia Subcounty	Ajia HC III	1	0
Arua	Aii-Ivu Subcounty	Cilio HC III	1	0
Arua	Arua Hill Division	Arua RRH	2	10
Arua	Pajulu Subcounty	Ediofe HC III	2	0
Arua	Omugo Subcounty	Omugo HC IV	5	18
Arua	Adumi Subcounty	Adumi HC IV	8	3
Arua	Rhino Camp Subcounty	Rhino Camp HC IV	10	9
Koboko	Abuku Subcounty	Gborokolongo HC III	0	2
Koboko	Abuku Subcounty	Gborokolongo HC III	0	2
Yumbe	Midigo Subcounty	Midigo HC IV	1	2
Yumbe	Lodonga Subcounty	Lodonga HC III	0	1
Yumbe	Lodonga Subcounty	Lodonga HC III	0	1
Zombo	Jang Okoro Subcounty	Jangokoro HC III	1	0
Moyo	Moyo Town Council	Moyo HOSPITAL	3	2
Moyo	Gimara Subcounty	Obongi HC IV	15	2
Nebbi	Pakwach Town Council	Pakwach HC IV	0	1
Nebbi	Pakwach Town Council	Pakwach HC IV	0	1
Nebbi	Nyaravur Subcounty	Angal St. Luke Hospital	18	0
Nebbi	Nebbi Town Council	Nebbi Hospital	0	5
Nebbi	Nebbi Town Council	Nebbi Hospital	0	5
Regional total			**87**	**72**

ANNEX 6: IPT ROLL-OUT BY PARTNER REGION

Region	Number of Health Facilities					
	Received INH	Trained	Mentored	Trained or Mentored	With Registers	With Job Aides
KCCA	28	22		22	22	22
Mbale	28	16		16		
Jinja	130	130		130	130	130
Mbarara	66	18	58	-40		
Fort Portal	57	118		118		
Hoima	12			0		
Arua	22			0		
Gulu & Lira	68	46		46	46	
Central W	37	160	9	151	64	114
Central E		30		30		
Masaka	25			0	5	
Moroto	17	2		2		
Soroti	19			0		
UPDF	5	15	3	12	15	15
Police	9	14	6	8	13	9
Total	**523**	**571**	**76**	**495**	**295**	**290**

ANNEX 7: FUNCTIONAL NTLP STRUCTURE



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ANNEX 8: MICROSCOPY EQA INDICATORS

EQA Indicator	2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Number of operational laboratories	303		592		801		839		961		1091		1,165		1,270		1,349		1,487		1,543	
Number of those rechecked (%)	272	90%	388	66%	658	82%	810	97%	899	94%	987	90%	1,064	91%	1,112	88%	1,185	88%	1,309	88%	1,379	89%
Number of positive slides rechecked	1,295		1,660		3,583		4,253		4745		4589		5,132		5,604		4,937		4,729		5,390	
Number of negative slides rechecked	4,802		6,514		13,418		16,654		20,305		2,0570		24,634		26,990		23,718		25,215		29,631	
Overall percentage positives in the laboratories' routine	16%		16%		15%		15%		14%		13%		11%		10%		10%		10%		9%	
Overall percentage high false positives	11%		12%		10%		8%		8%		7%		7%		7%		7%		6%		7%	
Overall percentage false negatives	5%		3%		3%		3%		3%		2%		2%		1%		1%		1%		1%	
Overall percentage true positives/all positives	89%		88%		90%		93%		92%		93%		95%		94%		93%		94%		97%	
Overall detection proportional to the controllers	0.84		0.88		0.87		0.90		0.93		0.92		0.89		0.96		0.95		0.98		1.01	
Number (%) of laboratories with more than 1 high false positive	33	12%	41	11%	76	12%	68	8%	74	8%	60	6%	65	6%	77	7%	72	6%	59	5%	79	6%
Number (%) of laboratories with 100% true positives	0		68	54%	355	61%	206	57%	541	70%	612	74%	304	66%	293	62%	267	68%	249	67%	283	65%

TRACK TB | END OF PROJECT REPORT

EQA Indicator	2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Number (%) of laboratories with 95–99% true positives	0				1	0%	2	1%	0	0%	0	0%	3	1%	1	0%	0	0%	3	1%	1	0%
Number (%) of laboratories with 90–94% true positives	0		5	4%	24	4%	24	7%	35	5%	22	3%	23	5%	34	7%	17	4%	16	4%	25	6%
Number (%) of laboratories with 85–89% true positives	0		8	6%	43	7%	57	16%	43	6%	48	6%	36	8%	54	11%	31	8%	37	10%	38	9%
Number (%) of laboratories with <85% true positives	0		45	36%	156	27%	74	20%	151	20%	145	18%	93	20%	93	20%	80	20%	64	17%	87	20%
Number of laboratories with insufficient data to calculate this parameter	272		262		79		447		129		160		605		637		790		940		945	
Number (%) of laboratories with more than 1 false negative	60	22%	51	13%	75	11%	89	11%	116	13%	90	9%	91	9%	48	4%	47	4%	37	3%	46	3%
Number (%) of laboratories as good as controllers at detecting positives (≥0.95)	0		60	51%	370	65%	462	57%	518	69%	611	75%	717	76%	767	80%	811	83%	942	85%	951	84%
Number (%) of laboratories almost as good as controllers at detecting positives (0.85–0.94)	0		12	10%	50	9%	54	7%	50	7%	30	4%	43	5%	36	4%	27	3%	21	2%	26	2%
Number (%) of laboratories moderately good at detecting positives (0.75–0.84)	0		11	9%	48	8%	35	4%	52	7%	42	5%	52	6%	53	6%	39	4%	33	3%	37	3%
Number (%) of laboratories doing poorly at detecting positives (0.50–0.74)	0		18	15%	59	10%	71	9%	86	11%	93	11%	75	8%	67	7%	60	6%	66	6%	80	7%
Number (%) of laboratories doing very poorly at detecting positives (<0.50)	0		16	14%	39	7%	185	23%	47	6%	36	4%	56	6%	40	4%	42	4%	41	4%	37	3%
Number of laboratories with insufficient data to calculate this parameter	272		271		92		3		146		175		121		149		206		206		248	

ANNEX 9: DIVISION PERFORMANCE IN TB CASE NOTIFICATION, PY1–PY5

Division	PY1	PY2	PY3	PY4	PY5		PY1	PY2	PY3	PY4	PY5
	All forms of TB						Pulmonary bacteriologically confirmed				
Central	719	1,112	1,183	1,231	1,227		343	613	643	583	555
Kawempe	1,351	1,014	870	960	991		503	478	463	436	317
Makindye	1,134	1,042	893	816	861		538	619	541	477	485
Mulago Wards 5 & 6	2,702	2,658	2,227	1,782	1,489		1,263	1,359	1,177	890	814
Nakawa	1,019	1,049	1,115	1,192	1,130		479	558	560	610	518
Rubaga	1,454	1,061	1,162	1,056	1,293		587	666	739	649	672
Total	**8,379**	**7,936**	**7,450**	**7,037**	**6,991**		**3,713**	**4,293**	**4,123**	**3,645**	**3,361**

ANNEX 10: LIST OF REGISTERED DRUG OUTLETS IN KAMPALA

	Name of Contact Person	Drug Shop/Clinic	Telephone Contact
NAKAWA			
1	Kaana David	Sabena - Mutongo	078257941
2	Sylvia Tumusabe	Banda Community	0758381625
3	Francis Okello	Concord Pharmacy - Mutungo	0778753798
4	Endriko Oketcho	Alpha Medical Center - Banda	0701545148
5	Titus Alex Okware	God Cares Medical Center - Banda	0772315731
6	Peace Tukamuhebwa	Kitintale Health Clinic	0754239471
7	Kazibwe Enock	Desire Drug Shop - Kitintale	0757783200
8	Keta Christopher	Doctor's Clinic Luzira	0704340927
9	Nakaweesa Resty	Mukisa Family Clinic - Mutungo	0772034701
10	Mwanga G	Mirembe Clinic - Mbuya	0778131664
11	Kansiime Jolly	Lucy Medical - Mbuya Zn 2	0776091766
12	Namagembe Milly	Yesu Amala - Banda Zn 3	0703534623
13	Mayengo Vicky	Good Samaritan - Kinawataka	0704682413
14	Wosukira Geofrey	Bulamu Medical Center	0757805782
LUBAGA			
1	Teddy Nakasolya	Alfa Drug Shop - Kawaala	0701105295
2	Esther Biira	Modern Drug Shop - Kawala	0784907566
3	Bernadette Kokoi	St. Johns Clinic - Bakuli	0781344408
4	Nabatanzi Prossy	Trete Pharmacy - Kasubi	0751134042
5	Yusuf Mawejje	Lubaga Road Clinic - Lubaga (Ewa Mumpi)	0704100630
6	Rheina Nakabozi	LD Drug Shop - Masanaffu Lubaga	0751205545
7	Isaac Mbanadho	Ron Medical Center - Lubaga	0700174864
8	Namujjumbi Josephine	VBC Care - Lubaga	0705556449

	Name of Contact Person	Drug Shop/Clinic	Telephone Contact
9	Mugalu Godfrey	St. Jude Medical Center - Kibuye	0755821690
10	Joeriah Ayub	Mengo Dr's Clinic	0705369393
11	Ivan Kayonza	Smiles Clinic - Mengo	0704961889
12	Monday Erasmus	Domain Clinic - Nankulabye	0782345294
13	Aupat Claudia	Faith Drug Shop - Nankulabye	0701991380
14	Miriam Babirye	Patience Drug Shop - Nankulabye	0774620771
15	Paul Kule	St. James M/C - Ndeeba	0752664495
16	Joshua Sengendo	Blessed M/C - Natete	0772074430
17	Sally Kanakulya	St. Barnard - Lubaga	0752625656
18	Barbra Nakatte	Wovatoyombye Drug Shop - Lubaga	0772604204
19	Monica Katusabe	Massanyu Medical Center - Kosovo	0755928780
20	Norman Atuhaire	Lungujja Kosivo Community H/C	0702411375
21	Annet Nakiirya	Royal Clinic - Kibumbiro- Lubaga	0702685773
22	Walekwa Awali	Safe Drugs Drug Shop - Nyanama Kitebi	0752745240
23	Sauya Nakitende	Bemosy Drug Shop - Nankulabye Nabulagala	0703309581
24	Beatrice Nakayinga	Blessed Drug Shop - Mutundwe	0701537799
25	Roselline Morrine Busulwa	God's Will Drug Shop - Busega Kibumbiro	0782362545
26	Kasibe Milton	Namulondo Medical Center - Nyanama Stage	0779357144
27	Kanakulya Joseph	Nateete Medicare	0700473814
28	Saffi Stefania	St. Edward Cinix - Lungujja Stabex	0706141257
29	Gankwenga James	Line Medical Center -Kososvo	0750860606
30	Mujasi Tom	MM Clinic - Nankulabye	0755194264
31	Kasoro Mary	St. Peter's Clinic - Kawaala	0752880479
32	Gorreth Nakiyondo	Mirembe Drug Shop - Nalukolongo	0750072102
		MAKINDYE	
1	Ruth Nakandi	Musasizi Drug Shop - Nsambya Kirombe	0782500804
2	Julius Wanyemma	Clinix Hospital - Nsambya	0773139253

	Name of Contact Person	Drug Shop/Clinic	Telephone Contact
3	Ivan Musasizi	De-Drug Shop - Lukuli	0703023469
4	Mugerwa Eva	Good Samaritan Drug Shop - Namuwongo	0772633868
5	Elijah Sibanziire	Rift Valley Medical Clinic - Makindye	0705078224
6	Christine Nyangoma	Ayebale Clinic - Makindye	0774367595
7	Edward Kikomaga	Niru Pharmacy - Wabigalo Makindye	0784706169
8	Ednah Katushabe	SMC Pharmacy - Makindye	0774309784
9	Mousa Ssenyondo	Senah Medical Center - Munyonyo	0703689090
10	Emma Ssenkali	Meeting Point - Kampala- Makindye	0782727128
11	Kakooza Ronnie	Kalen Clinic & Pharmacy - Makindye	0704782884
12	Elly Muniirwa	Beer Sheeba Clinic	0785666153
13	Wyclif Ssali	Gabba Martyrs Family Clinic	0702283548
14	Kayiza Emmanuel	Good Care Clinic - Kabalagala	0700311694
15	Nakaweesa Stellah	River Jordan M/C- Luwaffu	0784090033
16	Kayemba Lawrence	Home Care Clinic- Salaama	0742566130
17	Nuwansiima Layola Reatur	Hero's Dom - Najjanankumbi Kenjoy	0775356663
18	Kizito Joyce	Tusuubira Clinic - Namasubba	0772533344
19	Ojok Hellen	Hellen's Clinic - Katwe	0772405508
		CENTRAL	
1	Rogers Weswa	K.G. Life Care - Kisenyi	0758073438
2	John Paul Lwanyaaga	Frontier Medical Center - Central	0788660326
3	Josephine Namugumya	Emmanueal Medical Clinic- Kisenyi	0786306515
	Patricia Abila	Otoajapal Drug Shop -Kisenyi	0775815910
5	Harriet Elsie Mungono	Makerere University - Central	0755858955
6	Jacqueline Nakitto Kabega	Our Pharmacy - Owino Kaffumbe Mukasa Road	0703555249
7	Pauline Nakamyuka	Mass Pharmacy - Owino Kaffumbe Mukasa Road	0785293292
8	Jjuko Paul	Sanyu Medical Center	0772635950

	Name of Contact Person	Drug Shop/Clinic	Telephone Contact
9	Hellen Ssekitto	Emela Pharmacy	0700814581
10	Aisha Ssentamu	Rabin Clinic - Mengo Kisenyi	0759314841
11	Mungano Harriet	Makerere University - Central	0755858955
12	Nancy Cheptoyek	Good Lord Medical Centre - Makerere Kivulu	0757547360
13	Kembabazi Resty	Mukama Kyakuwa Clinic - Sir Apollo Road	0773186778
14	Namwanje Teo	Kisaakye Clinic	0771872024
15	Muzaale Paul	Good Samaritan General Clinic	0784441512
16	Bwekembe Victoria	Shree Hari Pharmacy - Lubaga Road	0756155365
		KAWEMPE	
1	Tukamushaba Hildah	Kemi Drug Shop - Kawempe	0756630784
2	Rebecca Akori	Comfort Pharmacy - Bwaise Taxi Park	0754433108
3	Faisal Ssali	Kawempe Mbogo Health Center	0751447442
4	Wamaria Gertrude	Tulla Clinic	0701208447
5	Namubiru Eliza	Kiganda M/C	0777518061
6	Sonko Robert	Multi-Care - Mpererwe	0751018285
7	Nalule Proscovia	Kagombero om- Mpererrwe	0702570883
8	Kyolaba Maurine	Kezah Clinic - Bwaise- Kawempe Central College	0751133376
9	Mbawadde Lillian	Kam MC Bwaise Eden Pub	0700310305
10	Kaudha Mary	Destiny Drug Shop - Kamwookya	0701892731

TRACK TB

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