Technical Approaches *to* TB:

CHALLENGE TB, SIAPS & TRACK TB

2014-2018

TECHNICAL APPROACHES TO TB: CHALLENGE TB, SIAPS & TRACK TB

Management Sciences for Health (MSH) works shoulder-to-shoulder with countries and communities to save lives and improve the health of the world's poorest and most vulnerable people by building strong, resilient, sustainable health systems. Together, we seek to achieve universal health coverage—equitable, affordable access to high-quality health services for all who need them—even in fragile, post-crisis settings. For more than 45 years in 150 countries, MSH has partnered with governments, civil society, the private sector, and thousands of health workers on locally led solutions that expand access to medicines and services, improve quality of care, help prevent and control epidemics, support inspiring leadership and transparent governance, and foster informed, empowered, and healthier communities.

Cover photo by SAMY RAKOTONIAINA

Dear Colleagues,

MSH has managed large, complex global and bilateral projects and programs for more than 45 years, for USAID and other donors, using a health systems approach to design and integrate TB into service delivery programs.

Using a people-centered approach, MSH works with local partners to develop health systems solutions that meet the needs of communities affected by TB. Strengthening national, regional, district, and local health managers and their institutions to provide quality health services is a core strategy to support health systems resilience and sustainability.

MSH has developed materials highlighting our technical approaches, results, and lessons from across our TB projects with multiple partners. These technical documents have been collected in this compendium to share our experiences and insights with other partners and implementers to continue the fight toward ending the TB epidemic.

All technical briefs and highlights in this compilation are from MSH projects dating from 2011 onward:

• The USAID-funded Challenge TB (CTB, 2014–2019) Project is the flagship global mechanism lead by KNCV for implementing USAID's vision of a world free of TB and its global End TB Strategy. CTB provides global technical leadership and support to national TB programs and other in-country partners. MSH is the lead partner in Afghanistan, Bangladesh, and South Sudan and is a supporting partner in Ethiopia, Nigeria, and DRC.

• The USAID-funded Systems for Improved Access to Pharmaceuticals and Services (SIAPS, 2011–2018) Program, implemented by MSH, ensured the availability of high-quality pharmaceutical products and services by using a systems strengthening approach to achieve a positive and sustainable health impact.

• The PEPFAR- and USAID-funded Track Tuberculosis Activity (TRACK TB, 2013–2018) Project, led by MSH, built leadership and technical capacity of the National Tuberculosis and Leprosy Program; executed an urban DOTS model for Kampala; created a program for MDR-TB; and improved the implementation of DOTS, TB/HIV, and MDR-TB interventions with strong M&E systems.

Photo by BERHAN TEKLE HAIMANOT

These materials showcase MSH's technical approaches, implementation strategies, results, and lessons from Challenge TB, SIAPS, and TRACK TB. Topics include:

- Local leadership, management, and governance capacity
- Contact screenings
- MDR-TB and DR-TB
- Community engagement
- Urban DOTS and scale up
- Treatment adherence
- Service integration, including HIV and TB integration
- Case finding interventions (e.g., FAST)
- GeneXpert implementation
- Utilization of health technologies
- Vulnerable and displaced populations
- Specimen transport
- TB drug supply

We hope that by sharing these materials, partners, national governments, and other stakeholders can build on our results, achievements, and lessons to end the TB epidemic.

We are thankful for the collaboration of our respected colleagues: MSH staff; national partners (ministries of health, national TB programs, local NGOs, and universities); international partners, including KNCV and IRD; and donors (principally the US Agency for International Development).

Joining with you in the hope of a world free of TB.

Dr. Pedro G. Suarez, M.D.

Senior Director, Infectious Disease Cluster

Management Sciences for Health

Arlington, VA, USA

CHALLENGE TB:

Technical highlights and technical briefs

The USAID-funded **Challenge TB (CTB, 2014–2019)** project is the flagship global mechanism lead by KNCV for implementing USAID's vision of a world free of TB and its global End TB Strategy. CTB provides global technical leadership and support to national TB programs and other in-country partners. MSH is the lead partner in Afghanistan, Bangladesh, and South Sudan and is a supporting partner in Ethiopia, Nigeria, and DRC.

Photo by SAMY RAKOTONIAINA

FROM 2018:

- From Lessons to Action: Expanding TB Contact Investigation across Five Afghanistan Provinces
- Find Actively, Separate, Treat: The FAST Strategy for Tuberculosis Infection Control in Bangladesh
- GxAlert for Real-time Management and Strengthening of Remote GeneXpert Network in Bangladesh
- Innovative One-stop Shop Approach for TB/HIV integration in Ethiopia
- Taking Supply Information Systems to the Next Level: Regional Collaboration in TB Medicines Supply Chain
- Online, Self-Administered Screening Tool for Improving TB Detection among University Students in Ethiopia

FROM 2017:

- Community Interventions to Improve Access to TB services in Afghanistan
- Targeted Tuberculosis Case Finding Interventions in Six Mining Shafts in Remote Districts of Oromia Region in Ethiopia
- Integrating Service Delivery for TB and Diabetes Mellitus – An Innovative and Scalable Approach in Ethiopia
- Overcoming the Challenges of Rolling Out e-TB Manager in Nigeria
- Overcoming Maintenance Challenges Associated with GeneXpert Machines — Experience in Bangladesh
- Improving Active Case Finding among a High-Risk Population in Bangladesh
- Improving the Quality and Performance of TB Culture Laboratory Services Through Cold Chain Specimen Transportation System in Ethiopia
- Implementing TB Activities In Emergency Settings: The South Sudan Experience

FROM 2016:

- Urban Dots in Afghanistan: Fighting TB in Kabul and Beyond
- Fighting Tuberculosis in a War-torn Country: Countering the Epidemic among Internally Displaced Persons in South Sudan

CHALLENGE TB:

2018

TECHNICAL BRIEF


Photo Credit: MSH

From Lessons to Action: Expanding TB Contact Investigation across Five Afghanistan Provinces

PROJECT CONTEXT

The National Tuberculosis (TB) Control Program (NTP) in Afghanistan began implementing active household contact screening of all bacteriologically confirmed TB cases eight years ago, but the coverage was limited to only a few health facilities, the screening was conducted passively, the number of families screened was low, most cases were missed, and only a small number of children were put on isoniazid preventive therapy (IPT). The result was not acceptable to the NTP because of factors such as lack of an appropriate management structure and screening tools, lack of trained human resources, and low community awareness.

The primary goal of the Challenge TB (CTB) project in Afghanistan is to assist the NTP to reach its strategic objective of increasing TB case notifications by at least 8% annually through comprehensive TB care and prevention activities. This collaboration has entailed strengthening leadership and management for TB control at the national and provincial levels; expanding access to direct observation of therapy, short course (DOTS); improving quality of care; strengthening health systems to minimize the existing gap in TB case notification; implementing TB infection control to reduce the risk of TB infection transmission to health care workers, clients, and communities; expanding TB surveillance among health care workers; strengthening monitoring and evaluation and operational research; and strengthening the multidrug-resistant TB program through the provision of technical assistance on Programmatic Management of Drug-resistant TB.

The contact investigation of source TB cases resulted in the identification and diagnosis of additional TB cases and the initiation of preventive medicine to children under the age of five.

AUGUST 2018

AFGHANISTAN

PROBLEM STATEMENT

Prior to 2014, a passive contact investigation strategy in the country produced limited results. Most of those with close contact to an infected patient could not visit health facilities, leading to poor IPT initiation and unacceptable results for children. The greatest challenge was concentrated in five of the most populated provinces in Afghanistan (Kabul, Herat, Kandahar, Nangarhar, and Balkh). The objective the CTB project was to expand an active contact investigation strategy across the country.

STRATEGIC APPROACH

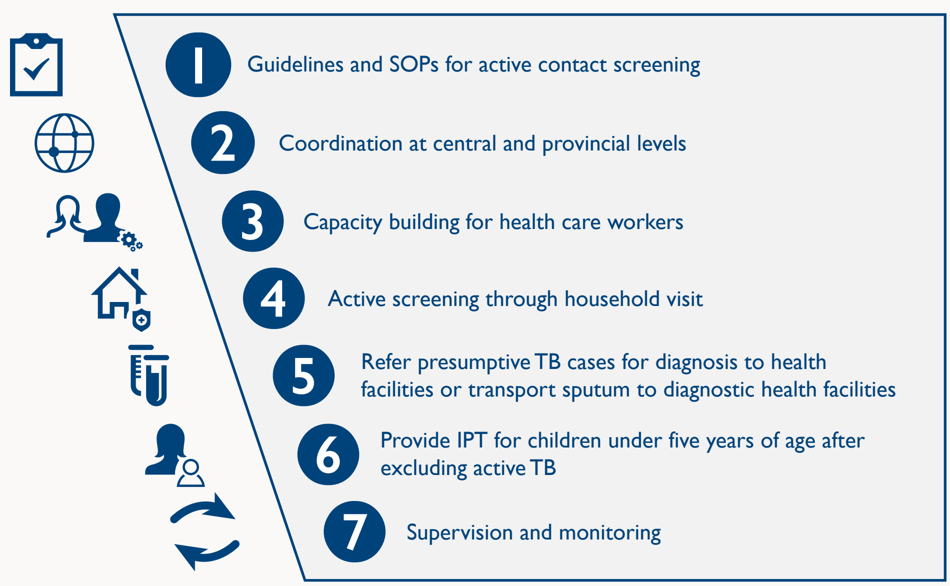
Contact screening (household screening) is part of the standard operating procedures (SOPs) implementation to address high-risk groups and increase case notifications in the country. Active contact screening was introduced in Kabul for urban DOTS in 2014 by the TB CARE I project, and this approach was expanded to four new urban DOTS-supported cities in late 2015 and to the remaining 29 provinces in 2016 with support from the CTB project and the Global Fund, respectively.

Based on available resources and NTP recommendations, CTB focused on active household contact screening of all bacteriologically confirmed TB index cases in five cities at both public and private health care facilities.

The project used the following approaches (figure 1):

- Technical capacity for the NTP in the development and revision of SOPs and guidelines for active contact screening
- Coordination of activities with related stakeholders at all levels, including the NTP, Global Fund, provincial health offices, Basic Package of Health Services (BPHS) nongovernmental organizations (NGOs), and the private sector
- Training and mentorship of health care workers on contact screening practices
- Household visits for index TB cases to screen all family members for signs and symptoms of TB, collect samples from presumptive TB cases, and refer individuals to a health facility for diagnosis
- Screening of children in close contact with index cases, referring children who have signs and symptoms to health facilities for further evaluation and diagnosis, and referring those without signs and symptoms for isoniazid (INH) preventive therapy (IPT)
- Supervision and monitoring of screening practices, including randomly checking 15% of screened contacts to confirm appropriate practices

FIGURE 1. Strategic algorithm for contact screening



PROJECT IMPLEMENTATION

1. Guidelines and SOPs for Active Contact Screening

Prior to 2014, only passive contact investigation mechanisms were implemented by the NTP in DOTS centers (index TB cases were asked to bring all family members to a diagnostic health facility for screening). The TB CARE I project supported the NTP to revise the SOPs for case detection and management of TB in children to include contact screening mechanisms. Other activities included:

- Translating the revised SOPs into local languages (Dari and Pashto) and distributing them to all health facilities
- Training medical staff on active screening
- Integrating contact screening in the NTP training curricula

2. Coordination and Expansion to Provincial Level

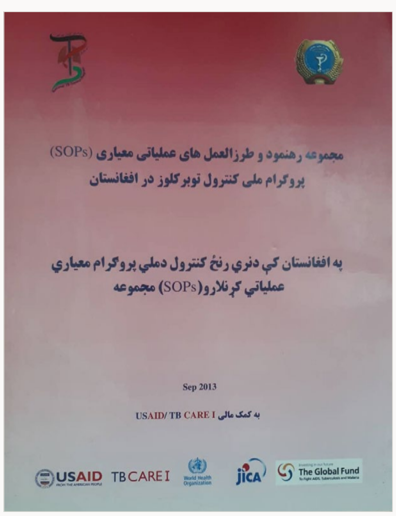
In early 2014, when active contact screening was applied in Kabul urban DOTS health facilities, the mechanism was introduced to the NTP and Ministry of Public Health during a coordination workshop, and the NTP agreed to apply it. Based on the outcome of the program implementation in Kabul, the NTP requested the CTB project to start this activity in four other populated Afghan provinces. With support from CTB, the following activities were conducted to improve coordination with key stakeholders:

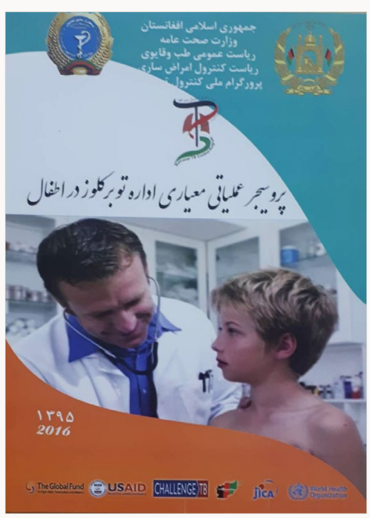
- Challenge TB presented the activity at an NTP task force meeting in Kabul early 2015
- The NTP agreed to implement active contact screening in five provinces (Kabul, Herat, Kandahar, Nangarhar, and Balkh) with support from CTB
- A consolidated work plan was developed to implement active contact screening in the remaining provinces with support from the Global Fund
- Active contact screening was introduced to all health facilities in during quarterly review workshops conducted at the Kabul Public Health Office (PHO), and the activity was coordinated with the Kabul Public Health Department, MOVE (the BPHS implementer of Kabul), the private sector, and the directorate of tertiary hospitals
- Active contact screening was introduced in the Herat, Kandahar, and Nangarhar PHOs and BPHS NGOs during an urban DOTS introduction workshop in 2015
- In late 2016, active contact screening was introduced in the Balkh PHO, BPHS NGOs, and health facilities during a coordination workshop

3. Capacity Building for Health Care Workers

The NTP training curriculum was revised to include active contact screening. In early 2015, training needs were assessed in all five urban DOTS cities. Each three-day training included SOPs for case detection, treatment, pediatric TB, TB infection control, drug management, and recording/reporting systems.

FIGURE 2. SOP for childhood TB, including contact investigation





All diagnostic centers were included in the program, and in 2015, 452 in charges, nurses, lab technicians, and other health care workers were trained on the SOPs and active contact screening. A monitoring worksheet was created for health staff conducting home visits to record information about index TB cases, including contact information, which would be verified by the patient for accuracy.

4. Active Screening through Household Visits

During the program introduction, BPHS NGOs and PHOs agreed that a health care worker from the diagnostic facility where an index TB patient was registered would conduct household visits (in Afghanistan, a bacteriologically confirmed TB case is defined as an index TB case). One person, most often the DOTS nurse, would perform the household visit and screen all family members, although a community health supervisor or lab technician from the health facility might conduct the activity if a DOTS nurse is unavailable.

5. Screening Method and Sample Transport

When a new index TB patient is identified and registered for treatment, a health care worker will coordinate a household visit to this patient if needed. The focal point will take the contact register book, contact information sheet, and sputum containers. All close contacts (any person who has been exposed to an index case and lives in the same household) are registered in the contact register. Health workers ask for signs and symptoms of TB (e.g., cough for more than two weeks with sputum, weight loss, fever, night sweating, loss of appetite), and any presumptive TB cases among the contacts will be registered as presumptive TB cases. After collecting a sputum sample, the presumptive TB patient will be asked to come to the health facility for further investigation. If the sputum smear microscopy is negative, the patient will be referred for x-rays and other diagnostic procedures.

6. Screening Children in Close Contact with Index TB Cases

According to the SOPs for contact screening, all children who are in close contact with index TB cases must be screened for active TB. During household visits, health care workers screen and register all children in the contact book;

A TB patient identified through active contact screening – DOT – Jebrahil CHC, Herat (Photo credit: MSH/Afghanistan)

TABLE 1. Contact Investigation Data from Kabul, Herat, Kandahar, Balkh, and Nangarhar, 2017 (Source: NTP surveillance department)

INDICATORS	ALL QUARTERS 2017
Bacteriologic confirmed TB cases (index cases)	7,864
Bacteriologic confirmed cases evaluated	6,271
Household contacts registered	44,469
Household contacts examined/screened for TB	6,641
Household contacts diagnosed as bacteriologic confirmed TB	392
Household contacts diagnosed as all forms of TB	602 (1,354/100,000 pop)
Number of children under 5 years of age	8,585
Number of children put on INH preventive therapy	7,946
Number of children who completed IPT treatment	5,631

those under the age of five are screened for signs and symptoms of TB. If presumptive TB is found, the child will be referred to a health facility for further investigation. If sputum is available a sputum exam is done; otherwise, the child will be referred for x-rays, a tuberculin skin test, and other consultations. If TB is confirmed, the child will be registered for treatment. For children under the age of five without signs or symptoms of TB, IPT will be started and the child will be registered in health facility contact register book. A six-month supply of INH (10mg/Kg) will be provided for the child, and family members will be asked to support the administration of the drug.

7. Supervision and Monitoring of the Screening Program

   Active contact screening is part of the NTP reporting and surveillance system, and all health facilities provide reports on a quarterly basis to the NTP. Tracking household contact investigations is an indicator on the NTP supervisory checklist, and supervisors/monitors should consider this during their evaluation of health facilities and the community. CTB provincial technical officers supervise and monitor the activity in close coordination with provincial TB coordinators and BPHS TB focal points. CTB provincial officers provide timely supervisory visits from health facilities, check all contact registers, and conduct random interviews with index TB patients in health facilities or by phone (each quarter, between 10% and 20% of index TB patients are interviewed by CTB provincial technical officers to ensure data accuracy and program quality). CTB supports the NTP to conduct quarterly data review workshops in all five urban DOTS cities (Kabul, Herat, Mazar, Kandahar, and Jalalabad). All health facility in charges present their TB activities, including contact investigation data. The technical team from CTB, PHOs, NGOs, and the NTP provides feedback, sets new targets for each health facility, and checks all registers.

   CTB also supports the supervisor and training costs associated with the active screening program. Assigned health care workers receive a quarterly transportation subsidy for each household visit after all documentation is completed. Recording and register books are supplied to all health facilities, and sputum containers are supplied by the NTP.

Screening children with close contact to index cases in Jalalabad city (Photo credit: MSH/Afghanistan)

A DOTS nurse at Maiwand Hospital discusses contact investigations with a supervisor (Photo credit: Dr. Darwish, CTB/MSH)

RESULTS AND ACHIEVEMENTS

In 2014, active household investigations piloted in Kabul by TB CARE I identified 1,540 index TB cases and evaluated 1,218 (79%) of those. Among the 3,847 households screened and registered, 347 (9%) were determined to be presumptive TB cases and 39 cases (11%) of all forms of TB were identified. A total of 519 children under the age of five were put on IPT.

TABLE 2. Results from Kabul to Show the Trend of Active Case Screening (Source: NTP surveillance system, quarterly)

INDICATOR	2014	2015	2016	2017
Bacteriologic confirmed TB (index cases)	1,540	1,632	1,696	2,031
Household contacts registered/screened	3,847	6,040	8,684	10,081
Household contacts examined for TB (presumptive)	347 (9%)	645 (11%)	1,005 (12%)	1,132 (11%)
Household contacts diagnosed as bacteriologic confirmed	20	32	45	48
Household contacts diagnosed as all forms of TB	39 (11%)	53 (8%)	105 (105)	155 (14%)
Children under 5 years of age registered	678	836	981	1,538
Children put on INH preventive therapy	519 (76%)	728 (87%)	851 (87%)	1,483 (96%)
Children who completed IPT treatment	213 (41%)	319 (43%)	440 (51%)	900 (61%)

TABLE 3. Trend of Contact Investigations in Five Provinces

INDICATOR	2015	2016	2017
Bacteriologic confirmed TB (index cases)	6,186	7,303	7,864
Household contacts registered/screened	22,194	35,169	44,469
Household contacts examined for TB	4,874 (22%)	4,941 (14%)	6,641 (15%)
Household contacts diagnosed as bacteriologic confirmed	246	292	392
Household contacts diagnosed as all form TB	464 (9%)	567 (11%)	602 (9%)

TABLE 4. Indicators for Pediatric TB

INDICATOR	2015	2016	2017
Children under 5 years of age	3,799	5,778	8,585
Children put on INH preventive therapy	3,399 (89%)	5,275 (91%)	7,946 (92%)
Children who completed IPT treatment	2,382 (70%)	3,762 (71%)	5,631 (71%)

In 2015, CTB expanded urban DOTS to four new cities (Herat, Kandahar, Jalalabad, and Mazar) and active household investigation to four additional provinces (Herat, Kandahar, Nangarhar, and Balkh). Based on a consolidate plan with the NTP and Global Fund, it was agreed that CTB would implement a full package of active household contact investigation in the five provinces where urban DOTS was already implemented.

The data trend from 2015 to 2017 shows significant improvement. In 2017, of 7,864 index cases, 6,271 (80%) were evaluated, 44,469 close contact households were screened, and 6,641 (15%) of those were determined to be presumptive TB. The percentage of presumptive TB cases in general out-patient departments is 3%. In total, 602 cases of all forms of TB (9%) and 392 bacteriologically confirmed TB cases (6% of presumptive) were identified and put on treatment. This intervention identified 5% of all bacteriologic cases in five provinces (7,864). The prevalence of TB cases is very high among household contacts at 1,354/100,000 population (44,469 households), while in the general population it is 189/100,000 population (WHO global report 2017).

In 2017, 8,585 children under the age of five were registered, and IPT (INH preventive therapy) was initiated for 7,946 (92%) of those; 5,631 (71%) children completed their IPT course. The trend of child screening and IPT has improved each year (Table 4).

Acknowledgements

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Authors

This publication was written by Said Mirza Sayedi, MD, with contributions from Dr. Azizullah Hamim, Dr. Ghulam Qader, and Dr. Mohammad Khakerah Rashidi from CTB; Dr. Lutfullah Manzoor from the NTP; and Muluken Melese.

For more information, please contact lessons@msh.org.

LESSONS LEARNED

Active contact investigation identifies more TB cases. The yield of TB is higher in close contacts (1,354/100,000) than in the general population, which was 135/100,000 in 2017 (NTP data 2017). Active household investigation has increased the identification of TB cases by 5% each year in the intervention areas. The number of children put in INH preventive therapy has also increased, and the outcomes of preventive therapy have improved each year.

CTB provinces have sustained high case notification and children on IPT. In those provinces where CTB is working, contact investigation has found additional TB cases, and the IPT rate is 71%. Contributing factors to this success include technical officers who conduct follow-ups and random checks with index cases, a good tracking system, timely data use and good coordination, and good financial management for transportation costs of health care workers.

CONCLUSION

Active household contact screening is a more effective method than passive screening for finding TB cases among close contacts and identifying children for IPT. Using new technologies like GeneXpert may increase the number of cases identified among contacts. Focusing on screening of all form of TB as index cases will identify additional cases, and the current algorithm for contact investigation should be revised.

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TECHNICAL BRIEF

Find Actively, Separate, Treat: The FAST Strategy for Tuberculosis Infection Control in Bangladesh

PROJECT CONTEXT

Bangladesh is one of the world's high tuberculosis (TB) burden countries, and TB is a major public health concern in the country. According to World Health Organization's 2017 Global TB Report, 38% of drug-sensitive and approximately 84% (<4,100) of drug-resistant patients are undiagnosed or unreported. A prevalence survey[1] demonstrated that TB prevalence is higher among the urban population than the rural population in Bangladesh. However, it is estimated that more than 30% of people do not seek care even when they are symptomatic.

The most infectious TB patients are these missing cases. Undiagnosed TB patients often transmit the disease in inpatient wards, infecting health care workers, patient attendants, and other patients. It is critical to find, diagnose, and effectively treat these TB patients to thwart the transmission of the disease. TB patients may present themselves to the hospital for reasons having nothing to do with TB, and they may not mention cough, fever, or weight loss —symptoms that may or may not be associated with pulmonary TB.

Large hospitals and nongovernmental organization (NGO) clinics in urban Dhaka are a hub for these patients by acting as entry points for both patients and caregivers from a large catchment area. In response to patient volume and health facility capacity, the USAID-funded Challenge TB (CTB) Project in Bangladesh introduced the FAST strategy (Find patients Actively, Separate safely, and Treat effectively) as a TB infection control strategy that prioritizes rapidly diagnosing patients and starting effective treatment.

[1] National Tuberculosis Prevalence Survey Bangladesh 2016.

SEPTEMBER 2018

BANGLADESH

STRATEGIC APPROACH

The premise of the FAST strategy is that TB treatment can prevent further transmission. Rapidly diagnosing and treating TB patients is the best way to reduce nosocomial infections, especially for health care workers who are at high risk of infection due to routine direct patient care. The FAST strategy is used to diagnose TB or multidrug-resistant TB (MDR-TB) within a variety of health care and congregant settings and is an infection control strategy with a focused approach for stopping TB transmission.

The FAST strategy (figure 1) encourages hospitals to find TB patients actively through "cough surveillance" in outpatient departments by asking about TB symptoms and identifying patients who are coughing. Sputum must be promptly tested for TB, ideally with Xpert MTB/RIF. Patients are then separated from the general hospital population while waiting for a laboratory diagnosis to prevent further transmission of TB. Once diagnosed, effective TB treatment is the most important step in preventing transmission of the disease, and patients become noninfectious soon after starting effective treatment.

FIGURE 1. The FAST approach

CTB Bangladesh established active screening systems in seven tertiary hospitals and seven NGO clinics in Dhaka city using the FAST strategy. The project received approval from the National TB Control Program (NTP) and sought necessary buy-in and permission from hospital authorities to implement FAST, which began in February 2018.

PROJECT IMPLEMENTATION

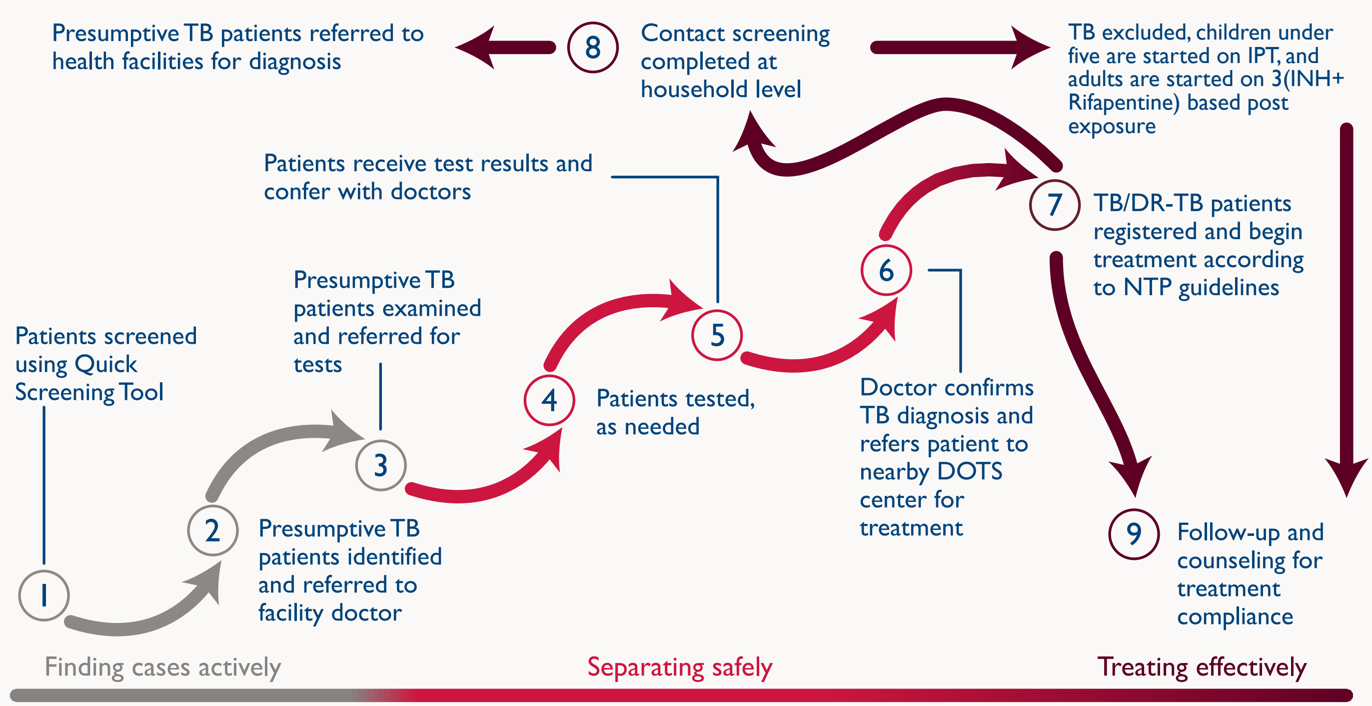
PRELIMINARY ACTIVITIES

The project conducted an initial meeting with institutional authorities in January 2018 to discuss the TB situation in the country and how implementing the FAST strategy could contribute to national case finding. Upon receiving consent from health facility directors, CTB conducted a preliminary assessment of hospitals and clinics to calculate patient burden and patient flow in medicine outpatient and in-patient departments each day. CTB hired 14 health workers (screeners) for screening, identifying presumptive TB cases among screened patients, and sending them for x-ray (if available) and GeneXpert testing if the x-ray was abnormal. CTB also provided three field supervisors to supervise the screeners and track their performance and record keeping. Field supervisors also coordinated and liaised with hospital and clinic authorities and reported to the project regularly. All 17 workers (14 screeners and 3 supervisors) were oriented for effective implementation of the FAST strategy. Between 15 and 20 doctors at each facility were also oriented on the FAST strategy and ways they could support the initiative.

CORE INTERVENTIONS

- Screeners screen general patients presenting at in and outpatient departments and NGO clinics using paper-based quick screening tools. Based on the screening criteria, they identify presumptive TB cases and refer them for further clinical evaluation and subsequent diagnostics.
- Presumptive patients are referred for diagnostic investigation according to the NTP algorithm (x-ray, acid fast bacilli (AFB) microscopy, GeneXpert, and any other tests advised by physicians). After clinical examination, presumptive patients are sent for a test to identify TB.
- The patient shares the test report with the doctor the next day. The doctor confirms the TB or drug-resistant TB (DR-TB) diagnosis based on the report and refers the patient to the nearest directly observed treatment-short course (DOTS) center/DR-TB treatment initiation center. Health workers at those facilities ensure initiation of treatment and follow-up on treatment progress.

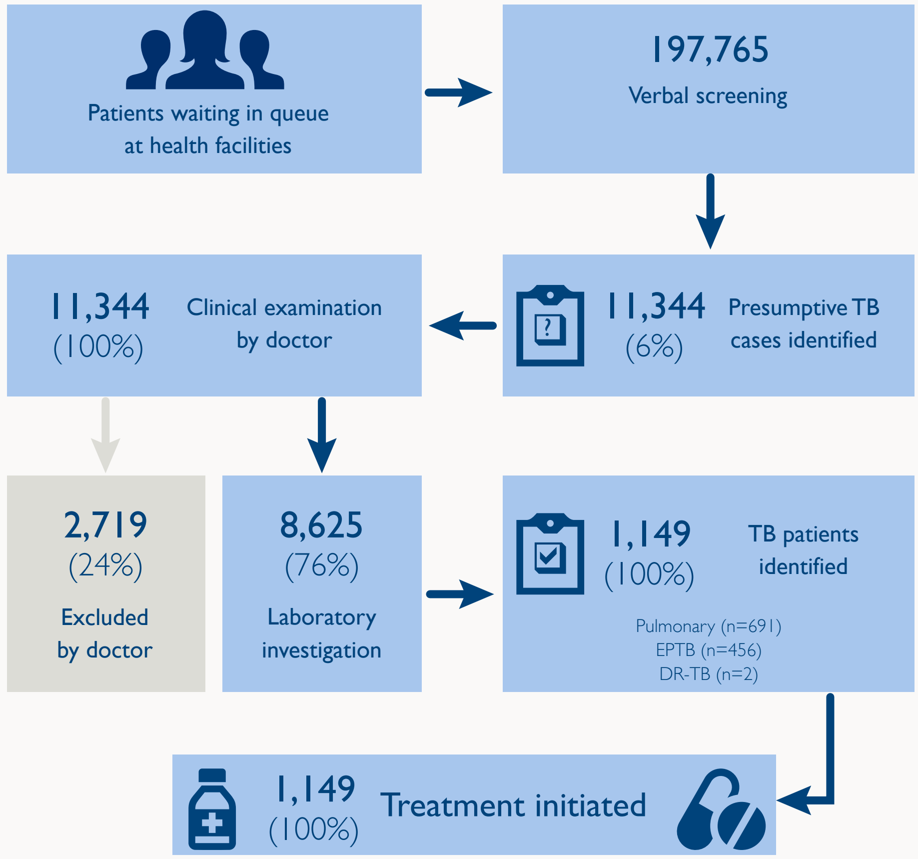
FIGURE 2. Steps in the FAST strategy



RESULTS AND ACHIEVEMENTS

From February to June 2018, 197,765 (76%) general patients were screened at outpatient departments at the 14 facilities, including seven tertiary care hospitals and seven NGO clinics. Among those screened, 11,344 (6%) presumptive TB cases were identified and sent for further evaluation. Of these presumptive cases, 8,625 (76%) went for further TB laboratory investigations (e.g., Xpert, x-ray, AFB, fine-needle aspiration cytology/biopsy), and 1,149 (13%) TB patients were identified, which is a positivity rate of 581/100,000 or close to 2.6 times the general populaton incidence. Of these 1,149 cases, 471 (41%) were pulmonary positive, 220 (19%) were pulmonary negative, 456 (40%) were extra pulmonary TB, and 2 (0.2%) were DR-TB. Treatment of all identified drug-sensitive and DR-TB patients is ensured through DOTS centers following NTP guidelines.

FIGURE 3. Data flow for FAST



LESSONS LEARNED

- The yield of TB using the FAST strategy is 2.6 times higher than the general population incidence estimate for the country.
- The FAST strategy is an active finding approach that promotes the idea that early detection and quicker initiation of TB treatment is an effective way to prevent TB transmission.
- In many health facilities in Bangladesh, proper ventilation and cough surveillance is often absent.
- Rapidly diagnosing and treating TB patients is the best way to reduce nosocomial infections, especially for health care seekers who share the same room or same floor within a health facility.
- An active and comprehensive diagnostic mechanism is essential to diagnose missing TB cases. The FAST approach can be used to diagnose additional TB and DR-TB cases in a variety of health care and congregate settings.

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Authors

This publication was written by Dr. Manzur-ul-Alam, Dr. Shayla Islam, and Dr. Shahrear Farid with contributions from Himangshu Karmokar, Dr. Oscar Cordon, and Dr. Abu Jamil Faisel.

For more information, please contact lessons@msh.org.

THE WAY FORWARD

Strengthen screening process and sustainability issues:

- Hospital authorities and staff can be engaged by building the capacity of doctors and nurses.
- Appropriate referral mechanisms should be established, and the existing intuitional capacity for early diagnosis and treatment should be utilized.

Establish triage for TB infection prevention and control:

- Active TB patients need quick diagnosis and treatment to prevent transmission of infection.
- From an infection prevention and control point of view, TB patients deserve priority for quick investigation and treatment. To achieve this, hospital management should take administrative action for the quick delivery of TB services at the facility. When needed, patients will be referred to the nearest center for x-ray and GeneXpert testing at no cost.

Promotion and branding of the TB program at the facility:

- The point of care for TB will display all essential TB-related materials.
- The FAST strategy will be one of the key implementation approaches for the Strategic Roadmap for Zero TB Cities Bangladesh and a major building block of the CHAKRA—a holistic approach to TB care where "Search, Treat, Prevent" has been conceptualized as stages along a patient pathway.

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TECHNICAL BRIEF

Photo Credit: © 2016 Md. Akram Ali, Courtesy of Photoshare

GxAlert for Real-time Management and Strengthening of Remote GeneXpert Network in Bangladesh

BANGLADESH

PROJECT CONTEXT

The USAID-funded Challenge TB (CTB) Project has supported 39 GeneXpert sites in Bangladesh since March 2015. At the beginning of the CTB Project, many machines were down, there was a high percentage of errors and nonfunctional modules, cartridge stocks-out were frequent, and low uptake of the Xpert network was prevalent. There were no structured monitoring mechanisms to report the need for maintenance of GeneXpert machines or for logistics management, optimal utilization, understanding error codes, or timely enrollment of drug-resistant TB (DR-TB) patients to treatment. All of these were major bottlenecks to the effective and efficient management of the Xpert network.

In addition, there was a lack of quality supervision and skilled human resources to monitor the machines across sites. Increasing the number of GeneXpert machines to 615 by 2022, a goal set by the National Tuberculosis Control Program (NTP) following the national GeneXpert scale up and implementation plan, was not feasible. However, many of the challenges could be resolved through the introduction of a real-time monitoring system called GxAlert. CTB introduced the system to connect GeneXpert machines and allow for remote monitoring and improvements in inventory management, maintenance, and utilization of the machines.

SEPTEMBER 2018

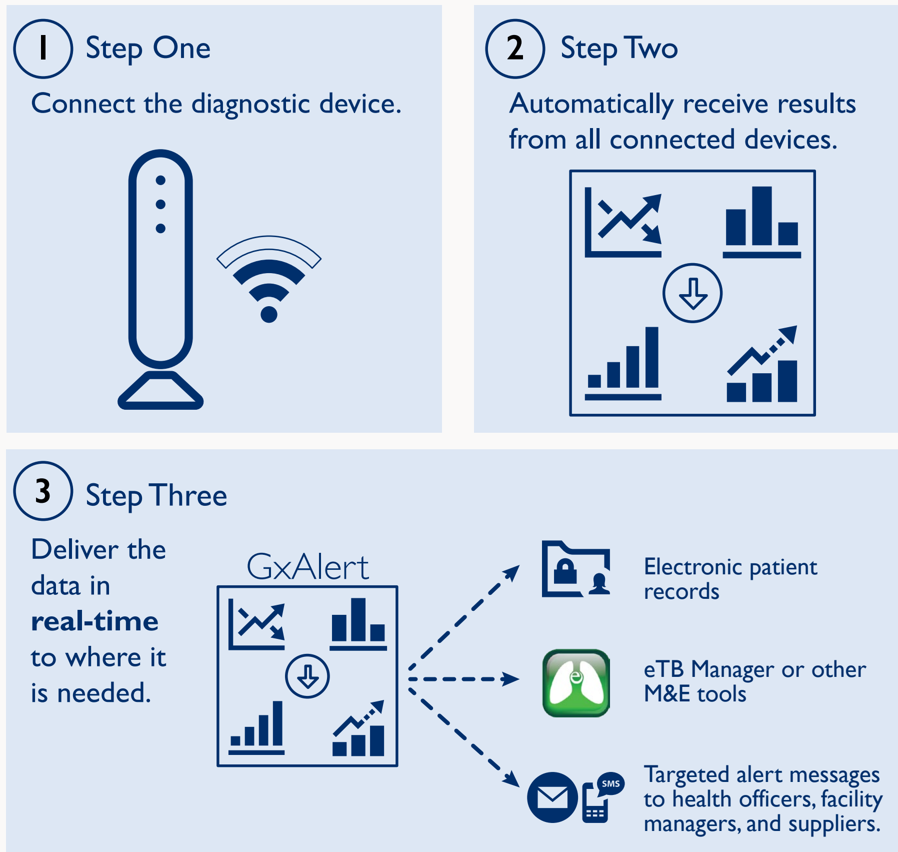
STRATEGIC APPROACH

GxAlert is a web-based open-source data connectivity application that includes a system for data management designed to work with any diagnostic device that can connect to the internet or a mobile network. It allows for detailed monitoring of:

- Device offline notifications
- Critical instrument error notifications
- Devices with automatic reporting for frequent errors (>5%)
- National multidrug resistant (MDR) case identification notifications
- Automatic monthly MDR case reports
- Modules marked as "do not use"

Results from GeneXpert are automatically sent to the GxAlert server, which provides robust and clear documentation to connect existing monitoring and evaluation systems (e.g., e-TB Manager) and eliminates the need for manual reporting and recording of any transcriptions or submission of results (figure 1).

FIGURE 1. Process of GxAlert connection



PROJECT IMPLEMENTATION

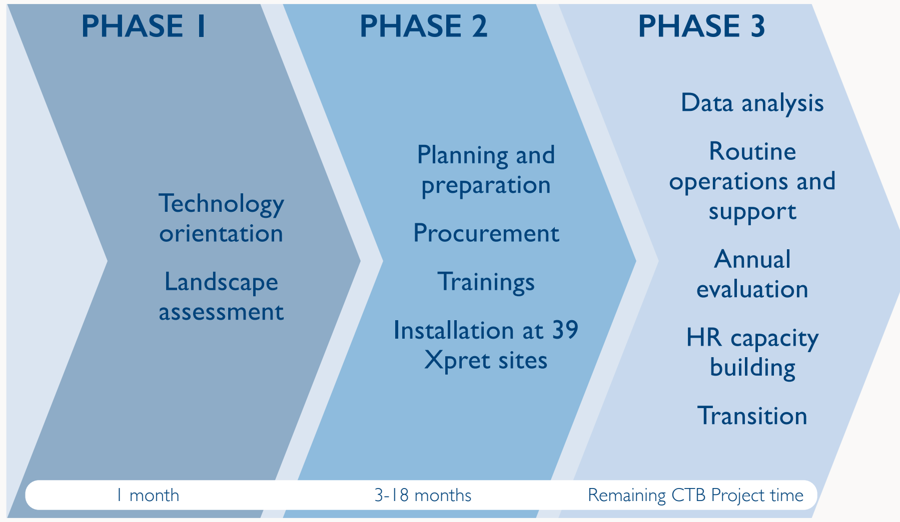
Implementing GxAlert to improve the monitoring system of the 39 GeneXpert machines in Bangladesh required careful planning to ensure a smooth procurement process, identify the implementation team, ensure that software was installed and configured properly, and train lab attendees to use the system as intended to achieve desired results. CTB took a phased approach to the implementation (figure 2) by first carrying out a landscape assessment. CTB conducted a series of meetings with all major stakeholders (i.e., BRAC, Damien Foundation) under the leadership of the NTP to pave the way for systematic implementation of GxAlert. CTB trained 11 core group members to complete the installation, data analysis, and troubleshooting of the system in November 2016 through System One, a South Africa-based IT solutions firm with expertise in the GxAlert system. All required instruments, including routers, wi-fi dongles, and SIM cards and multi-plugs for the 39 GeneXpert machines, were procured. Software was also purchased, including Team Viewer, Twilio SMS, Tableau Desktop Professional, Jira Helpdesk, and Confluence Knowledge Base.

To ensure local buy-in, two teams were created. Each consisted of two people from the NTP and two from CTB who provided technical support, oversaw installation, and coordinated with stakeholders. These teams received in-depth training from System One on all aspects of the software, including administrative issues and troubleshooting.

In Phase I, CTB provided training workshops to NTP staff and other key stakeholders on the technology and its functionality. In March 2016, CTB conducted the landscape assessment using the GxAlert Implementation Toolbox to identify strengths and weaknesses of the GeneXpert network. The results of the assessment were used as a foundation for the next steps in the implementation.

In Phase 2, CTB contracted with System One and procured all necessary routers and SIM cards. Through concerted advocacy efforts with the NTP, the products were cleared through the Bangladesh Telecommunication Regulatory Commission with the support of System One. CTB organized several trainings of trainers for the core technical team (comprising representatives from the NTP, CTB, other nongovernmental organizations, and Cepheid) in 2016. CTB successfully installed the GxAlert system on all 39 GeneXpert machines and oriented operators and field and central-level staff during field visits and trainings throughout 2017.

FIGURE 2. CTB implementation of GxAlert



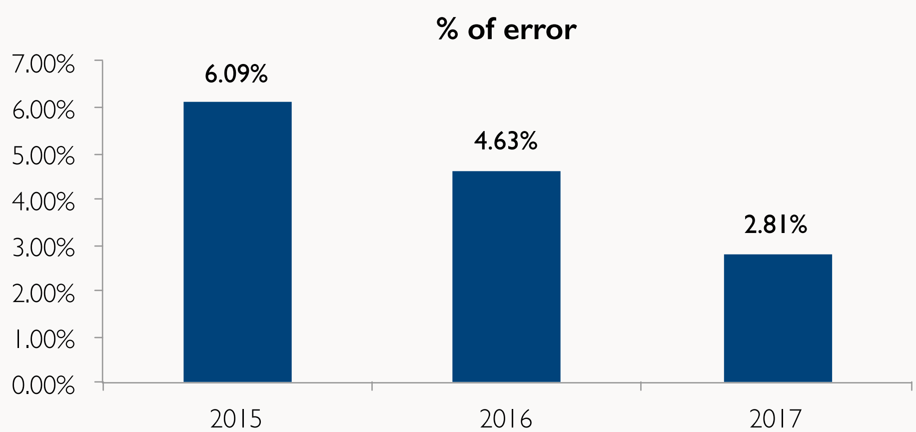
In Phase 3, CTB conducted a deep dive analysis to generate evidence on the effectiveness of this system to strengthen the GeneXpert network overall. Based on encouraging findings, CTB initiated dialogues with the NTP to hand over the system and scale up to other GeneXpert machines across Bangladesh. The NTP secured funding and initiated communication with the Global Drug Facility and the Global Fund to procure and introduce the system. CTB is currently working with the NTP and other stakeholders to scale up and sustain the GxAlert system.

RESULTS AND ACHIEVEMENTS

The analysis of GeneXpert data through GxAlert showed that the most common GeneXpert instrument and Xpert MTB/RIF test errors were due to incorrect sample processing. A high error rate (in particular of errors 2008, 5006, and 5007) spread across all modules suggests that operator error may be a cause; onsite retraining of staff may be necessary.

Figure 3 shows a downward trend in error rates over time as sites gained expertise and supervision (from 6.09% in 2015 to 2.81% in 2017). This

FIGURE 3. Year-wise error rate of GeneXpert machines



downward trend represents important progress of the GeneXpert network in Bangladesh when compared to many other countries (>10% error rates in some field settings).

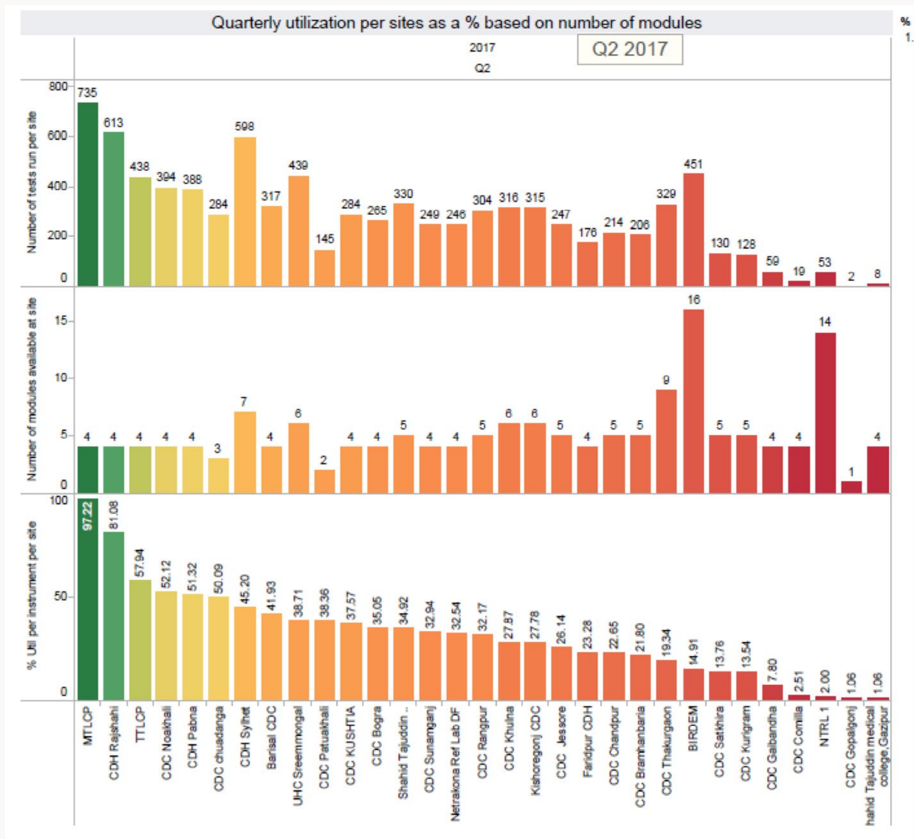
The trend of unsuccessful tests is decreasing each year. Among the three categories of unsuccessful test results—invalid, error, and no result—error is the most common. The most frequently error type codes are 5006 and 5007, which relate to incorrect specimen volumes being added to the cartridge. After getting results from sites through GxAlert, the NTP used that information to tackle frequently reported error test results from the 39 machines. The regular site-level feedback to the lab reduces both errors and cost.

GxAlert enables users to capture demographic information of presumptive TB and DR-TB patients that will help programs understand disease dynamics across geographic areas and by age groups and gender.

Information on the use of existing GeneXpert machines has helped the NTP plan for the distribution of additional machines. Data showed that some existing sites were demonstrating continuously lower utilization of machines while other sites were performing well. This was an important call for action for the NTP to improve the referral mechanism of those sites, transfer machines to higher-performing areas, or take other appropriate actions.

GxAlert helped the NTP prevent stock-outs and expiration of supplies at GeneXpert sites. In 2017, there were no shortages or expiration of cartridges at those sites, demonstrating important progress in managing inventory successfully.

FIGURE 4. Snapshot of GxAlert dashboard with examples of sites with low utilization



The real-time monitoring of the performance of machines and modules has resulted in a significant decrease in turnaround time for GeneXpert maintenance support (from 5–14 months to 2 weeks) from 2017 to 2018. The local Cepheid agency can now monitor module status in real time and take preventive actions immediately. NTP Bangladesh is maintaining 90% of functional module rate, which again is a major achievement in GeneXpert maintenance services.

GxAlert helps the NTP understand the mutation pattern of *Mycobacterium tuberculosis (MTB)* by capturing data on mutation probes from routine Xpert tests. Data show that mutation probe E is predominant in Bangladesh, and its distribution throughout the country is almost uniform. The frequency of mutation probes may indicate trends in transmission and circulation of new strains. Ultimately, this will help the NTP establish routine surveillance of MDR-TB and determine the time interval needed to conduct a drug resistance survey.

Acknowledgements

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Authors

This publication was written by Sarder Tanzir Hossain, Ebne Sayed Md. Imtiaz, Dr. Pronab Kumar Modak, and Dr. Shahrear Farid with contributions from Dr. Oscar Cordon and Dr. Abu Jamil Faisel.

For more information, please contact lessons@msh.org.

LESSONS LEARNED

- Real-time monitoring of GeneXpert machines can contribute to reduced error rates and shorter turnaround times for module replacement and can improve the overall maintenance of the machines.
- NTP laboratory staff now receive emails and SMS alert to speed up treatment initiation. The NTP gets SMS alerts and emails for DR-TB patient enrollment; stock-out and error (>5%) rates; critical module errors; and monthly MDR reports to ensure better connections among diagnosis, enrollment, and treatment.
- GxAlert reports can be used to troubleshoot problems encountered in remote laboratories by targeting the problem type. Site-level interventions as simple as regular cleaning can reduce both the number of unsuccessful test results and the cost.
- GxAlert has strengthened and improve programmatic decision making for cartridge procurement, distribution, and management.

THE WAY FORWARD

There are many operational challenges to be dealt with to realize the full benefit of the GxAlert system, and the following actions need to be taken:

- Deploy a full-time staff person at the central-level NTP to train users, troubleshoot problems, analyze GxAlert data and communicate the findings to program staff, and provide timely support to the field
- The NTP needs to scale up this system to all GeneXpert machines across the country, regardless of ownership
- The NTP needs to secure Government of Bangladesh funding and support to scale up and sustain the system
- The NTP needs to develop its own server and IT laboratory to host the data at the country level
- The NTP should develop a pool of TB data fellows who can produce robust evidence by analyzing GeneXpert data
- Integrate customs field as per national reporting format e.g. 10A and 10B
- Integrate with other systems (e.g., e-TB manager, DHIS 2)

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CHALLENGE TB

TECHNICAL BRIEF

Photo Credit: Warren Zelman

Innovative one-stop shop approach for TB/HIV integration in Ethiopia

PROJECT CONTEXT

Vulnerabilities associated with higher risk of infection and progression to tuberculosis (TB) disease are often linked to higher risks of exposure to infectious peers living in overcrowded housing conditions or correctional facilities. Conditions that lead to weakened immune status, such as HIV, malnutrition, and diabetes, also increase the risk of acquiring TB. Vulnerabilities arising from lack of awareness of signs and symptoms and poor access to health care are associated with delayed or missed diagnosis and onward transmission of the disease (Lönnroth 2015).

Globally, urban populations, prison inmates, migrant workers or daily laborers, and female sex workers are identified as vulnerable groups for TB and HIV. Individuals from these groups often come from settings with significant geographic and financial barriers to health access, in addition to stigma and discrimination. Global strategies have separate operational targets of reaching at least 90% of vulnerable TB populations through improved access to services, systematic screenings, and active, new case-finding methods (de Vries 2017; Stop TB 2016). Finding TB and HIV cases among these high-risk groups is critical in controlling TB and HIV epidemics.

In high TB- and HIV-burden settings, the two diseases reinforce each other and share common risk factors (Fujiwara 2012). Single, categorical services provided to persons with multiple, related risk factors miss opportunities to diagnose, treat, and prevent TB and/or HIV. For example, people living with HIV (PLHIV) are at a high risk of TB and are optimally served by integrated TB and HIV services and policies. Ethiopia is a high TB/HIV burden country that started implementing globally recommended collaborative TB/HIV activities in 2004, but several implementation challenges still remain (FMOH 2007).

ETHIOPIA

SEPTEMBER 2018

PROBLEM STATEMENT

Both global and Ethiopian national guidelines recommend integrated approaches to tackle the dual burden of TB and HIV. It is also believed that an integrated, family-based approach to TB and HIV care can remove access barriers, reduce delays in diagnosis, and improve management of TB among women, children, and other vulnerable groups. However, there is considerable variation across high disease-burden countries in terms of translating these recommendations into action. In Ethiopia, for example, TB and HIV clinics collaborate with each other through cross-referrals.

Under ideal conditions, both TB and HIV patients should receive a full package of services in one place—an approach often referred to as "one-stop shop." However, there are several barriers to implementing such an approach. For instance, TB services are far more decentralized than HIV treatment services, making a one-stop shop challenging under such circumstances. Breach of infection control protocols is another unresolved issue.

To address these challenges, the USAID-funded Challenge TB (CTB) Project designed an innovative family-matrix-guided implementation approach in selected demonstration sites in Ethiopia.

PROJECT APPROACH

This demonstration project was implemented through a collaborative process within the framework of existing national guidelines under the direction of senior leadership from Amhara and Oromia regions and Dire Dawa and Harari city administrations. First, the CTB Project team developed a concept note that was shared with the regional health bureaus (RHBs) of both regions and city administrations. The concept note was then discussed at regional TB/HIV working group meetings where consensus was reached on developing detailed implementation research protocols. Regional research ethics committees reviewed and approved the protocols. Senior management team members and TB focal persons were designated as principal investigators in their respective regions and CTB teams were co-investigators.

Implementation sites were selected based on high TB/HIV co-infection rates obtained from routine programmatic data. Three entry points were used to identify target populations for the project. Figure 1 summarizes entry points and major activities at each of them, and table 1 provides a comparison of conventional and innovative approaches added across two points of service delivery.

Figure 1. Strategic framework of a one-stop shop TB and HIV integration in Ethiopia

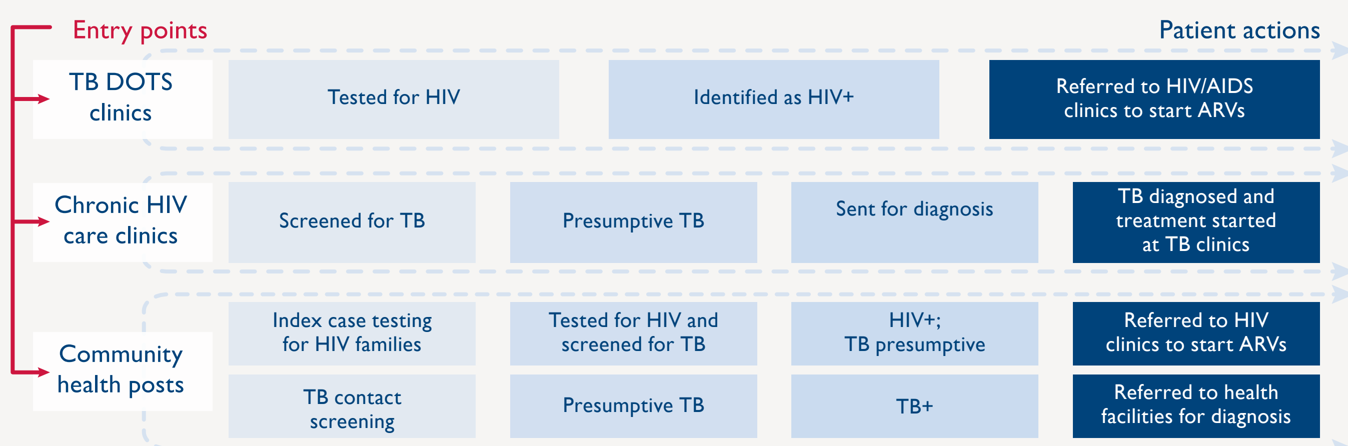

Table 1. Comparison of conventional and innovative components added across two points of service delivery

POINT OF SERVICE DELIVERY	CONVENTIONAL APPROACH	INNOVATIVE COMPONENTS ADDED
TB directly observed treatment, short course (DOTS) clinic	– Current index TB cases screened for HIV – HIV-positive patients linked to antiretroviral therapy (ART) – Contacts of current index TB cases screened for TB – Acid-fast bacilli microscopy used as primary test for presumptive TB cases	– Contacts of index TB cases tested for HIV – Pool of index TB cases expanded to include those treated 1-3 years previously (retrospective contact investigation) – GeneXpert used as primary test – Active community-based tracing of contacts of index TB patients
Chronic HIV clinic	– PLHIV screened for TB – GeneXpert used as primary test for presumptive TB patients – Confirmed TB patients linked to TB DOTS clinic – Close family members of index PLHIV tested for HIV – Newly identified PLHIV treated with antiretroviral drugs	– Close family members of index PLHIV tested for TB – GeneXpert used as primary test for testing family members with presumptive TB – Confirmed TB patients linked to ART – Active community-based tracing of family members of index PLHIV

PROJECT IMPLEMENTATION

The CTB Project implemented this project in 14 clinics in 6 towns between August 2017 and January 2018: Woldiya in Amhara; Shakiso, Megado, and Adola of Oromia; and Dire Dawa and Harari cities. These towns have TB/HIV co-infection rates exceeding 10%. The phased implementation approach listed below was followed.

Build consensus on the implementation approach

The project team initiated a consultative process to reach consensus on the need for the demonstration project, appropriateness of the selected sites, and alignment of the proposed package of interventions with regional priorities. The consultative process led to formation of regional task forces that guided and monitored implementation of the project.

Assess the baseline

Once consensus was reached at the regional level, the project team conducted a baseline assessment at the four selected sites. The assessment covered the following broad areas: availability and adequacy of existing TB and HIV services; trends in TB case-finding and treatment outcomes; trends in HIV testing and positivity rates; HIV care and treatment data, including management practices of opportunistic infections; and estimated size of vulnerable population groups both for TB and HIV.

Define the final intervention packages

Findings from the baseline assessment guided further refining of specific interventions. Accordingly, the following package of interventions was agreed upon:

- Perform retrospective TB contact investigations
- Screen and test the family of HIV index cases for TB and HIV (a family matrix card is used to identify and manage family members of PLHIV)
- Use GeneXpert MTB/RIF as the first line of TB diagnosis in the pilot study
- Link TB and HIV cases to TB DOTS and chronic HIV care, respectively
- Distribute national TB and HIV diagnostic algorithms and orient health care workers (HCWs) on the standard use of the algorithms

Implementation of Intervention Packages

The above intervention packages were implemented at the following points of service delivery.

TB DOTS clinic

The retrospective contact investigation was used as an entry point for TB and HIV services. In the investigation, trained nurses and data collectors reviewed the records of all TB patients currently on treatment and those treated in the preceding three years. In collaboration with and supervised by health extension workers (HEWs), the data collectors paid home visits to screen every household for presumptive TB and offer confidential HIV testing and counseling. Patients or samples were referred to a GeneXpert center for TB diagnosis. Eligible contacts, individuals having contact with presumptive TB index cases over the past year, those without TB, and PLHIV were linked to isoniazid/isonicotinoyl hydrazine (INH) preventive therapy services. Confirmed TB cases were linked to the standard TB treatment and care. HIV+ cases were referred to the health facility for chronic HIV care.

Chronic HIV care clinic

Here the family matrix card was used as an entry point for TB and HIV services. This approach was expanded to include TB screening as an additional activity. The specific activities included the following:

- Obtain informed consent from patients currently on ART
- Review their index cards
- Ask them to bring their family members to the clinic or obtain oral consent to visit their homes
- Screen for TB and test for HIV

Again, the presumptive TB and HIV+ cases were sent to nearby health facilities for confirmation and initiation of treatment. TB cases were put on TB DOTS, and HIV+ cases were linked to a chronic HIV care clinic.

Outreach activities and referral linkages

The HCWs went to the community with a list of TB index cases and HIV+ people. The HEWs joined the HCWs during the home visits, looking for the contacts of TB index cases and family members of HIV+ individuals. These visits were scheduled and planned. Together with the HEW, the HCWs paid home visits on weekends and after 3 pm during weekdays so that routine, facility-level services were not compromised. Visiting homes after regular clinic hours was defined as an outreach activity.

During the outreach visits, the HEWs and HCWs screened the contacts of TB index cases and carried out confidential HIV testing and counseling of presumptive TB cases and HIV+ individuals. The identified presumptive TB cases and HIV+ patients were sent to the nearby health facility. At the health facility, the presumptive TB cases were evaluated for TB and other related morbidities per the national guideline. The HIV+ individuals underwent the standard procedure at chronic HIV clinics to start on ART and other care. Feedback was sent to the referring team and the HEW received information about the outcome of the evaluation.

Monitoring and evaluation of outcomes

Progress was reviewed and monitored through quarterly, joint supportive supervision visits by project teams and RHB staff. The yields of TB and HIV+ rates were calculated as the outcome measures of the interventions.

RESULTS AND ACHIEVEMENTS

The project screened family members of 114 TB patients, 80 PLHIV, and 20 TB/HIV co-infected index cases. Of 527 family members screened, 198 (38%) presumptive TB and 44 (8.3%) definitive TB patients were detected.

The proportion of family members diagnosed with TB was 9.4%, 1.2%, and 5% among TB only, HIV+ only, and TB-HIV co-infected groups, respectively (table 2). The HIV+ rate was the same (2.6%) for both contacts of "TB only" and "HIV only" index cases whereas the rate was 11.6% among contacts of TB/HIV co-infected index cases. There was no significant association between type of index cases and TB case.

Table 2. Family members diagnosed with TB only, HIV+ only, and TB-HIV co-infection

VARIABLES	TB ONLY INDEX CASES	HIV+ ONLY INDEX CASES	TB/HIV INDEX CASE	ALL HIV+ (HIV ONLY AND TB/ HIV) INDEX CASES	ALL TB (TB ONLY AND TB/HIV) INDEX CASES
Number of index cases	114	80	20	100	134
Number of family members screened for TB	406	163	121	284	527
Number of presumptive TB cases identified	224	10	74	84	298
Number (%) of TB cases identified	38 (9.4)	2 (1.2)	6 (5.0)	8 (2.8)	44 (8.3)
Number of family members tested for HIV	116	151	69	220	185
Number (%) HIV+ among tested	3 (2.6)	4 (2.6)	8 (11.6)	12 (5.5)	11 (5.9)

Acknowledgements

Thank you to all of the staff from CTB Ethiopia for their support in the development of this technical brief.

Authors

This publication was written by Degu Jerene Dare with contributions from Zewdu Gashu.

For more information, please contact lessons@msh.org.

LESSONS LEARNED

The use of diagnosed TB and HIV index cases as an entry point for integrated, community-based screening of their contacts served as a high-yield case-finding strategy both for TB and HIV. Implementing the strategy on a wider scale can contribute to early finding of missing people with TB, thus leading to cutting transmissions in the community.

Screening contacts of HIV index cases for TB and HIV is a new experience in Ethiopia, but it proved to be successful. Since Ethiopia has a well-established community health system, this innovative approach can be integrated within the existing community health care platform as the one-stop shop approach of TB/HIV integration.

WAY FORWARD

Results from this pilot will be shared with the broader community to advocate for scale-up of the one-stop shop approach for community-based TB and HIV integration in Ethiopia and beyond.

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TECHNICAL HIGHLIGHT

Taking Supply Information Systems to the Next Level: Regional Collaboration in TB Medicines Supply Chain

Participants during the ECSA dashboard training and handover event. Photo credit: MSH

REGIONAL DASHBOARD

PROJECT CONTEXT

Tuberculosis (TB) remains a major public health problem in the regions of East, Central, and Southern Africa (ECSA). Because TB is an airborne disease, its transmission is facilitated by the movement of people across internal and national borders. Available risk mitigation measures in the region are largely inadequate, and individual countries are ill-prepared to handle disease control issues beyond their national borders. To operationalize the TB control strategy in ECSA countries, USAID, through Challenge TB and MSH, has facilitated technical and financial support for pilot cross-border TB interventions that span the region, including border areas. Among the challenges requiring intervention were prompt detection and treatment of TB among mobile populations crossing the borders, harmonization of TB treatments, and design and implementation of a supply chain information system that allows stock information sharing among member countries to ensure continuous availability of TB medicines.

CALL TO ACTION

Tuberculosis and information know no boundaries. The TB medicines supply chain has national, global, and regional implications. Regional collaboration in supply information systems is critical to ensure that medicines are accessible, affordable, and safe for all.

DESIGN AND IMPLEMENTATION APPROACH

To harmonize cross-border treatment of TB patients crossing country borders in the ECSA regions, in 2015 member countries agreed to a regional, web-based supply chain information system that tracks patient and stock information and shares it among member countries to support evidence-based decision making. Before the system was designed, a thorough user requirement assessment was conducted in several countries to understand and document users' demands and system requirements. A System Requirement Specification (SRS) document was prepared. On the basis of the SRS, a web-based system was developed, demonstrated and tested in 2016 and 2017. The system was designed with three major features: data entry, report (including dashboard), and system administration. A three-day training and user acceptance testing was conducted in April 2017 in Rwanda, Uganda, and Tanzania. Feedback was solicited and incorporated to improve the system. The final software product was installed in June 2018 following system users and administrators training.

Figure 1. ECSA Supply Chain Dashboard displaying stock status of TB medicines across regions

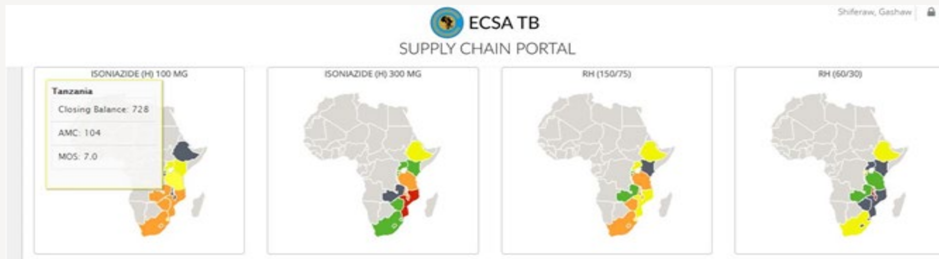
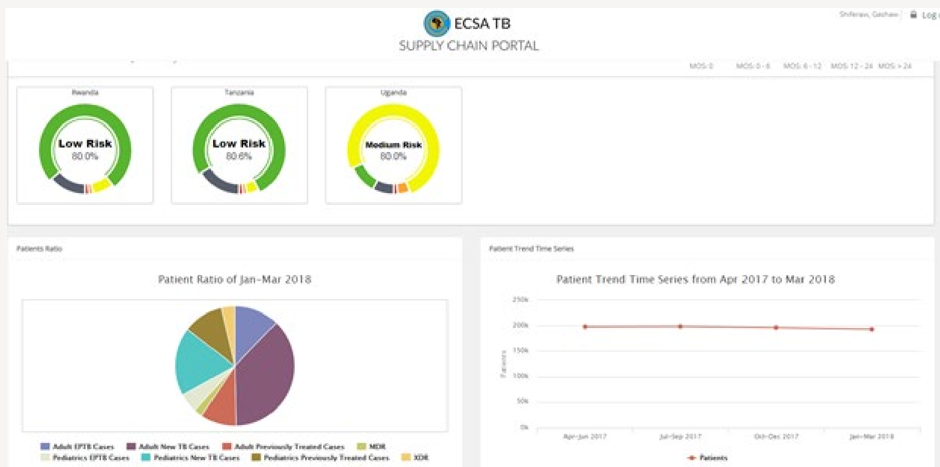


Figure 2. ECSA Supply Chain Dashboard displaying stock status of TB medicines



Features of the Dashboard

The automated, web-based dashboard is designed to foster simple data entry, faster information processing, and increased supply chain data visibility while reducing the workload.

The **data entry** feature is designed to emulate the manual data capturing tool, which maintains simplicity and uniformity across the region. It has the capability to capture stock and patient information at different levels of a country's supply chain system, and it is interoperable with existing systems. In addition, auto-calculation, pre-population, and validation rules during data entry are built in to prevent errors and reduce the workload at the time of data capture.

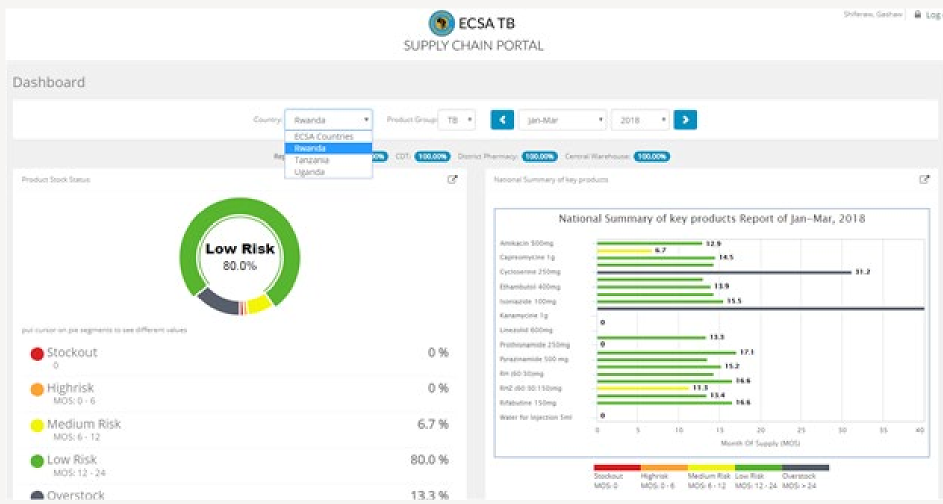
The **report** feature is designed to display information in different formats, such as charts, tables, and maps. Reports are categorized by country, supply chain level, and individual TB products. The system has 16 national and 14 health facility-level reports in different formats. This enables users to visualize stock status, consumption patterns, and outstanding shipments to make informed decisions. For example, considering the amount of stock available and its consumption pattern, the system informs users if they need to transfer or borrow TB medicine(s) to or from border countries before medicines expire or are stocked-out. The system also helps countries redistribute TB medicines among facilities. The reporting feature accommodates supply chain key performance indicators, such as percentage of facilities with stock-outs, potential stock-outs, understocked, or overstocked for individual TB medicines and percentage of facilities maintaining an optimum stock level according to the country's inventory policy.

Another important feature of the dashboard is its **administration** feature. This feature allows countries to successfully manage TB product lists, TB service-providing facilities, intermediate stores, system users, funding sources, and individual countries' maximum-minimum inventory control policies.

Benefits of the Dashboard

- Reduced data burden through auto-calculation and pre-population during data entry
- Enhanced data analysis and reporting with automatic reports by each level of a country's system and by TB products
- Simpler usability by emulating the current manual system and common data requirements in each country
- Enhanced data availability, visibility, and accessibility online with interactive maps, charts, and tables
- Enhanced coordination among key players and existing country systems through interoperability
- Enhanced accountability and performance indicators to ensure implementation across the region
- More streamlined supply chain decisions for quantification, procurement, and re-distribution among countries
- Improved data quality, uniformity, and integrity through the validation, security, and approval processes
- Early warning system for wastage reduction, stock-out prevention, and redistribution planning

Figure 3. ECSA Supply Chain Dashboard displaying stock status of TB medicines for a single country



LESSONS LEARNED

Developing regional systems requires thorough user and system requirement gathering in each country to understand common data requirements and the unique nature of each country's supply chain (e.g., having different inventory holding policies and reporting intervals). This helped to engage and involve key stakeholders in each country and accommodate requests with the aim of cross-border supply chain information sharing for decision making.

A detail use case analysis, system requirement gathering and documentation, vigorous testing, and solicitation of feedback were also critical to developing the system.

Building the capacity of local dashboard users and system administrators is important for the successful implementation, sustainability, and ownership of the dashboard. The dashboard could be used by regional donors and implementing partners to allocate their resources where they are most needed.

SUCCESS STORY

On June 8, 2018, MSH and KNCV—through the USAID-funded Challenge TB project and ECSA Health Community—launched a new, web-based regional TB patient and medicine supply chain information dashboard to harmonize TB diagnosis and treatment to patients crossing borders and enhance information availability and visibility across the ECSA region. The dashboard provides Ministry of Health National TB Programs, donors, and partners in the ECSA region with TB-related patient and stock status information to make cross-border supply chain decisions. The information from the dashboard serves as a mechanism to help avert stock-outs, prevent wastage, avoid emergency procurements, and ensure an uninterrupted supply of TB medicines across the region. Eventually, it will help ensure that patients crossing borders will be able to continue and complete their ongoing TB treatment.

The dashboard will improve the user's ability to capture, analyze, and generate TB patient and supply chain information for decision making in each member country. In addition, it enhances visibility through a secure website. To ensure data quality and reduce workload, the system includes built-in features such as auto-calculation, pre-population, and validation rules. On June 6–8, 2018, as part of the handover, 10 people from the Ministries of Health in Rwanda, Tanzania, and Uganda and the ECSA Health Community Secretariat were trained on how to use, manage, and administer the dashboard. On the last day of training, a handover event was organized for participating countries, KNCV, MSH, and ECSA Health Community Secretariat Director General Professor Yoswa Dambisya. During the event, Professor Yoswa recalled the 2014 ECSA member counties' initiatives to harmonize cross-border TB diagnosis and treatment. He said, "Tuberculosis is the most contagious airborne disease and knows no boundaries. Therefore, the action countries implement need to cross boundaries too. This is a good platform that neighboring countries could share TB medicines related information so that TB treatment and continuum of care for patients will not be interrupted when they are moving from one member country to another."

Professor Yoswa expressed his gratitude to the USAID East Africa region for financial support, KNCV for coordinating the activity, and MSH for technical support in the design of the dashboard. Dr. Victor Ombeka, Country Representative for KNCV Kenya, congratulated ECSA and member countries for completing the training and transferring the system to their own server. He also highlighted the importance of implementing the dashboard in the current member countries, which will give clear direction to scale up and bring in more member countries to share TB-related patient and stock information for cross-border TB diagnosis and treatment harmonization initiatives.

ECSA assumed ownership and is implementing the system across Rwanda, Tanzania, and Uganda, with the goal of having it fully operational by August 2018. The result and lesson from the three countries implementation will help to include more member and non-member countries in the region and work on interoperability of the dashboard with each country's existing supply chain information systems.

Prof. Yoswa Dambisya, ECSA Director General, speaking during the event.
Photo credit: Gashaw Shiferaw/MSH

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Thank you to all of the staff from Challenge TB East, Central, and Southern Africa for their support in the development of this technical highlight.

Authors

This publication was written by Gashaw Shiferaw.

For more information, please contact lessons@msh.org.

WAY FORWARD

- Inadequate financial and human resources to be leveraged among donors and implementing organizations. Although it may not be resource intensive, financial resources to hire and train data entry operators and system administrators would help to successfully implement the dashboard.
- Currently only three of the 20 ECSA member and non-member countries in the region are incorporated into the system. More coordinated effort and ownership would help to bring more member countries on board to support the cross-border initiative in sharing TB supply chain information.
- Although the dashboard has the capability to integrate with any existing country system, interoperability between existing electronic systems and the dashboard has yet to be addressed. A requirements assessment, including technology platforms, supply chain data requirements to be exchanged, and necessary platform to ensure interoperability, should be conducted.

The Global Health Bureau, Office of Health, Infectious Disease and Nutrition (HIDN), US Agency for International Development, financially supports this publication through Challenge TB under the terms of Agreement No. AID-OAA-A-14-00029. This publication is made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of Challenge TB and do not necessarily reflect the views of USAID or the United States Government.

TECHNICAL HIGHLIGHT

Online, Self-Administered Screening Tool for Improving TB Detection among University Students in Ethiopia

Photo Credit: Warren Zelman

PROJECT CONTEXT

Early tuberculosis (TB) case-finding and providing prompt treatment are priorities of TB prevention and care. However, socioeconomic, cultural, and geographic barriers hinder the community from reaching health facilities. Decentralizing services, utilizing case-finding strategies in health facilities and households, and offering services within the reach of the community have been implemented. However, these are affected by the lack of patient-centered services geared to the locality.

Because of the rapid expansion of mobile technology and connectivity, using digital technology for TB case-finding and treatment has been part of TB prevention and care in many countries (1). Evidence has shown the usefulness of electronic TB registers (2) and text messaging to remind patients about their status and/or providing TB-related information and adherence or treatment observation support (3-7). Sub-Saharan African countries were delayed in designing electronic media for the TB program. However, with current advancement of the technology and scaling up of electronic medical records, mobile technology has become a viable alternative.

Ethiopia is one of the most populous countries in Africa with a high TB burden across a wide geography. The national TB program has reached hundreds of thousands of cases and successfully treated them. However, health authorities believe that a third of cases have been missed in the community, development corridors, industries, and crowded settings, such as universities. Over the last decade, the country has expanded the number of universities to nearly 50. Unfortunately, effective TB prevention and care activities have not kept pace with this expansion, especially as the number of students continues to grow and many students room together.

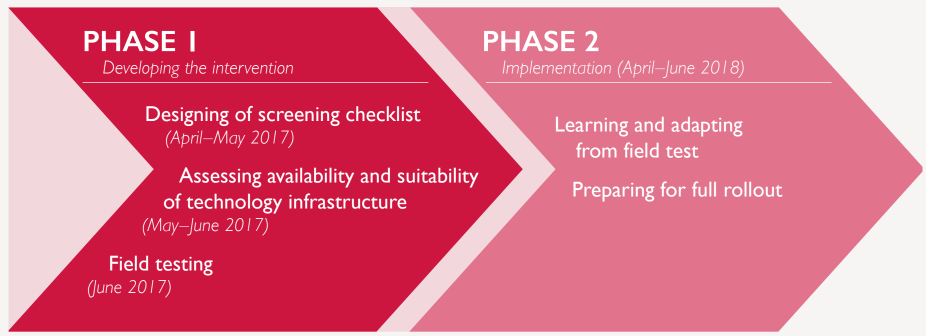
ETHIOPIA

PROBLEM STATEMENT AND TOOL DEVELOPMENT

Most tertiary-level students are free from TB. However, a few infected students can transmit the disease to many others. Because of the relatively low estimated incidence and high turnover of student populations, face-to-face mass screening may not be feasible.

The USAID-funded Challenge TB (CTB) Project piloted an online, self-administered screening as an initial screening tool for university students in Ethiopia. The objective was to assess the feasibility and yield of self-administered tools for identifying missing cases of TB among the student population. The tool was developed in partnership with the national TB program through a consultative process that involved students and university administration. The activities took place from April 2017 to June 2018 (figure 1).

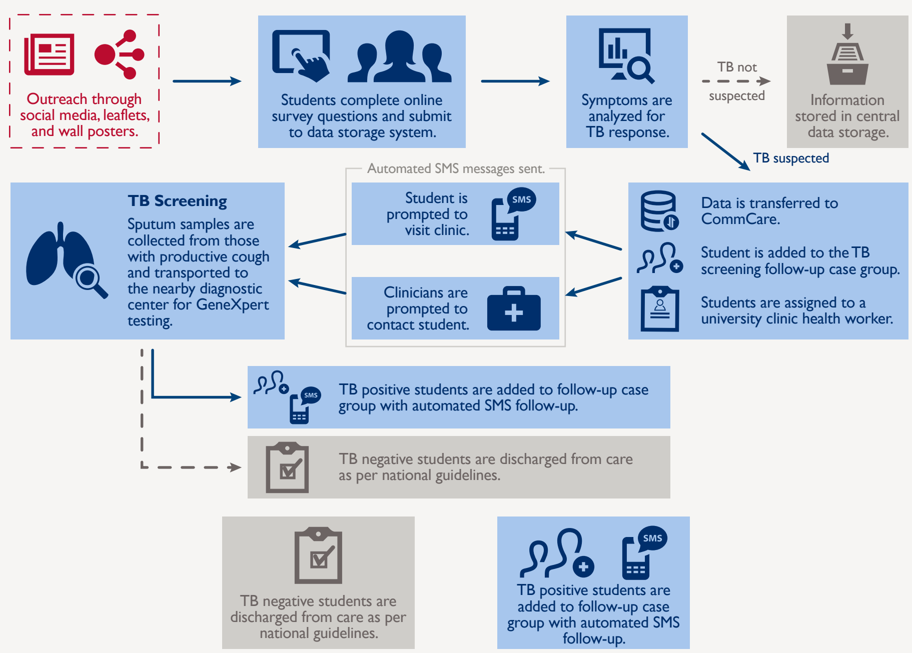
FIGURE 1. Implementation timeline



STRATEGIC RESPONSE

Figure 2 details the workflow for self-administered TB screening. Student representatives and clinic staff conducted general sensitization about the availability of free TB screening services through social media (including the university's official website), information leaflets, and wall posters in high-traffic locations across the university. Students were asked to complete the online screening questionnaire and submit it to the central database. The information was then analyzed, and those who fulfilled the criteria for presumptive TB (formerly called TB suspect) received an automatic message from the CommCare system. Students with presumptive TB were then added to a follow-up case group and assigned to a university clinic health worker. An automatic message was sent to the student clinic worker and to the student simultaneously, prompting the student to visit the clinic and alerting the clinician to expect a student with TB symptoms. If the student did not show up within a few days of the message, the clinic worker made a phone call and reminded the student to visit the clinic. Those who visited the clinic were further evaluated for clinical symptoms and signs.

FIGURE 2. Workflow for self-administered TB screening for university students



Sputum samples were collected from those with productive cough and transported to the nearby diagnostic center for GeneXpert testing. Those with positive sputum test results were linked to the student clinic for treatment and further follow-up. Those with negative results were further evaluated for alternative treatment and discharged from care in accordance with national guidelines.

PROJECT IMPLEMENTATION

In partnership with the national TB program, CTB followed a phased implementation approach as detailed in figure 2.

Phase I: Developing the Intervention

Designing the screening checklist

The content of the self-screening checklist was based on the nationally endorsed, symptom-based screening checklist. The draft checklist was further refined on the basis of feedback from experts until the content of the screening checklist was finalized.

Assessing availability and suitability of technology infrastructure

Before testing the tool, the project team conducted a baseline assessment for availability of internet connections; it was confirmed that all universities in Ethiopia had broadband WiFi connections.

Field testing

Following infrastructure assessment, the screening tool was field-tested among students at Arsi University, which involved consultative meetings with key stakeholders, including university officials, student representatives, IT officers, and student clinic staff. In a day-long consultative workshop, participants reviewed the screening tool and algorithm and suggested potential improvements. This was followed by a mock screening of 49 students who provided detailed feedback about the screening experience.

The following were key recommendations put forward by workshop participants:

- Set the online screening website as the default home page at the computer laboratory facility to encourage students to do the self-screening the moment they open the internet browser.
- Target free WiFi internet hotspots around dormitories, classrooms, cafeterias, and libraries and promote completing the self-administered screening on student laptops, tablets, smartphones, and the computer laboratory facility at the library.
- Use social media and networks to rollout and promote the online technology to all communities of students across the university.
- Adopt an automated SMS system to easily link students with the university clinic or health facility to obtain further treatment; the system should allow health care workers to track and monitor the progress of students identified as presumptive TB cases.

Overall, participants liked the online, self-administered TB screening test and felt that the questions were relevant and easy to understand and respond to. Based on the voluntary response, we found also that students had contact with TB patients either through their families or students they know who are currently taking TB treatment.

Phase II: Implementation

Learning and adapting from field test

Following the field-testing experience at Arsi University, the results were further discussed among the experts who developed the online screening tool. The following functionalities were added:

- An automated text messaging system was added using CommCare solutions
- Prescreening consultative meetings were included as a standard component of student mobilization
- Mini-media, flyers, and posters were used to promote screening
- The instruction section of the online questionnaire was shortened to make it more user friendly

Preparing for full rollout

After the tool was refined, full implementation was initiated at Kotebe Metropolitan University in the following order:

- An initial meeting was held with the president of the university to secure his agreement
- Student representatives and clinic staff were approached to get their buy-in
- A one-day orientation was organized for 42 student representatives and clinic staff who sensitized students to do the self-screening by posting information posters in strategic locations and displaying the screening website on social media

- CTB assigned a coordinator who reviewed the screening data on a daily basis and transferred those with presumptive TB to CommCare for automatic messaging to inform the student-clinic nurse coordinator
- The clinic nurse then contacted those presumptive TB cases individually and arranged for medical evaluation
- Those who were found to be symptomatic were advised to provide a sputum sample for testing
- Sputum samples were collected and transported to the ALERT* hospital laboratory for GeneXpert testing
- Symptomatic patients with negative Xpert results were further evaluated by a physician and received the necessary treatment as per the national guideline

RESULTS AND ACHIEVEMENTS

Out of the 2,100 students at the university, 1,417 completed the online screening checklist. Men accounted for 58% of those screened and 87% were age 19 or younger. According to the screening criteria, 120 students fulfilled the criteria for presumptive TB. Figure 3 summarizes the screening procedure and its yield. The proportion of self-reported presumptive TB was 8.5%, but upon further review of the clinical information by student clinic staff, 17.5% did not fulfill the criteria for presumptive TB. The screening effort did not identify any new patients but confirmed the presence of one student already on TB treatment.

FIGURE 3. Summary of screening procedure and yield

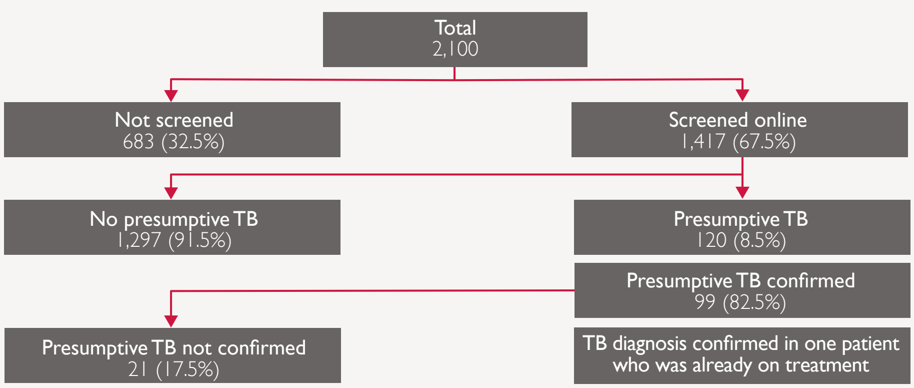


Table 1. Implementation challenges and solutions for online screening tool

CHALLENGES	ACTIONS TAKEN/PROPOSED
Inaccurate contact information; some students entered wrong phone numbers and other contact information.	Student representatives verified the information provided.
Some students did not own mobile phones.	This was a challenge for only a few students; a hard copy of the screening questionnaire was made available and the SMS message was relayed to them through student clinic staff.
Several episodes of social unrest during project implementation led to repeated internet down time.	Political transition has led to an improved situation, but this remains a concern for future implementation of this approach.
Students who lived off-campus or were on a field trip during the screening session were difficult to reach.	Make the online screening tool part of routine TB screening for all students.
Because student clinics were not part of the established public DOTS centers, it was unclear where specimens collected from symptomatic students should be referred.	The project team made prior arrangements with project-supported sample transport couriers and a GeneXpert site at the ALERT hospital. Specimens were collected at student clinics and transported in batches to avoid inconveniencing students.

CHALLENGES

Because this was the first experience in the country, several challenges were encountered during implementation (table 1).

* All Africa Leprosy, Tuberculosis, and Rehabilitation Training Centre in Addis Ababa

Acknowledgements

Thank you to all of the staff from Challenge TB Ethiopia for their support in the development of this technical highlight.

Authors

This publication was written by Degu Jerene Dare with contributions from Andualem Aklilu, Abebe Fikre, and Daniel Gemechu.

For more information, please contact lessons@msh.org.

LESSONS

This was the first digital health TB self-screening experience in Ethiopia. Through this approach, TB screening was conducted with limited resources in a short period of time. The following factors were critical to the success of the activity:

- Joint planning exercises and stakeholder engagement throughout the process
- Willingness of student teams and clinic staff to collaborate with the project team
- Availability of free WiFi at students' disposal
- Performance-based incentives (mini-media sets provided upon completion of the screening)
- Presence of a ready sample-transport system

WAY FORWARD

The use of online, self-administered digital technology can serve as an affordable case-finding approach among literate communities with good internet access and will be rolled out across the country. Further work is needed to better understand the cost and yield of the intervention when scaled up to more sites. An embedded operational research project is planned to more comprehensively document the experience. The utility of the tool among other high-risk groups (e.g., contacts of TB patients) should be explored.

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CHALLENGE TB:

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CHALLENGE TB

TECHNICAL BRIEF

Photo Credit: MSH, Moumina Dorgabekova

Community interventions to improve access to TB services in Afghanistan

PROJECT CONTEXT

The basic package of health services (BPHS) was instrumental in ensuring the decentralization of and access to health services in Afghanistan. The BPHS defines the scope of health services from the provincial and national levels to the local level, including to health posts at the community level.

In 2017, there were 14,130 health posts, each of which had two voluntary community health workers (CHWs) (one male and one female). Each CHW received monthly kits of essential medicines and other supplies. The health posts provide education; information on priority health problems such as identifying and referring patients to health centers, including those with presumptive TB cases; and other basic services. The National TB Program (NTP), with the support of USAID-funded TB projects, covered 6,500 (46%) health posts and 13,280 CHWs. However, Afghanistan has nearly 28,260 CHWs.

To achieve the NTP strategy for expansion of high quality DOTS (universal access), community-based DOTS (CB DOTS) was designed and piloted with technical and financial support from the USAID-funded Tuberculosis Control Assistance Program (TB CAP) in four provinces—Badakhshan, Baghlan, Jowzjan, and Herat—in 2009. This approach encompasses awareness raising activities, such as community events in schools, mosques, and bazaars; disseminating information, education, and communication (IEC) materials; displaying billboards and broadcasting TB messages through local media to increase demand; training CHWs and community health supervisors on presumptive TB case identification, referrals, and DOTS provision; and proper recording and reporting activities to document evidence. In addition, basic health centers were upgraded with diagnostic service provisions to ensure community access. Based on the success achieved in bringing TB services closer to the patients, TB CAP planned to scale up CB DOTS to nine additional provinces (Kabul, Bamyan, Takhar, Faryab, Kandahar, Ghazni, Paktika, Paktia, and Khost) where USAID supports delivery of the BPHS through the Partnership Contracts for Health (PCH). In 2015, CTB implemented the full CB DOTS package in 15 provinces. The Global Fund has implemented CB DOTS in the additional 19 provinces by training CHWs and community health supervisors. CB DOTS is also an effective referral system between clinics and community care programs to deliver home-based TB treatment in rural, hard-to-reach areas in a feasible and cost-effective way.

AFGHANISTAN

FEBRUARY 2018

PROBLEM STATEMENT

Afghanistan has made remarkable improvements in health indicators since 2005. However, a wide range of barriers prevent rural communities in Afghanistan from accessing TB and other health services. TB case detection remains low in hard-to-reach areas. Populations living in rural and hard-to-reach areas are at increased risk for TB due to the presence of large numbers of internally displaced people and poor hygiene, nutrition, and ventilation. Public health facilities are also less accessible and require extensive travel time. TB case identification and infection prevention remain challenges in these areas. A recent Ministry of Public Health (MOPH) study[1] showed that 67% of the population is within two hours walking distance to basic health services. Still, 34% of active TB cases are missing, with most of those in remote and hard-to-reach areas.

TB activities are not fully integrated into the BPHS. Low presumptive case identification in health facilities is due to weak coordination between communities and health facilities.

Low knowledge about TB at the community level is due to weak health education sessions in health facilities, no community events, a lack of a unique strategy for CB DOTS implementation countrywide and for community participation in case notification and TB care, and no community involvement in contact screening and isoniazid preventive therapy (IPT). The lack of a unique strategy for CB DOTS implementation has resulted in low case notification and poor treatment outcome in remote and hard-to-reach areas.

STRATEGIC APPROACH

CB DOTS is an effective and efficient approach to engage the community in awareness, detection, and treatment of TB and brings TB services to the community. CTB designed a full package of CB DOTS activities (figure 1) to support the MOPH/NTP to expand high-quality DOTS to the community to ensure universal access to quality TB services for improved TB treatment outcomes.

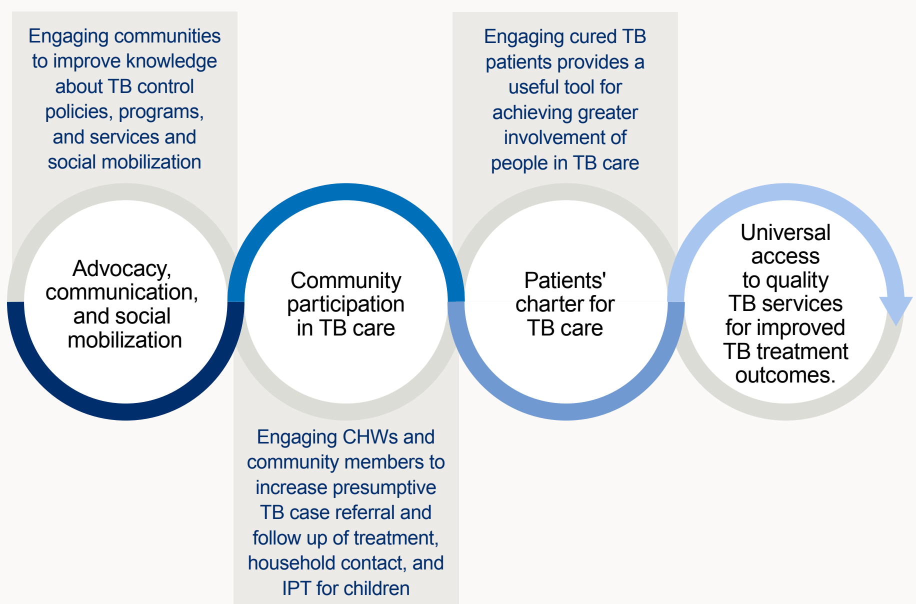
Improving the referral of presumptive TB cases to health facilities for diagnosis and continuous advocacy, communication, and social mobilization at the community level have resulted in increased TB case notification and improved cure rates and treatment success rates at the provincial level.

Interventions during this program were designed to engage BPHS implementers to realize the integration of the NTP in health service delivery with a focus on training CHWs. Trained CHWs are able to identify individuals with TB symptoms, refer individuals for TB testing and treatment, and supervise patients' medication intake.

Specifically, CTB supported the MOPH/NTP in the following technical areas:

- Universal access (DOTS expansion)
- Health system strengthening and political commitment
- Monitoring and evaluation
- TB infection control
- Behavior change communications

FIGURE 1. CB DOTS strategic approach for improved and universal access



PROJECT IMPLEMENTATION

The CB DOTS full package was subcontracted (fixed price contract) and implemented by eight local BPHS implementing nongovernmental organizations (NGOs) in 13 provinces and by direct implementation by the NTP/CTB in two provinces in October 2015. Output indicators were established for each province. CB DOTS technical officers were hired by local NGOs for project implementation and management and were responsible for the following activities:

- A one-day CB DOTS orientation training for the health facility in charges in each province
- A two-day CB DOTS orientation training for community health supervisors in each province
- A one-day CB DOTS training for CHWs by the trained health facility in charges and community health supervisors in each province
- Monthly TB task force meetings
- Monthly supportive supervision by technical officer from health facilities and health posts
- Incentivize CHWs to accompany bacteriological confirmed cases of TB to health facility and follow up on treatment
- In each province, 10 TB patient associations were established that comprised between 10 and 15 cured TB patients; quarterly TB review meetings were held at the health facility level
- Recognition of best performer from CHWs and other community members
- Advocacy, community, and social mobilization activities
- Regular monitoring of CB DOTS implementation by the central CTB team

ADVOCACY, COMMUNICATION, AND SOCIAL MOBILIZATION

In the context of wide-ranging partnerships for TB control, advocacy, communication, and social mobilization aims to influence policy change and sustain political and financial commitments; provide two-way communication between care providers and people with TB as well as to communities to improve knowledge of TB control policies, programs, and services; and mobilize and engage society, especially the poor, and all allies and partners in the campaign to Stop TB.[2]

In each province, 20 billboards with TB messages were installed in crowded areas. Each health facility implementing CB DOTS holds two quarterly community events for an average of 30 participants. The local radio station also airs daily TB messages at peak times.

COMMUNITY PARTICIPATION IN TB CARE

Community participation in TB care requires a working partnership between the health sector and the community—the local population, especially the poor, and TB patients, both current and cured. The experiences of TB patients help fellow patients cope with their illness and guide NTPs in delivering services that are responsive to patients' needs. Ensuring that patients and communities alike are informed about TB, enhancing general awareness about the disease, and sharing responsibility for TB care can lead to effective patient empowerment and community participation, increase the demand for health services, and bring care closer to the community.

Meeting with district governor and district headquarters staff

In each province, CHWs, family health action groups, and local elders are trained on identifying presumptive TB cases, how and where to refer them, and proper follow-up on their TB treatment. The community health supervisor and CB DOTS technical officer regularly carry out supportive supervision of CHWs and community groups and provide routine encouragement, motivation, and monitoring to ensure that CHWs are supported to perform in their catchment area. Transportation costs are covered for CHWs and community members who accompany bacteriological confirmed TB cases.

Responsibilities of trained CHWs and other community members under CB DOTS include:

- Identifying presumptive TB cases during household visits
- Referring presumptive TB cases to the nearest TB diagnostic center or health facility
- Collecting and transferring sputum of those unable to travel to a TB diagnostic center

- Supporting DOTS for TB patients at the community level
- Following up with TB patients for sputum examination during treatment (second, fifth, and last month of treatment)

CB DOTS trainings for male and female CHWs

- Screening the contacts of bacteriologically confirmed TB cases and supporting IPT for children under the age of five
- Providing TB health education to TB patients, their families, and the community
- Recording and maintaining proper documentation of their performance

PATIENTS' CHARTER FOR TB CARE

The purposes of the Patients' Charter for TB Care are to empower people with TB and communities and to make the patient-provider relationship mutually beneficial. The Charter sets out the ways in which patients, communities, health care providers, and governments can work as partners and enhance the effectiveness of health services in general and TB care in particular. It provides a useful tool for achieving greater involvement of people in TB care.

In addition, 10 TB patient associations have been established with the main goal of providing a coordinating body to unite cured TB patients across the district and ensure their participation in TB control in their communities. Association members work within the catchment area of a health facility to:

- Share their TB-related experience and information with others to create awareness of TB and work against TB stigma in the community
- Advocate for partnerships to improve TB patients' health, make treatment processes more efficient, and create awareness in the community on the proper care of TB patients
- Provide social, psychological, and legal support to TB patients
- Supervise patients who take TB medicines under home-based DOTS
- Assist and encourage TB patients to comply with and complete treatment

RESULTS AND ACHIEVEMENTS

Increased number of presumptive TB cases referred by CHW/community

Since the development and implementation of the CB DOTS full package, there has been an increase in the number of presumptive TB cases referred by CHWs or community members. The percentage and number of presumptive TB cases referred by CHWs or community members increased nearly three-fold between October 2015 and September 2017 (figure 2).

Increased identification of bacteriologically confirmed TB cases in remote and hard-to-reach areas

Among those presumptive TB cases referred by CHWs or community members, there has been an increase in the number of bacteriologically confirmed TB cases (figure 3). The training and mentorship provided to CHWs contributed to improved record keeping in the TB unit registers.

Better integration of BPHS and CB DOTS services

There has been a notable improvement in the performance of health facilities in 15 provinces in selected CB DOTS indicators. For example, the percentage of bacteriologically confirmed TB cases referred by CHWs or community members increased from 2% to 15% between October 2015 and September 2017.

Reduced loss to follow-up and improved treatment outcomes

The close treatment monitoring and support by the CHWs contributed to positive treatment outcomes that were registered by the NTP over the past 18 months (figure 4, table 1). Of the 2,803 pulmonary bacteriologically confirmed TB patients registered and treated between October 2015 and December 2016, 99% (2,787) were evaluated for treatment outcome. Among these, the treatment success rate was 96% (2,680) (table 1). The treatment success rate at the health facility level was 87%. The loss to follow-up was 2% and the failure rate was less than 1% compared to 3% and 1%, respectively, at the health facility level. The number of patients not evaluated for treatment outcomes also decreased.

Improved household investigation of index cases

A total of 13,798 TB index cases were registered for household contact, and 85,753 contacts were screened for TB. Among these, 15,569 presumptive TB cases were detected, 977 were diagnosed with TB, and 11,437 children under the age of five were put on IPT.

Universal access (DOTS expansion)

CTB expanded CB DOTS to 15 provinces around the country. Although the Global Fund is implementing CB DOTS in the remaining 19 provinces, activities are limited to training of community health supervisors and CHWs and incentives for the CHWs who identify TB sputum smear positive (SS+) patients. Engaging BPHS implementers and NGOs in CB DOTS implementation resulted in early case detection, diagnosis, and treatment of TB patients and increased access to TB services in hard-to-reach areas and among children under the age of five, women, and TB patients' contacts.

Political commitment and systems strengthening

CTB supported the NTP to advocate the End TB strategy[3] to leaders, politicians, community elites, and community members at all levels and fostered a link between health facilities and the community to secure their political commitment. Regular meetings were conducted with the MOPH/NTP, provincial health departments, and other stakeholders. Meetings were also held with local politicians and community leaders to advocate for the TB strategy in districts and villages. TB campaigns were conducted in villages and hard-to-reach areas, and World TB Day was celebrated at the community level. TB infection control at the community level was introduced and implemented through an integrated approach. A revised CHW manual and SOPs included TB infection control indicators, and CHWs were trained by BPHS implementers. Health post and community monitoring and evaluation systems were improved through regular joint visits and on-the-job training on recording and reporting systems.

A billboard with a TB message

Advocacy with community elders in Paktika Province

FIGURE 2. Contribution of CB-DOTS in TB indicators

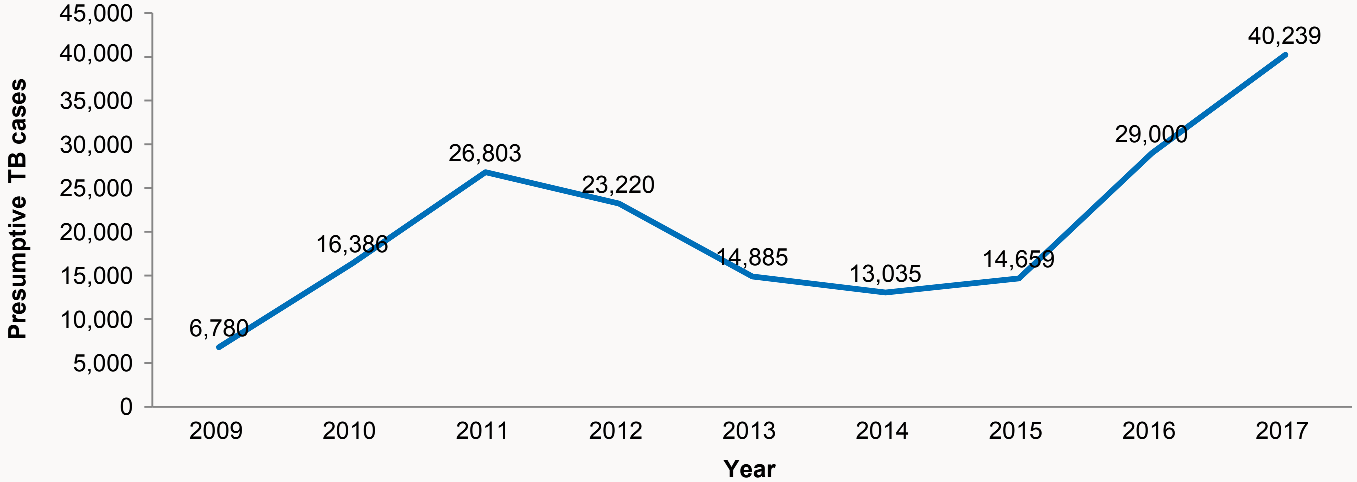


FIGURE 3. Number of bacteriologically confirmed TB patients referred by CHWs/community

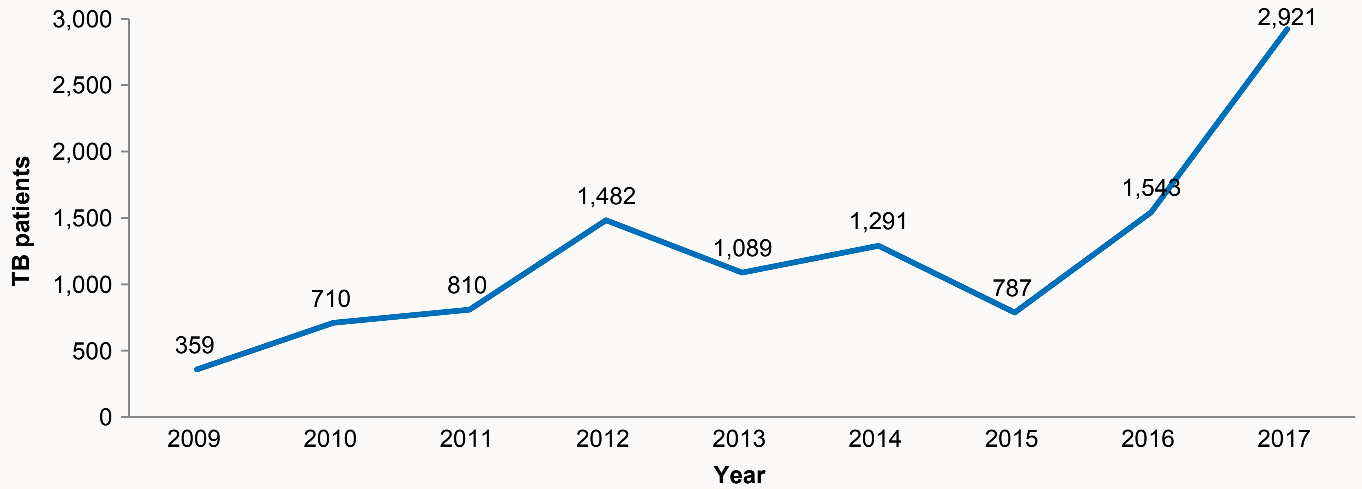


FIGURE 4. Number of TB patients under treatment by CHW/community

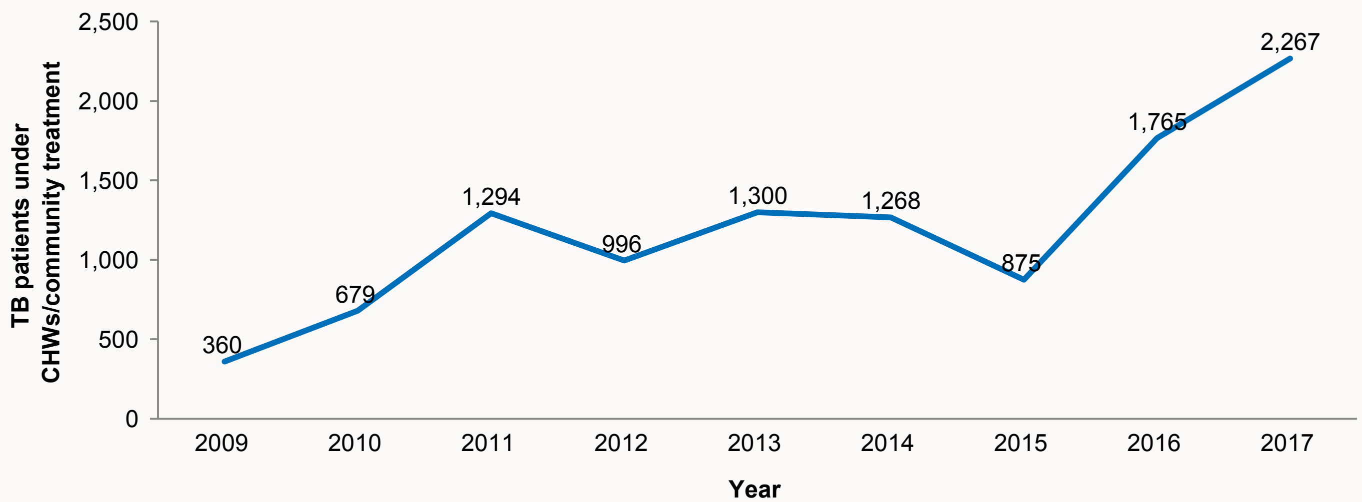


TABLE 1. Treatment Outcome of CB DOTS, January 2015 through June 2016

VARIANCE	TREATMENT SUCCESS RATE	DIED RATE	FAILURE RATE	LOST TO FOLLOW UP RATE	NOT EVALUATED RATE	P VALUE
National (29,657)	25,802 (87%)	890 (3%)	295 (1%)	900 (3%)	1,780 (6%)	> 0.001
15 CTB-supported Provinces (19,652)	17,490 (89%)	396 (2%)	182 (1%)	591 (3%)	993 (5%)	> 0.001
CB DOTS (2,787)	2,680 (96%)	54 (2%)	0 (0%)	51 (2%)	2 (0%)	

LESSONS LEARNED

The experience of CTB in Afghanistan has provided a number of important lessons learned that can be used to inform future work.

CB DOTS is an effective approach for the treatment and detection of missed cases of TB in rural and hard-to-reach areas. CB DOTS engages an entire community, including neighbors; friends; volunteers; CHWs; health personnel; local politicians and leaders; teachers; and nontraditional partners, such as local healers, schools, and university students, in TB advocacy and messaging. CB DOTS has gained increased recognition as an effective, efficient, and ethical means of delivering care to patients with TB.

CB DOTS orientation training for female CHWs

CTB is implementing the CB DOTS full package in 15 provinces with high detection of TB cases. In the remaining 19 provinces, where a limited package is being implemented, detection of TB cases has remained low.

CB DOTS can also help to address stigma with community groups through regular community events and dialogue. Using volunteers to link to the community is vital for getting information, services, and support to people with TB, who are often spread out in a region's least-accessible places. Community events with volunteers may even be more effective than TB patient associations in TB case detection. Like regular staff, volunteers need periodic, consistent training and supervision to ensure quality services. Also like paid employees, they need support and recognition of the value of their contribution to keep them motivated. Reaching neglected, shunned, isolated, poor, or otherwise marginalized populations often requires strong local partnerships with key stakeholders, such as officials, associations, volunteers, and religious and civic leaders. The NTP recommends that the full CB DOTS package should be expanded to all 34 provinces as a means to detect and treat TB cases. CB DOTS can both optimize adherence and provide a way to offer psychosocial support.

Capturing data directly from the community fills a critical data gap needed for data-informed planning and decision making. Relying on current NTP recording and reporting formats that focus on data collection by CHWs misses data that can be collected directly from the community, TB patient associations, and other community groups, particularly because 50% of the CHWs trained in 2004 are no longer active.

Recognition is a critical driver for performance and improvement. Best performer recognition at the provincial level has played an important role in increasing the TB case detection and in overall TB program improvement.

WAY FORWARD

CB DOTS implementation supported community members to be involved in developing local solutions to increase case notification and led to community ownership of TB control programs. CB DOTS has been implemented in more than 400 health facilities and 15 provinces, and the Afghan MOPH is working to integrate the CB DOTS strategy into its BPHS nationwide. To achieve this, the following recommendations should be considered:

- Involve mobile health teams working in *white areas*[4] in CB DOTS implementation
- Revise the terms of reference for health facility, health shura, and TB patient associations
- Activate a sputum sending system from basic health centers and health subcenters to diagnostic health facilities
- Strengthen supportive supervision mechanisms at the central and provincial levels
- Conduct annual refresher trainings for health facility in charges, community health supervisors, CHWs, nurses, and lab technicians
- The System Enhancement for Health Action in Transition, CTB, and Global Fund should support community events countrywide
- Institutionalize incentive schemes for CHWs
- Increase the number of billboards and installations at the provincial level

References

1 Strategic Plan for the Ministry of Public Health (2011-2015), Government of the Islamic Republic of Afghanistan. Link: www.moph.gov.af

2 The goal of the Stop TB strategy was to dramatically reduce the global burden of TB by 2015 in line with the Millennium Development Goals and the Stop TB Partnership targets. Link: www.who.int/tb/strategy/stop_tb_strategy/en

3 The WHO End TB Strategy aims to end the global TB epidemic, with targets to reduce TB deaths by 95% and to cut new cases by 90% between 2015 and 2035, and to ensure that no family is burdened with catastrophic expenses due to TB. Link: www.who.int/tb/post2015_strategy/en

4 According to then MOPH access to health services policy, *white areas* refer to areas where a pregnant woman is within two hours walking distance to the nearest health facility.

Acknowledgements

Thank you to all of the staff from Challenge TB Afghanistan for their support in the development of this technical brief.

Authors

This publication was written by Basir Ahmad, Ghulam Qader, and Mohammad Khkerah Rashidi.

For more information, please contact lessons@msh.org.

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CHALLENGE TB

TECHNICAL BRIEF

Targeted Tuberculosis Case Finding Interventions in Six Mining Shafts in Remote Districts of Oromia Region in Ethiopia

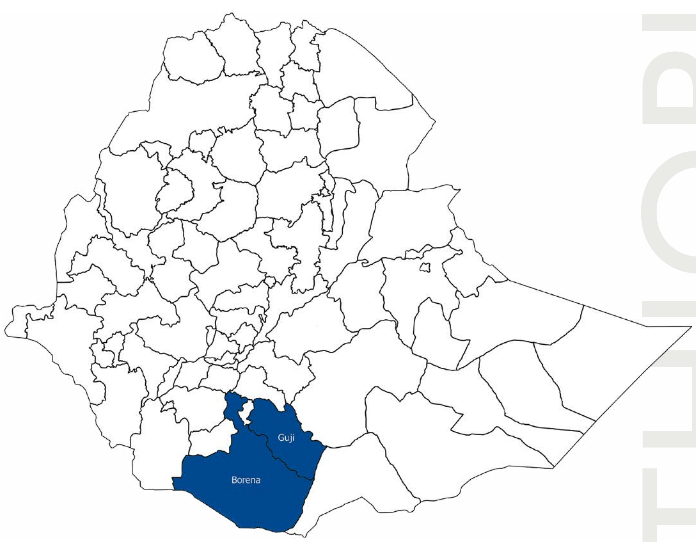
PROJECT CONTEXT

Ethiopia is the second-most populous country in sub-Saharan Africa, with 99.4 million inhabitants. Despite many years of efforts to prevent and control tuberculosis (TB), the World Health Organization's (WHO), 2016 Global TB Report lists Ethiopia as one of the 30 high-burden TB, TB/HIV, and multi-drug resistant TB (MDR-TB) countries, with an estimated incidence of 200,790 in 2014 (207 per 100,000 population). The WHO report also estimated 194,000 TB cases (200 per 100,000) and 32,010 deaths (33 per 100,000 population) from TB in Ethiopia in 2014. The rate of MDR-TB was estimated to be 1.6% of new TB cases and 11.8% of previously treated TB cases.

Infectious diseases including TB are among the top 10 causes of morbidity and mortality in Ethiopia. While the general epidemiologic features show declining trends in the incidence, prevalence, and TB-associated mortality rates, there are geographic hot spots and specific key population groups that are at particularly high risk of the disease. During the fifth year of the Help Ethiopia Address Low TB Performance (HEAL TB) project, USAID's most notable TB activity in the country, implemented by Management Sciences for Health (MSH), the Guji and Borena zones within the Oromia region were targeted for the highest case notification rates (Figure 1). Part of the high infection rate was because of two high-risk groups—internal migrant workers in informal mining shafts and the mobile pastoralist population in the area.

After the phase out of successful and comprehensive support by HEAL TB in April 2016, MSH's TB program support continued under USAID's Challenge TB project, which focuses on addressing key population groups. The interventions initiated in the informal mining areas continued to be priorities both for partners and the National TB Program (NTP).

Figure 1. Map of Ethiopia showing Guji and Borena Zones



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PROBLEM STATEMENT

The mining community has long been associated with a high prevalence of various lung diseases. Tuberculosis (TB) rates, in particular, are very high, partly as a result of the high prevalence of silicosis resulting from prolonged exposure to silica dust in mine shafts, especially in gold mines. High rates of HIV transmission and confined, humid, poorly ventilated working and living conditions further increase the risk of TB among mine workers.

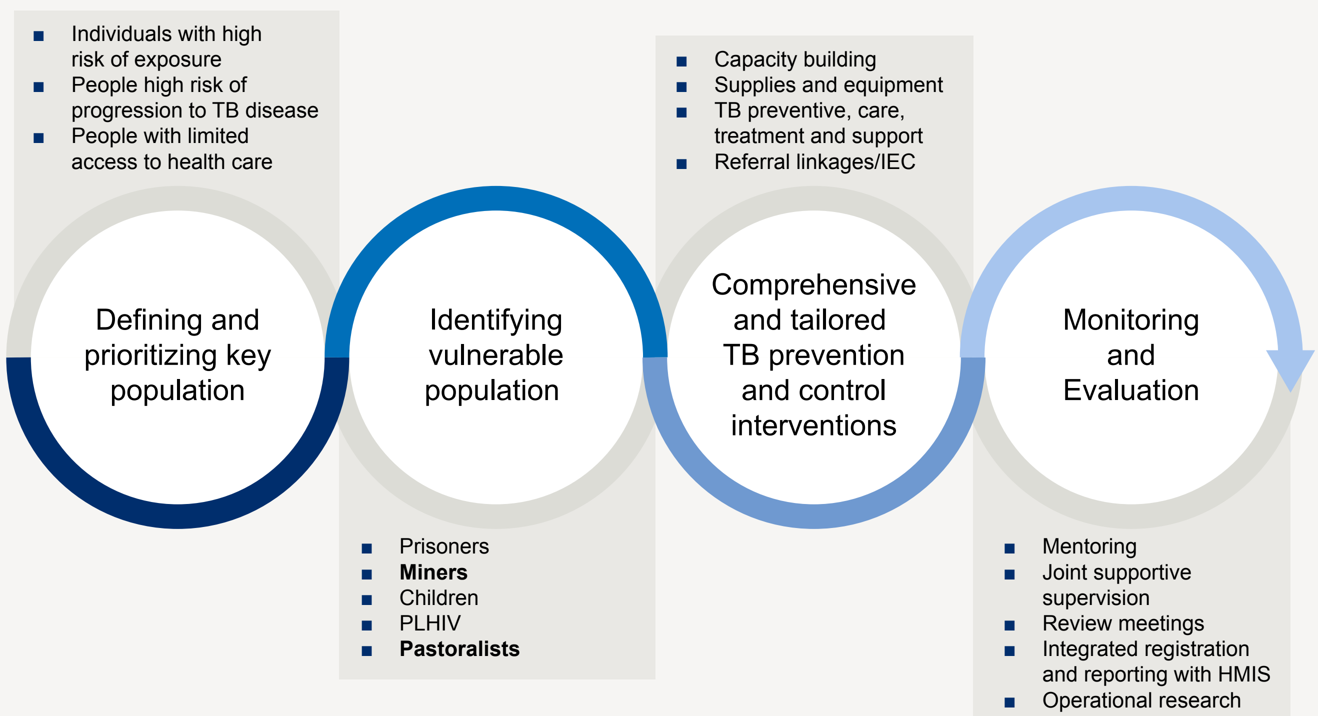
The targeted community lives in remote areas, has a pastoralist lifestyle with a traditional gold mining practice. This has resulted in sub-optimal TB case finding and treatment follow-up. This is compounded by a high number of mobile migrant mining workers. However, there have not been special interventions in this area to enhance TB case finding and the burden of TB in these communities is rarely estimated. Therefore, MSH took the initiative to determine the burden of TB in this community in order to tailor interventions.

PROJECT APPROACH

Both the HEAL TB and Challenge TB projects were designed to assist Ethiopia's NTP to increase case detection and improve treatment success rates to reach global targets through a comprehensive package of TB control interventions. The proposed interventions were aligned with the national TB control goals in the five-year health sector development plan-five (HSDP IV). Both projects aimed to provide quality DOTS treatment, strengthen referral linkages to the community, and assist the NTP and regions to improve, expand, and sustain TB services.

Through this assistance, the regions, zonal health departments, and woreda (district), primary health care units (PHCUs) improved TB and MDR-TB program management, provided tighter TB/HIV collaboration, and strengthened the health system (Figure 2).

Figure 2. Tuberculosis prevention and control framework among vulnerable population



Decentralizing TB care to the community level combined with strengthening the health care systems were the main strategies of the projects. The following were key areas of intervention by the projects:

- TB DOTS
- Pediatric TB
- Capacity strengthening of TB laboratory
- TB/HIV
- Supply management of TB drugs
- MDR-TB services expansion and improvement in quality
- Capacity building in TB program management and technical skills
- Innovations and operational researches

The focus of the Challenge TB project is rendering tailored interventions, and expanding and scaling up the experience following HEAL TB, while focusing on key populations and other high risk and congregate settings related to TB and TB/HIV such as children, HIV infected people, mining areas, and prisons. One of those tailored interventions, which started during HEAL TB and scaled up during Challenge TB, is TB in the mining areas in the Oromia region of the Guji zone.

PROJECT IMPLEMENTATION

Together with Borena and Guji zonal health department and the Oromia Regional Health Bureau (RHB), MSH, through the HEAL TB project (December 2015-June 2016) and now through Challenge TB (December 2016-present), identified six districts within the mining areas. Six woreda coordinators were trained and deployed to coordinate case finding and treatment observation. These are health care workers with TB program experience in the Borena and Guji zones in the mining areas. A GeneXpert machine was also provided to one health center for use as a primary diagnostic tool for miners. Motorbikes were bought for sample transportation for all mining woredas in the zones. The project also provided technical support on the mentoring, supportive supervision and capacity building of health care workers engaged in TB case evaluation and diagnosis in the health facilities in the mining districts.

The project identified 55 active volunteers and 81 women developmental armies to support the health education and social mobilization with the coordinators. During the nine months of the intervention, health education and sensitization on TB and TB/HIV was provided to 22,525 miners, 23 catchment area meetings were conducted, and an estimated 42,678 workers were engaged in informal gold mining activities. In addition, 23 PHCU catchment area meetings were conducted.

The recruited coordinators provided health education for the mining workers at the mining shafts and screened the workers for TB using the symptomatic TB screening recommended by WHO.

The presence of any one of the following signs or symptoms in an individual is diagnosed as a presumptive TB case:

- Two or more weeks of cough;
- Fever persisting for more than two weeks;
- Night sweating for at least two weeks; and
- Weight loss.

Among HIV infected individuals, the presence of the aforementioned symptoms of any duration is taken as a presumptive TB case.

The coordinators referred presumptive TB cases to a nearby health center for TB evaluation and AFB or GeneXpert. They also served as TB treatment supporters for those who started anti-TB medications. In addition, the coordinators carried out contact investigation for individuals who had come into close contact with the presumptive cases.

RESULTS AND ACHIEVEMENTS

The coordinators registered all of the miners they approached and identified as presumptive TB cases and referred them to health facilities for evaluation. The presumptive TB cases were evaluated and identified; those confirmed with TB diagnosis were also traced and registered by the coordinators who provide a monthly report to the project and district offices.

Out of 42,678 mining workers in the six districts of Guji and Borena, a total of 11,842 (27.7%) miners were approached and screened for TB symptoms. Of those, 1,288 (10.9%) were found to be presumptive TB cases within a nine-month period. Of those presumptive TB cases, GeneXpert or AFB tests evaluated 93% (1,199) of them for TB. Of those evaluated by GeneXpert or AFB tests, 208 TB cases (17.3%) were diagnosed with active TB cases. About 66% (137) of those active TB cases were bacteriologically confirmed and the rest were clinically diagnosed. Twelve of the 208 cases (5.8%) were found to be rifampicin resistance TB (Table 1). Overall, the TB prevalence was 1,756 per 100,000 screened mining workers. All of the diagnosed TB patients were tested for HIV and six (2.9%) were HIV positive.

The identified presumptive TB and active TB cases as well as HIV positive miners could have been missed TB and HIV cases contributing for the ongoing transmission of both epidemics among the pastoralist community. Hence, the finding indicated that the tailored intervention is paramount to identify a significant number of TB cases within the mining population.

Table 1. TB cases identified by screening mining workers in Guji and Borena zones, (December 2015-Feberaury 2017)

CHARACTERISTICS	FREQUENCY	PERCENTAGE
Estimated number of mining workers in the area	42,678	
Number of workers screened for TB	11,842	27.7
Mining workers with presumptive TB	1288	10.9
Mining workers tested for TB	1199	93.1
Total TB cases diagnosed	**208**	**17.3**
– Number of bacteriologically confirmed TB cases diagnosed	137	65.9.0
– Number PTB smear negative diagnosed	40	19.2
– EPTB diagnosed	19	9.1
– Rifampicin-resistant TB	12	5.8

CHALLENGES

Thousands of workers from all over the country travel to these traditional gold-mining areas. There was no proper shelter, so workers lived in very crowded, temporary shelters. Sex workers also travel to these areas because there is a high cash flow, which poses a challenge for TB control because the sex workers move from one mining field to another. Seasonally, the miners go back to their birthplace and this mobility makes it difficult for TB treatment follow-up.

A circular migration between communities and mine locations can increase the risk of TB transmission, treatment interruption, and treatment failure. The crowded living and working environments, possible high HIV transmission, and mobile population require a special strategy, and a tailored, high impact intervention.

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Authors

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For more information, please contact lessons@msh.org.

WAY FORWARD

The prevalence of 1,756 TB cases per 100,000 screened miners is seven times the WHO threshold for a health emergency, and is also nearly nine times the incidence rate in the general population of Ethiopia. These could have been a missed TB cases in the mining community, and continue to fuel the transmission of TB in the general population. The evidence from this targeted implementation of active case finding strategies should be used to guide national program priorities to enhance case finding. A multi-sectoral approach is needed to address TB in such settings. The targeted intervention was critical in reaching and diagnosing the mining workers with TB cases and should be scaled up in other mining areas in Ethiopia.

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CHALLENGE TB

TECHNICAL BRIEF

Integrating Service Delivery for TB and Diabetes Mellitus – An Innovative and Scalable Approach in Ethiopia

PROJECT CONTEXT

The burden of non-communicable diseases (NCDs) in low-income countries is expected to rise from 47% in 1990 to 69% in 2030, and diabetes mellitus (DM) accounts for a significant proportion of this increase.[1] Recent global estimates show that close to 300 million people were living with DM in 2010, of which, about 7 million developed the disease during that year alone. The projected number of DM cases for 2030 is more than 400 million with about 30% of the prevalent cases expected to occur in low and middle income countries (LMIC). Simultaneously, both tuberculosis (TB) and human immunodeficiency virus (HIV) epidemics continue to be major public health problems in those same settings. As DM and TB share similar risk factors, it is believed that the slightest interaction between the two diseases could result in devastating consequences. Several studies revealed higher rates of TB among patients with DM compared to those without. Moreover, patients with DM present with atypical clinical features of TB, which poses diagnostic challenges for clinicians. Also, TB treatment failure and relapse appear to be higher in diabetic patients. Similarly, there is some evidence that people living with HIV (PLHIV) are at increased risk of various NCDs including DM.

Ethiopia, with a population of about 90 million, is on the World Health Organization (WHO) list of high TB burden countries. According to estimates by the International Diabetes Federation (IDF) in 2013, about 1.8 million adult people between the ages of 20 to 79 live with diabetes in Ethiopia, an estimated prevalence of 4.36%.

As part of the effort to address these challenges, the WHO, in collaboration with the International Union against Tuberculosis and Lung Disease (IUATLD) has developed a global framework for collaborative activities against the two diseases. This guidance represents a major step in fostering collaboration between disease control programs for NCDs and communicable diseases (CDs). However, there is limited progress with the translation of the global guidance into action. Part of the reason for the delay in implementation of the global recommendations is lack of experience in delivering integrated services. Our objective was to demonstrate the feasibility of providing integrated clinical care for DM, TB, and HIV in general public hospitals in Ethiopia.

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STRATEGIC APPROACH

This project was implemented as part of Management Sciences for Health's (MSH's) Innovation Challenge Fund (INCH)[2] initiative designed to encourage innovative interventions across MSH supported projects. MSH used the ExpandNet Framework[3] to scale up the innovation.

To ensure the creation of the right environment for scale up of the innovation, the team worked with the Ministry of Health and local health authorities to establish a scale up working group. A key role of the working group was to ensure that integrated services were being delivered at the sites through regular review and monitoring of site activities (Figure 1). At the same time, the team supported the expansion of the innovation to more sites (horizontal expansion), and added other components (e.g., screening for other NCDs such as hypertension).

The working group made sure that integrated services were happening at the sites through regular review and monitoring of site level activities.

Summary attributes of a successful innovative project according to the ExpandNet framework. According to this framework, a successful innovative project should exhibit the following attributes: (a) Credible - it will be accompanied by evidence that the integrated approach improved the intended outcome; (b) Observable - potential users can see the result; (c) Relevant - the innovation sharply addresses the felt problem; (d) Has relative advantage over alternative approaches; (e) Easy to understand; (f) Compatible with local policy context; and (g) Testable in other settings before further scale up.

FIGURE 1. Integrated service delivery for TB and Diabetes Mellitus

Project

- Provided money through MSH/INCH fund
- Supplied glucometer, lancet and alcohol swabs for diabetes clinics
- Distributed existing guidelines and SOPs for TB/HIV integration
- Developed on-site orientation materials for TB/DM integration

Regional health offices/hospitals

- Assigned focal persons at regional and hospital levels
- Endorsed the activity as part of the routine work in the selected hospitals

Project staff

- Sensitized hospital administration about the need for integrated services
- Trained health workers on the integrated screening approach
- Conducted regular supportive supervision and mentoring
- Collected and analyzed data

Trained health workers

- Screened diabetic patients for TB
- Screened HIV patients for DM and TB
- Screened TB patients for DM and HIV

Regional focal persons

- Participated in joint consultative meetings
- Monitored project progress

Scale up of integrated service delivery for TB and Diabetes Mellitus

PROJECT IMPLEMENTATION

We implemented the pilot phase of this project from February - June 2015. Based on the actual caseload and need for integrated services, we selected four hospitals – two from the Amhara region (Debreberhan and Debre Tabor) and two from the Oromia (Bishoftu and Shashemene) region. At each hospital, we provided on-site orientation on how to identify and manage/refer clients for the three diseases to one focal person who was responsible for site level coordination, and three clinicians working in TB, antiretroviral therapy (ART), and diabetes clinics in the two regions. Clinicians in ART clinics screened patients both for DM and TB. Those in TB clinics screened patients for HIV and TB, and patients attending diabetes clinics were screened for TB. We provided minor supplies, mentoring support and monitored the progress during monthly visits to the hospitals using standardized checklists.

For TB screening in DM and HIV clinics, we adapted and used the screening checklist for PLHIV. Symptomatic patients were offered further diagnostic tests based on the symptoms and availability. Sputum microscopy was the preferred method of diagnosis for patients with productive cough. Chest radiography was available for patients upon clinician's recommendation.

We used two symptom-based screening tools for initial screening followed by a blood test. The first step involved using risk scoring system adapted from a published literature (Table 1). Age, family history, hypertension, waist circumference, alcohol intake, and smoking were used to build a scoring system. Scores for the individual variable ranged from 0-3 with the cut-off point of the total score being 5. Patients with a score of 5 or more were considered "high risk" groups.[4] Regardless of the risk scoring value, the clinic nurse administered a checklist of clinical symptoms developed by our team, and categorized the patients as being "symptomatic" or "asymptomatic." The clinic staff also administered either a Fasting Plasma Glucose (FPG) or Random Plasma Glucose (RPG) test using a glucometer. Patients in DM clinics received FPG tests because they take their anti-TB medications before eating breakfast, while those in ART clinics received RPG tests. An FPG of greater than or equal to 126 mg/l or RPG of 200 mg/dl was considered suggestive of DM.

TABLE 1. Diabetes Risk Scoring System

DIABETES RISK SCORING		
Family history of diabetes (any of parents or siblings)		**Score**
No	1 [ ]	0
Yes	2 [ ]	1
Age group		
<35 yr	1 [ ]	0
35-44 yr	2 [ ]	2
>=45 yr	3 [ ]	3
Hypertension (currently on medication or bp>=140/90)		
No	1 [ ]	0
Yes	2 [ ]	1
Waist circumference in CM (taken below ribs, usually at umblicus)		
(Men/women)		
<84/77	1 [ ]	0
85-89.9/77-83.9	2 [ ]	2
>=90/84	3 [ ]	3
Current smoking		
Never or ex-smoker	1 [ ]	0
Current smoker	2 [ ]	1
Alcohol on a daily basis (irrespective of the type)		
Never or <1 drink per day	1 [ ]	0
1-4.9 drinks per day	2 [ ]	1
>=5 drinks per day	3 [ ]	2
Total score ==_____________ [add values for 19 thru 24]		
>=5 points	1 [ ]	
<5 points	2 [ ]	

RESULTS AND ACHIEVEMENTS

A total of 3,439 patients were screened and treated, including 888 from DM clinics, 439 patients with TB, and 2,112 patients in HIV clinics (Table 2). The results show that the yield of TB among patients with DM was about three times the estimated prevalence in the general population of Ethiopia, but over 83% of these were already detected and managed by the existing health system. In contrast, about a third of TB patients had abnormal blood sugar, which is suggestive of DM, but the existing health system detected only 3.5% of these cases.

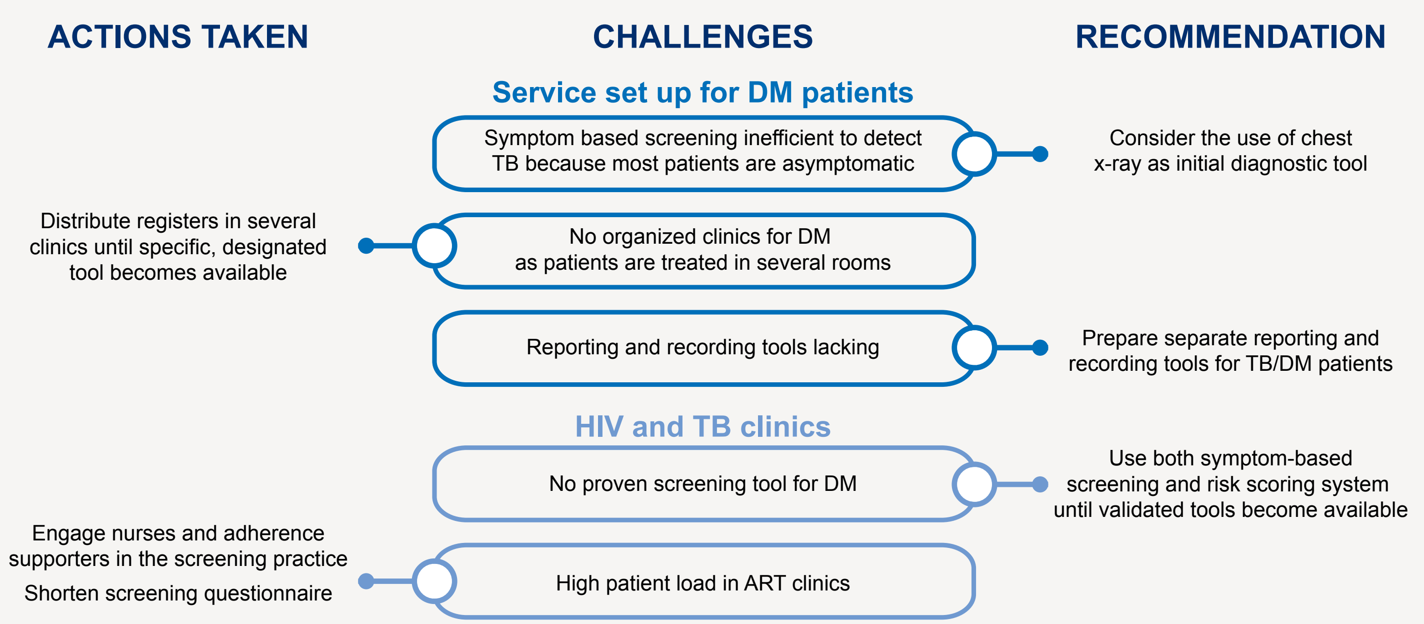
TABLE 2. Summary Information about the Project Beneficiaries

DM clinic	
Total screened for TB	888
Number (%) diagnosed with active TB	6 (0.7)
TB clinic	
Total screened for DM	439
Number (%) with FPG ≥126 mg/dl	141 (32.4)
Co-infected with HIV	49 (12.5)[a]
HIV clinic	
Total screened for DM	2112
Number (%) with RPG ≥200mg/dl	31 (1.5)[b]
Number (%) co-infected with TB	316 (15.8)[c]

[a] Out of 392 who received HIV test; [b] Data were missing for 37; [c] Data were missing for 114

Given the achievements of this work, a stakeholder consultative meeting was held in May 2015 in Adama to review the project's implementation progress. Participants included clinicians from participating hospitals, representatives of regional health bureaus and MSH technical teams. A strong sense of local ownership, provision of minor supplies (glucometer, lancet, anti-septic swabs, etc.), regular mentoring and supervision, and clinicians' interest in gaining new knowledge and experience were key factors contributing to successful implementation of the innovation. However, several challenges were identified with suggested recommendations or corrective actions were taken (Table 3).

FIGURE 2. Actions and recommendations to further integration of TB-DM services



Acknowledgements

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Authors

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WAY FORWARD

Lessons from this project have been shared at several other national and international conferences including a roundtable discussion at the 46th Union World Conference on Lung Health in Cape Town, South Africa, in 2016, an MSH-organized symposium at the same conference a year later in Liverpool, England, and in 2017 at the annual conference of the Ethiopian Medical Association under the theme "Tuberculosis and Diabetes: A Looming Co-Epidemic and Lessons Learned from TB/HIV Collaboration in Ethiopia." Additional lessons on the nationwide scale up strategies will be shared in 2017 at the 48th Union World Conference on Lung Health in Guadalajara, Mexico.[5]

Through the catalytic role that MSH plays both in Ethiopia and globally, TB/DM integration is a top priority for the national TB program in Ethiopia. The activities initiated under the MSH/INCH are now fully integrated within the activities of the national TB program and adequate budget is allocated through the USAID/Challenge TB project. Clinician orientation materials have been more standardized and clinicians from more than 42 hospitals have been trained. More results are expected in the coming years.

Integrated delivery of TB/HIV and DM services is feasible in settings with limited resources. The approach should be scaled up in settings with dual or triple burden of these diseases. Lessons from the scaled up implementation of the approach should be shared widely.

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2 The MSH Innovation Challenge (INCH) Fund seeks to identify promising innovations in field projects that have the potential to improve health outcomes, and help replicate and scale tools, models and approaches that have proven successful.

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CHALLENGE TB

TECHNICAL BRIEF

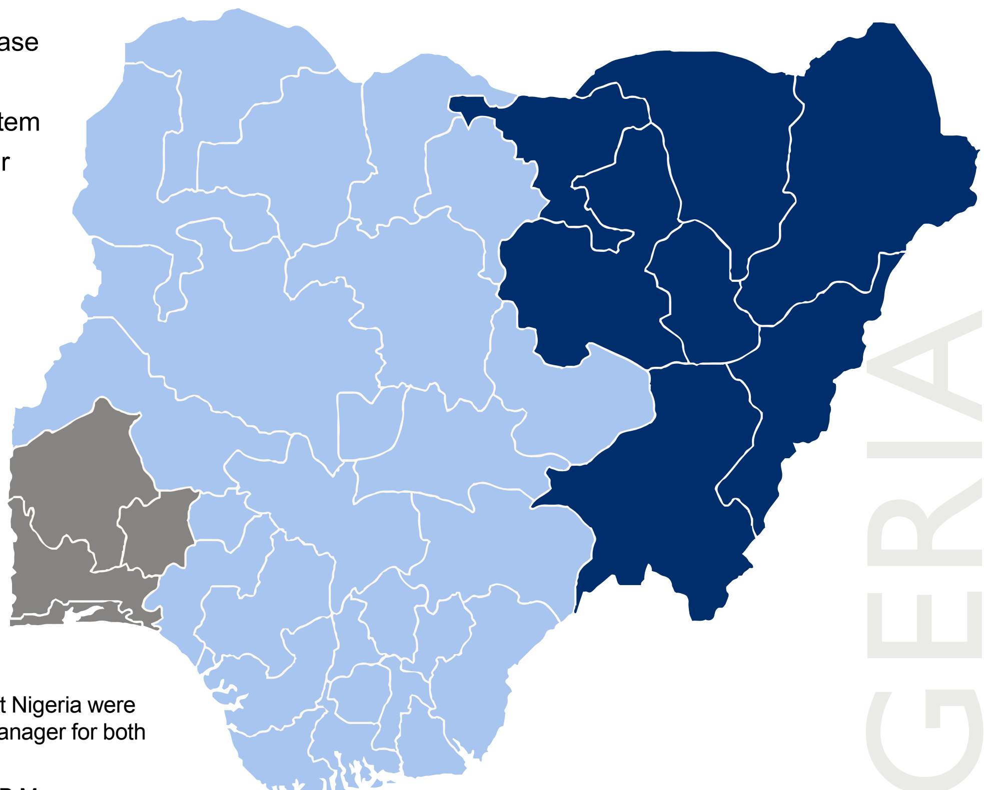
Overcoming the Challenges of Rolling Out e-TB Manager in Nigeria

Training on e-TB Manager for tuberculosis supervisors in Kano, North West, Nigeria

PROJECT CONTEXT

In 2011, an electronic tuberculosis (TB) management system, e-TB Manager, was introduced in Nigeria for drug-resistant TB case management. The e-TB Manager is a web-based, case-by-case real time reporting system for TB patient data. It was initially adopted for recording and reporting drug-resistant TB (DR-TB) data but was harmonized in 2015 to support both drug-resistant and drug-susceptible tuberculosis (DS-TB).[2,3] The system is accessible to users through a password-protected website. Currently, e-TB Manager cuts across more than 300 high-burden TB DOTS facilities, 16 DR-TB treatment centers, two national and six zonal reference laboratories, and 37 state TB program offices.

FIGURE 1. Implementation of harmonized e-TB manager version in Nigeria



- (4 states- Lagos, Oyo, Ondo & Ogun-, South West Nigeria were pilot states for the harmonized version for e-TB Manager for both DS & DR-TB.
- (26 states- scale-up states) as of today on the e-TB Manager
- (7 states) are the pending states, where we have not rolled out the e-TB manager

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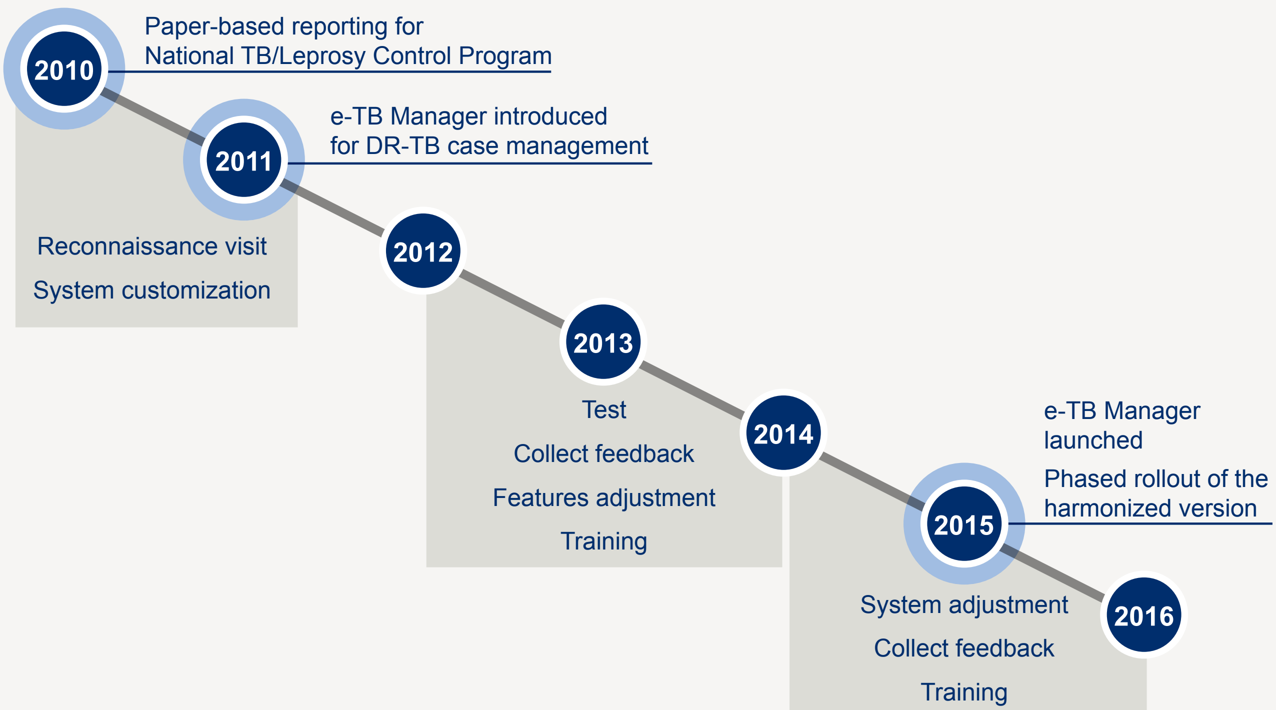
Initially, e-TB Manager was used only for DR-TB patients at one treatment center at the University of Ibadan Teaching Hospital in South West Nigeria, but it has gradually been expanded to other treatment centers as they have opened. By 2016, e-TB Manager was in use in all 16 treatment centers where DR-TB patients are managed. Encouraged by the successful implementation for DR-TB, the process to harmonize and implement the system for both DS-TB and DR-TB patients was launched in 2015 by the Federal Government of Nigeria.[2,4]

FIGURE 2. History of e-TB Manager development in Nigeria



STRATEGIC RESPONSE

In 2011, the Nigerian National TB Control Program (NTP) sought to migrate from paper-based to electronic reporting. Prior to 2011, e-TB Manager was at various stages of implementation in Ukraine and the Philippines, and evidence suggested the significant impact the tool could have when fully operational. This body of evidence and the push by the World Health Organization for countries to start exploring the potential of information and communication technologies necessitated an in-country drive for an electronic tool that could be adapted for digital reporting for TB care and control.[1,4] TBCARE 1 leveraged MSH's capability in software development to offer e-TB Manager, a customized, comprehensive, web-based electronic platform for TB.

e-TB Manager includes five operating units called modules that support the notification of DS-TB and DR-TB presumptive clients and cases; provides first- and second-line TB medicine management; and has a new laboratory module designed to help reference laboratory staff reported completed tests for TB patients across the country promptly.[2]

PROJECT IMPLEMENTATION

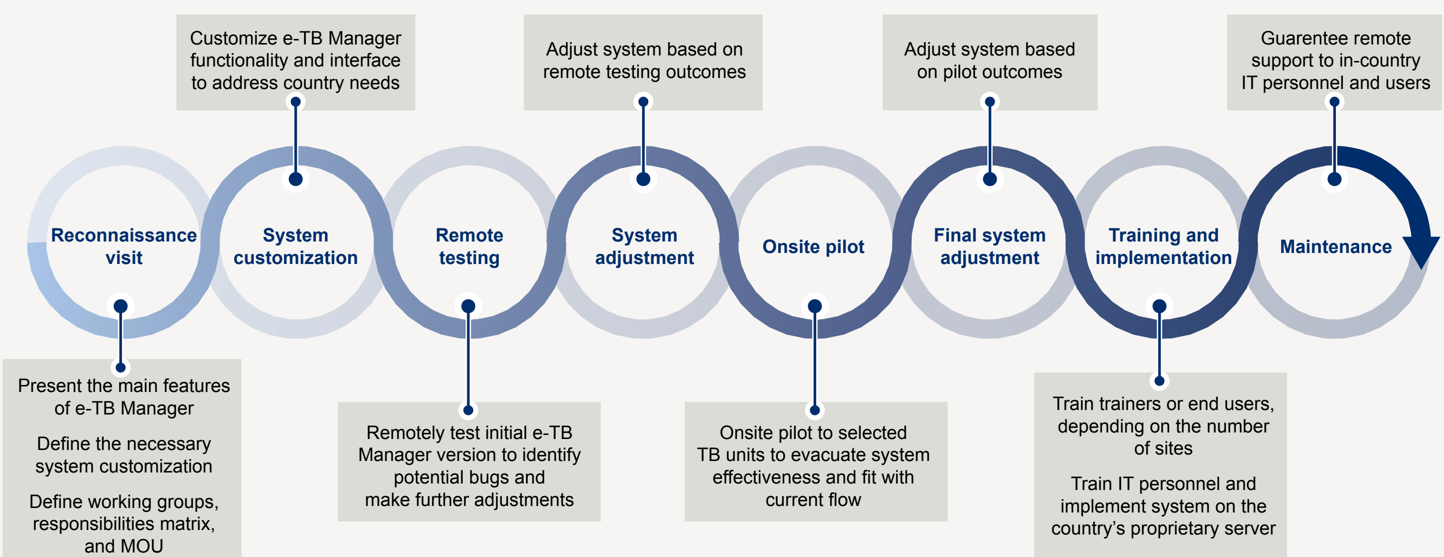
e-TB Manager now has eight implementation models that have been adopted by in-country stakeholders. It is important to note that a key component of a successful implementation is to involve the country team at each step of the process to guarantee country buy-in and ownership. Although challenges were encountered at each stage of the implementation, the MSH team ensured that these challenges were addressed before proceeding to the next step. The following were necessary steps in the implementation of the electronic platform (Figure 3).

The HMH, Dr. Khaliru Al-Hassan, launched e-TB Manager in March 2015.

Reconnaissance visit: This visit was conducted by MSH's e-TB Manager experts to study the country health system and the operational standards for its TB and DR-TB structure, define working groups, create a responsibility matrix, and sign a memorandum of understanding with the overall aim of adapting the generic version of e-TB Manager to country-specific needs.

A major challenge was getting the country to agree on the initial level of customization, what approach should be used in the rollout process, and whether the adoption should be for both DS-TB and DR-TB. MSH supported the country to methodically work through each of these challenges. It was agreed that the initial adoption of the electronic tool should support DR-TB case management only, with a plan to expand the system if the DR-TB implementation was successful.

FIGURE 3. The e-TB Manager Implementation Model



System customization: The generic e-TB Manager was customized to address in-country paper-based reporting needs. In-country stakeholders had multiple requests for customization and refined old requests, which necessitated discussion and delayed the release of the prototypes for the final versions. To address this challenge, a deadline was set after which no new customization or refining of requests would be accepted.

Remote testing: After the deadline for request submissions had passed, e-TB Manager was remotely tested to identify bugs and make any necessary adjustments. Remote testing was initially conducted outside of Nigeria, and as a result, necessary feedback was not provided by target users of the platform and prototype versions did not meet the specifications. The project engaged the services of an in-country TB advisor who worked directly with the e-TB Manager developer to ensure that the agreed-upon specifications were achieved internally before presentation to outside stakeholders.

System adjustment: Skype meetings were regularly organized by the in-country e-TB Manager system implementation team, which comprised MSH-TBCARE and MSH Challenge TB project staff, a TB advisor and trainer, an IT expert, and the e-TB Manager developer, and communicated country-level feedback during testing and proposed adjustments that would help improve the final version.

Dr. Opeyemi facilitating one of the e-TB Manager training sessions.

Onsite pilots: A prototype, country-specific version of e-TB Manager was then deployed to be piloted at one DR-TB treatment center during DR-TB implementation and in four states during the pilot of the harmonized version for DS-TB and DR-TB before scaling-up across the country. Experiences from field testing by in-country end users of the system were gathered during the pilot and helped to inform further customization to improve the system. The aim of the pilot test was to evaluate system effectiveness and fitness within the current workflow of the NTP and to show whether the electronic tool would be acceptable to end users.

Final system adjustment: The system was adjusted based on pilot outcomes and configured to enable future remodeling to improve outcomes and integration into Nigeria's flow of TB data recording and reporting.

Implementation and training: National-level officers of the NTP and other supporting TB implementing partners, including DOTS providers, medical officers, pharmacists, laboratory officers, and program staff, were trained as master trainers on the different operating units of the system. They would then be responsible for conducting country-level training, supportive supervision, and on-the-job mentoring for users of the five operating modules of the system.

Maintenance: During the initial implementation process, the servers were hosted in the MSH Arlington Office and were later move to the cloud, but in-country stakeholders felt that country-level information should be housed within Nigeria. Consequently, during the implementation of the harmonized version, the e-TB Manager server was moved in country. Continued regular support is being provided to in-country IT personnel and the system in general.

RESULTS AND ACHIEVEMENTS

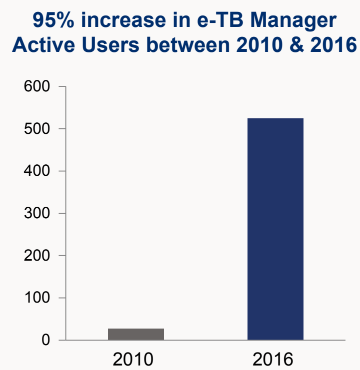
The e-TB Manager was used for DR-TB case management from 2010. The number of active DR-TB cases being managed in the system increased from 23 in 2010[i] to 1,037 in 2016.

Following the launch of the harmonized version of the e-TB Manager in December 2015 by the Federal Government of Nigeria and the subsequent phased roll-out of the platform across the 37 states in Nigeria, the number of presumptives TB patients entered into the e-TB Manager platform increased from 21,104 in 2016 to 123,137 in July,2017; the number of TB and DR-TB cases notified increased from 7,671 to 31,638 and 1,084 to 1017 from 2016 to July 2017 respectively. See figures 4-6.

Other achievements:

- Training of and provision of tablets and desktops for 784 health care workers across 30 states in Nigeria
- Creation of a virtual dashboard that showcases NTBLCP's TB reportable indicators
- Integration of the dashboard to the NTBLCP's website to help increase visibility of tracked national level indicators
- Source of data for WHO annual DR-TB indicators for Nigeria
- Local hosting of e-TB Manager server in-country for country ownership and sustainability
- Adoption of the e-TB Manager as the sole electronic reporting tool for patients-level TB management by the NTP in Nigeria

FIGURE 4. Progress with patients-level electronic reporting in Nigeria



149,922

Total # of persons (presumptive/confirmed TB cases) entered into the system (DS-TB & DR-TB presumptive and cases to the time of reporting

28,291

Total # of DS-TB & DR-TB cases entered and management through the system

121,631

Total # of presumptives both DS & DR-TB

FIGURE 5. DR-TB Patients managed on the e-TB Manager Platform (2010–2016)

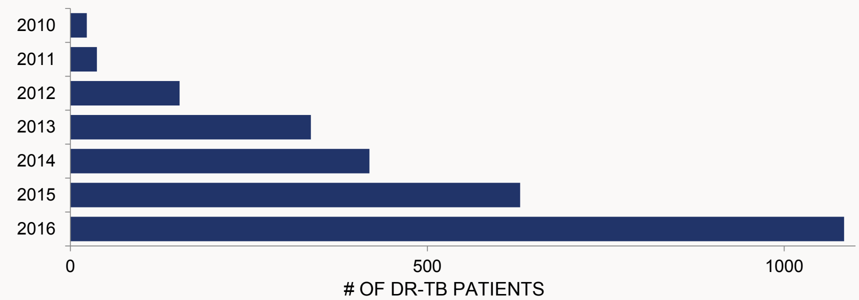
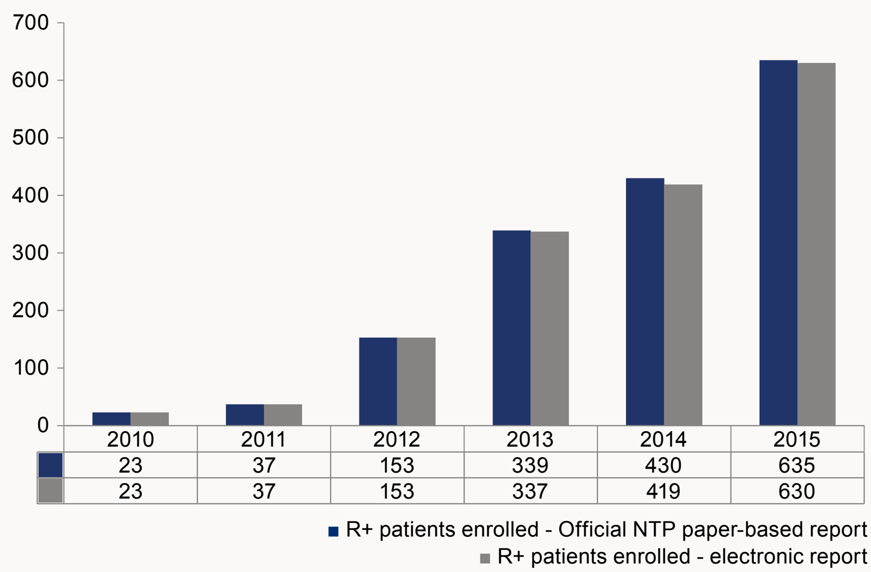


FIGURE 6. Comparison between NTP official DR-TB report Versus Report on the e-TB Manager[ii]



	2010	2011	2012	2013	2014	2015
R+ patients enrolled - Official NTP paper-based report	23	37	153	339	430	635
R+ patients enrolled - electronic report	23	37	153	337	419	630

[i] e-TB Manager pilot for DR-TB started in the same facility where programmatic management for DR-TB started in the country in 2010. Users entered retrospective patient data for patients in 2010.

[ii] Before electronic reporting can replace the paper-based reporting system it must be shown that paper-based and electronic reporting are comparable over multiple reporting periods. R+ refers to Rifampicin resistant TB.

CHALLENGES

The challenges encountered during the process of digitalizing TB reporting can be broadly categorized into operational and infrastructural challenges.

OPERATIONAL CHALLENGES

Human resource: The need for change, the methodology of communicating that need, and the reluctance of users to adapt to the new technology slowed the process. This was further complicated by low computer literacy among TB program users. Users often had to multitask because they were required to attend to both TB needs and the needs of other health programs, such as HIV, malaria, and immunizations.

Program: e-TB Manager had to be adapted to reflect the NTP's frequently changing paper-based recording and reporting system, which made it difficult for users to become familiar with the tool.

INFRASTRUCTURAL CHALLENGES

Internet service: The access and availability of internet service in Nigeria is limited. Urban areas have service providers, but rural settings often have limited or no access to the internet, making it difficult to upload data into e-TB Manager.

Computers: Most of the supported facilities do not have computers. With support from implementing partners in the TB control program in Nigeria, some facilities were provided with tablets.

LESSONS LEARNED

The e-TB Manager implementation began in 2011 with one DR-TB facility at the University of Ibadan Teaching Hospital and fewer than 30 users across the service providing areas. Since then, the tool has received wide recognition and gained acceptance across various level of TB service provision. Critical factors that have aided the growing buy-in by stakeholders include:

- ***A commitment by stakeholders to understanding system requirements:*** TBCARE 1 and now Challenge TB made a concerted effort to adjust the e-TB Manager implementation model based on participants' feedback, the NTP's needs, and the implementation experience. The project solicited user feedback on the data that should be collected; changes in paper-based reporting; expected outputs; and clear definitions of users' roles and responsibilities, which were used to determine access rights.
- ***Critical and ongoing customization:*** MSH's generic version of e-TB Manager was used, but the system underwent critical and ongoing customization to reflect Nigeria's paper-based reporting system, address gaps reported during pilots, and meet the needs of the NTP and end users. In addition to the basic features of e-TB Manager for DS-TB and DR-TB presumptive clients and case, the tool was remodeled to reflect the NTP's paper-based quarterly reporting templates to simplify report generation by primary users.
- ***Flexible implementation approach:*** e-TB Manager and the approach to implementation have remained flexible by responding to the needs of participants at the various trainings and their informal evaluations of each new e-TB Manager module that has been introduced.
- ***System pilot for each version of e-TB Manager:*** Following the acceptance of a newly introduced and upgraded version of the electronic tool, capacity building of target users in the country was done in a phased manner to allow for skilled and experienced facilitators to deliver the trainings. When capacity was an issue, a group of master trainers was trained to help deliver the same quality of training. Such pilots also allowed for bugs to be reported and fixed.

Acknowledgements

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Authors

This publication was written by Emmanuel Opeyemi with contributions from Berhanemeskal Assefa.

For more information, please contact lessons@msh.org.

WAY FORWARD

e-TB Manager is a well-structured TB surveillance tool that has served the NTP well. Its implementation has benefitted the TB program by improving access to useful information. It is receiving recognition and is accepted by health care workers, particularly TB supervisors at the subnational level and TB program managers at the national level. The platform is currently undergoing a revision to allow for an offline version that will ensure continuous data entry without internet connectivity, thereby allowing health units to notify and follow-up with presumptive clients and cases even when internet connectivity is lacking. This offline mode is being developed for Android mobile devices and tablets. The system uses an open source solution to allow for ease of adaptation and integration with other platforms.

According to the World Health Organization, the potential of information and communication technologies for TB control is largely untapped. The potential of e-TB Manager has not been fully maximized in-country because of the challenges mentioned above, but efforts are under way to ensure that the system is institutionalized and that infrastructural challenges, such as limited internet connectivity, are addressed through the development and deployment of the offline version.

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TECHNICAL HIGHLIGHT

Overcoming Maintenance Challenges Associated with GeneXpert Machines — Experience in Bangladesh

CTB Lab advisor replacing the defective module of a GeneXpert machine at CDC Kishoregonj

BANGLADESH

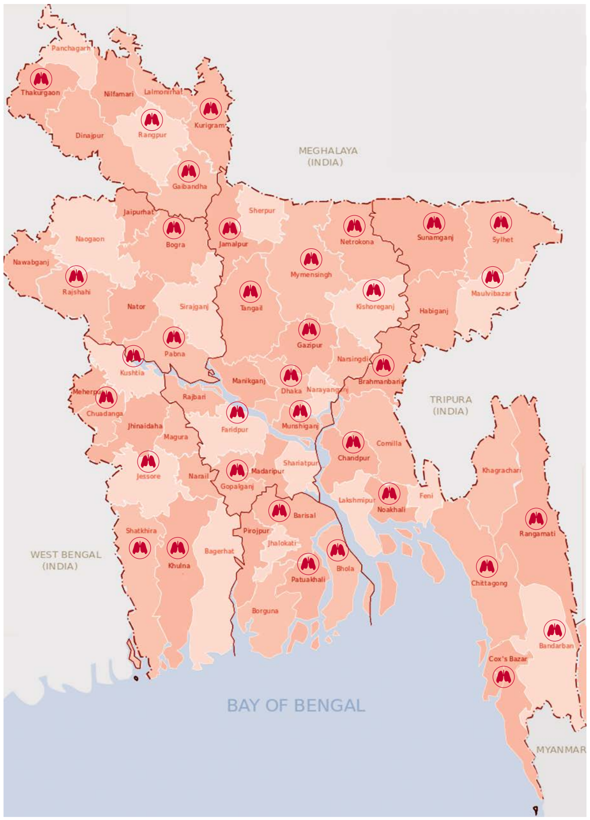
PROJECT CONTEXT

GeneXpert has revolutionized the diagnosis of tuberculosis (TB) and drug resistant TB (DR-TB) by effectively detecting M. tuberculosis in clinical specimens and RMP resistance in less than two hours without sophisticated laboratories. This enables patients to begin treatment for rifampicin resistant TB on the same day, rather than after several months of ineffective treatment.

Through the TBCARE II Project, USAID supported the expansion of NTP's diagnostic capacity and installed 39 GeneXpert machines between 2012 and 2014. Most of the machines (23) were placed in district level Chest Disease Clinics (CDCs) across the country; the remaining 16 are in tertiary level hospitals in Dhaka City, including the Chest Disease Hospital-CDH, National TB Reference Laboratory-NTRL, Regional TB Reference Laboratories-RTRLs and specialized hospitals (Figure 1).

In April 2015, as the TB CARE II project phased out, Challenge TB Bangladesh, implemented by Management Sciences for Health (MSH), took responsibility for operationalizing the 39 GeneXpert machines (228 modules in a total) in 38 centers across the country.

FIGURE 1. Geographic Distribution of GeneXpert



SEPTEMBER 2017

PROBLEM STATEMENT

In July 2015, an initial exploratory assessment of GeneXpert machines was conducted by the project and found nine non-functional machines (out of 39) in addition to multiple module failures among the GeneXpert network. During this time, CTB experienced significant maintenance challenges from lack of an implementation plan by the predecessor project and slow troubleshooting support from the manufacturer, Cepheid. There were no established mechanisms to support the module replacement process, which included customs clearance of shipped modules and spare parts by NTP, module swap (exchange of defective module with new module between country and Cepheid EU), routine troubleshooting, and GeneXpert check run.

The GeneXpert check test (formerly called calibration) was not performed routinely, even though it is required by Cepheid to maintain the warranty and is also crucial to ensuring that the GeneXpert provides accurate results. The customs clearance was very complicated due to bureaucracy and a weak monitoring system. Also, returning defective modules to Cepheid EU was a big challenge for NTP, as they don't have an established mechanism to pay shipment costs. Many maintenance issues were due to poor placement of the instruments in facilities and lab technicians' lack of knowledge to implement routine preventive maintenance practice. Also, the supply chain management was weak that led to chronic shortage of cartridges in 2015 leading to emergency procurements.

Dusty module at the beginning of the Challenge TB Bangladesh project

Dusty computers at the beginning of the Challenge TB Bangladesh project

PROJECT IMPLEMENTATION

There are 39 NTP-supported[1] GeneXpert machines in 38 sites across the country (six GX16 and 33 GX4 machines = 228 modules). Upon taking responsibility for improving and ensuring proper maintenance, CTB revived communications with Cepheid EU and the local Cepheid agency and renewed all 39 warranties (three years for each GX4 and one year for each GX16 machine). CTB began regular engagement with the local Cepheid agency to ensure timely maintenance support.

With CTB support, one member of the NTP's staff (M&E officer) and a CTB lab advisor were sent to Toulouse, France, to be trained on GX maintenance and troubleshooting. CTB calibrated 36 machines and replaced more than 100 broken modules since December 2015 in phases.

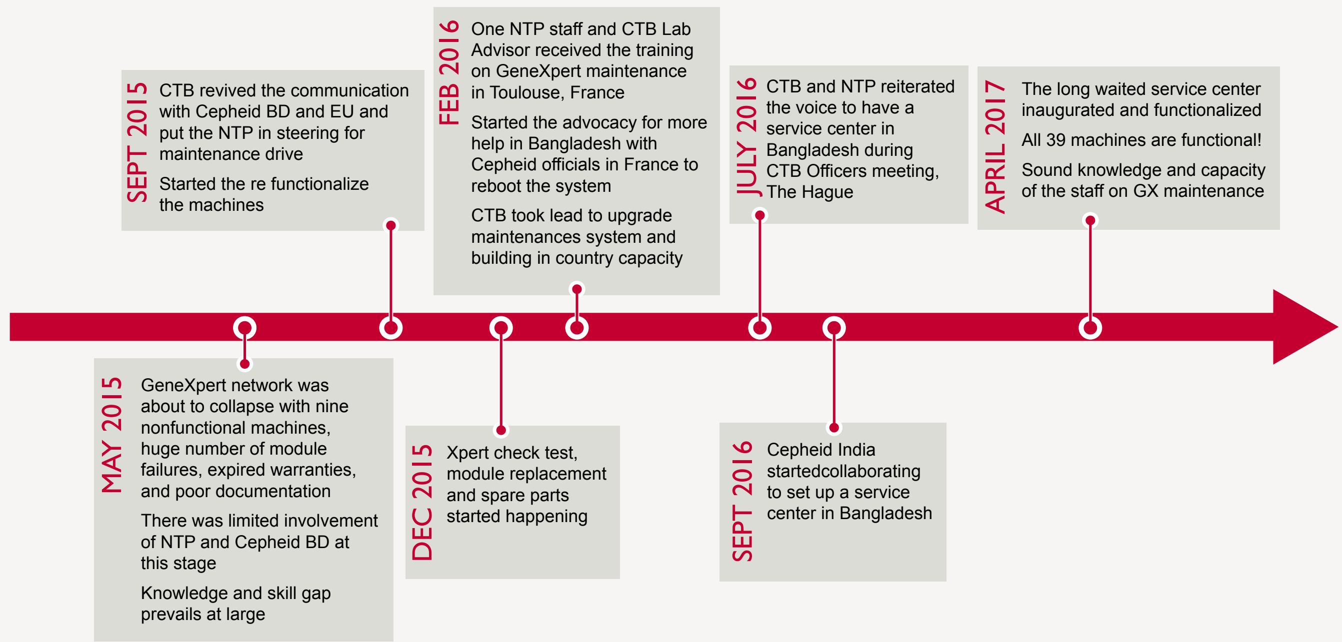
CTB also conducted feedback workshops on GeneXpert centers' performance in APA2 for the operators (medical technologists), CDC consultants/ lab coordinator/ lab focal person from partners, supportive supervision of GeneXpert sites to monitor the performance of the network.

CTB developed the monitoring standard operating procedures (SOPs), checklist, and implementation plan for NTP Bangladesh to address staff shortage, and provided training on routine GeneXpert maintenance.

CTB provided NTP with technical assistance to build regional pools of trained staff with onsite maintenance demonstrations of the GeneXpert during regular supervision and visits. The project also advocated at different international meetings to establish a GeneXpert service center in Bangladesh as a permanent solution for maintenance.

In November 2016, CTB introduced the GXAlert software to all GeneXpert sites (currently 32 covered) to monitor the machine's performance and data capture in real time and provide necessary feedback to improve the utilization, cartridges, consumable forecasting, and maintenances of the machines.

FIGURE 2. Timeframe for GeneXpert support in Bangladesh from Challenge TB.



[1] A few machines are managed within the NGO sector primarily with icddr,b, purchased through TB REACH. The icddr,b managed machines are in Dhaka (and soon Sylhet) and used for TB diagnosis among more affluent segments of the population who are able to pay for a chest x-ray, with free GeneXpert as follow-up if indicated.

RESULTS AND ACHIEVEMENTS

By initiating, re-engaging, and expanding communications among NTP, the local Cepheid agency, and other stakeholders, CTB has streamlined the process by which maintenance issues are addressed. Through these multi-pronged efforts, all 39 GeneXpert machines are now functional and have up-to-date GeneXpert check test statuses. While a few modules are pending intervention, more than 206 out of 228 (90%) modules are functional (Figure 3).

After persistent advocacy by CTB at international meetings and fora, Cepheid established a GeneXpert service center in Bangladesh by acknowledging the country's needs. This has increased interest and enthusiasm among donors and partners for expanded availability and use of GeneXpert

As full functionality[2] of machines increased, this has resulted in more tests to diagnose TB and DR-TB cases as shown in Figure 4.

To mitigate a backlog, CTB trained and oriented the staff at all GeneXpert sites on basic maintenance.

The turnaround time for module replacement has been slashed from 5 -12 months down to two weeks. CTB devised a faster mechanism of customs clearance for NTP involving the Cepheid local agency. The inventory/shipment of spare parts/ modules is properly managed and monitored and no lost cases have been reported. Warranties and other relevant information are now well documented and NTP has created a position for a focal person to oversee the NTP-managed GeneXpert network.

FIGURE 3. Status of GeneXpert Modules

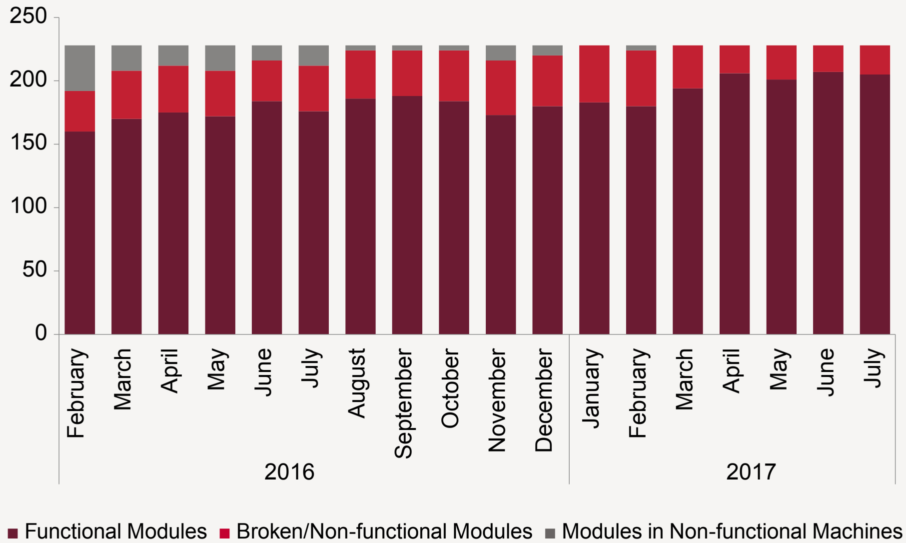
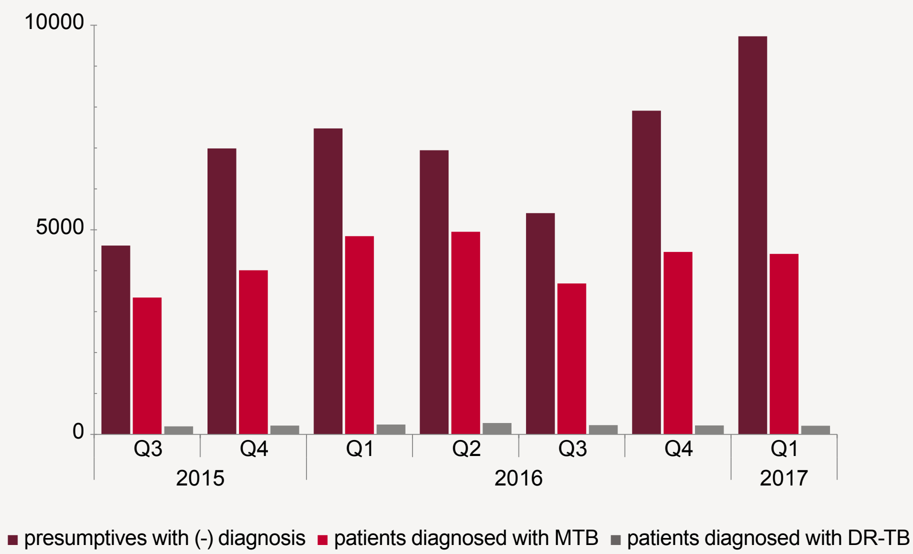


FIGURE 4. GeneXpert Testing for Presumptive TB



2 Functionality at 100% is not possible in most field settings because modules that become non-functional occur at random and replacement is not immediate.

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Thank you to all of the staff from Challenge TB Bangladesh for their support in the development of this technical highlight.

Authors

This publication was written by Sarder Tanzir Hossain and Oscar Cordon with contributions from Vidya Mahadevan and Chris Welch.

For more information, please contact lessons@msh.org.

LESSONS LEARNED

GeneXpert maintenance remains challenging in many countries around the world. Proactive efforts by CTB Bangladesh, a strong relationship with NTP, partners, and Cepheid played a vital role in successfully strengthening the existing system. The complexity of decision-making and action in the Bangladeshi health system and inadequate maintenance support from manufacturer may not allow the complete benefit of the rapid diagnostic to be fully realized. Due to poor implementation, new technologies that can significantly change the way TB and MDR-TB are diagnosed can be deemed not feasible and abandoned. In the absence of increased support, more robust diagnostic technology will be required for settings like Bangladesh to reach END TB targets. Therefore, it is critical to have proper support, placement, and buy-in of new technology by the country program before implementation. Establishing systems for maintenance and links to service providers is essential to sustain a TB diagnostic network.

WAY FORWARD

It will be critical to appoint a full time GeneXpert network manager to ensure optimum utilization of the machines. Additionally, NTP should enforce the GeneXpert implementation plan, monitoring tools, and SOPs and should take over the full responsibility of the network and secure the required funding to scale, strengthen and sustain the network and be prepared enough to take over upcoming developments of the GeneXpert technology. This includes the introduction of GeneXpert MTB/RIF Ultra to better diagnose TB in children and people living with HIV, Omni to expand molecular diagnostic testing close to population as a point of care diagnostic tool, and C360 for real-time disease and system surveillance information.

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USAID FROM THE AMERICAN PEOPLE | IRD Interactive Research & Development | msh Management Sciences for Health | KNCV TUBERCULOSISFOUNDATION | CHALLENGE TB

TECHNICAL HIGHLIGHT

Photo Credit: Monoru Jacob

Improving active case finding among a high risk population in Bangladesh

Selection of local volunteers and DOT providers (indigenous community) for proper referral linkage and treatment adherence

PROJECT CONTEXT

Administratively, Bangladesh is divided into four tiers: divisions, districts, upazilas and unions; Urban localities can be classified as either urban areas or metropolitan cities. Within districts, the 12 metropolitan cities across the country operate as independent administrative areas, separate from upazilas. As of 2017, metropolitan cities account for 30% of Bangladesh's population and is expected to grow 50% over the next 14 years. This country's administrative structure greatly affects how a population receives health care services and who provides those services. Health service delivery, management and also human resource are different in rural and urban areas.

Bangladesh has a pluralistic health system with many stakeholders performing within that framework, including government and non-government organizations (NGOs). The healthcare infrastructure under the DGHS (Directorate General of Health services) comprises six tiers: National, Divisional, District, Upazila (sub district), Union, and Ward. In metropolitan areas, despite the coverage of Ministry of Health and Family Welfare (MoHFW) with secondary and tertiary level care, the primary health care services are delivered as Essential Service Delivery Package (ESP) through Urban Primary Health Care Service Delivery Project (UPHCSDP) which is under a separate ministry (the Ministry of Local Government, Rural Development and Cooperatives). Additionally, the USAID-funded Smiling Sun health franchise program is operated by a network of health provides similar ESP in cities, which includes TB services. This inevitably creates fragmentation in the provision of health services.

Bangladesh is a tuberculosis (TB) endemic country and is ranked sixth among the 30 high TB burdened countries, with estimated incidence of 225 (all forms) and 45 deaths per 100,0000 population per year. Historically TB services in Bangladesh have focused on treatment through standalone TB clinics and TB hospitals; diagnosis was passive and was dependent on the beneficiaries' health-seeking behavior. During the implementation of the MoHFW's Second Health and Population Plan (1980-1986), TB services were expanded to 124 sub-district health facilities, commonly known as upazila health complexes (UHCs), and were integrated with leprosy during the Third Health and Population Plan (1986-

BANGLADESH

91). TB-DOTS (directly observed treatment, short course) was adopted in Bangladesh in November 1993 during the Fourth Population and Health Plan (1992-1998) and was operating in all upazilas by 1998. TB-DOTS implementation was initiated in metropolitan areas in 2002, beginning with Dhaka. The National TB Control Program (NTP) adopted the StopTB Strategy in 2007, and began managing drug-resistant TB (DR-TB) with the 24 month protocol in 2008. It has since increased coverage to five districts through chest disease hospitals (CDHs).

HEALTH SYSTEM

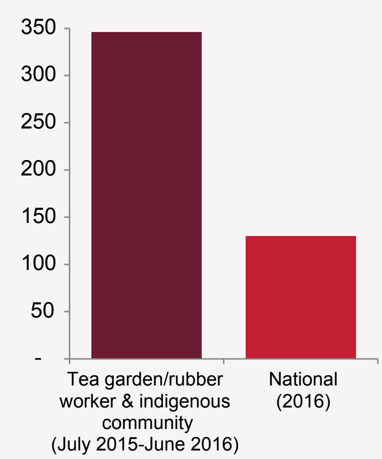
The MoHFW is the lead agency responsible for formulating national-level policy, planning, and decision-making in the provision of healthcare and education which are implemented by various authorities and healthcare delivery systems across the country from the national to the community level. The ministry and its relevant regulatory bodies also have indirect control over the NGOs and the private sector healthcare systems. The country has a pluralistic health system and many stakeholders perform within that framework, including government and non-government organizations.

Through the USAID-funded Challenge TB (CTB) project, Management Sciences for Health (MSH) and its partners with National Tuberculosis Control program (NTP) have been working toward the End TB goal by improving active case finding across 14 districts and two city corporations, by prioritizing surveillance among selected high risk populations to improve detection and treatment coverage. It supports the National TB Program of Bangladesh to achieve the goals of its National Strategic Plan for TB. MSH is the implementing partner and KNCV and IRD are the technical partners for the project. This project helps the NTP in making strategic choices for a sustainable difference, ensuring the highest impact with limited resources.

PROBLEM STATEMENT

CTB works throughout Bangladesh to provide technical assistance (TA) to the NTP in all components of a TB control program including laboratory network strengthening, Public Private Mix (PPM), Advocacy, Communication and Social Mobilization (ACSM), Programmatic Management of Drug-Resistant TB (PMDT), TB/HIV, mHealth, monitoring and evaluation (M&E) and surveillance. CTB is working with sub-awardees to improve active case finding among high-risk and neglected populations in specific geographical location. The specific high-risk population of the project is TB-diabetes infected; tea garden and rubber garden workers, and indigenous communities from Sylhet division; slum dwellers; factory workers and children. The selected populations are under-served and they do not have access to mainstream health services that put them on risk for getting TB. Figure 1 shows the case notification rate (CNR) of the target group compared to the national CNR.

TB Case Notification Rate (per 100,000 population)



PROJECT IMPLEMENTATION

The strategic response of the project is to ensure the essential basic TB services are delivered to underserved and high-risk populations in collaboration with government health staff. Approaches and implementation strategies are outlined below:

Address case detection and improved treatment:

- Improve health seeking behavior and empower communities through awareness activities
- Improve patient-centered early diagnosis and treatment services at health facilities, through household screening and selection of local DOT providers
- Improve intensified case finding for risk groups through working with sub-awardees
- Enhance quality of TB diagnosis by keeping laboratory network functional and ensuring EQA
- Increase detection and enhance quality of MDR-TB treatment through provision of social support for patients and DOT providers

Ensure improved TB infection prevention and control measures through capacity-building of TB program managers and health workers:

- Improve the performance of health workers involved in TB prevention and care
- Improve TB infection control in key settings

Sustainable mechanisms integrated in all interventions:

- Strengthening political commitment and leadership
- Ensure quality data and functional surveillance system

Courtyard meeting with tea garden workers

Photo Credit: Monoru Jacob

- Improve evidence base and quality of TB control activities through operations research

Tea, rubber garden workers and indigenous communities

The tea and rubber garden workers are marginalized communities and live in isolation from mainstream society. They are poor and lack access to education and other basic services. These populations work in garden areas which are confined tea-garden territories. Limited primary healthcare services provided by tea garden authorities do not include TB. Government health facilities are usually located outside the tea-garden territories further contributing to a lack of access to TB services.

The project also provides targeted services to the Khasi people—an indigenous community in Bangladesh—which live in isolated, highland territories where government health facilities are not available. They lack access to education, basic healthcare services, and have a rich tradition of myths and taboos that affect health behaviors.

The tea and rubber garden workers and indigenous communities are reached through a network of community level health volunteers and DOT providers under a partner NGO called HEED Bangladesh. These volunteers are responsible for active case finding through household (HH) visits, presumptive referrals and treatment adherence, awareness raising activities including courtyard meetings and traditional folk songs among the workers and indigenous community members, and outreach sputum camps. They also raise TB awareness among village doctors and pharmacists, who are often the primary contact for those seeking healthcare and link them with TB-DOTS centers. There are also coordination meetings with tea garden managers to ensure patient rights exist, including leave with pay and job security.

RESULTS AND ACHIEVEMENTS

From July 2015 to September 2016, 17,992 presumptive TB patients from the target groups were tested and 3,060 (17%) TB cases were detected. Out of the total cases 1,979 were diagnosed as bacteriologically confirmed (64.6%), 769 were clinically diagnosed (25.1%) and 312 were extra pulmonary TB cases (10.19%). The case notification rate (CNR) of all forms of TB among these groups was 346 per 100,000 population (Table 1), more than double the CNR of all form TB cases in the Sylhet division (170 per 100,000 population) and higher than the CNR of all forms TB at the national level (130 per 100,000 population). Through contact investigation 136 cases have been identified from these defined population (Table 2).

TABLE 1. Case notification among the tea garden workers and indigenous community

INDICATOR	ACHIEVEMENTS
# of presumptive patients tested in vulnerable groups	17,992
# of total TB cases identified	3,060 (17%)
Number of child case detected	189 (6%)
Case notification rate per 100,000 population	346
Number of presumptive tested through GeneXpert	178
Number of MDR cases identified	3 (1.68%)

TABLE 2. Case notification among the tea garden workers and indigenous community through active screening

INDICATOR	ACHIEVEMENTS
# of presumptive identified through contact investigation	309
# of case identified through contact investigation	136 (40% of presumptives and 4% of total cases)

Other achievements:

- 15 court yard meetings were held with tea garden workers
- 23 orientation sessions were held among tea and rubber garden workers and 25 sessions were held with indigenous community members.

LESSONS LEARNED

- Tea and rubber garden workers and indigenous community members access TB services at both the community and households levels
- Engaging local community people for household screening and DOT provision has a significant effect on case finding and treatment adherence
- Motivation and engagement of tea, rubber garden and punji management authorities in planning and implementation processes resulted in easy access to and support from vulneravble groups.

Activities to increase TB awareness, including courtyard meetings and traditional folk songs with tea and rubber garden workers and indigenous communities

Photo Credit: Monoru Jacob

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Thank you to all of the staff from Challenge TB Bangladesh for their support in the development of this technical highlight.

Authors

This publication was written by Zakia Siddique and Mohammad Shahrear Farid with contributions from Oscar Cordon, Vidya Mahadevan, Mohammad Hossain and Chris Welch.

For more information, please contact lessons@msh.org.

CONCLUSIONS

In Bangladesh tea and rubber garden workers and indigenous communities live in isolated areas with difficulties to access government health facilities. In addition, the level of poverty of some of these groups put them at risk of getting TB. To address these key populations, CTB implemented increased case detection, identified missing cases, and increased adherence by implementing a community based delivery of TB services that included household screening (contact investigation), recruiting of local community volunteers for symptomatic referral, provision of DOT and strengthening the follow up.

Active screening of indigenous community

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TECHNICAL HIGHLIGHT

Improving the Quality and Performance of TB Culture Laboratory Services Through Cold Chain Specimen Transportation System in Ethiopia

PROJECT CONTEXT

The health care system in Ethiopia relies upon a tiered network of health facility laboratories and reference laboratories, with an increasing degree of specialization at each tier. As part of this design, specialized tests have been decentralized at various laboratories throughout the country for tuberculosis (TB) diagnostic and patient follow up, including solid culture, liquid culture, line-probe assay (LPA), GeneXpert, electrolyte, hormone analysis and other organ function tests. To utilize this network effectively, it is essential to strengthen communication and data sharing systems at all tier levels. Robust supply chain systems must exist to ensure specimens requiring specialized testing are referred from one tier to the next. In the event of instrument breakdown or specimen backlogs, nearby reference laboratories must be able to perform referred specimens to ensure uninterrupted services provision.

While specimen referral services have been implemented at all tier levels with varying degrees of effectiveness, they have not been uniformly effective in all areas and specimen types because different temperature level requirements are needed to maintain quality. The Ethiopian Public Health Institute (EPHI) in collaboration with USAID's Help Ethiopia Address the Low Tuberculosis Performance (HEAL TB) project, implemented by Management Sciences for Health (MSH), designed a platform for van specimen transport system to be applied in the Oromia and Amhara regions. After the MSH/HEAL TB project ended on July 15, 2016, USAID's Challenge TB (CTB) project took over the initiative, also implemented by MSH and led by the KNCV Tuberculosis Foundation in Ethiopia.

At the beginning of the HEAL TB project in 2011, culture and drug susceptibility testing (DST) using solid media was available to the program in two regions to detect drug-resistant tuberculosis (DR-TB) and for monitoring treatment response, which made identifying drug-resistance patterns possible and allowed health care workers to provide more appropriate drug treatment for DR-TB patients. However, the limited number of culture

ETHIOPIA

laboratories, weak and uncoordinated specimen referral linkages, long distances between referring and testing sites, and weak means of transportation led to delays in specimen collection and delivery to testing sites and delays in delivering results, which hindered patient care and follow up activities in two regions. The introduction of new diagnostic technologies, particularly GeneXpert MTB/RIF service, was also challenging because of weak referral linkages, resulting in the inaccessibility of the service to support implementing programmatic management of drug-resistant tuberculosis (PMDT).

Thus, the HEAL TB project, Regional Health Bureau (RHB)/RL and EPHI identified TB specimen referral as a critical weakness that not only threatened the efficiency and accuracy of the laboratory service, but also influenced timely patient access to appropriate diagnostic services in routine programmatic practice. Thus, strengthening the TB specimen referral system in two regions was selected as a priority activity for collaboration between RHB/RL and the National Tuberculosis Program (NTP)/EPHI.

PROJECT IMPLEMENTATION

The courier system was primarily designed to address TB specimen transport from multi-drug-resistant TB (MDR-TB) Treatment Initiating Centers (TICs) to TB culture laboratories and sputum to GeneXpert sites. However, since there was a need for transporting other samples such as blood specimens for viral load testing, the vans also transported those on their way to and from the TICs. The frequency of the courier schedule was defined by larger volumes of specimens with a focus on inaccessible urban areas. An electronic specimen referral and results communication system was designed and implemented to facilitate prompt delivery of results. The new system was designed with the following principles in mind:

- Integration: Integrate the collection and transport of many samples in one trip
- Quality: Keep the quality of the specimens intact from collection to delivery to the labs
- Timeliness: Deliver the sample on time to the testing lab
- Saving resources: Cost-effective and efficient
- Regularity: Able to organize and remind the health facilities of regular test monitoring
- Customer satisfaction: Timely delivery of lab result and treatment initiation

Since August 2016, eight vans with built-in specimen transport systems were deployed in Amhara, Oromia and Addis Ababa regions. Of the eight vans, three were assigned to Amhara region to support specimen collection and delivery from nine TICs to two culture labs in the region. Similarly, three vans were assigned to Oromia region to support specimen collection and delivery from 18 TICs to three culture labs. The remaining two vans were stationed centrally both as back up and to support sample transport activities with the central reference lab and Addis Ababa region. After eight months (August 2016 - March 2017) of successful implementation of sputum transport in nine TICs and two TB culture reference laboratories and in consultation with the EPHI, the Amhara region increased transportation services to 79 health facilities. The weekly-integrated specimen transportation schedules specifically considered health facilities with heavy HIV and TB loads, and in accordance with the national integrated specimen guidelines, prioritized patients with indications for viral load measurement. If a health facility was a TIC, schedules for viral load specimen collection were synchronized with the monthly MDR-TB clinic days when sputum cultures were collected. EPHI also deployed the centrally stationed vans to collect specimen from Addis Ababa and surrounding Oromia region TICs and implemented integrated specimen referral in Addis Ababa region. In addition, EPHI used the vans to transport TB culture and viral load reagents that needed cold chain to maintain quality which can affect the quality of laboratory services.

In Oromia region, the three vans focused on transporting sputum specimens for TB cultures from 18

TICs to four culture laboratories including to the Ethiopian National Tuberculosis Reference Laboratory (NTRL). To take full advantage of the van specimen transportation system, Oromia region also planned to integrate specimen transportation in 114 heavy HIV and TB load health facilities starting in July 2017.

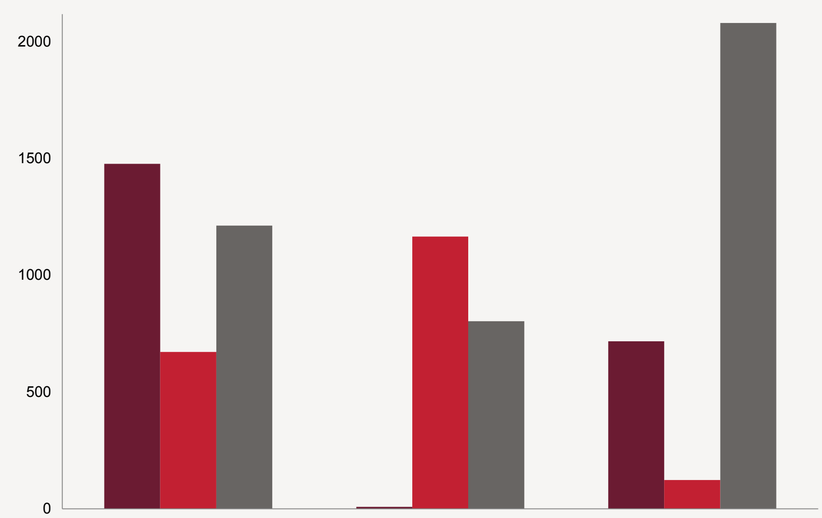
As an integral part of van specimen transportation system, CTB is currently supporting the implementation of an online eSpecimen[1] system in Amhara, Oromia and Addis Ababa regions to track sample pick-up and delivery, and communicate results, so lab results can arrive instantly. The eSpecimen RS implementation is currently active at EPHI, Jimma University Mycobacteriology Research Center, Adama Regional Lab, Harari RL and Addis Ababa RL. Software training was given to 236 personnel (221 laboratory professionals, nine TB focal persons and six data clerks).

Limited internet connectivity during the widespread social unrest in the country between July and September 2017, was the greatest challenge that hampered the implementation of the electronic sample referral and results delivery system.

RESULTS AND ACHIEVEMENTS

- A total of 28 TIC and 71 GeneXpert testing health facilities were supported through the new sample transport system.
- A total of 8,256 specimens were transported from health facilities to testing laboratories using the cold chain vehicles. Of the specimens transported, 3,360 were collected for TB culture testing, 1,976 for GeneXpert testing, and 2,920 for viral load testing (Figure 1).
- The average days between specimen collections at the health facility to specimen delivery at the testing laboratory showed improvement over time was reduced from more than a week to one day in the last two months. (Figure 2)
- The average sample rejection rate using cold-chain vans was 0.3%, which is far lower than the baseline average rejection rate of 3.4% at Adama Regional Laboratory.

FIGURE 1. Summary results of the cold-chain vehicle supported sample transport system, August 2016-June 2017



	# of specimen transport for TB culture test	# of specimen transport for GeneXpert test	# of specimen transport for viral load and other tests
Oromia	1477	8	717
Addis Ababa	671	1165	123
Amhara	1212	803	2080

[1] eSpecimen is an electronic sample referral and results delivery systems. When a sample is ready for transportation to the lab, the referring health worker sends an SMS with the code and quantity of the sample. This notification goes to the courier driver and the lab. At the same time, the message is displayed at the e-specimen website (www.especimeneth.msh.org). When results are ready both the treating health worker and the patient are notified through SMS. In addition, the result is uploaded to the website from where health workers can print the information.

Acknowledgements

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Authors

This publication was written by Degu Jerene Dare with contributions from Dereje Habte Woldehanna, Gudeta Tibesso and Bihil Sherefedin.

For more information, please contact lessons@msh.org.

FIGURE 2. Comparison of the traditional postal system and cold chain vehicle in terms of quality and timeliness of sputum sample referral

Characteristics	Traditional postal courier system	Cold chain vehicle
Average days between specimen collection and delivery to testing site	≥ 7 days	1 day
Initiation of specimen processing by the laboratory	5 days	2 days

Percentage of specimens rejected
Decrease from 3.4% to 0.3%

WAY FORWARD

By supporting routine specimen transportation through cold chain vehicles in Oromia and Amhara regions, Challenge TB has demonstrated improvements in the timeliness and quality of sputum specimens for TB culture. More specifically, the newly designed system:

- Contributed to the reduction of the average sputum transportation and delivery time from about one week to one day.
- Enhanced specimen integrity during transportation.
- Led to better communication between TB culture laboratories and van couriers enabling culture labs to process specimen in timely manner.
- Significantly reduced the number of specimen rejected due to poor specimen transportation.

Van sputum transport is very critical to access limited TB culture laboratories by a large number of health facilities located in a country with difficult terrains. Moving forward, proper cost-effectiveness analysis should be conducted before considering a nation-wide scale up.

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CHALLENGE TB

TECHNICAL HIGHLIGHT

Implementing TB Activities In Emergency Settings: The South Sudan Experience

Mingkaman IDP camp, South Sudan
Photo credit: WHO/C. Haskew 2016

SOUTH SUDAN

PROJECT CONTEXT

The World Health Organization (WHO) estimates an annual incidence of all forms of tuberculosis (TB) in South Sudan at 146 per 100,000 population. South Sudan has had consistent annual case increases of about 20% during the last five years with treatment success rates (TSR) stagnating between 75 – 80% over the same period. TB is a major cause of morbidity and mortality in complex emergencies. The incidence and mortality of TB are thought to increase during times of conflict, although notification rates tend to decrease with rising conflict intensity. Armed conflict disrupts health service delivery, diverts resources and contributes to delayed diagnosis and self-treatment (i.e., treatment without biomedical diagnosis and management, possibly using traditional medicines or inadequate anti-TB medicines), leading to increased TB transmission. Because TB treatment is lengthy, it is vulnerable to interruption in such settings, raising concerns over the potential emergence of drug resistance.

Following the 2013 crisis in South Sudan, there was massive displacement of the population who either sought refuge in protection of civilians (PoCs), internally displaced peoples' (IDP) camps or refugee camps. Juba PoC and Mingkaman IDP were among the emergency settings that emerged to accommodate displaced populations. The July 2016 crisis displaced more than 2 million people either internally as IDPs or externally as refugees (BBC media 2017). Currently, the internally displaced population totals about 100,000 in the Mingkaman IDP and 95,000 in the Juba PoC. These two emergency settings presented a hotspot for tuberculosis transmission, as many displaced people lived together in crowded tents and without adequate ventilation, especially in Juba PoC.

In 2014, when the USAID-funded, Management Sciences for Health-led Challenge TB (CTB) project was launched, there were inadequate TB diagnostic services, knowledge gap and low staff capacity, poor referral linkages, no contact investigation, poor case detection rate (CDR) and frequent stock outs of TB medications and supplies.

DECEMBER 2017

PROJECT OPERATIONS

The CTB project in year one and two covered a wide geographical area, including three of the 10 states of South Sudan, the greater Equatoria states and provided external quality assessment (EQA) support nationwide. Following the July 2016 crisis and the widespread insecurity, the project geographical area was reduced to focus on Juba City with continued support to the emergency site of Mingkaman IDP camp and Juba PoC.

CTB trained HHP conducting contact investigation in Mingkaman IDP

PROJECT IMPLEMENTATION

BUILDING CAPACITY

(TRAINING, ON THE JOB TRAINING)

To address knowledge gap among health workers, CTB supported training and mentorship of health workers and home health promoters (HHPs). The HHPs are community volunteers trained in TB basic and contact investigation and are tasked with conducting health education, tracing the contacts of bacteriologically confirmed TB cases, and tracing TB patients who are lost to follow up. The CTB project also trained health care workers on TB/HIV co-management and TB infection control in health facilities. Health care providers were also trained in supply chain management to ensure accurate supply forecasting and reduce stock-outs of essential TB commodities.

CTB procured and distributed bicycles to HHPs in Mingkaman to facilitate contact tracing

CTB trained HHP referring a contact for diagnosis in Juba PoC

CONTACT INVESTIGATION

Contact investigation (CI) was initiated in both Juba PoC and Mingkaman IDP to diagnose active TB among the contacts staying with bacteriologically confirmed smear positive TB patients in the two emergency settings.

The approach entailed a household visit to a bacteriologically confirmed index TB case by trained TB HHPs who screen close contacts of the index case for active TB using WHO screening forms and refer presumptive contacts for diagnosis in a TB diagnostic health facility. This approach was recommended by the Ministry of Health to spearhead the newly launched community health system, known as Boma Health Initiative (BHI).

Steps taken in piloting contact investigation included:

- Adapting CI practices in the context of South Sudan
- Health worker orientation on mapping bacteriologically confirmed index TB cases and assigning HHPs to do CI
- Training TB home health promoters on how to conduct a contact investigation
- Monitoring and evaluation of CI activities

- On the job training and mentorship of HHPs
- Developed and printed TB health education flip chart for HHPs to use when teaching health education

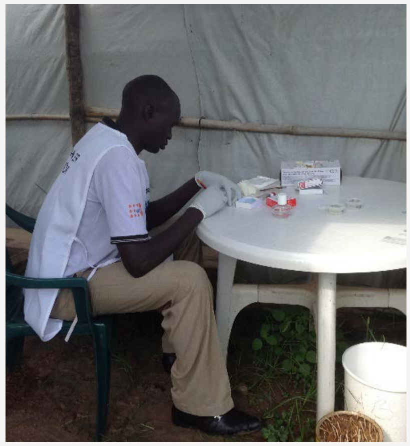
SCALING UP LABORATORY SERVICES

The CTB project trained eight (M8:F0) lab personnel on smear microscopy and laboratory personnel from the two emergency settings on the use of LED microscopy and external quality assessment (EQA). CTB procured and deployed three LED microscopes to Juba and Bentiu PoCs and Mingkaman IDP, and supported the NTP to prepare and coordinate delivery of reagents to the mentioned facilities.

RECORDING AND REPORTING

CTB provided on-the-job training and mentorship of health care workers on how to record and report case finding, sputum conversion and treatment outcome.

CTB mentored lab personnel on sputum smear preparation



CTB Principal advisor mentoring lab technician on how to record and report in the TB lab register in Juba PoC

RESULTS AND ACHIEVEMENTS

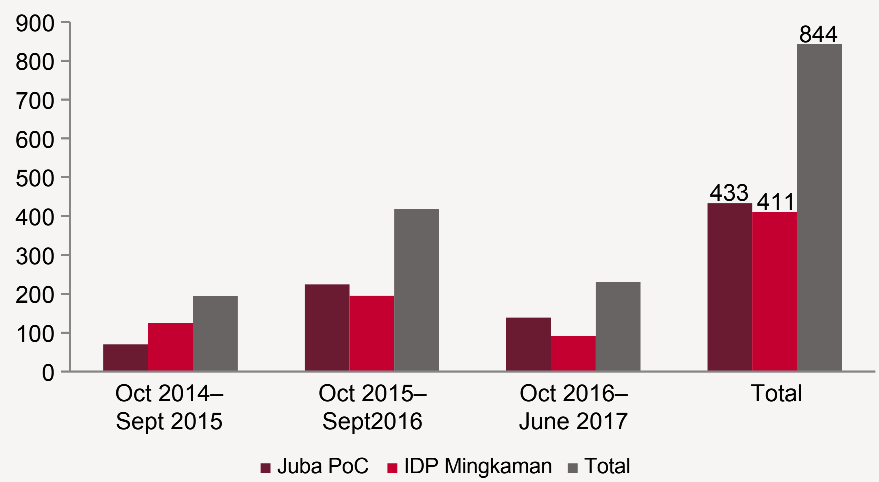
HUMAN RESOURCES DEVELOPMENT

A total of 103 (M81:F22) health care workers (cadres included clinical officers, nurses, midwives, pharmacist, lab technicians and a doctor) and 215 (M170:F45) HHPs were trained in Juba PoC and Mingkaman IDP camp. Challenge TB, together with NTP, continued to provide onsite mentorship and supportive supervision. To improve data quality, CTB in collaboration with NTP supported the review of treatment guidelines, recording and reporting tools, standard operating procedures (SOPs) and produced TB/HIV health education flip charts that were distributed to facilities in Juba PoC and Mingkaman IDP.

CASE NOTIFICATION

Through CTB support, quality TB services are more accessible to

FIGURE 1: TB case notification in Mingkaman IDP camp and Juba PoC, October 2014-June 2017



the displaced population in the Juba PoC site and Mingkaman IDP camp. Between October 2014-June 2017 (Figure 1), 433 TB cases were notified in Juba and 411 TB cases were notified in Mingkaman. This represents prevalence of 456 and 411 per 100,000 populations in Juba PoC and Mingkaman IDP (estimated 95,000-person population in Juba PC and 100,000-person population in Mingkaman IDP).

EXTERNAL QUALITY ASSESSMENT (EQA)

In South Sudan, the EQA network started in 2012 with the aim of ensuring AFB microscopy results are accurate and reliable. The EQA is part of the lab quality improvement strategy stipulated in the national strategic planning documents. Until 2014, EQA was performed in only 12 laboratories with a number of irregularities due to insufficient trained laboratory technicians on EQA slide randomization. Because of the need to expand EQA in the country, CTB factored indicators on EQA into its annual work plan and started collecting and reporting on EQA data in October 2014. In year 2 and 3, CTB decentralized EQA activities by training 34 lab technicians and 29 county focal persons from the greater equatorial states on EQA.

TABLE 2: EQA results for Juba PoC

	Q3, 2015	Q4, 2015	Q1, 2016
Total number of smears done	89	220	235
Total number of positive smears	06	19	33
Number of scanty smears	00	00	00
Total number of Follow-ups during	02	07	28
Positive among follow-ups	00	01	00
Scanty among follow-ups	00	00	00
Slide positivity rate	6.7%	8.6%	14%*

As illustrated in TABLE 2, there was no major error detected.
* This high positivity rate is mostly as a result of the Juba Teaching Hospital, which is the main national referral center. Most cases referred to this center are highly suspected TB cases

WAY FORWARD

CTB as a global project ends in 2019. Despite challenges of operating in emergency settings, the South Sudan Challenge TB project has been able to support improvements in case notification, slide positivity rate and data quality. Unfortunately, the CTB project in South Sudan prematurely ended in 2017. Projects working on the humanitarian and emergency side are enhancing their efforts to alleviate the sufferings of the South Sudanese. It is ironic, however, that the only USAID supported mechanism for TB in South Sudan is pulling out prematurely when it is much needed to support the Boma Health Initiative. CTB stresses the urgency for more programs like this to continue delivering much-needed quality TB care services in emergency settings.

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Authors

This publication was written by Dr. Edward Bepo and Dr. Berhanemeskal Assefa.

For more information, please contact lessons@msh.org.

CHALLENGE TB:

2016

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CHALLENGE TB

OCTOBER 2016

Photo Credit: MSH

URBAN DOTS IN AFGHANISTAN: FIGHTING TB IN KABUL AND BEYOND

Background

Afghanistan faces a burden of tuberculosis (TB) among the highest in the world, according to the World Health Organization (WHO). An estimated 60,000 new cases arise yearly, with 110,000 Afghans now living with TB; 14,000 Afghans died from the disease in 2015. Only about two in three presumed patients are found, and the treatment success rate is only 49 percent on average in the country.

To win their fight against TB, the Ministry of Public Health's (MoPH) National Tuberculosis Program (NTP) and partners must make significant progress in Kabul, where nearly 4.5 million people live-- approximately 15 percent of the country's population. New cases of all forms of TB exceed 8,000 a year in this crowded capital city.

Yet Kabul presents particular challenges to TB control. Observers note a seeming lack of motivation among public health staff, likely related to low salaries. Infrastructure presents another barrier to high quality care: 45 percent of Kabul's public health facilities do not own the buildings they work in, but instead rent houses, where infection control may be difficult. Private hospitals, too, lack standardized buildings and often fail to conform to ministry guidelines.

About half of all patients go to private facilities for health care: private facilities are located more conveniently and have shorter wait times, more reliable electricity, and a better reputation.

However, before 2009, private facilities did not provide TB services. That year, to respond to the growing TB epidemic, the USAID-supported project TB CAP introduced Urban DOTS in Kabul. The next USAID program, TB CARE 1, continued to expand Urban DOTS to new public and private health facilities; Challenge TB (CTB) followed in 2014, and will support and expand TB control until 2019.

CHALLENGE TB IN AFGHANISTAN

Challenge TB is USAID's flagship global mechanism for implementing the Agency's TB strategy as well as contributing to TB/HIV activities under the U.S. President's Emergency Plan for AIDS Relief (PEPFAR). It is a five-year project designed to aid the National TB Control Programs (NTP) in reaching their objectives. In Afghanistan, these include increasing TB case notification by at least six percent a year, maintaining sputum conversion rate over 90 percent, and keeping the treatment success rate above 89 percent--through providing high-quality TB services to vulnerable communities countrywide.

Management Sciences for Health (MSH) leads implementation in Afghanistan, with KNCV Tuberculosis Foundation providing remote support. National partners include the Ministry of Public Health and NTP as well as the Ministries of Justice, Higher Education, Defense, the Interior, the National Directorate of Security, and the Afghanistan Private Hospitals Associations. Numerous NGOs also work in this broad coalition.

Strategic Response: Urban DOTS in Kabul

Building on the prior USAID-funded programs, Challenge TB is increasing case detection, improving treatment, and strengthening the MoPH's ability to manage and direct TB activities. A major focus is to expand the application of Directly Observed Therapy, short-course (DOTS), the internationally recommended strategy for TB control, which calls for accurate diagnosis, directly observing patients taking their medication, ensuring reliable drug supply and adherence, and tracking and reporting TB efforts.

Key to making Urban DOTS work in Kabul has been the building of strong partnerships among many organizations and all levels of health workers, in public and private facilities throughout the city. A goal is that all health care providers and managers expand knowledge and skills in TB service provision, and coordinate with each other and with the NTP.

Toward that end, CTB has engaged and trained the personnel of 110 health facilities in Kabul--all the public facilities as well as at least 70 private. CTB is working toward integrating health services to the point that when any patient arrives, for any reason, they are quickly screened for coughing and other signs of tuberculosis, then diagnosed if screening indicates it. Just as important, all health care workers who deal directly with TB are trained and supported to conduct active contact investigation for all patients, rather than waiting for presumed TB patients to visit a health facility.

Implementation

Challenge TB began by assessing the state of TB and TB services citywide, then proceeded to build the TB capacity of frontline staff at both public and private health facilities. Key interventions include training, weekly supportive supervision, upgrading health-facility infrastructure, and organizing reliable supplies. The project has developed and disseminated national guidelines and standard operating procedures for treatment, infection control, and pediatric TB to health facilities and staff in Kabul (and 15 provinces beyond). The project has also integrated TB tracking information into the Ministry of Public Health's information system.

In addition, Challenge TB emphasizes a public-private mix: it has engaged the senior leadership of both public and private associations and facilities, so that private facilities are recognized by the government and in return follow MoPH guidelines for TB--and all share the the vision of a TB-free Afghanistan.

Urban DOTS activities have included:

- Stakeholder and situation analyses, with assessment of health facilities;
- Introduction of the Urban DOTS approach to MoPH and other national and international stakeholders, including NTP, other government ministries, and international and local organizations;
- Training of public and private health care staff in standard operating procedures for TB;
- Regular supportive supervision for health care staff;
- All parties' implementing of standard operating procedures for TB case detection, treatment, and infection control;
- Ensuring a regular supply of TB drugs and laboratory supplies;
- Quarterly review workshops for health staff, with target-setting for the next quarter;
- An emphasis on reporting, monitoring and evaluation;
- Expansion of TB services to new public and private health facilities.

Along with the emphasis on skills and reporting, the project celebrates achievements and recognizes outstanding facilities with appreciation certificates. In addition, it organizes World TB Day celebrations at facilities, for the benefit of both providers and communities.

Results

In July 2009, only 22 health facilities in Kabul City offered any type of TB service. By the end of August 2016, with the USAID-funded interventions, 95 health facilities provided TB control services, including 15 private facilities.

By 2015, results included (see Table 1):

- Detection of presumptive TB cases had increased over 500 percent from baseline;
- Diagnosed and treated TB cases (all forms) increased close to 200 percent;
- New sputum-smear-positive cases increased 78 percent, to 1,449;
- The treatment success rate rose from 49 percent to 73 percent.

Yet Kabul City still has far to go. For example, the case notification rate for all TB cases is still only two-thirds, and for new sputum-smear positive cases, 42 percent. This translates to an estimated 3,000 patients undetected, untreated, and contagious. The treatment success rate is still well short of the target of 89 percent.

Expansion

In late 2015, CTB assisted the MoPH to expand the Urban DOTS program to four more cities, all with overcrowding, congestion and other attributes similar to Kabul: Mazar-I Sharif, Kandahar, Herat, and Jalalabad. These cities—to the north, south, east, and west of the country--are also key hubs for the health system and collectively host a population of approximately 5.5 million. In addition, they see major influxes of residents from neighboring provinces for work and host most of the country's Internally Displaced Persons (IDP) camps as well as the major prisons.

CTB is now working throughout these cities, covering all the prisons and diabetes centers as well as standard health facilities. By the end of 2015, 125 of the 304 (41 percent) of public and private health facilities were providing TB DOTS services in Kabul, Mazar, Herat, Kandahar and Jalalabad.

Next Steps

As the program expands, CTB is reaching out to a large and growing number of civic and health-related trade groups and associations to become informed and active in TB control. Project staff are facilitating the creation of associations of health care providers as well as partnering with universities and scientific institutions, patient advocacy groups, religious leaders, and civic organizations, to inform them about TB and what they can do about the epidemic. CTB enlists their action and their help in informing their members and others.

For instance, the project is helping establish a TB Technical Review Panel in each city, composed of representatives of medical associations. CTB is organizing a Gynecologist TB Association, Surgeons' TB Association, Pediatricians' TB Association, Diabetic TB Association, TB/HIV Association and so on—to have a practitioner group in each specialty with which to engage. A leader, or "champion" will guide the association's activities and spread the word to other practitioners about how to screen for, diagnose, and treat or refer, TB patients. The champion will also represent the specialty on the TB Technical Review Panel.

In addition, CTB is also actively reaching out to teaching hospitals, teaching students and staff, and helping revise standard operating procedures for case detection and management. ■

Table 1: Urban DOTS achievements in Kabul, by indicator

Indicator, by year	2009	2010	2011	2012	2013	2014	2015
Number of health facilities with lab services	106	111	111	112	120	131	132
Health facilities covered by DOTS	22	48	53	68	73	80	85
Potential TB patients identified/ examined	2,856	10,150	11,900	13,644	14,181	17,061	17,525
All TB cases notified	1,934	2,738	2,728	3,215	3,548	5,007	5,449
New sputum-smear positive cases notified	814	1,022	1,082	1,174	1,204	1,280	1,449
Conversion rate of sputum smear positive cases	47%	65%	68%	70%	72%	73%	73%
Treatment success rate of new sputum-smear positive cases	49%	62 %	68%	70%	72%	73%	NA
Transfer-out rate of new sputum-smear positive cases	46%	26 %	16%	18%	18%	17%	NA

Figure 1: Trend of patient identification and notification in Kabul (2009 – 2015)

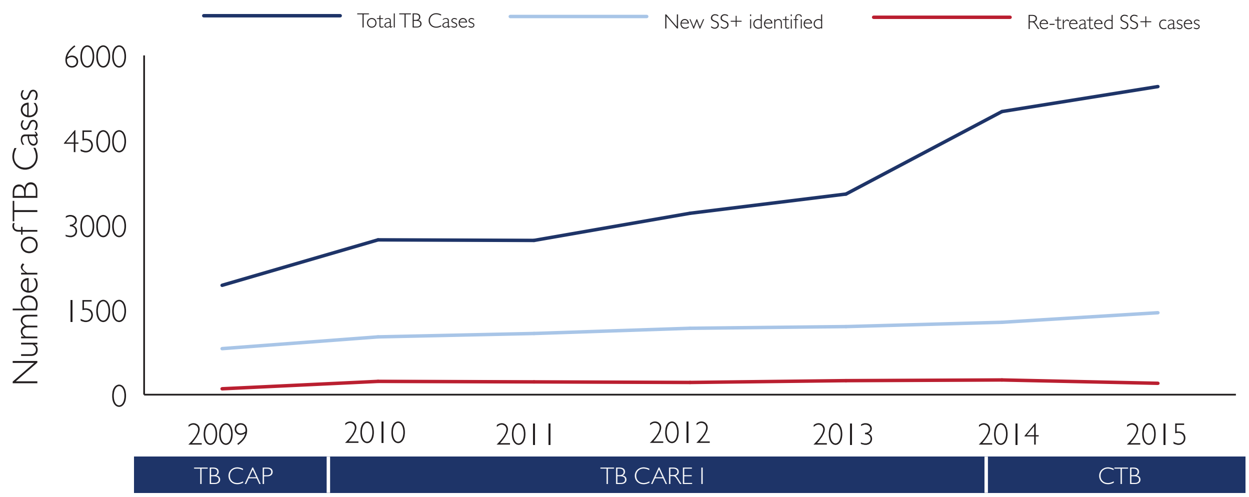
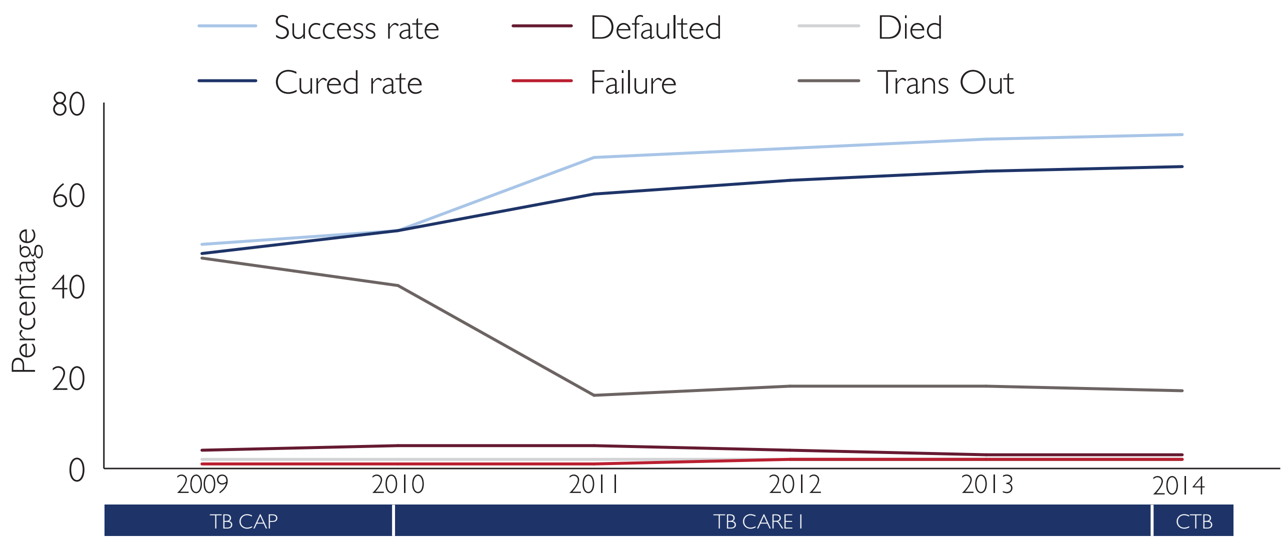


Figure 2. Trend of treatment outcomes for TB patients, Kabul (2009 – 2014)



Lessons Learned

- The Urban DOTS approach engaging a broad coalition of both public and private sectors can contribute to a significant increase in case notifications and improvement of the treatment success rate and other indicators.
- Conscious and continuous emphasis on health workers--including training, supervision, feedback, and recognition--appeasr to have increased their commitment to making TB control a priority.
- Active contact screening started late in Kabul, but is bearing fruit and could profitably be strengthened in Kabul and extended as early as possible to other Afghan urban centers.

Additional information can be obtained from:
Management Sciences for Health, Darulaman Road, House #24, Ayub Khan Mina Karte Seh, Kabul, Afghanistan
+93 799.344.106 • www.msh.org

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Photo Credit: MSH

FIGHTING TUBERCULOSIS IN A WAR-TORN COUNTRY: COUNTERING THE EPIDEMIC AMONG INTERNALLY DISPLACED PERSONS IN SOUTH SUDAN

Background

The world's youngest nation, South Sudan, is struggling on many fronts, including against tuberculosis (TB). TB/HIV co-infection is also a growing concern: in 2014, 67 percent of TB patients in South Sudan were living with HIV.

Since the outbreak of war in December 2013, more than 2.5 million South Sudanese have been displaced, out of an estimated population of 12 million. While close to a million people fled to neighbouring countries, approximately 1.6 million South Sudanese are now in "internally displaced persons" (IDP) camps and five Protection of Civilian sites (POCs) at United Nations Peacekeeping Mission bases scattered throughout the country.

While the IDP camps are mostly set in open areas around churches and schools, the POCs are fenced and heavily guarded. Their overcrowding and close quarters contribute to the risk of TB and TB/HIV co-infection, while elaborate security measures make it difficult for medical workers to enter.

South Sudan's health system is weak overall, with TB services scant in the nation's few functioning health facilities. Only 87 out of the country's 1,147 health facilities (under 8 percent) currently provide TB diagnosis or treatment.

In the IDP camps, NGO health teams have set up limited clinics that focus on basic and emergency health care. The UN Mission bases, too, are ill prepared to defend against TB, and the UN mandate covers no more than basic and emergency care.

CHALLENGE TB IN SOUTH SUDAN

Management Sciences for Health (MSH) is the sole implementer of the U.S. Agency for International Development (USAID)'s Challenge TB project in South Sudan. Through Challenge TB, MSH's work contributes to USAID's goal of a world free of TB as part of its End TB Strategy, which seeks to reduce TB mortality by 35 percent and reduce incidence levels by 20 percent by 2019. It also looks to relieve families of the devastating burden of caring for a TB patient.

In the Mingkaman IDP camp, CTB partners with Health Link South Sudan and Arkangelo Ali Association (AAA). In the Juba POC, CTB joined humanitarian partners including International Medical Corps, which manages the POC's only hospital.

Challenge TB

Challenge TB (CTB), a five-year project launched in 2014, is the primary mechanism for implementing USAID's global End TB Strategy. It also contributes to the U.S. President's Emergency Plan for AIDS Relief (PEPFAR) TB and HIV activities.

In South Sudan, Challenge TB provides direct technical support and guidance to the National Tuberculosis and Buruli Ulcer Programme (NTP) of the Ministry of Health (MOH) as well as community-based organizations. The project focuses on the former Central Equatoria, Eastern Equatoria and Western Equatoria States, which show a significantly higher burden of TB and HIV compared to other states. They are also more populated and accessible.

Strategic Approach

CTB's strategy builds on that of the previous USAID program, TB CARE I, which ended in December 2014. Thus it is integrating TB services into primary health care centers and training key health workers including clinicians, laboratory technicians, and volunteers from the community, called Home Health Promoters (HHPs).

War and its aftermath have limited access to many areas, however, threatening to derail some of the progress under TB CARE I. Most humanitarian actors in South Sudan have been forced to prioritize emergency, life-saving interventions for the IDPs, instead of development-oriented programming,

Challenge TB is working with the MOH and partners to support TB control services in the Mingkaman IDP camp (population approximately 49, 000) and the Juba POC (population approximately 100,000).

Expanding Community-Based DOTs

CTB provides technical support to health care workers of implementing partners in IDP camps and POCs, through onsite training, quarterly onsite mentorship, and supportive supervision performed jointly with the NTP, State TB office or County Health Department. As of mid-2016, CTB had trained 42 clinicians and nurses—16 in Mingkaman and 26 in Juba POC.

Photo Credit: MSH

A CTB trainee conducts contact investigation at Mingkaman IDP in South Sudan during HHP refresher training in February 2016.

Training covered basic knowledge about TB and active case finding, including standard operating procedures to increase case detection at triage and in outpatient departments, antenatal wards, and HIV clinics. The training also covered accurate reporting and use of monitoring and evaluating tools for TB.

This onsite training also enabled staff to fill all TB monitoring and evaluation tools correctly, identify common errors, and correct them. This was particularly important for lab technicians, whose work requires a high degree of accuracy and completeness.

After the trainings, CTB staff conduct monthly and quarterly supportive supervision visits together with NTP and implementing partners. These and other follow-up visits and refresher trainings have enabled CTB to reinforce the training and identify and address gaps in both theory and practice.

CTB also coordinated the delivery of equipment, supplies, and drugs to TB laboratories in the two displaced-persons settings. The project has trained lab technicians and monitored the quality of lab services within the external quality assessment (EQA) network.

Increasing TB Education and Contact Investigation

Just as important has been training and supporting the volunteer Home Health Promoters, who work directly with the NGOs. In Juba POC, case finding had been strictly passive before the project began—TB was diagnosed only if individuals arrived at the hospital for treatment. CTB emphasizes active contact investigation, performed primarily by the HHPs, which has proven highly effective in other CTB settings.

In 2015, CTB provided technical support to NTP to develop and disseminate HHP manuals to guide the training of HHPs across the country. Between 2015-16, CTB trained 54 HHPs (37 men and 17 women) in Mingkaman IDP camp and Juba POC on the basics of TB, contact investigation of bacteriologically confirmed TB patients, referral for diagnosis, follow-up care to ensure treatment adherence, and health education using flip charts. CTB has also provided bicycles to help HHPs reach people otherwise unreachable by the project or MOH.

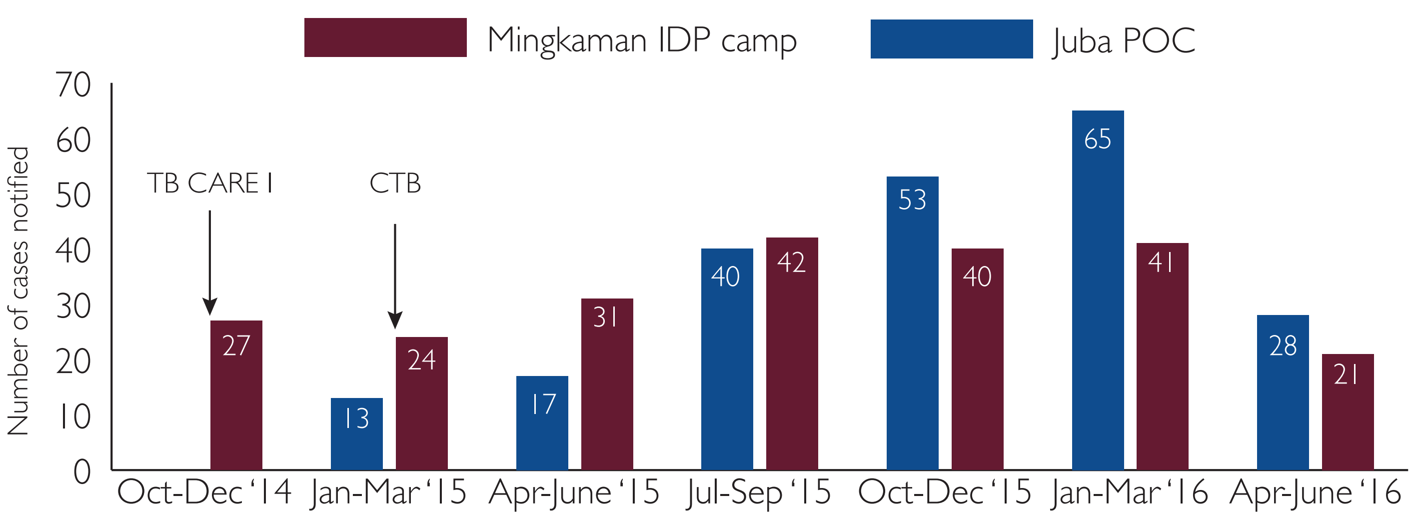
The HHP volunteers come from the same communities as other IDPs; they know local norms, and how to get things done in the camps and POCs. They know the patients and their families, and can easily go household to household, even in the POCs, educating the community and checking on patients who may miss a drug dose.

Like the clinicians, HHPs benefit from project-related supportive supervision, follow-up visits, and refresher trainings.

Tailoring Treatment and Infection Control to the Environment

In the POC, conditions are crowded and the health facility is one large area without walls that can isolate patients. Therefore CTB encourages partners to provide DOT not in a room nor in the health facility, but in an open field. IDPs at the camp are more scattered and have better ventilation, so infection control is somewhat less of a challenge.

Figure 1: TB case notification in IDP sites (October 2014-June 2016)



Source: Challenge TB Year 2 Quarterly Monitoring Report, April-June 2016

Photo Credit: MSH

HHP trainees watch a lab technician demonstrate how to collect and handle sputum samples at Juba POC.

Full integration of TB/HIV services into general health care is key to ensuring access to TB services in South Sudan.

Results

- Case detection grew from 27 cases in the last quarter of 2014 (October-December) to 106 cases the first quarter of 2016 (January – March).
- Cumulatively, health workers diagnosed 442 TB cases (226 in Mingkaman IDP camp and 216 in Juba POC) between late 2014 and mid 2016. All were enrolled on treatment.
- The treatment success rate in Mingkaman IDP camp rose from 33% in early 2016 to 60% in the third quarter (July-September) of 2016.
- The training, supervision, active contact investigation, and fast-tracking of coughers at health facilities all appeared to contribute to the dramatic increase in case detection.
- However, insecurity in both settings caused case detection to fall by about half in the second quarter of 2016 (April – June).

Lessons Learned

Full integration of TB/HIV services into general health care is key to ensuring access to TB services in South Sudan. Currently, many private and public health facilities even outside the IDP camps and POCs do not offer TB services. CTB's continued support to health partners is important as CTB is not a service provider.

Within the IDP camps and POCs, both training and continuing joint supportive supervision of health care providers have contributed to access to and quality of TB care.

Active contact investigation for case finding is essential and needs to be continued. Since it can best be accomplished through residents trusted by the community, it is important to continue to support the work of HHPs in the IDP camps and POCs.

Adjustments to the environment, such as offering DOTS to IDPs in the open rather than in crowded or contained areas, will continue to be a priority. ■

Additional information can be obtained from:
Management Sciences for Health, MOH Ministries Complex, Kololo Road, Juba, South Sudan • +1.703.524.6575
www.msh.org

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SIAPS:

TECHNICAL HIGHLIGHTS AND TECHNICAL BRIEFS

Technical Highlights and Technical Briefs from SIAPS

2017-2018

USAID FROM THE AMERICAN PEOPLE

SIAPS Systems for Improved Access to Pharmaceuticals and Services

The USAID-funded **Systems for Improved Access to Pharmaceuticals and Services** (SIAPS, 2011–2018) Program, implemented by MSH, ensured the availability of high-quality pharmaceutical products and services by using a systems strengthening approach to achieve a positive and sustainable health impact.

FROM 2018:

- Adopting the Pharmacovigilance Monitoring System for the Philippines National Tuberculosis Program
- Improving Xpert MTB/RIF Assay Implementation in the Philippines National TB Control Program

FROM 2017:

- Economic Cost of Non-Adherence to TB Medicines Resulting from Stock-Outs and Loss to Follow-Up in the Philippines
- Ensuring Sustainable Access to TB Medicines through Inclusion in the Philippine National Formulary
- Building Leadership and Governance in Supply Chain Management for the National TB Control Program of the Philippines

Photo by FABIENNE DUPLEIX JOUBERTON

SIAPS:

2018

Adopting the Pharmacovigilance Monitoring System for the Philippines National Tuberculosis Program

USAID
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SIAPS
Systems for Improved Access to Pharmaceuticals and Services

January 2018

BACKGROUND

Drug-resistant tuberculosis (DR-TB) is a major threat to global health. The World Health Organization (WHO) estimated that, in 2015, about 480,000 people developed multidrug-resistant TB (MDR-TB) in the world, and that an additional 100,000 people with rifampicin-resistant TB were newly eligible for MDR-TB treatment. Furthermore, an estimated 9.5% of these cases were extensively drug-resistant TB (XDR-TB).[1] Currently, MDR-TB patients require daily treatment for 18 months or more with medicines that are usually more toxic and less effective than those used to treat drug-susceptible TB. This created the need for shorter and more effective treatment for latent TB infection to prevent the emergence of disease in and transmission from the estimated 1 billion people infected with TB in the world today.[2]

Over the past 10 years, much progress has been made in research and development of new drugs for TB. Specifically, two novel drugs, bedaquiline (BDQ) and delamanid for the treatment of MDR-TB, have been approved as part of combination therapy for adults with pulmonary TB when other alternatives are not available. Also, novel drug combinations to treat drug sensitive and/or DR-TB in a shorter timeframe (from 18 months down to 9 months), including new or repurposed drugs, are under investigation in a series of phase II and III trials.[3]

As with any new medicine, its safety must be closely monitored to identify and evaluate adverse effects, such as unexpected and serious adverse reactions, in the early post-marketing phase, particularly for medicines given conditional or expedited approval, as was the case with BDQ and delamanid. The purpose of the monitoring is to learn more about its safety profile and improve treatment protocols and outcomes.

Given limited knowledge about the safety of the new TB medicines and regimens, WHO recommended monitoring and evaluation, including pharmaco-vigilance (PV) and drug resistance surveillance.[2] Specifically, in 2012, WHO recommended that the use of shorter regimens for MDR-TB be accompanied by the collection of drug safety data within a framework of observational research. In 2013 and 2014, WHO recommended active PV as one of the five conditions to be met when using BDQ and delamanid to treat MDR-TB patients.[4]

In 2015, WHO came up with the essential requirements for active drug-safety monitoring and management (aDSM) applicable to patients on treatment with new anti-TB drugs, novel MDR-TB regimens, or XDR-TB regimens, in order to detect, manage, and report suspected or confirmed drug toxicities.[4] aDSM is intended to be an integral component of the programmatic management of drug-resistant TB (PMDT). aDSM is particularly useful for systematic collection and prompt analysis of safety data to learn more about the safety profile of new medicines in the early post-marketing phase and inform future policy on the use of these medicines. Although one of the main costs associated with active surveillance is the creation or adaption of a database, WHO highly recommends the use of an electronic tool to standardize and safe-keep data in active surveillance implementation.[5] The management of data in electronic format is indispensable and will facilitate data sharing as well as generation of indicators and analysis.[4]

PROJECT APPROACH

The Philippines, with 2.6% of its more than 286,000 new cases of TB being MDR-TB cases,[6] introduced the shorter treatment regimen (nine-month treatment regimen [9MTR]) in 2015 and BDQ in June 2016 under an operational research framework; implementation was scaled up under programmatic conditions in 2017. Delamanid had been registered in the country since September 2017. Under the operational research framework, the WHO recommended that:

- The protocol be approved by a national ethics review committee, ahead of patient enrollment
- Treatment be delivered under operational research conditions following international standards to assess the safety and effectiveness of the regimens
- Implementation be monitored by an independent monitoring board set up by and reporting to WHO

Using the PV system framework (figure 1) developed under the USAID-funded Strengthening Pharmaceutical Systems (SPS) Program, a PV structure (figure 2) was put in place to ensure active monitoring of patients enrolled in the program and facilitate systematic data collection.[7]

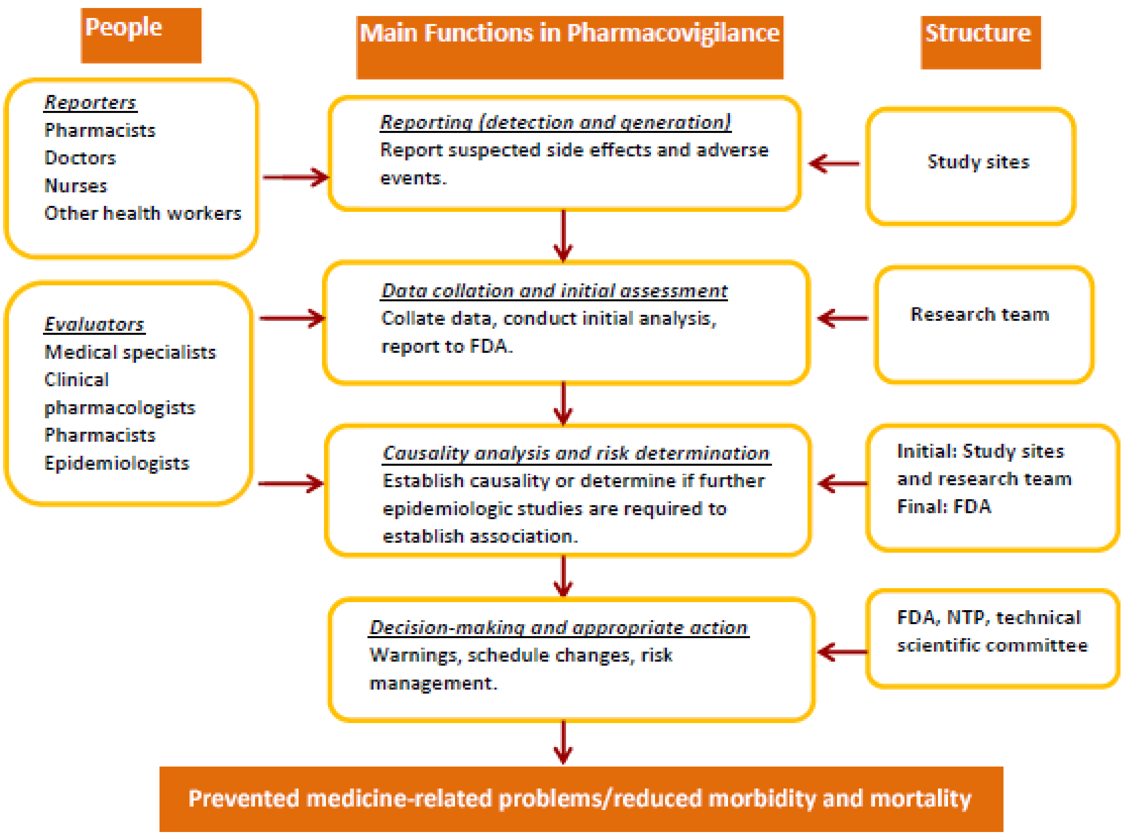
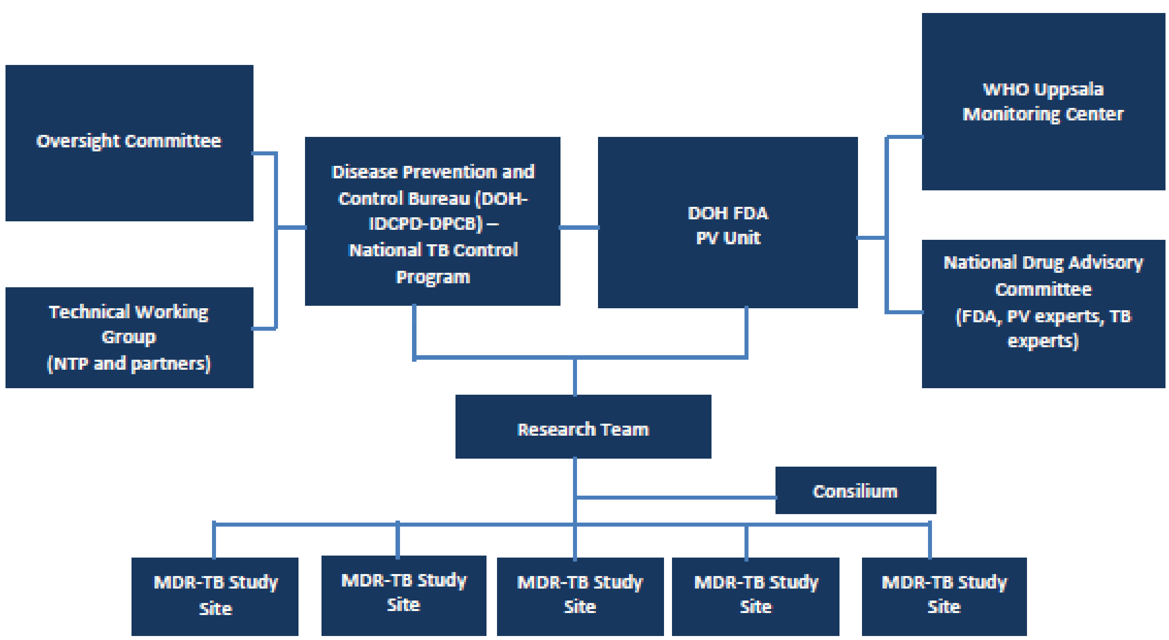


Figure 1. PV system framework[7]



Abbreviations: DOH = Department of Health; FDA = Food and Drug Administration; MDR-TB = multidrug-resistant tuberculosis; NTP = National Tuberculosis Control Program; PV = pharmacovigilance; 9MTR = 9-month MDR-TB treatment regimen; WHO = World Health Organization;

Figure 2. Structures and stakeholders involved in active PV surveillance for new medicines and novel regimens for TB under operational research[7]

PROJECT IMPLEMENTATION

The Department of Health-Pharmaceutical Division (DOH-PD) and National TB Program (NTP) in the Philippines adopted the web-based application Pharmacovigilance Monitoring System (PViMS) to ensure systematic data collection and simplify the analysis of medicine safety information.[8] PViMS is a free web tool developed by the USAID-funded Systems for Improved Access to Pharmaceuticals and Services (SIAPS) Program, implemented by Management Sciences for Health, to help clinicians, regulatory bodies, and implementing partners monitor medicine safety, specifically in resource-limited countries.[9] The SIAPS Program works to improve the availability and quality of information for decision making through the use of electronic tools combined with systems strengthening.[6, 8]

Prior to adoption of PViMS, the Lung Center of the Philippines-National Center for Pulmonary Research (LCP-NCPR), the research arm of the NTP that managed operational research, received scanned study forms through email from study sites. The data was subsequently entered into Microsoft Excel® files for data management and analysis. A total of 11 Excel files were created by LCP-NCPR, which represent the 11 study forms of the operational research. As more patients were enrolled in the program, the data became more complex and increasingly difficult to manage and analyze with Excel. Furthermore, data-entry personnel experienced difficulty in transcribing data from the scanned paper forms into the database. Recording adverse events (AEs) was not standardized. Given the number of patients receiving treatment under operational research and the number anticipated to be rolled into the programmatic phase of implementation, it became obvious that a robust electronic tool was required to collect, manage, and analyze safety data from active monitoring of patients on BDQ and 9MTR.

Through SIAPS, USAID supported the DOH-PD in implementing and operationalizing PViMS at the central and peripheral levels in the Philippines. To ensure effective implementation, SIAPS, NTP, the Food and Drug Administration (FDA), and LCP-NCPR collaboratively conducted a readiness assessment in 2016 to determine the current IT infrastructure, human resources, processes, data management, and quality control mechanisms available and to identify gaps in the PV recording and reporting of patients at the seven treatment facilities implementing the 9MTR for PMDT patients.[10] Results from the assessment were used to design the PViMS implementation plan. Data elements in PViMS were harmonized with those recommended by the WHO aDSM framework and local regulatory requirements for active safety monitoring of TB patients and new TB medicines. Furthermore, all the safety data collected by LCP-NCPR in Excel from July to December 2015 under the operational research framework were cleaned, validated, coded into medDRA,[11] and migrated to PViMS by SIAPS.

In preparation of programmatic implementation of the 9MTR and BDQ, SIAPS worked with Knowledge Management Information Technology Services (KMITS) to make PViMS interoperable with the country's national TB database. This allows seamless exchange of data between the two information systems and eliminates duplication of work. Finally, SIAPS trained key central-level staff on the clinical, reporting, publishing, and analytical functionalities of PViMS. The training was augmented with onsite mentoring visits by FDA, KMITS, LCP, and PD at 7 of the 10 implementing treatment facilities (table 1). Another important aspect was the inclusion of PViMS orientation as part of the 9MTR roll-out by NTP.

In 2017, NTP, PD, KMITS, LCP, and FDA created the *PViMS User Guide: Active Reporting of Adverse Events*[12] to further standardize the reporting of aDSM data through PViMS. The DOH also released a department memorandum on issuing PViMS user accounts. In September 2017, SIAPS held a workshop for 63 central and regional NTP, PD, and FDA staff along with facility staff from the 10 implementing sites. During the workshop, regional coordinators from FDA, PD, and NTP in 9 regions worked collaboratively in planning programmatic implementation of standardized aDSM data recording and reporting in their respective regions.

The objectives of systematic data collection within an active drug monitoring program, such as aDSM, are to:

- Detect unknown adverse drug reactions (signals) early
- Better characterize known reactions
- Measure risk (incidence)
- Identify risk factors for important reactions so that appropriate measures can be taken to minimize the risk of harm and improve treatment outcomes[13]

PViMS is therefore expected to help the NTP achieve the stated objectives with respect to the new anti-TB medicines and novel TB treatment regimens. It will also help the Philippines comply with international standards for medicine safety monitoring and contribute to global efforts to better characterize the safety profile of these treatments.

RESULTS

PViMS has been implemented in 10 out of 94 facilities involved in the treatment of MDR-TB patients on new anti-TB medicines and/or 9MTR as of December 2017 (table 1) and in the LCP-NCPR as the 9MTR and BDQ operational research database. With implementation of PViMS, the Philippines has established the basic infrastructure for efficient safety-data collection in the NTP to ensure the new treatments are not only safe and effective, but the best possible health outcomes are attained for MDR-TB patients. Furthermore, aDSM data collected from treatment sites can be analyzed at the national level in collaboration with TB and drug safety monitoring authorities in-country to make quick evidence-based decisions to improve the safety of TB patients as recommended by WHO.[4]

Table 1. PMDT treatment facilities where PViMS is operational

Treatment facility	Location	Region
Lung Center of the Philippines	Quezon City, Metro Manila	National Capital Region
Dr. Jose N. Rodriguez Memorial Hospital	Caloocan City, Metro Manila	
Ilocos Training and Regional Medical Center	San Fernando, La Union	Region 1
Dr. Jose B. Lingad Memorial Hospital	San Fernando, Pampanga	Region 3
Batangas Medical Center	Batangas City, Batangas	Region 4A
Sorsogon Medical Mission Group Hospital	Sorsogon City, Sorsogon	Region 5
West Visayas Medical Center	Iloilo City, Ilollo	Region 7
Eversley Child Sanitarium	Cebu City, Cebu	Region 7
Zamboanga City Medical Center	Zamboanga City, Zamboanga	Region 9
Xavier University Community Health Care Center (Committee of German Doctors)	Cagayan de Oro, Misamis Oriental	Region 10

The ultimate purpose of systematic data collection within aDSM is to enable causality assessment for serious adverse events (SAEs), determine their frequency (rates), and detect signals.[4] Through PViMS, data collection, causality assessment, determining the frequency, and signal detection can be performed in a single platform. The line-listing and first review of all episodes, which is the first step in analysis of aDSM data, can be easily done in PViMS.

From January to September 2017, 1,184 patients were started on the new treatments under programmatic conditions (1,141 patients on the 9MTR and 43 patients on BDQ). Of these, 470 patients (39%) (made up of 460 patients on 9MTR and 10 patients on BDQ) were treated at 10 sites that use PViMS; 23 of the patients treated at the 10 sites where PViMS is installed reported 32 SAEs involving 13 system organ classes from January 2017 to October 2017.

In addition, feedback from the operational research team noted the following positive results:

- Organization and encoding of reported AEs is easier using PViMS: LCP-NCPR is managing 329 9MTR and 75 BDQ patients' data; each patient had an average of 16 events and 25 clinical evaluations for the entire treatment duration
- Shorter time to prepare LCP-NCPR quarterly reports using PViMS: Previously about 15 calendar days (with no distractions) were required to complete the quarterly report (including mapping the reported SAEs to the affected system organ classes), but with PViMS it requires just 1 day
- Fewer keystrokes: Redundancies in data entry experienced with Excel, such as having to enter the patient study ID or medical record number each time there is a clinical evaluation, site visit, or event with the patient, have been eliminated
- Overview of patient's medical history: With PViMS, it is easy to view and follow a patient's medical history over time from a single page, whereas with Excel, the health workers has to look through 11 separate files

CHALLENGES AND LESSONS LEARNED

A major challenge being encountered in implementing PViMS is the slow Internet connection at the 10 sites implementing PViMS and LCP-NCPR. This makes it hard to access the website when needed, thus slowing down the pace of work. Patient demographics and treatment regimen data from the country's national TB database must be complete and updated to ensure that the data transferred to PViMS when the event occurred is accurate.

Due to the urgency of 9MTR and BDQ implementation under programmatic conditions, the drafting of policy and implementation of PViMS are being done simultaneously. Drafting of administrative policy will take longer because of multi-stakeholder involvement.

Collaboration with relevant stakeholders from the planning stage of PViMS ensured that the system complied with national regulatory requirements. Leadership is a critical success factor in PV. However, TB and drug safety monitoring authorities in-country lack sufficiently trained staff to undertake causality assessment and analyze data. In addition, there is no dedicated staff to routinely assess all reports received in PViMS in order to detect signals.

NEXT STEPS

With the planned expansion of 9MTR (known as standard shorter treatment regimen in programmatic implementation) and use of BDQ to all 163 (as of December 2017) treatment centers in the 17 regions of the country comes the need to also expand implementation of standardized aDSM data collection using PViMS. The more data that are available the better the reliability of the safety profile.[5] Plans are already underway for this. However, success will depend on availability of the following:

- A pool of trainers to train personnel at all treatment and satellite treatment centers in the expansion of PViMS use, eventually in all 17 regions
- Continuous supportive supervision and on-the-job mentoring to strengthen the capacity of staff to use PViMS
- Enhanced IT infrastructure of the DOH where PViMS is deployed to support the increase in the number of facilities that will use the software

- Periodic data quality checks in PViMS to ensure that valid data are collected so that clinical and regulatory decisions emanating from such data are also valid
- Field testing and finalizing the draft aDSM recording and reporting flow SOPs using PViMS at the central, regional, and peripheral levels

It is further envisaged that other DOH programs in the Philippines, such as malaria, HIV/AIDS, immunization, family planning, maternal and child health, and nutrition, will adopt PViMS while monitoring the safety of medicines used in these programs.

Finally, although initial steps on institutionalizing PViMS as the tool for collecting and managing drug safety data have been taken, a policy that supports PViMS implementation nationwide should be finalized and approved to strengthen the governance structure and ensure sustainability of the system.

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4301 N. Fairfax Drive, Suite 400 | Arlington, VA 22203 USA
Tel: +1 (703) 524-6575 | Fax: +1 (703) 524-7898 | E-mail: siaps@msh.org | Web: www.siapsprogram.org

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Improving Xpert MTB/RIF Assay Implementation in the Philippines National TB Control Program

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SIAPS
Systems for Improved Access to Pharmaceuticals and Services

February 8, 2018

BACKGROUND

Despite the continuous efforts of the National TB Control Program (NTP) to increase case finding by expanding the number of laboratories and implementing other interventions such as active case finding for high-risk populations, TB case finding has remained below expectations. The introduction of rapid TB diagnostic technology such as Xpert MTB/RIF assay (or Xpert) in 2011 has improved TB detection, particularly of rifampicin-resistant TB (RR-TB) cases. RR-TB is currently used as a proxy indicator for the presence of multidrug-resistant TB (MDRTB). The TB detection rate using Xpert is 32% among new presumptive drug-susceptible TB cases, and 35% among drug-resistant presumptive TB cases; this is higher than the 15% positivity rate for TB diagnostic microscopy. Xpert was also able to detect RR-TB in an average of 35% of MTB+ cases.[1] The scale-up of Xpert services has increased the test's availability in the NTP laboratory services, with 207 sites established by the end of 2016. However, Xpert's performance capabilities in terms of case finding are not fully realized, due to a variety of issues affecting its implementation.

KEY ISSUES AND ANALYSIS

Limited Access to Xpert Sites

More than 50% of existing Xpert sites are situated in intermediate-level facilities such as district, provincial, or tertiary hospitals, or in specialized laboratories and tertiary medical centers; the rest are located in primary care units (e.g., rural health units (RHUs) or health centers). With this distribution, the number and location of Xpert sites remains inadequate to ensure universal access to rapid TB diagnostic tests and drug susceptibility testing. This inadequate access is a result mainly of long distances between the Xpert sites and referring health facilities. In Nueva Ecija, for example, the distance from a referring healh center to the referral laboratory ranges from less than a half-kilometer to almost 45 kilometers.[2]

Additionally, the high cost and variable availability of transport, especially in hard-to-reach rural areas, further limit access to services. Furthermore, the availability of Xpert services, particularly in primary care facilities, is not assured on a daily basis due to the shortage of medical technologists, who often are tasked with administering more than one laboratory per week.

Variable Performance of the Specimen Referral and Transport System

The performance of the specimen referral and transport system is unreliable. Poor packaging and transport expose specimens to damaging conditions, affecting their integrity before testing is carried out. Field observations showed that poor specimen packaging is common in primary care facilities because (1) the appropriate packaging supplies are not available, (2) health workers are not aware of proper specimen packaging techniques, and (3) health workers or patients often pay for the packaging supplies, leading to the use of poor-quality materials. These factors have led to specimen leakage or spillage from their primary containers, and subsequent contamination; specimens were exposed to heat, which can kill mycobacteria and lead to false-negative results; and specimen leakage has potentially exposed, or infected, people involved in specimen transport with the TB mycobacteria.

Under Programmatic Management of Drug-Resistant Tuberculosis (PMDT), specimen transport is adequately supported with donor funds (i.e., from the Global Fund). However, in DOTS primary care facilities, the system is loosely supported by funds from patients, health workers, and local government units. Public utility vehicles are commonly used for specimen transport from DOTS facilities, resulting in variable transport times, delays, and poor specimen handling.

Supply Management Problems

Stock-out of cartridges was experienced due to inaccurate quantification of supply requirements, resulting in the provision of lesser quantities than what was requested by testing facilities. The shortage of cartridges resulted in the testing of patients being limited; drug-resistant TB (DRTB) patients were preferentially tested whereas high-risk presumptive TB patients were excluded from testing. Additionally, improper transport during distribution tends to expose cartridges to heat and shocks during transit, potentially compromising quality. Storage conditions are also variable, especially at primary-level facilities, where temperature exceeds the recommended limit (28 °C). This exposes the cartridges to risk of damage, which can lead to erroneous test results.

Variable Quality of Tests

In 2015, the National TB Reference Laboratory (NTRL) reported that 5% of tests performed yielded errors or invalid results. This is the equivalent of 3,449 wasted cartridges. Most errors can be attributed to faulty operator practices; to cartridge quality, which can be due to poor distribution and storage; or to poor specimen transport conditions.[1] Faulty practices can be attributed to inadequate operator training, caused by a lack of training opportunities. Training quality has also been compromised by the lack of trainers, as well as insufficient training equipment and supplies (i.e., Xpert machines and cartridges for training). There is no organized external quality assurance scheme for Xpert implementation, and the performance of regular maintenance activities at the facility level is also inconsistent.

RECOMMENDATIONS

A number of interventions are needed to address the performance gaps in the Xpert laboratory network, mainly in terms of strengthening laboratory support systems. The planned medium-term widespread expansion of Xpert is not likely to succeed in addressing accessibility and case finding issues without filling these systemic gaps. The following recommendations are considered strategic short-term interventions with long-term benefits, including improved access to testing and increased TB case detection.

- Strengthen the specimen referral and transport system to improve accessibility of Xpert services. The system should be supported with the necessary guidelines, funds, packaging materials, and training to address the problems in organization, financing, and processes such as specimen collection, packaging, and courier/transport services.
- Improve supply management capacity at all levels and stages of the management cycle, particularly quantification, distribution, and storage of supplies. Quality assurance of supplies must also be put in place.
- Strengthen the maintenance of Xpert laboratory equipment and facilities. A functional, regular maintenance program must be organized and implemented; maintenance tasks at the facility level assigned to operators should be regularly performed.
- Strengthen training and supervision of Xpert operators. Training quality should be improved by addressing the systemic gaps in the current Xpert training program, particularly in providing adequate practice time during training. Management of the Xpert training program should be strengthened by decentralizing some functions to the subnational level to address delays and backlogs in training.
- Improve the selection of Xpert sites under the expansion scheme. Use a carefully designed set of criteria to guide NTP managers in selecting new sites for Xpert expansion. Consider local TB burden, location of existing diagnostic (e.g,. X-ray) and treatment facilities, feasibility of specimen referral routes, and availability of transport in selecting the sites.

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4301 N. Fairfax Drive, Suite 400 | Arlington, VA 22203 USA
Tel: +1 (703) 524-6575 | Fax: +1 (703) 524-7898 | E-mail: siaps@msh.org | Web: www.siapsprogram.org

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TECHNICAL HIGHLIGHT

Economic Cost of Non-Adherence to TB Medicines Resulting from Stock-Outs and Loss to Follow-Up in the Philippines

INTRODUCTION

One of the key elements of successful tuberculosis (TB) control programs is adherence to treatment, and this is a cornerstone of most international and national policies and guidelines. Non-adherence is often due to patient-related factors, but can also be a result of provider issues, such as stock-outs of TB medicines. Non-adherence results in increases in length and severity of illness, deaths, disease transmission, and drug resistance. These have economic consequences in terms of costs and loss of income for patients and their families and also costs to the health system.

Non-adherence is commonly due to treatment interruption, which may be for short intermittent periods of a few days or for longer periods of weeks or months, and may even end up as complete discontinuation of treatment. Interventions to prevent treatment interruption are aimed at both patients and providers. On the provider side, actions include ensuring proper prescribing practices and management of side effects, providing good quality medicines, and preventing stock-outs. On the patient side, these include interventions to encourage patients to continue treatment even when they feel better, use medicines as directed, and remove barriers such as transport costs. These actions are believed to be a good investment, but the economic savings have not been well and clearly defined. The Philippines is among 22 countries considered to have a high burden of TB, including multidrug-resistant (MDR) TB. The Philippines Department of Health (DOH) has an extensive TB program with directly observed treatment short (DOTS) courses for TB and programmatic management of drug resistant TB for MDR-TB. In addition, the DOH has strategies and procedures in place to ensure and improve treatment adherence, including supervised treatment, patient compliance incentives, and supply chain management strengthening. This is not always easy, however, especially in a large, decentralized country where health care services are largely managed at local levels and stock-outs and loss to follow-up (LTFU) have been challenges.

In recent years, National Tuberculosis Control Program (NTP) data and several studies have indicated problems with stock-outs of some TB medicines and with LTFU. Both of these problems result in treatment interruption.

At the request of the NTP and USAID, a study was conducted to determine the health, mortality, and economic impact of stock-outs and LTFU to justify greater investment in addressing these challenges.

Child with MDR-TB undergoing treatment in the Philippines. (photo: WHO/HM Dias)

METHODOLOGY

Three case studies were selected on the assumption that these would probably have had the greatest impact: stock-outs of drug-sensitive TB (DS-TB) category 1 medicines; LTFU of DS-TB patients; and LTFU of MDR-TB patients.

Data were obtained from three sources: a global literature review, a review of NTP documents and records, and interviews with an expert panel of doctors, pharmacists, and NTP staff. Algorithms were developed based on the information received (figure 1), and these were modeled in a spreadsheet-based tool developed by SIAPS to analyze the impact.

The models quantify the likely impact of the treatment interruption in terms of subsequent treatment or non-continuation of treatment and in terms of provider costs, household out-of-pocket costs, and productivity losses. The models show the additional health and cost outcomes of each specific type of treatment interruption, excluding the health and cost outcomes that would have been incurred if treatment had not been interrupted.

RESULTS

DS-TB medicine stock-outs

Based on the results of a sample patient survey conducted in early 2014, as many as 2,663 DS-TB patients may have been unable to obtain medicines from the public sector for a month or more. The likely impact of these stock-outs is that 266 of these patients would have developed MDR-TB because of poor-quality private sector treatment, poor adherence, or discontinuation of treatment (table 1). And these 266 patients are likely to have infected an additional 63 people with MDR-TB. In addition, 588 patients and persons infected by those patients are likely to have died.

The total additional economic cost resulting from the stock-outs is likely to have been as much as USD 21 million, comprised of USD 1.5 million for additional service delivery costs and USD 19.5 million for additional household costs (out-of-pocket costs and productivity losses) (table 2). This works out to a cost of approximately USD 8,000 per patient who interrupted treatment, meaning that an investment of up to that amount to prevent the stock-out for one patient would have resulted in a net saving to society.

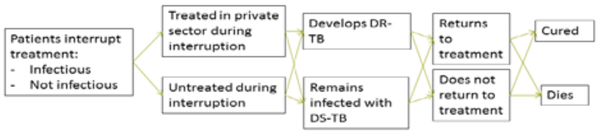

Figure 1. Conceptual framework for treatment interruption

DS-TB patients lost to follow-up

In 2014, 8,870 DS-TB patients were reported by the NTP as lost to follow-up. The likely impact of this LTFU is that 887 of these patients would have developed MDR-TB through poor-quality private sector treatment, poor adherence, or discontinuation of treatment. And those 887 patients are likely to have infected an additional 245 people with MDR-TB. In addition, 1,958 patients and persons infected by those patients are likely to have died.

The total additional economic cost resulting from this LTFU is likely to have been as much as USD 72.2 million, comprised of USD 5.8 million for additional service delivery costs and USD 66.4 million for additional household costs. This works out to a cost of approximately USD 8,000 per patient who interrupted treatment, meaning that an investment of up to that amount to prevent LTFU for one patient would have resulted in a net saving to society.

MDR-TB patients lost to follow-up

A study of a 2012 cohort of MDR-TB patients found that 29% were lost to follow-up. We applied that percentage to the 2,680 MDR-TB patients treated in 2014, which gave an assumption that 777 MDR-TB patients would have been lost to follow-up. The likely impact for the 777 patients is that 330 would have developed XDR-TB through poor-quality private sector treatment, poor adherence, or through discontinuation of treatment. And those 330 patients are likely to have infected an additional 19 people with XDR-TB. In addition, the MDR-TB patients who were still infectious at the time of interruption are likely to have infected an additional 474 persons with MDR-TB. Plus, 233 people are likely to have died as a result of the LTFU.

The total additional economic cost resulting from this LTFU is likely to have been as much as USD 12.9 million, comprised of USD 4.5 million for additional service delivery costs and USD 8.4 million for additional household costs. This works out to approximately USD 17,000 per patient who interrupted treatment, meaning that an investment of up to that amount to prevent the LTFU for one patient would have resulted in a net saving to society.

Table 1. Impact of treatment interruption on morbidity and mortality

Number of	DS-TB stock-outs of 1 month	DS-TB LTFU of 3 months	MDR-TB LTFU of 5 months
Patients whose treatment was interrupted	2,663	8,870	777
Patients who develop MDR-TB as a result of the interruption	266	887	0
Patients who develop XDR-TB as a result of the interruption	Not estimated		330
Additional persons who develop DS-TB as a result of the interruption[1]	0	0	0
Additional persons who develop MDR-TB as a result of interruption	63	245	474
Additional persons who develop XDR-TB as a result of interruption	Not estimated		19
Persons who die as a result of the interruption	588	1,958	233

Table 2. Estimated economic impact of treatment interruption

	DS-TB stock-outs of 1 month	DS-TB LTFU of 3 months	MDR-TB LTFU of 5 months
Number of patients whose treatment was interrupted	2,663	8,870	777
Total estimated additional cost			
Provider cost	$ 1.5 million	$ 5.8 million	$ 4.5 million
Household cost	$ 19.5 million	$ 66.4 million	$ 8.4 million
Total	$ 21.0 million	$ 72.2 million	$ 12.9 million
Estimated additional cost per affected patient			
Provider cost	$ 573	$ 655	$ 5,733
Household cost	$ 7,309	$ 7,485	$ 10,875
Total	$ 7,882	$ 8,141	$ 16,608

[1] In both of the DS-TB case studies, the opinion of the expert group was that none of the patients with DS-TB should be infectious at the time of the treatment interruption and, therefore, no additional people would be infected as a result of the interruption.

CONCLUSIONS

The results of the three case studies show that TB treatment interruption can have a significant impact on morbidity and mortality, causing many people to develop MDR-TB and XDR-TB, resulting in many new infections and deaths. The economic impact on the health services, families, and society in general is equally devastating, running into many millions of US dollars.

These results are only approximate estimates because some of the assumptions were based on estimates provided by an expert panel in the absence of data. However, it is likely that the above figures are actually underestimated, partly because we did not take into account that some patients who had become non-infectious before interrupting treatment but did not return to treatment would have become infectious again at some stage. We also did not take into account that some of the persons who would have developed MDR-TB would have later developed XDR-TB.

The global literature review found that little research has been done on the impact of treatment interruption, and additional research would, therefore, be highly beneficial, both in the Philippines and globally to provide a more robust evidence base.

The results of the analysis indicate that prioritization should be given to improving supply chain management to prevent stock-outs; reduce DS-TB patient LTFU through better education and case management, especially in regions where it is high; and reduce MDR-TB LTFU through improved case management, including better management of medicines, because adverse side effects are a major reason for LTFU.

It is clear from these case studies that the cost of treatment interruption in the Philippines is significant and that investing additional resources to resolve the causes of these problems is likely to be extremely worthwhile.

Further Reading

1. Collins, D, et al. The Economic Cost of Non-adherence to TB Medicines Resulting from Stock-Outs and Loss to Follow-Up in the Philippines. Arlington, VA: SIAPS; 2016.
2. Podewils LJ, et al. Patterns of Treatment Interruption among Patients with Multidrug-Resistant TB (MDR TB) and Association with Interim and Final Treatment Outcomes. PLoS ONE 2013;8(7): e70064. doi:10.1371/journal.pone.0070064
3. Soucy Brown M et al. Philippine Tuberculosis Supply Chain Options Analysis: Technical Report. Arlington, VA: SIAPS; 2015
4. Tupasi T, et al. Factors Associated with Loss to Follow-up during Treatment for Multidrug-Resistant Tuberculosis, the Philippines, 2012–2014. Emerging Infectious Diseases www.cdc.gov/eid, Vol. 22, No. 3, March 2016.

ABOUT SIAPS | The Systems for Improved Access to Pharmaceuticals and Services (SIAPS) program works to assure access to quality pharmaceutical products and effective pharmaceutical services through systems-strengthening approaches to achieve positive and lasting health outcomes. SIAPS is funded by the US Agency for International Development (USAID) and is implemented by Management Sciences for Health.

4301 N. Fairfax Drive, Suite 400 | Arlington, VA 22203 USA
Tel: +1 (703) 524-6575 | Fax: +1 (703) 524-7898 | E-mail: siaps@msh.org | Web: www.siapsprogram.org

SIAPS
TECHNICAL HIGHLIGHT

Ensuring Sustainable Access to TB Medicines through Inclusion in the Philippine National Formulary

Using a systems strengthening approach, the Systems for Improved Access to Pharmaceuticals and Services (SIAPS) Program is building the capacity of the pharmaceutical system at all levels to reduce the country's tuberculosis (TB) burden through increased access to pharmaceutical and laboratory services. Specifically, program objectives are to:

- Ensure the availability of effective, quality, and safe pediatric fixed-dose medicine combinations (FDC) for TB
- Ensure the availability of effective, quality, and safe anti-TB medicines for multi-drug resistant (MDR) TB
- Build the capacity of the National Tuberculosis Program in registering existing and new TB medicines in the Philippine National Formulary.

March 2017

BACKGROUND

TB caused an estimated 14,000 deaths in the country in 2015, according to the World Health Organization's (WHO) Global Tuberculosis Report for that year, which classifies the Philippines as a high TB-burden country. The National TB Control Program (NTP) of the Department of Health (DOH) leads the effort to ensure access to anti-TB medicines. The DOH's Pharmaceutical Division (PD) and Food and Drug Administration (FDA) also help ensure access through regulating in-country registration, quality, safety, and affordability.

Seeking Sustainable Access to New Drugs

The DOH requires medicines to be included in the Philippine National Formulary (PNF), the country's essential medicines list, before government funds can be used to acquire them.

Pediatric anti-TB medicines, which are commonly kept in bottles, present storage and distribution problems for the NTP and health facilities because of their bulky size. Further, administering them is time consuming and imprecise. New pediatric fixed-dose combination TB medicines recommended by the WHO have several advantages. However, they were not included in the PNF, so therefore could not be purchased with government funds.

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SIAPS Systems for Improved Access to Pharmaceuticals and Services

Further, the program wanted the PNF to include the anti-TB for MDR-TB medicines it currently uses. These are acquired through the Global Drug Facility (GDF) under a grant from the Global Fund, and are exempted from PNF inclusion. However, depending solely on the inclusion exemption as well as external funding for these medicines is not sustainable.

Therefore, the NTP plans to transition to government funding for these medicines, and including them in the PNF was a prerequisite step. The NTP also sought to build its capacity to acquire needed drugs in the future and to help ensure sustainable access to them.

APPROACH

SIAPS helps countries adopt new medicines and regimens by using a systems strengthening approach that engages stakeholders, builds on existing systems or establishes new ones where appropriate, strengthens human resources via trainings, improves the distribution chain for new TB medicines, and records and reports information for decision making in relevant areas.

SIAPS promotes stewardship and pharmaceutical governance by working with NTPs to coordinate all in-country partners and to define roles and responsibilities for implementation of these new medicines and regimens. The overall goal is to promote sustainability among all parts of a health system.

INTERVENTION

To begin the project, SIAPS helped coordinate regular planning meetings and discussions with the NTP's Drugs and Supplies Management (DSM) sub-technical working group. SIAPS then facilitated collaboration among the NTP, the PD, WHO, and the GDF.

The NTP then finalized the list of anti-TB for MDR-TB medicines to be acquired through the GDF. Assisted by SIAPS, the DSM prepared the required rationale, references, and guidelines used as basis for presentation to the Formulary Executive Committee (FEC) of the PD. The DSM then circulated the prepared documents and presentation for review by the NTP manager and DSM sub-technical working group members and revised the materials accordingly. Finally, the DSM coordinated with the PD to finalize the NTP manager's presentation to the FEC.

RESULTS

In October 2015, three new pediatric fixed-dose formulations were approved for inclusion in the PNF, two of which are dispersible flavored tablets. This ensures that the program will be able to acquire these medicines by using government funds. In addition to being easier to administer to children, the tablets are easier to store, take up less storage space in warehouses and health facilities, and are easier to distribute, thereby drastically reducing the logistics management burden and costs.

Further, five anti-TB medicines for MDR-TB were included in the PNF in September 2016. This will ensure that these medicines are consistently available to patients whether procured using government or external funds.

Table 1. New anti-TB medicines included in the PNF

MDR drugs	Capreomycin 1 g powder for injection
	Para-amino salicylic acid 4 g sachet
	Moxifloxacin 400 mg film-coated tablet
	Prothionamide 250 mg film-coated tablet
	Cycloserine 250 mg capsule
Pediatric drugs (new formulations)	Rifampicin 75 mg + isoniazid 50 mg + pyrazinamide 150 mg dispersible fixed-dose combination tablets
	Rifampicin 75 mg + isoniazid 50 mg dispersible fixed-dose combination tablets
	Ethambutol 100 mg tablet

With this experience, the DSM can take the lead on completing the approval documents and process to acquire new drugs the program needs. The DSM now regularly meets with its sub-technical working group to compile a list of needed medicines and coordinate completing requirements for inclusion approval.

WAY FORWARD

The DSM needs close coordination to agree upon and finalize medicines that should be included in the formulary. Further, the program should be able to clearly justify inclusion of these products, together with reference guidelines and recommendations. Lastly, the FEC should set up a meeting schedule that is coordinated and finalized with the appropriate NTP manager.

The NTP is already planning to include other medicines in the formulary such as *bedaquiline*, a powerful new drug for the management of MDR-TB, and rifapentine to manage latent TB. Faced with evolving global recommendations and guidelines, the NTP is now in a better position to adapt and keep up with progress in managing TB and ensure that the Philippines has access to the best possible medicines and treatment.

4301 N. Fairfax Drive, Suite 400 | Arlington, VA 22203 USA
Tel: +1 (703) 524-6575 | Fax: +1 (703) 524-7898 | E-mail: siaps@msh.org | Web: www.siapsprogram.org

A member of the Drugs and Supplies Unit of the NTP uses QuanTB to quantify the medicine and supply needs of the program, which will then be presented to the Drugs and Supplies Management Working Group

Building Leadership and Governance in Supply Chain Management for the National TB Control Program of the Philippines

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SIAPS
Systems for Improved Access to Pharmaceuticals and Services

January 2017

The National TB Control Program (NTP) in the Philippines is continuously scaling up its operations in the diagnosis and treatment of tuberculosis (TB) to achieve the results and deliverables described in the 2010–2016 Philippine Plan of Action to Control Tuberculosis.

Findings from the 2013 joint program review showed gaps in the supply management system of the TB program, including procurement, forecasting, storage capacity, and management practices.

> "Medicine supply chain management is complex and requires the coordination and collaboration of multiple stakeholders.

To address the increased work load, supply chain activities, and identified gaps, the NTP recognized the need for a Drugs and Supplies Management Working Group, which was established in 2014. This group aims to discuss issues and challenges in the supply chain management of TB medicines and laboratory and other health-related supplies. It also helps to coordinate and strengthen NTP efforts to address challenges in medicine management.

Medicine supply chain management is complex and requires the coordination and collaboration of multiple stakeholders. Good governance requires appropriate structures, systems, regulations, and procedures to provide quality services and oversight. The ultimate purpose is to ensure that patients receive the right medicines at the right time.

SIAPS ACTIVITIES

The US Agency for International Development-funded Systems for Improved Access to Pharmaceuticals and Services (SIAPS) Program is supporting the NTP in its effort to increase the capacity of various aspects of supply chain management, including leadership and governance. SIAPS supported the NTP in establishing the Drugs and Supplies Management Working Group by developing the terms of reference and facilitating regular meetings with partners and stakeholders. The purpose of the group is to:

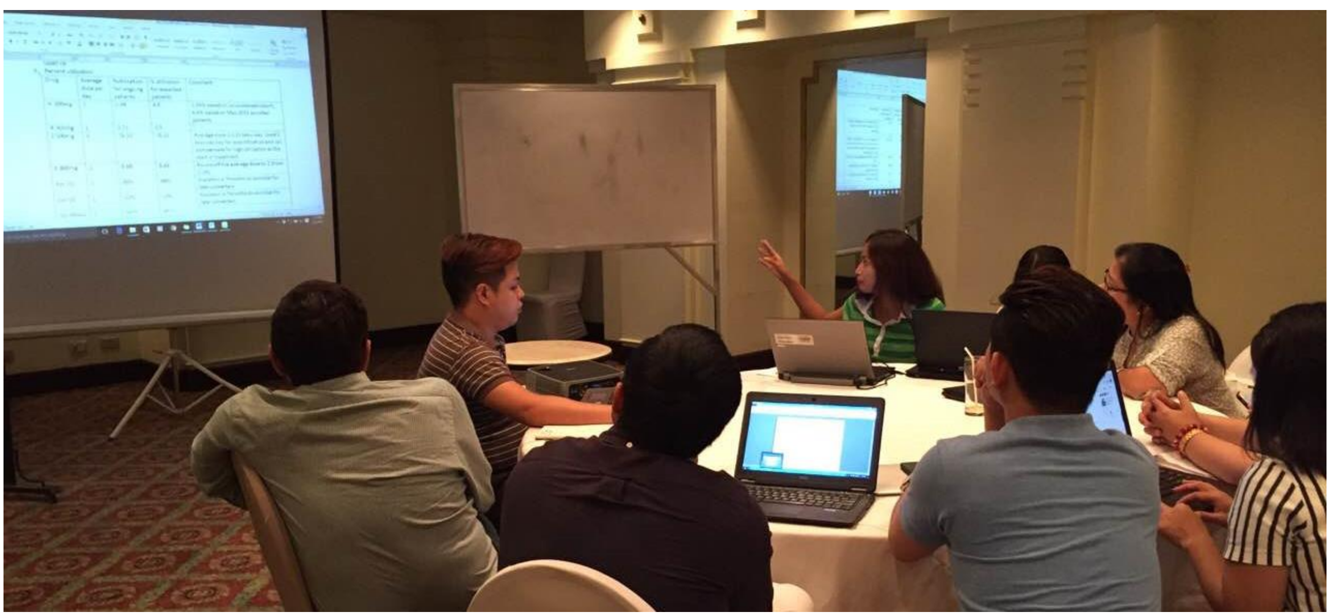
- Provide a platform to discuss, review, and validate decisions surrounding the management of TB medicines and laboratory and health-related commodities
- Ensure good governance, management, and adherence to treatment protocols
- Contribute to ensuring transparent and accountable medicine management services and systems

Table 1. Procurement Parameters Managed by the Drugs and Supplies Management Working Group

Parameters	2014	2015	2016
Total value of procurement	$4,026,447	$2,503,205	$1,927,248
Number of accelerated deliveries	1	0	3
Number of accelerated orders	0	0	2

Note: All prices are in US dollars.

To strengthen the capacity of the working group, SIAPS provided an orientation on quantification and forecasting, including the use of QuanTB and other tools. SIAPS also provided technical assistance and mentoring on data quality reviews and actual forecasting and quantification.



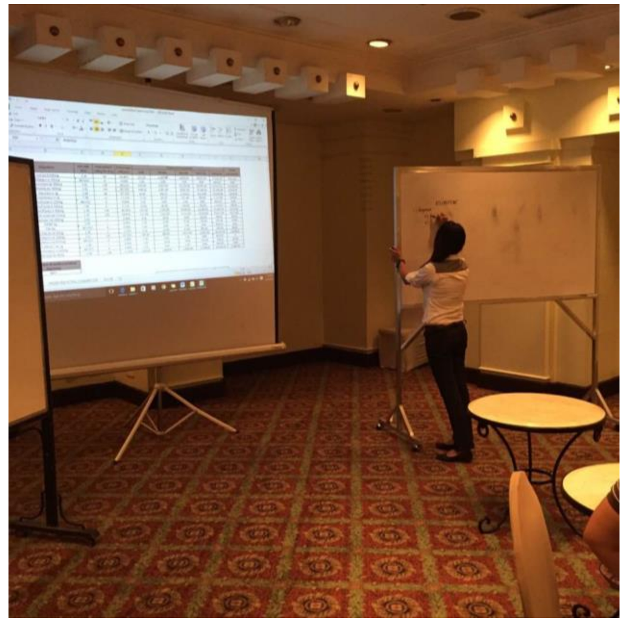
Sample presentation at the Results and Discussion Workshop with the Drugs and Supplies Management Working Group

RESULTS

Regular forecasting and quantification exercises and working group meetings helped the NTP ensure the uninterrupted supply of second-line TB medicines for programmatic management of drug-resistant TB and to address several issues related to the overall medicine and supply management.

Since the working group was established in 2014, it has:

- Approved six delivery plans and procurement orders to ensure a continuous supply of second-line TB medicines valued at approximately USD 8,456,900
- Accelerated four shipments and two procurement orders to prevent impending stock-outs
- Held or reduced deliveries to prevent overstock
- Averted wastage of medicines due to expiration by redistributing and donating stock
- Initiated the development of guidelines and job aids on proper waste management and laboratory supplies management
- Made programmatic decisions relevant to medicine use and supply, such as a memorandum on the use of capreomycin instead of kanamycin as the primary injectable agent during a global shortage
- Improved the capacity of members on data review and analysis for forecasting and quantification by mentoring staff and providing technical input during regular meetings



Sample presentation at the Results and Discussion Workshop with the Drugs and Supplies Management Working Group

CONCLUSION

By supporting the organization of the technical working group and building capacity at the central level, SIAPS has strengthened the TB program's leadership and governance in supply chain management. The NTP now oversees forecasting and quantification and manages the working group, while SIAPS provides technical assistance as needed. Significant improvements are attributed to the creation of the working group, and it is highly recommended that it be replicated at the regional level.

4301 N. Fairfax Drive, Suite 400 | Arlington, VA 22203 USA
Tel: +1 (703) 524-6575 | Fax: +1 (703) 524-7898 | E-mail: siaps@msh.org | Web: www.siapsprogram.org

TRACK TB

TECHNICAL HIGHLIGHTS AND TECHNICAL BRIEFS

Technical Highlights and Technical Briefs *from* TRACK TB

The PEPFAR- and USAID-funded **Track Tuberculosis Activity** (TRACK TB, 2013–2018) project, led by MSH, built leadership and technical capacity of the National Tuberculosis and Leprosy Program; executed an urban DOTS model for Kampala; created a program for MDR-TB; and improved the implementation of DOTS, TB/HIV, and MDR-TB interventions with strong M&E systems.

FROM 2018:

- National TB And Leprosy Program (NTLP) Leadership and Technical Capacity Enhanced for Effective TB Control

FROM 2017:

- Integrated Performance Assessment, Mentorship and Quality Improvement Approach for TB Care

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TRACK TB

TRACK TB

2018

NATIONAL TB AND LEPROSY PROGRAM (NTLP) LEADERSHIP AND TECHNICAL CAPACITY ENHANCED FOR EFFECTIVE TB CONTROL

Uganda is among the 30 high TB/HIV burden countries in the world with TB prevalence of 253/100,000 population and HIV prevalence of 6% in the general population. The TB/HIV co-infection rate is still high, standing at 42%.

Challenges of weak systems for health service delivery, poor funding and inadequate human resources at various levels has affected TB control efforts in the country. At the inception of TRACK TB project in 2013, the National TB program was largely funded through donor support with only 4% of the annual NTLP budget funded through domestic sources. The NTLP strategic plan was also not finalized and there was lack of a comprehensive annual operation plan around which to engage partners. There were delays in adopting new policies like the shift from EH to RH, INH prophylaxis, one-stop shop model for TB/HIV collaborative services and expansion of the TB diagnostic algorithm to include use of new diagnostics like Xpert MTB/Rif and digital chest X-ray. Similarly, there were gaps in the quality of TB data and delayed reporting from the health facilities and districts to the national level.

TRACK TB organized planning meetings with implementing partners to discuss the NTLP priorities and enable the partners to align their work plans with the NTLP priorities for the next year (2016/2017).

The TRACK TB project has been implemented by Management Sciences for Health, Inc. (MSH) in partnership with the AIDS Information Centre (AIC), University of California, San Francisco, and the Curry International Tuberculosis Center (UCSF/CITC). It was funded by the United States Agency for International Development (USAID).

Dr. Raymond Byaruhanga, Chief of Party, TRACK TB project, Management Sciences for Health, Plot 15, Princess Anne Drive, Bugolobi, Kampala, Ugand

Email: rbyaruhanga@msh.org
www.msh.org

These challenges affected the country's performance in TB control and the quality of TB care. For instance, out of the 90,000 TB cases expected to be notified, almost half are missed each year. Also, less than one quarter of the estimated drug resistant TB cases are diagnosed and treated each year. On another note, the NTLP realised significant gains in TB control, particularly in improving the treatment outcomes for registered TB patients in care and TB/HIV collaborative services. Over 76% of the registered TB patients are successfully treated each year and over 90% of the TB/HIV co-infected patients are receiving ART.

The USAID funded TRACK TB project between 2013 and 2017 strengthened the leadership and technical capacity of the NTLP to effectively coordinate the national TB response and ensure a harmonized approach in implementation of TB control in the country. The project achieved the following through technical support to the NTLP; functionalization of the National Coordination Committee (NCC) for TB, improved planning for TB through revision and dissemination of the NTLP strategic plan and annual operational plans, scaling up quality improvement interventions in TB care and revision and dissemination of the NTLP strategic plan and annual operational plans, scaling up quality improvement interventions in TB care and revision and dissemination of TB policy guidelines, manuals/SOPs and tools.

i) Revitalizing the National Coordination Committee (NCC) for TB to improve advocacy, funding and accountability

The project in 2016 supported the NTLP to revitalize the National Coordination Committee (NCC) for TB to advocate and mobilize for additional funding and human resource for TB control in the country.

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TRACK TB

The Ministry of Health through NCC for TB achieved high level and regular oversight of the TB control program and increased accountability by the NTLP which resulted in among other achievements the national level dissemination of the TB prevalence survey results, an inclusive planning for TB by partners and improved absorption of Global Fund resources for TB. The NCC for TB will remain a strong platform to coordinate the TB response, including liaising with other bodies like the Parliamentary Caucus for TB to harness opportunities for raising awareness about TB and mobilizing additional resources for TB control from domestic sources up from the current 4%.

ii) Implementation of Management and Organizational Sustainability Tool (MOST) for TB

The project supported the NTLP in use of the Management and Organizational Sustainability Tool to monitor progress in implementation of TB control activities. A priority action plan was developed in a TB stakeholders meeting and this was updated annually depending on the achievements and results. The evaluation of the MOST for TB priority action plan for 2016/17 showed that three quarter 22/28 (76%) of the priority activities were implemented (Annex 1)

iii) Strengthened capacity of the NTLP in planning and review of performance in TB and leprosy control

Figure 1: TB stakeholders during technical review of the NSP

To improve the planning and coordination of TB and leprosy control activities, TRACK TB project supported the revision of the national TB and leprosy strategic plan (2015/16-2019/20). The revision aimed at incorporating findings of the recent national TB prevalence survey and strategies to address the expanded TB epidemic. The revision also aimed at aligning the NSP interventions and indicators/ targets to the global WHO End TB strategy. The revised NSP has been pivotal in Global Fund joint TB/HIV concept note application and the grant negotiations. The project also supported the NTLP in developing Annual Operational Plans (AOPs) for TB control and shared the NTLP priorities with the implementing partners to inform their planning.

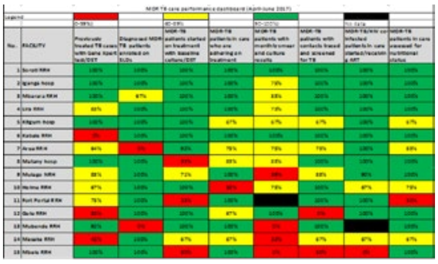
TRACK TB project in addition provided technical assistance to the NTLP to organize Quarterly Regional performance reviews to enable districts to discuss the regional performance in TB control, validate the quarterly TB reports before reporting through DHIS2 and update the regional teams on NTLP TB priorities and tools. This support contributed to improvement in the timeliness and quality of reports sent through DHIS2, to 75% in 2016/17.

iv) Technical assistance to NTLP in resource mobilization, ensuring optimal use of Global Fund resources for TB control

To improve access and utilization of the Global Fund resources, TRACK TB project supported the NTLP in the Global Fund grant application, addressing the technical review panel (TRP) comments and the grant negotiations. A total of USD 21 Million of the Global Funds grant to the country was approved for TB control for the period 2018-2020.

The project in addition supported the implementation of the GF work plan specifically, by preparing requisitions for funds and coordinating GF activities thereby contributing in improving utilization and absorption of GF resources up to 76% by end of the current TB grant (2015-2017).

v) Develop quality improvement system for TB care and scale up implementation by NTLP and partners.



To improve the quality of TB care, the project supported the NTLP to develop a Quality Improvement manual to guide implementation of quality improvement in TB care, including tools for mentorship of health providers. Capacity of the DTLS was built in QI during the annual DTLS' course in Buluba. The project in collaboration with partners implemented quality improvement interventions at the 15 MDR TB treatment initiation health facilities. The facilities were assessed for quality of MDR TB care and health providers were mentored to implement QI projects to address gaps in MDR TB care. A performance dashboard developed to monitor performance of the facilities showed improvement in the quality indicators and also pointed the poorly performing indicators and health facilities for targeted mentorship and support.

vi) Establish a robust NTLP M&E system that helps to provide strategic information for decision making

The project supported the NTLP to migrate TB reporting through the MoH electronic-HMIS (DHIS2) by strengthening capacity building of health workers in reporting using DHIS2, supported data analysis and reporting of TB & MDR-TB data to the national level. The project in addition procured an electronic server for NTLP to upgrade the MDR-TB electronic register to web-based system (MDR-TB e-MIS)

As a result of the project support, the National TB Program capacity has been strengthened in its leadership, management and coordination of TB control activities in the country. There is increased stewardship and accountability of the TB program through an effective platform, the NCC for TB that engages partners and stakeholders for a concerted TB response. There is also an updated national strategic plan in place for the period 2015/16-2019/20 and a number of TB guidelines, SOPs and tools revised in line with the current national and international guidance and recommendations. The country was awarded a new Global Fund grant of 21M USD to support the TB response in 2018-2010. This will go a long way in addressing the funding gaps to implement TB activities and meet the national targets for TB control in the country.

ANNEX I: THE MOST FOR TB ACTION PLAN PROGRESS 2013 - 2017

Areas of Improvement as Indicated in the MOST for TB Action Plan	Baseline Score**	Score at 2016	Target	Improvement Required to Move from 2014 Score to 2015 Target	Comments
1. Strategic Planning	3/4	4/4	4/4	1. Revised the NSP (2015/16-2019/20) 2. Printed copies of the NSP available 3. Dissemination of the NSP to all stakeholders, including district health offices and IPs done	NSP was revised in light of the TB Prevalence Survey findings & End TB strategy
2. M&E*	3/4	4/4	4/4	1. Availability of an M&E plan for the NSP & 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 in DHIS2 Completeness and timeliness of TB reporting improved (%)
3. 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 & distributed. Upgrading it on-line. To be done through Web based ordering (WAOS)
4. Human Resources*	2/4	2/4	3/4	1. Assignment of the 6 coordination roles in proposed NTLP structure to the staff 2. Clarification of human resources policies and procedures at NTLP (job classification and appraisal) 3. Number of NTLP central unit staff that have received capacity building to address identified capacity gaps	Dependant on 3 above
5. Advocacy, Communication and Social Mobilization	2/4	3/4	3/4	1. ACSM focal person in place (designated by USTP) 2. Minutes of quarterly ACSM technical working group meetings 3. ACSM strategy revised and disseminated 4. Involvement of the TB stakeholders in the development of ACSM plan	To be officially communicated Did desk review and consulted people to develop TB communication strategy
6. 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 fora	Oriented newly recruited DTLSs in Buluba Done through Global Fund support and IPs
7. 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.

Color codes: Green: completed Blue: Ongoing Red: not yet implemented

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TRACK TB

2017

QUALITY IMPROVEMENT TECHNICAL HIGHLIGHT 2017:

INTEGRATED PERFORMANCE ASSESSMENT, MENTORSHIP AND QUALITY IMPROVEMENT APPROACH FOR TB CARE

With the current prevalence, about 89,000 TB cases are estimated annually, but the country notifies only half of those cases each year. The rest of the cases are missed, a recipe for continuous TB transmission and emergence of drug resistant TB (DR-TB).

Kampala Capital City Authority (KCCA), with only 5% of the national population, notifies approximately 18% of all the TB cases in the country. The city is faced with challenges of urban populations and inadequate access to quality health care that impact on TB control indicators in the city. In 2012, TB cure rates for Kampala City was as low as 30% and the treatment success rate was 70%, significantly below the WHO target of 85% and 90% respectively. The poor performance was attributed to a number of issues including; low TB case finding by health providers, poor monitoring of TB patients on treatment, and weak systems to follow up with TB patients in the community. These gaps contributed to the low TB case notifications, poor treatment outcomes of TB patients, and the low detection/enrollment of DR-TB patients on appropriate treatment.

CONTEXT

Uganda is among the 30 high-burden TB/HIV countries globally. The recent national TB prevalence survey found a much higher TB burden than was previously estimated, with TB prevalence of 253/100,000 and TB incidence of 234/100,000 population (MOH, 2016).

Despite the high TB burden, the country is grappling with declining TB case notifications.

The TRACK TB Project, a five year USAID-funded project implemented by Management Sciences for Health (MSH), works to increase the TB case detection and treatment success rates in focus areas to meet the national targets for reducing the burden of TB, TB/HIV and multi-drug resistant TB (MDR-TB). The project provides technical support to KCCA to implement the urban TB control interventions at health facilities and communities in Kampala. The interventions include continuous quality improvement (CQI) approaches in TB care at health facilities to improve the quality of care and outcomes of TB patients registered in care.

Mentorship session on use of TB diagnostic algorithm.

APPROACH

The quality improvement (QI) approach entailed implementation of an integrated performance assessment of health facilities on standards of TB, TB/HIV and MDR-TB care, mentorship of the facility providers and application of continuous quality improvement methods to address gaps in TB care.

The approach adopted from the national QI framework and strategic plan (MOH, 2016) focuses on improving the standards of health care and application of continuous quality improvement methods to address gaps in the processes of health care.

A facility assessment and mentorship checklist was developed to assess the performance of the health facilities on key standards of TB care. The standards were adapted from the international standards of TB care (WHO, 2010). Five domains in TB care were identified to routinely assess performance of the facilities. These included; TB case management; management of TB laboratory services; TB infection control; management of TB logistics, and TB information management.

Following the facility assessment, on-site mentorship of multidisciplinary teams at the health facility was carried out, focusing on addressing the gaps in knowledge and skills in TB management. The target health providers included the nurses and clinicians in the outpatient department (OPD), TB/HIV clinics, laboratory staff and midwives in MCH/FP clinics. Health facility teams implemented CQI initiatives by identifying gaps in TB care, carrying out analysis of the gaps and designing/ implementing changes to address the gaps.

IMPLEMENTATION

The QI intervention was introduced through a phased approach starting with 10 pilot facilities that expanded systematically to cover 45 health facilities. The selected facilities, which contribute approximately 80% of the total TB case notifications in Kampala, were selected based on their high volume of patients, level of care, and geographical coverage.

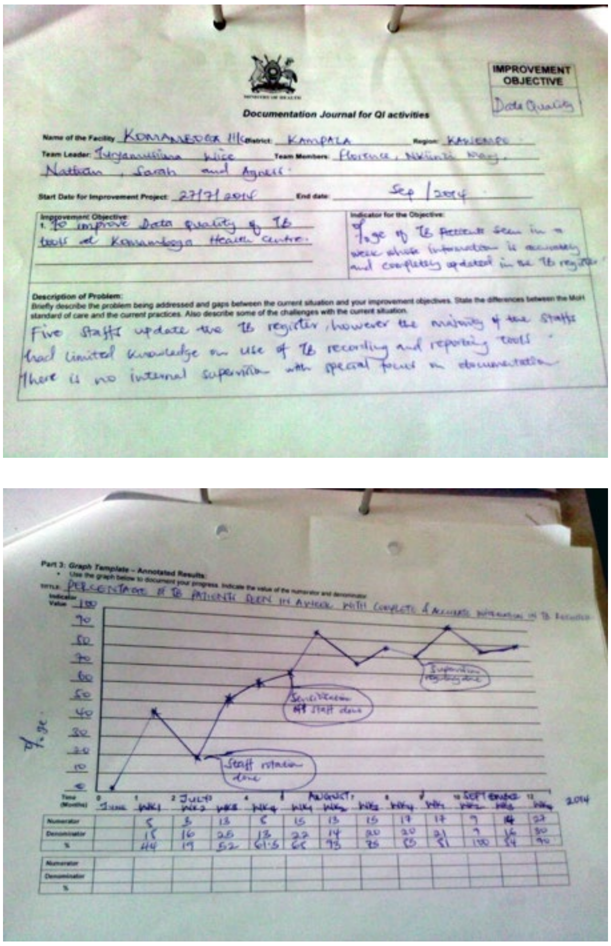
Health providers from the selected facilities were trained in CQI using the national QI curriculum of the ministry of health (MOH). The facility teams received QI coaching and mentoring on a monthly basis to help implement their QI projects, document successful changes, and monitor performance. The mentors were drawn from the MOH, KCCA and the project team. A facility assessment and mentorship tool was used to assess performance of the facilities and mentor the health providers.

The priority improvement objectives implemented included:

- Improving TB case finding through intensified TB screening at all care entry points, contact investigation of infectious TB cases, and strengthened use of Xpert MTB/Rif
- Improving TB case management and treatment outcomes through DOT implementation and monitoring for treatment response at 2, 5 and 6 months
- Improving TB/HIV integrated care through HIV testing for all presumptive and confirmed TB cases, Cotrimoxazole prophylaxis and ART for co-infected TB/HIV patients

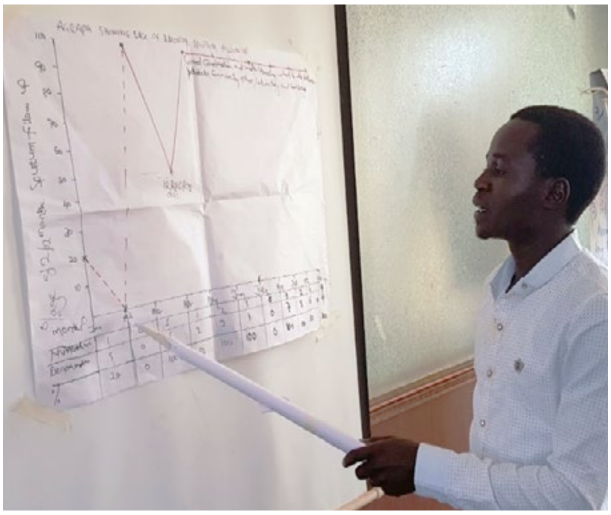
The facility teams used QI documentation journals to record the implemented QI projects, analyze gaps in performance, test changes to address the gaps, and plot run charts on indicators to monitor performance (Figure 1).

Figure 1: QI documentation journal on data quality for Komamboga HC



QI learning sessions were organized on a bi-annual basis for facility teams to share their results on indicator performance, accomplishments and lessons learned. During the learning sessions, the facility teams were also updated on the current strategies for TB control and identified successful changes that could be adopted by the other facilities for immediate implementation (table 1 and figure 2).

Figure 2: Clinician from Reach out Mbuya presenting data on 2 month follow up sputum smear during the learning session



RESULTS AND ACHIEVEMENTS

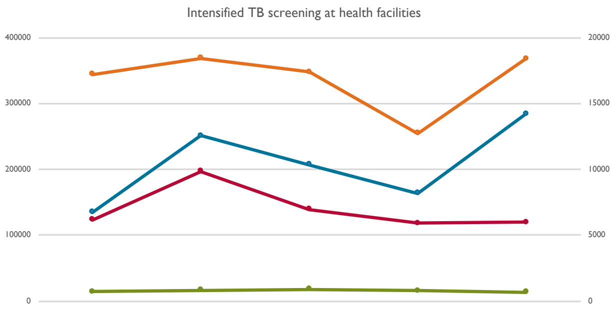
1. Improving TB diagnosis through intensified TB case finding at various care entry points

Between January 2016 and March 2017, the total OPD attendance was stable, except for a decline in between Oct-Dec 2016, where access to services and utilization was at its lowest, likely due to the holiday season. TB screening among the OPD attendances doubled from 134,551 to 283,938 patients. The presumptive TB cases identified increased initially from 6,180 in the quarter of Jan-Mar 2016 to 9,836 in the quarter of Apr-June 2016, then declined slightly and stagnated at 5,978 between Jan-Mar 2017. There was however no significant improvement in newly confirmed TB cases identified (Figure 3). This is probably because of ineffectiveness of the TB screening methods used.

Table 1

IMPROVEMENT OBJECTIVE	ACTIVITIES TO ACHIEVE IMPROVEMENTS
Improve screening of OPD clients for TB	• Assign focal person at triage to supervise documentation in OPD register • Introduce ICF tools at all care entry points (ICF forms, OPD registers, etc.) • Provide health education to all clients with an emphasis on TB information • Orient all health workers at care entry points on TB screening • Create reminders on filling the TB column of the OPD register
Improve sputum follow ups at 2, 5 and 6 months	• Provide adequate counselling and health education throughout the treatment period • Provide sputum mugs to clients on the visit preceding the sputum month • Identify a focal person to pick and update results in the unit register • Create a list of patients due for follow up or make use of the appointment register
Improve Xpert MTB/Rif testing	• Mentor health workers on eligibility for Xpert MTB/Rif test • Ensure presence of algorithm for Xpert MTB/Rif at all facilities • Display hub rider's route plan or schedule at the facility or in the labs • Conduct regular coordination meetings between hub riders, laboratory staffs and TB clinic team • Improve Xpert MTB/Rif test result documentation for retreatment patients

Figure 3: TB screening cascade at health facilities

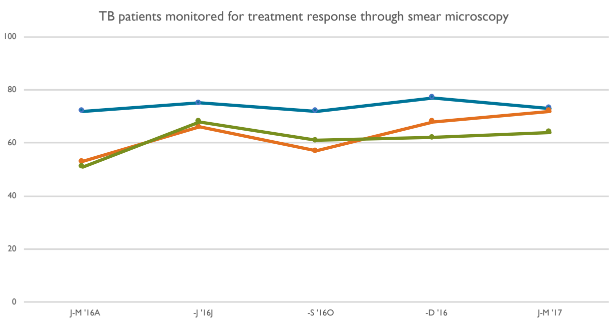


	J-M '16	A-J '16	J-S '16	O-D '16	J-M '17
Screened for TB	134551	250853	207126	164012	283938
OPD attendance	344279	369036	347983	254506	367670
Presumptive TB	6180	9836	6957	5926	5978
Confirmed TB	715	815	911	796	692

2. Improving TB case management by monitoring for treatment response at 2, 5 and 6 months

The facility teams monitored registered TB patients for treatment response at 2, 5 and 6 months. More than 72% of the registered TB patients had follow up smear done at 2 months. The proportion of registered TB patients with follow up smear at 5 and 6 months was slightly lower than at 2 months and a decline noted in follow up smear done at 6 months to 64% (Figure 4). This indicates the need for strengthening monitoring of TB patients towards the end of treatment.

Figure 4: Treatment response monitoring at 2, 5 & 6 months of treatment



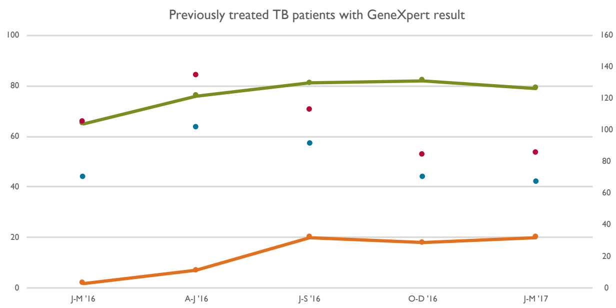
	J-M '16	A-J '16	J-S '16	O-D '16	J-M '17
% smear at 2 mo	72	75	72	77	73
% smear at 5 mo	53	66	57	68	72
% smear at 6 mo	51	68	61	62	64

The close monitoring of patients for treatment response has contributed to improvement in the treatment outcomes of TB patients in Kampala with cure and treatment success rate improving from 30% and 70% at the beginning of the project in 2013 to 77% and 86% in 2016, respectively.

3. Improving MDR-TB diagnosis through Xpert MTB/Rif testing for high risk TB patients

To improve MDR-TB diagnosis among the high risk TB patients, facility teams implemented interventions to ensure all previously treated TB patients get Xpert MTB/Rif test. The proportion of re-treatment TB patients who received Xpert MTB/Rif test improved over the last one year from 65% in the first quarter of 2016 to 79% in the quarter Jan-Mar 2017. As a result, the number of rifampicin resistant TB (RR-TB) cases detected increased from two cases to 20 cases during the same period (Figure 5).

Figure 5: Previously treated TB patients with GeneXpert test



	J-M '16	A-J '16	J-S '16	O-D '16	J-M '17
% done Genexpert	65	76	81	82	79
Rif resistant	2	7	20	18	20
Genexpert test	70	102	91	70	68
Retreatment cases	107	135	113	85	86

The project developed a QI dashboard to monitor the performance of the facilities in priority standards of TB care. The dashboard was shared with the health facilities, KCCA and the NTLP on a quarterly basis. The dashboard enabled the project identify the poorly performing health facilities on specific indicators for TB care and carried out targeted mentorships and coaching to the facilities to address the issues in performance and improve the quality of TB care (Figure 6).

Figure 6: QI dashboard showing performance of the health facilities in TB care indicators

TB Quality of Care performance monitoring dashboard (July - Dec 2016)

Legend: 0-59% (red); 60-89% (yellow); 90-100% (green); No data (black)

	Patients attending OPD screened for TB						Presumptive TB examined in the lab					
	Jul	Aug	Sep	Oct	Nov	Dec	Jul	Aug	Sep	Oct	Nov	Dec
Namungoona hosp	100	100	100	100	100	100	100	98	100	100	100	100
Kisugu HC	100	100	100	100	100	100	100	99	100	100	100	100
Mengo hosp	100	100	14	88	83	84	100	100	100	100	86	85
Reachout kinawatak	100	100	100	100	100	100	90	100	100	93	100	100
Kamwokya CCC	100	100	100	100	100	100	100	80	88	100	83	100
Nsambya home care	100	100	100				100	85	100	85	100	100
Rubaga hosp	42	36	13	57	64	74	69	50	38	100	71	57
Kitebi HC	47	52	52	28	72	50	51	30	53	100	55	82
Murchison bay hosp	1	2	100	34	67	98	98	84	100	100	100	100
Kiswa HC	4	72	100	40	58	28	90	43	96	96	100	100
Kisenyi HC	45	47	51	46	88	79	90	99	100	92	86	78
Komamboga HC	96	91	56	100			60	54	100	100	100	100
Mulago hosp							86	84	100	100	96	89
Kawala HC	77	66	20	16			88	21	100	100	94	74
Kibuli hosp	0	1	12	91	0	0	100	100	85	66	100	100
Joy Medical Center	100	99	100	6	7	9	100	83	90	100	100	100
Kawempe home care	100	100	100	100	100	100	94	84	100	100	100	100
AIC	100	100	100	100	100	100	100	100	100	86	82	91
Alive medical center	100	100	100	100	100	100	100	100	100	100	100	100
Uganda cares Owino	100	100	100	100	100	100	100	100	100	87	53	100
Luzira staff clinic	38	5	60	51			80	20	34	100	62	67
Touch Namuwongo	100	100		100			100	100	100	100	100	100
Naguru hosp	53	41			87	20	76	92	77	100	87	75
Butabika hosp	92	42	100	0	0	0	84	75	87	94	100	100
Reach Out-Mbuya	100	100	100	100	100	100	95	74	100	100	97	33
Reachout bannda	100	100	100	100	100	100	89	64	90	92	100	
Hope clinic lukuli	5	3	92	100	100	100	90	100	100	100	100	100
Kitante Med center	100	100	100	1	100	100	100	100	95	100	100	95
Uganda cares Kitante	100	100	100	100	100	100	56	100	100	74	100	70
Nsambya police	100	100	99	100	100	100	69	58	100	100	11	0

	New PBC TB done smear at 2 months						New PBC TB done smear at 6 months						TB/HIV co-infected patients on ART					
	Jul	Aug	Sep	Oct	Nov	Dec	Jul	Aug	Sep	Oct	Nov	Dec	Jul	Aug	Sep	Oct	Nov	Dec
Namungoona hosp	100	100	100	100	100	100	100	100	80	100	100	100		100		100	100	100
Kisugu HC	77	92	67	83	88	67	78	71	67	67	82	70	100	100	100	100	100	100
Mengo hosp	100	100	100	92	93	100	100	93	88	88	92	100	100	87	63	100	100	100
Reachout kinawatak		100	100	86	100	100	100	50	100	100		83	100	90	100	67	86	100
Kamwokya CCC	70	100	100	100	100	100	0	75	100	86	70	67	50	0	100	100	100	100
Nsambya home care	100	100	67	100	100	78	83	78	82	90	83	100	90	57	77	90	73	82
Rubaga hosp	100	100	86	73	93	92	77	100	100	88	100	100	100	100	100	100	100	100
Kitebi HC	91	82	89	91	100	63	80	100	70	70	91	82	89	100	100	100	100	100
Murchison bay hosp	50	100	60	100	100	100	100	100		100	50	100	100	100	100	100	100	100
Kiswa HC	100	100	89	100	100	89	86	58	92	92	89	38	100	100	100	100	86	100
Kisenyi HC	84	74	100	70	91	79	66	57	56	61	77	54	95	78	96	75	90	90
Komamboga HC	86	67	92	86	60	88	25	33	60	63	56	50	95	54	86	100	75	67
Mulago hosp	61	38	13	77	71	36	48	36	42	54	49	39	100	96	98	80	98	95
Kawala HC	82	82	76	74	94	88	91	50	82	38	50	56	91	76	81	94	100	92
Kibuli hosp	100	83	50	100	100	88	100	75	100	50	50	67	100	100	100	100	100	100
Joy Medical Center	100	50		100	100	100	100	0	75	67	50	100		0	0	100	100	100
Kawempe home care	50	67	100	100		67	67	100	100	63	50	50	100	67	100	100	100	100
AIC	100	0	100	100	100	100	0		0	50	0	0	100	100	50	100	100	100
Alive medical center	67	60	63	86	100	80	78	67	50	63	33	83	78	82	100	91	100	88
Uganda cares Owino	0	60	67	60	63	50	0	0	0	75	0	20	94	100	100	86	79	86
Luzira staff clinic	100	100	50	100	80	100		50	67	100	67	100	100	0				50
Touch Namuwongo	67	100	100	100	100	100	100	0	0	50	67	50	100	100		100		
Naguru hosp	78	47	70	87	77	42	85	74	74	72	57	29	71	71	100	63	70	50
Butabika hosp	100	75	100	0	100	75	100	100	67	100	100	60	50	100	50	100	100	50
Reach Out-Mbuya	100	50	100	33	75	100	50	60			100		81	83	100	100	100	25
Reachout bannda	100	100			0	0		0	100		100	0	100	67		100	67	
Hope clinic lukuli	100	75	100	0			25	25	0		0	13	80	77				100
Kitante Med center	100	100	100							100	0	100		100	0			100
Uganda cares Kitante	100	50	80		50	40	40	50	63	100	100	100	100	75	100	50	83	100
Nsambya police		0	60	20	100	100	20	0	40		50	0	100	100		100		

RECOMMENDATIONS AND NEXT STEPS

The QI initiative has enabled the facilities to build the capacity of health workers in TB management, re-organized clinic flow processes, and ensured quality TB care to the patients.

Although the majority of the health facility providers are knowledgeable in QI, they lack commitment, have poor culture of data use, and there is lack of involvement of the facility leadership. The facility QI teams therefore need to be strengthened to ensure they are functional, and the facility management must be engaged to ensure effective leadership for QI.

Results and accomplishments in QI also need to be shared at learning sessions and in various fora, including disseminating a compendium of successful changes in TB care to scale up implementation of continuous quality improvement in TB care in all health facilities.

Additional information can be obtained from:

Dr. Raymond Byaruhanga,
Chief of Party, TRACK TB project
Management Sciences for Health,
Plot 15, Princess Anne Drive, Bugolobi,
P.O. Box 71419, Kampala, Uganda

rbyaruhanga@msh.org
www.msh.org

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