



**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



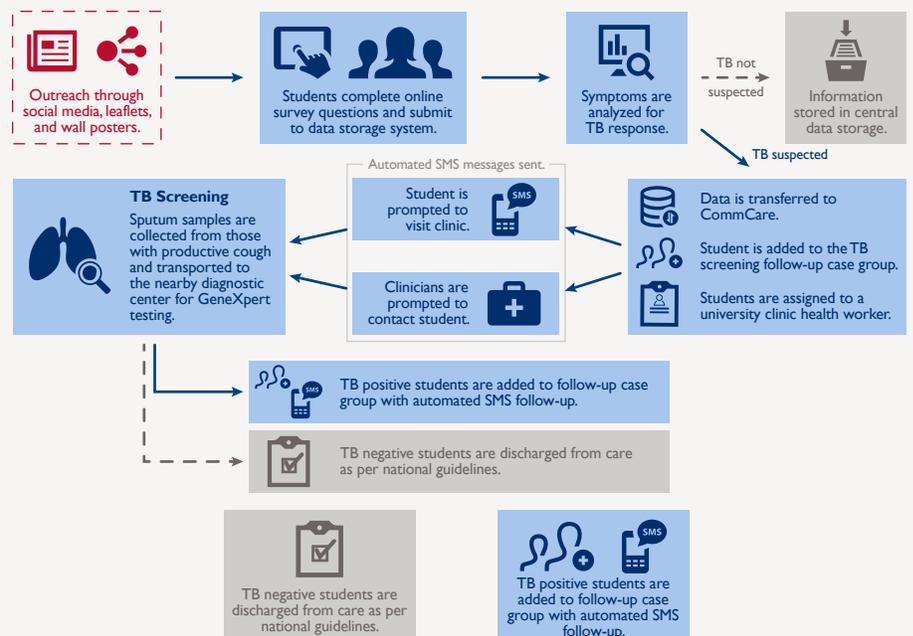
## STRATEGIC RESPONSE

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

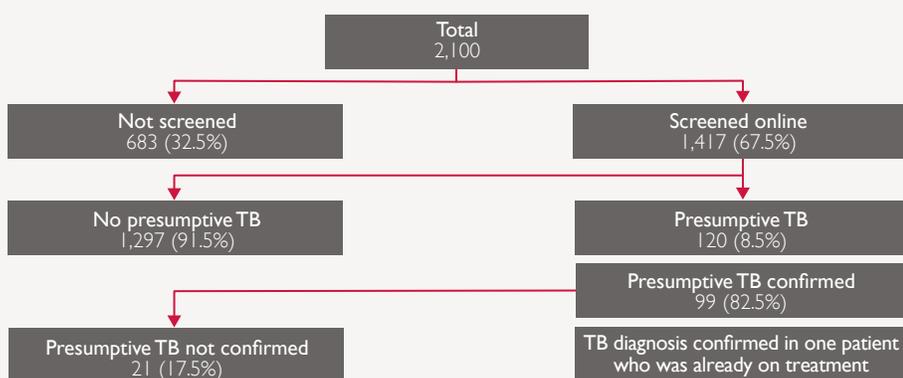


Table 1. Implementation challenges and solutions for online screening tool

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

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## 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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