



TECHNICAL BRIEF



Optimizing the Use of e-TB Manager for TB Case Management in Resource-Constrained Areas in Nigeria

TBLS training on e-TB manager offline mode application — photo credit MSH

BACKGROUND

Mobile applications have played an important role in field data collection in developing countries. However, poor infrastructure remains a challenge to fully utilizing mobile services. Information and communication technology and internet connectivity are rarely available in rural areas, while in urban areas, available connectivity is often slower than the service in more developed regions of the country.

e-TB Manager, an electronic tuberculosis (TB) management system, is a web-based tool used to manage all TB-related data and information needed by national TB control programs (NTPs) (SIAPS, 2016). The system integrates data across all aspects of TB control, including information on presumptive cases, patients, medicines, laboratory testing, diagnosis, treatment, and outcome. A notable feature is case monitoring, which enables providers to manage susceptible TB,

drug-resistant TB (DR-TB), TB-HIV, and pediatric TB cases from diagnosis to treatment outcome in line with World Health Organization guidelines.

e-TB Manager was introduced in 2011, and its harmonization for case management of both drug-sensitive TB (DS-TB) and DR-TB was introduced in 2015 (MSH, 2018). In total, 16 DR-TB treatment centers, 300 high-burden TB DOTS facilities, 768 local government TB supervisors (TBLS), two national and six zonal reference laboratories, and 36 state TB program offices were given differing levels of access to the web portal to conduct TB case management activities. Because e-TB Manager is a web-only portal application (which requires an internet connection), its use was a major challenge for high-burden facilities and TBLS in areas with no or low internet connection across Nigeria.

NIGERIA

STRATEGIC RESPONSE AND IMPLEMENTATION

Online data entry and accessibility in low-income countries such as Nigeria remains a challenge due to the high cost of bandwidth connection, unavailable or inconsistent network connectivity, and network-constrained environments. Inaccessibility during offline periods is a major challenge for users and affects the use of e-TB Manager. In coordination with the National TB and Leprosy Control Programme and other implementing partners, MSH, under the USAID-funded Challenge TB (CTB) project, sought an agile solution to this challenge by developing and deploying an offline-mode mobile application—an Android local data-storage application version of e-TB Manager. The implementation models adopted by in-country stakeholders began

by developing the most critical features of case management and then determining which features could be added later based on their use and response. This helped address challenges encountered at each stage of the implementation process. The implementation plan shown in figure 1 was followed in developing and deploying the offline-mode mobile application between May and September 2017.

Requirement Analysis: As a web portal, e-TB Manager requires constant internet connectivity for users, particularly DOTS officers in network-constrained areas, to enter or update case data on the platform. This high reliance on the internet results in a high cost of bandwidth connection and makes it challenging to use the system in some areas in the country

with poor connectivity. CTB conducted a thorough requirement analysis for e-TB Manager and proposed using an offline mobile Android application and synchronization feature. The aim of this application is to enable users in network-restricted areas to upload case data, which are stored in a phone’s local data storage, and then synchronize with the application server when the user has an adequate internet connection and schedules the synchronization (figure 2).

System Development and

Deployment: The proposed solution had the potential to reduce the cost of the bandwidth usage and cut down server workload by synchronizing case data from the e-TB Manager remote application server with a local database on the user’s device for offline use. It has improved the ease of data entry and ultimately the quality of a user’s day-to-day work. DOTS officers and TBLS are tasked with entering data in e-TB Manager in addition to their clinical responsibilities with TB patients, including dispensing drugs, filling out testing forms, and entering case data in the paper-based register.

A country-specific prototype of e-TB Manager was deployed in four states (Lagos, Ogun, Oyo, and Kano). During the pilot phase, the application was installed manually on each phone and not from the Google Play Store to limit access to 24 TBLS and 48 DOTS officers (6 TBLS and 12 DOTS officers in each state). The experiences of field-testing by end users of the system were

FIGURE 1. Process flow diagram for implementation of e-TB offline mobile

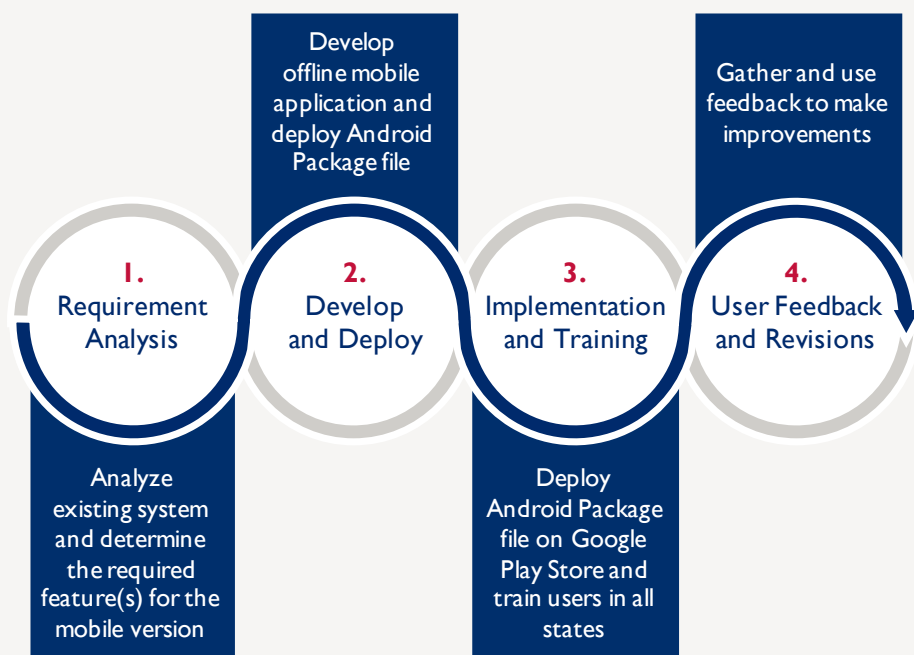
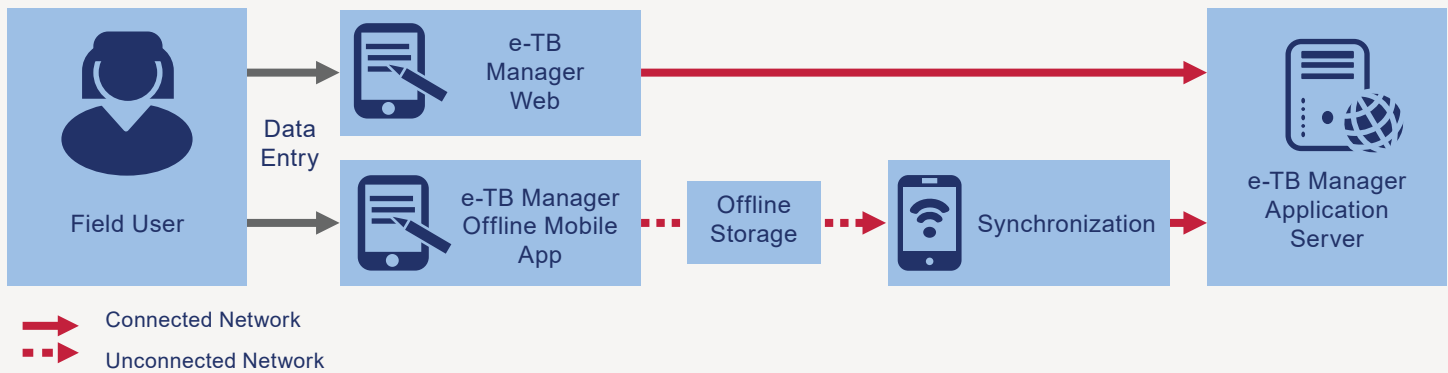


FIGURE 2. Data flow diagram for e-TB Manager



gather during the pilot and helped to inform system improvements. The aim of the pilot test was to evaluate the mobile application's stability and synchronization effectiveness within the current workflow of the NTP and to show whether the mobile application would be acceptable to end users.

Implementation and Training:

National-level officers of the NTP and other supporting TB implementing partners were trained as master trainers on the different

functional units of the application. After completing the training, individuals then became responsible for conducting other country-level training, supportive supervision, and on-the-job mentoring for users of the mobile application across the 774 local government areas for the TB supervisor with an additional 370 users in high-burden facilities.

User Feedback and Revisions: The system was adjusted based on user experiences. The initial audience for

the offline-mode mobile application was mainly DOTS officers working in the field who used it to enter and update basic case data such as presumptive and confirmed DS-TB and DR-TB cases. Each user profile in the offline-mode mobile application is attached to a facility. However, after deployment it became necessary to add a multi-facility feature to allow TBLS to manage all the health facilities in their domain and local government area.

RESULTS AND ACHIEVEMENTS

Following the launch of the offline-mode mobile application, 168 TBLS across the 14 CTB-supported states and other users (TBLS and high-burden facilities) were trained by the NTP. By the end of 2018, and after all users had been trained, there was a notable increase in the number of new and updated cases uploaded from the offline-mode mobile application (figure 3). Field users found the mobile application easier to use primarily because data entry was possible

even in a network-constrained environment. Anecdotally, there was also a reduction in the amount of data used per month.

After the launch of the offline-mode mobile application, there was an increase from 61,800 presumptive and confirmed cases in April–June 2018 to 65,459 presumptive and confirmed cases in July–September 2018, with the offline-mode mobile application accounting for about 60% of the upload (39,217). By addressing specific field user

accessibility issues, data could be synchronized with the system when field users were in a network-enabled environment, resulting in a reduction in backlogged data and fewer challenges with monthly data bundles from users. Anecdotally, users have found the interface easy to use and appreciate not needing connectivity during the data entry process. Navigating through task menus is less cumbersome as the application links users to the facilities they support.

FIGURE 3. Comparison of TB data entry (presumptive and confirmed cases) using the e-TB Manager web portal and offline mobile application

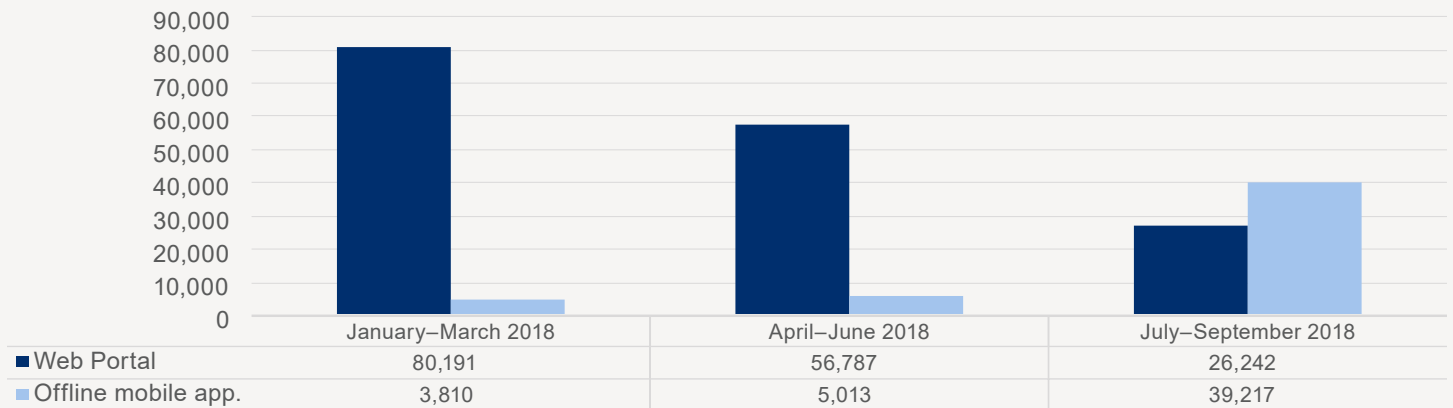
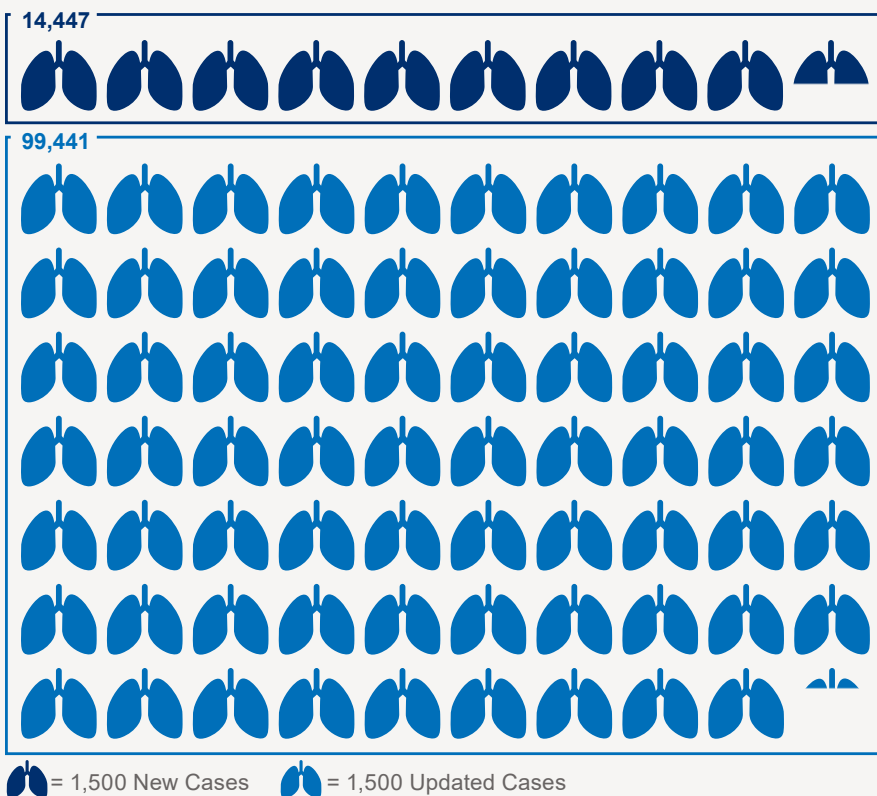


FIGURE 4. Number of new (presumptive and confirmed) and updated cases uploaded through the offline-mode application in 2018



LESSONS LEARNED

The offline-mode mobile application was developed for one facility for a user profile because the initial requirement discussion was for high-burden facilities in network-constrained areas, but the TBLS, who visit multiple facilities in their local government area, were not taken into consideration. There was no discussion about storage space on the tablet since users are managing their case data locally and synchronizing it at different points in time. Their case data, which are locally stored on the tablet, will require allocated storage space to avoid issues related to lack of space for the application in future.

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WAY FORWARD

The e-TB Manager offline-mode mobile application was designed for data entry by health officers in high-burden facilities. However, after deployment of the offline application, it was discovered that the application is also useful to local government TBLS users, who enter cases from facilities under their local government area without a tablet. In addition, the basic case management feature was implemented on the offline-mode mobile application for easy

and quick case data entry in the field for facility users. The application is being upgraded to accommodate multiple facilities for TBLS that have more than one facility in their user profile and to manage space by removing presumptive cases with test results and completed cases from the offline-mode mobile application as the application's optimal use is for presumptive and confirmed cases on treatment only.

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