Implementing QuanTB to Improve Forecasting, Supply Planning, and Early Warning Systems for TB Medicines: Myanmar Report

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About SIAPS

The goal of the Systems for Improved Access to Pharmaceuticals and Services (SIAPS) Program is to ensure the availability of quality pharmaceutical products and effective pharmaceutical services to achieve desired health outcomes. Toward this end, the SIAPS result areas include improving governance, building capacity for pharmaceutical management and services, addressing information needed for decision-making in the pharmaceutical sector, strengthening financing strategies and mechanisms to improve access to medicines, and increasing quality pharmaceutical services.

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ACRONYMS

EWS	early warning system
GDF	Global Drug Facility
MDR-TB	multidrug-resistant tuberculosis
MOH	Ministry of Health
M&E	Monitoring and Evaluation
NTP	National TB Control Program
PAS	para-aminosalicylic acid
PPM	Public-Private Mix
PSM	procurement and supply management
SIAPS	Systems for Improved Access to Pharmaceuticals and Services
TB	tuberculosis
UNOPS	United Nations Office for Projects and Services
USAID	US Agency for International Development
WHO	World Health Organization

ACKNOWLEDGMENTS

The Systems for Improved Access to Pharmaceuticals and Services (SIAPS) Program would like to express appreciation to the National TB Control Program (NTP) for its cooperation and commitment in strengthening the forecasting, supply planning, and early warning system (EWS) in Myanmar. The authors acknowledge the NTP and tuberculosis (TB) stakeholders and partners, including Population Services International Myanmar (particularly for the Public-Private Mix (PPM) for TB Care and Control); Myanmar Medical Association for PPM; Médecins Sans Frontières-Holland; the World Health Organization (WHO); Family Health International; and United Nations Office for Projects and Services (UNOPS) Myanmar for its collaboration and support of the intervention. In particular, the authors would like to acknowledge Dr. Si Thu Aung (Deputy Director/NTP Program Manager), Dr. Htet Myet Win Maung (Assistant Director of the NTP) and Ms. Yu Par Min Lwin (NTP Central Pharmacist) for providing perspectives as beneficiaries of QuanTB and SIAPS technical assistance.

INTRODUCTION

This report summarizes the information gathered as part of a review of implementation of QuanTB and related technical assistance to strengthen TB pharmaceutical management in the Myanmar.

Background

TB is a preventable and curable infectious disease that ranks alongside HIV/AIDS as a leading cause of death worldwide. If untreated, the disease can be debilitating and can kill approximately 50% of those infected. Proper forecasting, supply planning, and stock monitoring are key to ensuring an uninterrupted supply of TB commodities to meet the evolving needs of TB programs as treatment is scaled up and treatment regimens change. The US Agency for International Development (USAID)-funded SIAPS Program has provided technical assistance to NTPs in 12 USAID-focus countries since 2013. SIAPS regional or in-country technical advisors have collaborated with NTPs to address challenges that hamper uninterrupted access to TB medicines, such as the lack of reliable information for effective decision making in TB supply chain management, an EWS to prevent stock-outs or expiries, and supply chain system monitoring mechanisms, as well as limited institutional and human resource capacity in these areas. The support included the use of QuanTB—an electronic forecasting tool and EWS that transforms complicated calculations into a user-friendly dashboard that displays key quantification and supply planning information and alerts on risks of stock-outs or expiries . Implementation of the tool was complemented by other SIAPS TB technical assistance activities, such as quantification capacity-building training and participation in country monitoring missions.

Myanmar is a low-income country in South East Asia with a 2015 population of approximately 53.9 million and a life expectancy at birth of 65 years for males and 68 years for females[1,2]. The leading causes of illness and death are malaria, HIV/AIDS, and TB. In 2014, the TB prevalence was 457 per 100,000 population, and 141,957 TB cases were reported[3,4]. The TB rate is the highest in East Asia and three times higher than the global rate. The country has seven administrative regions and seven states. The public health expenditure comprised approximately 1% of the gross domestic product in 2014[5]. The NTP is funded mainly through the Government's Ministry of Health (MOH) and international development partners, including the Global Fund.

[1] World Development Indicators. Available at: http://data.worldbank.org/indicator.
[2] WHO Country Cooperation Strategy. Available at: http://www.who.int/countryfocus/cooperation_strategy/ccsbrief_mmr_en.pdf?ua=1.
[3] WHO Global TB Report Myanmar Country Profile. Available at: https://extranet.who.int/sree/Reports?op=Replet&name=/WHO_HQ_Reports/G2/PROD/EXT/TBCountryProfile&ISO2=MM&outtype=html
[4] WHO. Available at http://www.who.int/countries/mmr/en/.
[5] World Development Indicators. Available at: http://data.worldbank.org/indicator.

Key Gaps that Necessitated QuanTB Implementation

- *Inadequate forecasting and supply planning capacity:* Inadequate technical skills and tools to forecast and plan for the supply of TB medicines resulted in under or overestimation of TB medicines. The process took too long using Excel spreadsheets, and the results were comparatively less accurate than the QuanTB results.

- *Challenges in stock status monitoring and the lack of a proper EWS*: The NTP did not have a monitoring system for stock status and pipeline management of TB medicines. It had difficulty determining and tracking the stock status of second-line TB medicines and could not estimate how much stock would remain after all currently enrolled patients had finished their full course of treatment. There was also no proper EWS to prevent stock-outs, overstocks, or expiries of TB medicines. As a result, there were overstocks and expiries in some situations and stock-outs in others.

- *Logistics and epidemiologic information system:* There was no tool, mechanism, or standard procedure to routinely transfer patient enrollment information from the MOH's Monitoring and Evaluation (M&E) Unit to the Logistics and Supply section. There also was no tool or way to compare and monitor numbers of enrolled patients versus stock balance.

- *Deficiencies in baseline data to use in future assumptions for accurate forecasting:* The NTP did not have information on patient weight band distribution for each treatment regimen or on the patient ratio for para-aminosalicylic acid (PAS)-containing and non PAS-containing regimens.

The implementation of the QuanTB EWS and related SIAPS TB technical assistance helped to address these gaps.

Goal and Objectives

SIAPS conducted a review of SIAPS TB technical assistance and QuanTB implementation in Myanmar. Specific objectives were to determine:

- Key achievements or results of SIAPS QuanTB technical assistance in Myanmar
- Experiences and perspectives of the beneficiaries from the NTP
- Challenges and lessons learned

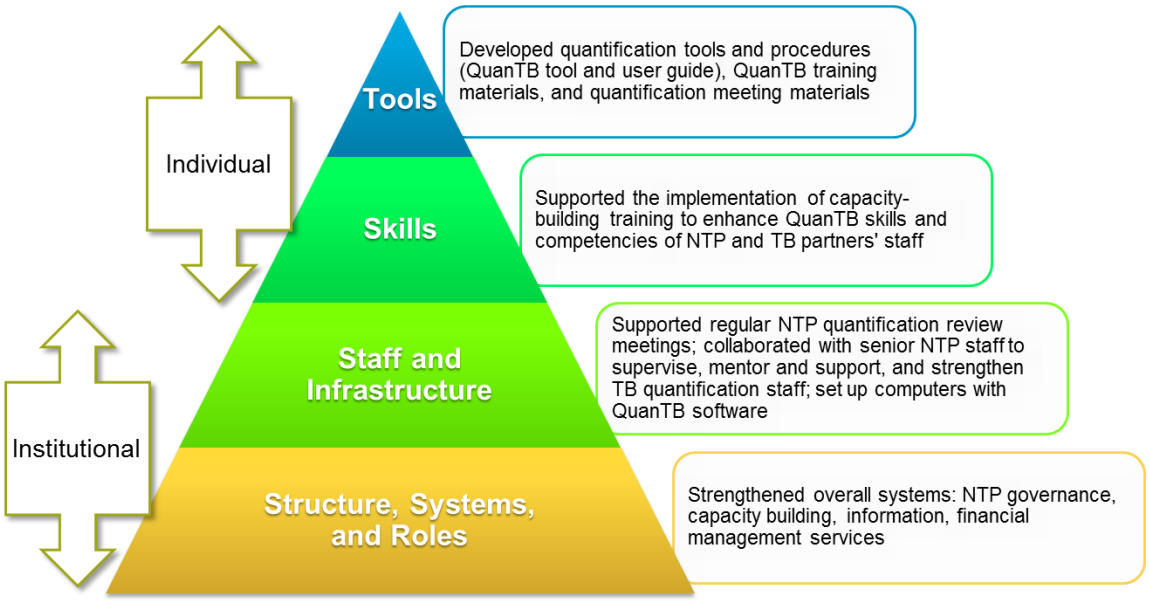
This report summarizes key aspects and results of the Myanmar review.

METHODOLOGY

Data were collected through a review of relevant background documents and reports; interviews with SIAPS TB staff; and remote data collection through telecommunication with SIAPS TB field advisors (using a questionnaire for SIAPS field advisors) and with local beneficiaries of the technical assistance (using one questionnaire for active users of QuanTB and another for senior NTP officials/decision makers). Data were analyzed by content (mostly qualitatively) and by prevalent themes around key achievements or success areas. In addition, online experience and satisfaction surveys were completed by country beneficiaries and global partners. Results of the online surveys have been reported separately[6].

Strategic Approach

SIAPS developed QuanTB to promote a systems strengthening approach to TB medicine management[7]. As shown in figure 1, implementation of the tool is expected to strengthen the country quantification system through systemic institutional and individual capacity building. Optimum capacity at all levels of the capacity-building pyramid is key to ensuring timely reporting of valid data; timely updating of QuanTB files; and the generation of accurate forecasts, supply planning information, and EWS alerts. The information informs proper decision making and development and implementation of remedial actions through a technical working group or partner coordination forum.



[6] Goredema W, Sawyer K, Mwatawala S, Owuna C. 2017. *Implementing an Early Warning System for TB Medicines: Global Report.* Submitted to the US Agency for International Development by the Systems for Improved Access to Pharmaceuticals and Services (SIAPS) Program. Arlington, VA: Management Sciences for Health.
[7] SIAPS Program. 2013. *QuanTB User's Guide.* Submitted to the US Agency for International Development by the Systems for Improved Access to Pharmaceuticals and Services (SIAPS) Program. Arlington, VA: Management Sciences for Health.

Figure 1: Systemic institutional and human resource capacity building in quantification.[8]

Key interventions that were implemented in Myanmar included:

- *Capacity building:* NTP staff were trained through a QuanTB workshop and on-the-job mentoring to effectively implement QuanTB.

- *Ongoing implementation of QuanTB for quantification, stock status monitoring, and as an EWS:* Myanmar has used QuanTB in forecasting and supply planning of TB commodities, and in generating early warning signals and taking remedial action to address risks such as overstocking and expiry of medicines.

- *Provision of technical assistance through Global Drug Facility (GDF) monitoring missions and program review:* This has strengthened quantification and the TB supply chain system.

[8] *Adapted from:* Potter C, Brough R. Systemic capacity Building: A Hierarchy of needs. Health Policy and Planning 2004; 19(5): 336–345.

RESULTS AND DISCUSSION

Process

SIAPS has provided TB technical assistance to Myanmar since January 2015. A SIAPS in-country technical advisor was embedded at the NTP from March 2015 to January 2016. The MOH/NTP implements the tool with SIAPS technical assistance and in collaboration with key local TB partners and stakeholders, including Population Services International Myanmar (particularly for the PPM for TB Care and Control); the Myanmar Medical Association for PPM; Médecins Sans Frontières-Holland; WHO; Family Health International; and UNOPS Myanmar, which is the principal recipient of a Global Fund grant. The country is currently using QuanTB for forecasting, procurement, supply planning, and as an EWS. The first QuanTB exercise was held in March 2015 using the NTP's 2014 fourth-quarter data, but at that time, the NTP had still not fully committed to using the tool. The tool was officially adopted at a quantification workshop for 2016 TB commodity needs held by UNOPS and the NTP in May 2015. During this workshop, both a pre-existing Excel-based method and QuanTB were used, and the QuanTB outputs were adopted and used for the final forecasts.

The QuanTB implementation process is as follows: Myanmar generates QuanTB data at different levels of the supply chain. Each quarter, all states and regions report their stock data to the NTP central pharmacist. They also report case data to the NTP central level (the NTP has established a practice for transferring patient enrollment data from the M&E system to the supply chain logistics system (central store) on a quarterly basis). An Excel data file that is in the same format as QuanTB is used to collect data, which are then fed into QuanTB. The NTP records its quarterly patient enrollment data in the Excel file, and the NTP's central pharmacist extracts the required data for QuanTB from that file. The central pharmacist consolidates reports from all states and regions and compiles the Global Fund quarterly report. He or she uses the information to update the national QuanTB files and sends the quarterly report, including stock status and impending risks, to the NTP program manager to decide on corrective actions to mitigate the risks. The central pharmacist also alerts all sites by phone or e-mail of impending stock risks.

Beneficiary Experiences and Perspectives

Respondents rated key attributes of QuanTB favorably. They consider it a simple, user-friendly, timely, reliable, and useful tool compared to the Excel spreadsheets used previously.

Respondents rated key attributes of the tool favorably compared to the Excel spreadsheets they used previously, which quantified medicines one by one. QuanTB has improved the speed and timeliness of forecasting and informed supply chain decision making for TB medicines. The dashboards have alerted decision makers to potential stock-outs and overstocks, and a number of corrective actions have been taken based on QuanTB outputs. The availability of case data enables the NTP to easily compare expected cases with enrolled cases and correct projected trends. QuanTB has made forecasting more accurate and efficient. The respondents provided specific examples to substantiate the usefulness of the tool (see below). At the time of the

evaluation, the NTP was using QuanTB for the Central Store, Upper Myanmar Store, and Lower Myanmar Store and felt it could sustain the use of the tool in these stores. QuanTB users noted that data generated at the health facility level are the most accurate, particularly for expiry risks. In general, there did not appear to be any gap in funding to sustain use of the tool.

Accomplishments

Key accomplishments and results of SIAPS TB technical assistance and QuanTB implementation in Myanmar include:

- *Adopted and institutionalized QuanTB:* The tool was adopted and institutionalized as the national quantification tool, and data are regularly generated and made available for decision making.

- *Enhanced NTP quantification capacity and skills:* Key NTP staff, including the NTP central pharmacist, the WHO TB procurement and supply management (PSM) officer at the Central TB store, and the Lower and Upper Myanmar regional pharmacists, routinely conduct QuanTB exercises and generate useful data on a quarterly basis.

- *Improved forecasting and supply planning*: The NTP has conducted quarterly QuanTB exercises for first- and second-line medicines since the first QuanTB-based forecasting workshop for 2016 needs, which was conducted in May 2015. QuanTB was successfully implemented from the Central Warehouse down to the two subwarehouses (Upper Myanmar and Lower Myanmar). QuanTB generates more reliable forecasts and supply planning data than did the Excel-based tool. The NTP can generate different forecasting scenarios and determine how much stock will be expired or needed depending on the expected enrollment under different scenarios. Supply planning has greatly improved. In 2016, the traditional supply planning practice that had three equal shipments per forecasting year was replaced with one QuanTB-based accurate supply plan for each category of medicines. This has helped solve stock-out and storage space problems. The Global Fund approved Myanmar's 2016 QuanTB-based PSM plan without major queries, unlike with previous Excel-based plans.

- *Implemented an EWS to prevent stock-outs and wastage of TB medicines:* The EWS for first-line medicines has helped the NTP identify problems and develop and implement timely interventions to minimize or avert potential stock-outs and expiries earlier than when it used QuanTB (e.g., ethambutol 400mg, isoniazid 300mg, and second-line medicines cycloserine 250mg and PAS 60% 100g jar). QuanTB enables the NTP to immediately predict risks so that the central pharmacist can promptly inform the NTP program manager about any issues and initiate corrective actions. For example, the procurement process for ethambutol 400mg and isoniazid 300mg was modified based on QuanTB information. Through continuous monitoring, the NTP realized there had been a 50% achievement of multidrug-resistant TB (MDR-TB) targets and moved the 2015 second-line medicine shipment to 2016 to prevent expiry. The QuanTB dashboard alerts expedited the procurement process for ethambutol 400mg and isoniazid 300mg for

modified regimes to fill the gap before receipt of the 2016 Global Fund order shipment. In the NTP central warehouse, QuanTB alerts helped prevent the expiry of rifampicin/isoniazid 150/75mg and a stock-out of isoniazid 300mg. There were no stock-outs of TB medicines during the quarter ending September 2015 and only one alert of a medicine with less than three months of stock since the quarter ending May 2016 (kanamycin, which the country was phasing out)[9,10]. The NTP gets information to reallocate its stock from one treatment center to another based on the lower-level QuanTB exercises.

Sample QuanTB Dashboards[11]

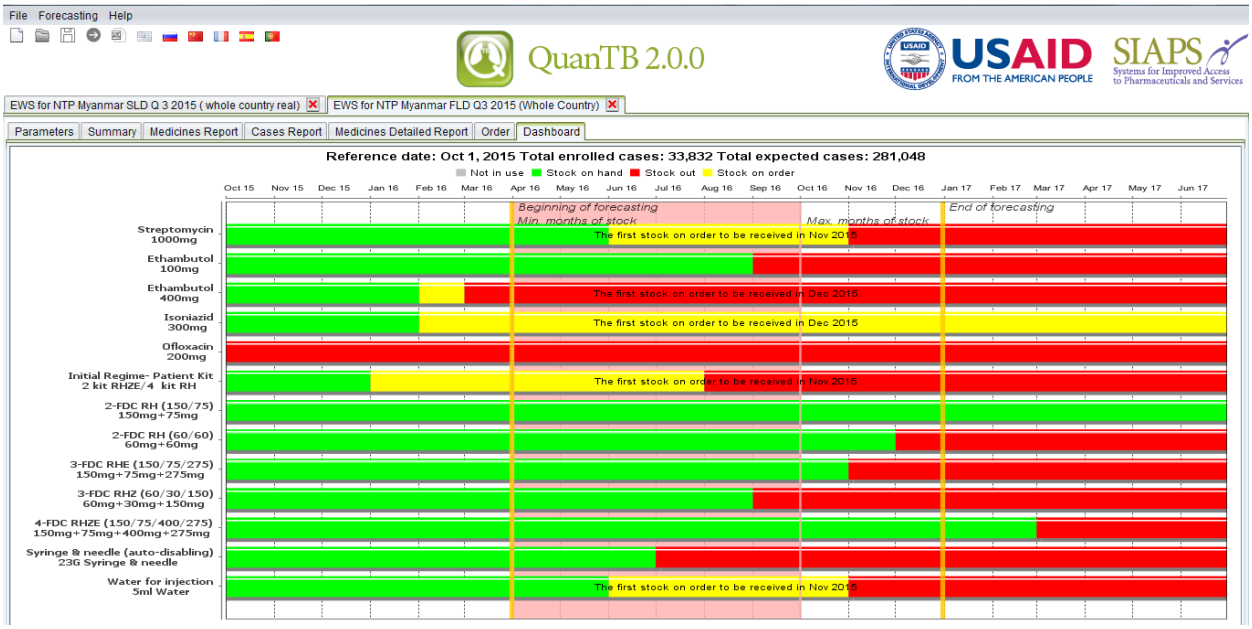


Figure 2. First-line medicines (third quarter of 2015)

The only medicine that was out of stock (ofloxacin 200mg) is used for a modified regime of first-line treatment. Because only about one-half of 1% of enrolled patients were on this regime, the NTP did not use the medicines until the end of 2015, and therefore, the dashboard showed a stock-out. Aside from that medicine, the NTP had adequate first-line medicines on hand plus in the pipeline to last until at least July 2016.

[9] SIAPS. Sept. 2015. SIAPS TB Quarterly Report: QuanTB and Early Warning System Roll-out and Implementation. Submitted to the US Agency for International Development by the Systems for Improved Access to Pharmaceuticals and Services (SIAPS) Program. Arlington, VA: Management Sciences for Health.
[10] SIAPS. May 2016. SIAPS TB Quarterly Report: QuanTB and Early Warning System Roll-out and Implementation. Submitted to the US Agency for International Development by the Systems for Improved Access to Pharmaceuticals and Services (SIAPS) Program. Arlington, VA: Management Sciences for Health.
[11] SIAPS. November. 2015. Monitoring TB Medicine Availability: Quarterly Report – Myanmar.

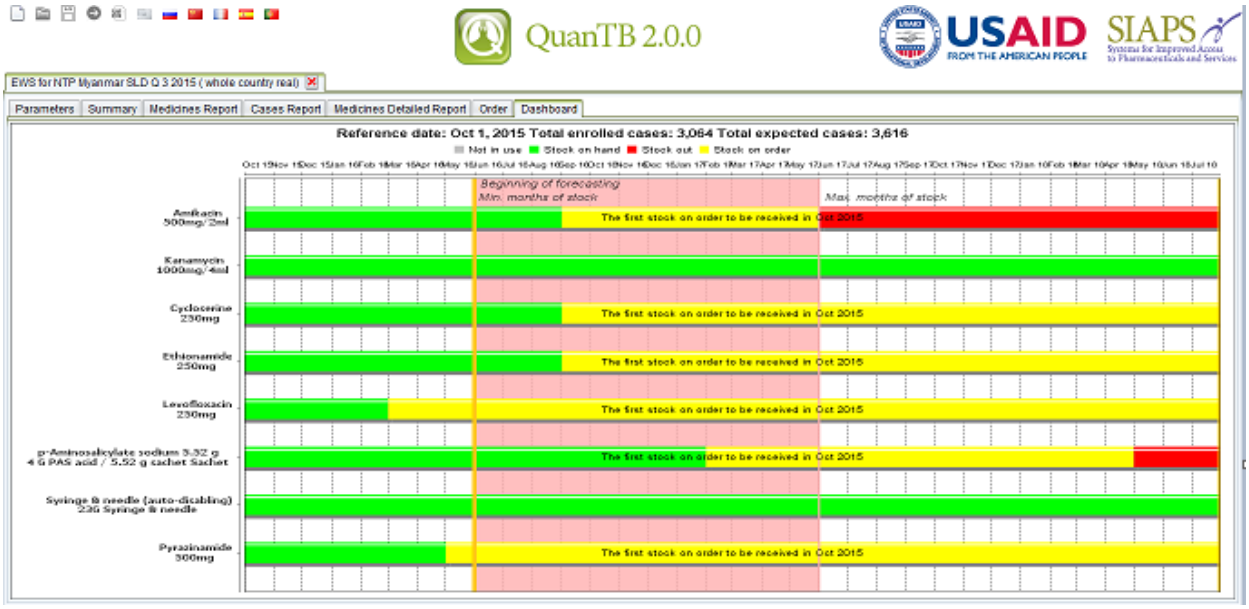


Figure 3. Second-line medicines (third quarter of 2015)

- *Identified and addressed TB PSM challenges through GDF monitoring missions and external TB program review:* GDF monitoring missions that have been conducted in-country have used QuanTB data to identify TB supply chain challenges and recommend interventions to address them. SIAPS participated and led the assessment of pharmaceutical supply management-related issues. Annual action plans were developed and implemented based on the findings and recommendations. SIAPS also participated in the 2014 National Evaluation Meeting of NTP Myanmar.

- *Strengthened information systems and improved data quality and reporting for informed decision making:* The implementation of QuanTB has resulted in improved data processing and reporting, and the forecasting and supply planning information has been used for better decision making for the TB supply chain. Data are now available on the number of patients enrolled each month (previously, the NTP only collected the total enrollment for the quarter). Data are also available on the number of patients enrolled by treatment regimen (regimen-specific information was not reported previously because these data were not considered essential for forecasting). A mechanism and practice for transferring patient enrollment data from M&E to the supply chain logistics system (Central Store) on a quarterly basis has improved coordination between the central pharmacist and the M&E Unit. SIAPS is collaborating with the Clinton Health Access Initiative, which is the implementing partner for the mSupply logistics management information system software, and the NTP to integrate QuanTB and mSupply. The NTP uses mSupply for inventory management. mSupply stock status data are imported into QuanTB. SIAPS participated in the NTP's review meeting for the mSupply pilot.

- *Developed a National Strategic Plan (2016–2020):* SIAPS collaborated with the Supply Chain Management System/Myanmar to provide technical support to the NTP in developing the National Strategic Plan.

- *Strengthened systems:* The implementation of QuanTB and SIAPS TB technical assistance have strengthened key functional areas of supply chain systems for TB control, including:

    - Governance: The NTP uses EWS reports to make appropriate decisions and take related remedial actions.

    - Capacity building: The NTP's institutional and staff capacity for quantification and stock status monitoring has improved.

    - Information systems: EWS reports have facilitated evidence-based decision making. The EWS has also strengthened information systems by linking patient enrollment data with TB medicine stock data and facilitating the early detection of potential stock-outs, overstocks, and expiry of TB medicines and related commodities. With the ongoing integration of QuanTB and mSupply, mSupply stock status data can now be imported into QuanTB.

    - Financial management systems: EWS reports have been used to mobilize resources, particularly when emergency funding is needed to prevent imminent stock-outs. Cost analyses, budgeting, and overall financial management systems have also been enhanced through better estimation of national needs and less wastage.

    - Services: More effective and efficient quantification and supply planning have resulted in improved procurement. Stock status monitoring has helped to inform the redistribution of commodities within and between countries in the event of under- or overstocks. Deliveries of pending supplies now scheduled efficiently using QuanTB v3. Staff can use the tool to execute accurate quantifications and generate stock status reports when needed.

    - Procurement and supply planning: Monthly EWS reports inform decisions on when commodities will be needed and when to place orders.

- *Improved collaboration:* Strong collaboration has been established among the MOH/NTP, SIAPS, and other partners in Myanmar. Good coordination and collaboration were also established among the NTP, GDF, and other local and global TB stakeholders. SIAPS support has helped connect Myanmar NTP staff with NTP staff from other countries to facilitate the exchange of inventory.

All of this has led to improved availability of TB medicines and improved TB control services.

Key Challenges and Lessons Learned

Challenges

- *Human resources and capacity issues:* Staff engagement and commitment to adopt the new technology is a challenge because staff assigned to QuanTB are also busy with competing commitments in their medicine stores and may not have the time to use the tool. Also, pharmacists from different levels of the supply chain work under different supervisors, and if

the supervisor does not prioritize QuanTB, the pharmacists under that supervisor could become inactive. Staff attrition is also a problem. Two people who were first trained in 2014 were shifted to other responsibilities, which adversely affected the implementation of QuanTB. All of this adversely impacts timeliness of reporting. The lack of IT support can also be a challenge. Although there is no designated IT support staff, the SIAPS home office TB team has provided IT support to address software issues when needed.

- *Information system, data quality, and reporting issues:* While the quality and accuracy of data have improved, the time it takes to collect the data is still a challenge. There are also delays in getting case data, which are reported quarterly from the peripheral to the national level, where they are fed into QuanTB biannually. Therefore, the data are not readily available if they are needed sooner. At times there is inconsistency in the stock data from the central level reported during different quarters, which points to data quality issues. Overestimations of TB patient targets can lead to overstocks.

- *Data collection:* MDR-TB patient data were not routinely collected by regimen split, which led to additional work to collect the data each quarter.

Lessons Learned

- Regular monitoring of TB stock levels against patient enrollment is key to ensuring the early identification of potential wastage or stock-outs of TB medicines. However, more effort is needed to address other factors contributing to overstocks or stock-outs of TB medicines.

- Capacity-building refresher trainings on QuanTB and on improving data quality and reporting are needed on an ongoing basis. They help to address human resource issues and the adverse impact of ongoing staff attrition.

- For the best coordination, collaboration, and results, TB partners supporting the implementation of QuanTB or related activities should consider embedding in-country field advisors within the NTP.

Gaps for Future Consideration

- Address the above-mentioned data quality and reporting issues.

- Build in-country IT capacity to address QuanTB software problems as they arise.

- Conduct capacity-building refresher trainings on QuanTB and on improving data quality and reporting on an ongoing basis.

CONCLUSION

With USAID/SIAPS technical assistance, the Myanmar MOH NTP is successfully implementing the QuanTB EWS using a locally led, effective, and sustainable approach to improve forecasting, monitor stock, track expiries and stock-outs, make informed decisions, and take appropriate actions to close underlying PSM gaps. However, continued investment is needed to address the remaining gaps. The NTLP should continue to engage and collaborate with local stakeholders and partners to sustain use of the tool.