

A large, abstract purple graphic on the left side of the page, consisting of a thick curved line that forms a large loop, with a smaller circle attached to it.

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

August 2016



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

Wonder Goredema
Salama Mwatawala

August 2016



This report is made possible by the generous support of the American people through the US Agency for International Development (USAID), under the terms of cooperative agreement number AID-OAA-A-11-00021. The contents are the responsibility of Management Sciences for Health and do not necessarily reflect the views of USAID or the United States Government.

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.

Recommended Citation

This report may be reproduced if credit is given to SIAPS. Please use the following citation.

Goredema, Wonder, S. Mwatawala. 2016. *Implementing QuanTB to Improve Forecasting, Supply Planning, and Early Warning Systems for TB Medicines: Uganda 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.

Systems for Improved Access to Pharmaceuticals and Services
Pharmaceuticals and Health Technologies Group
Management Sciences for Health
4301 North Fairfax Drive, Suite 400
Arlington, VA 22203 USA
Telephone: 703.524.6575
Fax: 703.524.7898
E-mail: siaps@msh.org
Website: www.siapsprogram.org

CONTENTS

Acronyms	iv
Acknowledgments	v
Introduction	1
Background	1
Goal and Objectives	2
Methodology	3
Strategic Approach	3
Results	5
Process	5
Beneficiary Experiences and Perspectives	5
Accomplishments	5
Challenges and Lessons Learned	9
Gaps for Future Consideration	10
Conclusion	11

ACRONYMS

DHIS	District Health Information System
EWS	early warning system
GDF	Global Drug Facility
MDR-TB	multidrug-resistant tuberculosis
MOH	Ministry of Health
MSH	Management Sciences for Health
NMS	National Medical Stores
NRA	National Regulatory Authority
NTP	National TB Control Program
QPPU	Quantification and Procurement Planning Unit
SIAPS	Systems for Improved Access to Pharmaceuticals and Services
TB	tuberculosis
USAID	US Agency for International Development

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 Uganda. The authors acknowledge the NTP and tuberculosis (TB) stakeholders and partners, including the National Medical Store (NMS), the National Regulatory Authority (NRA), the Ministry of Health's (MOH) Pharmacy Department's Quantification and Procurement Planning (QPPU), and Management Sciences for Health (MSH) through the Securing Ugandans' Right for Essential Medicines (Uganda SURE) Project and the Uganda Health Supply Chain project (UHSC) for their contributions and support in implementing the intervention. In particular, the authors would like to acknowledge Mr. Samuel Balyejussa and Ms. Victoria Nakiganda for providing their perspectives as beneficiaries of QuanTB and SIAPS technical assistance.

INTRODUCTION

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

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 expiries¹. 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.

Uganda is a low-income country in East Africa with a 2015 population of approximately 39 million and a life expectancy at birth of 56.7 years for males and 60.3 years for females². In 2014, the prevalence of TB was 159 per 100,000 population, and 46,171 TB cases were reported³. The health system is organized into central, provincial, and district levels. In 2014, the public health expenditure comprised approximately 46% of the total health expenditure⁴. The health system is funded primarily through the government public health budget and the Development Partners Group for Health, including the World Health Organization, a Health Basket Fund⁵, and the Global Fund.

¹ 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.

² World Development Indicators. Available at: <http://data.worldbank.org/indicator>.

³ WHO Global TB Report Uganda Country Profile. Available at: https://extranet.who.int/sree/Reports?op=Replet&name=%2FWHO_HQ_Reports%2FG2%2FFPROD%2FEXT%2FTBCountryProfile&ISO2=UG&LAN=EN&outtype=html.

⁴ World Development Indicators. Available at: <http://data.worldbank.org/indicator>.

⁵ WHO Country Cooperation Strategy. Available at: http://www.who.int/countryfocus/cooperation_strategy/ccsbrief_uga_en.pdf.

Key Gaps that Necessitated QuanTB Implementation

- Inadequate technical skills to forecast and plan for the supply of required medicines. Previously, the country was using an Excel spreadsheet and the process was time consuming because TB medicines were quantified one by one.
- The lack of an EWS to flag medicine stock risks resulted in frequent stock-outs of TB medicines and expiry of second-line TB medicines.
- There were no periodic reviews of quantification that could take into account the current patient numbers and stock levels by expiry.
- Supply planning and tracking orders were challenging due to inadequate pipeline data visibility. Uncoordinated procurements resulted in the NMS and the Global Drug Facility (GDF) delivering supplies at the same time, and there were late procurements of TB medicines.

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

Goal and Objectives

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

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

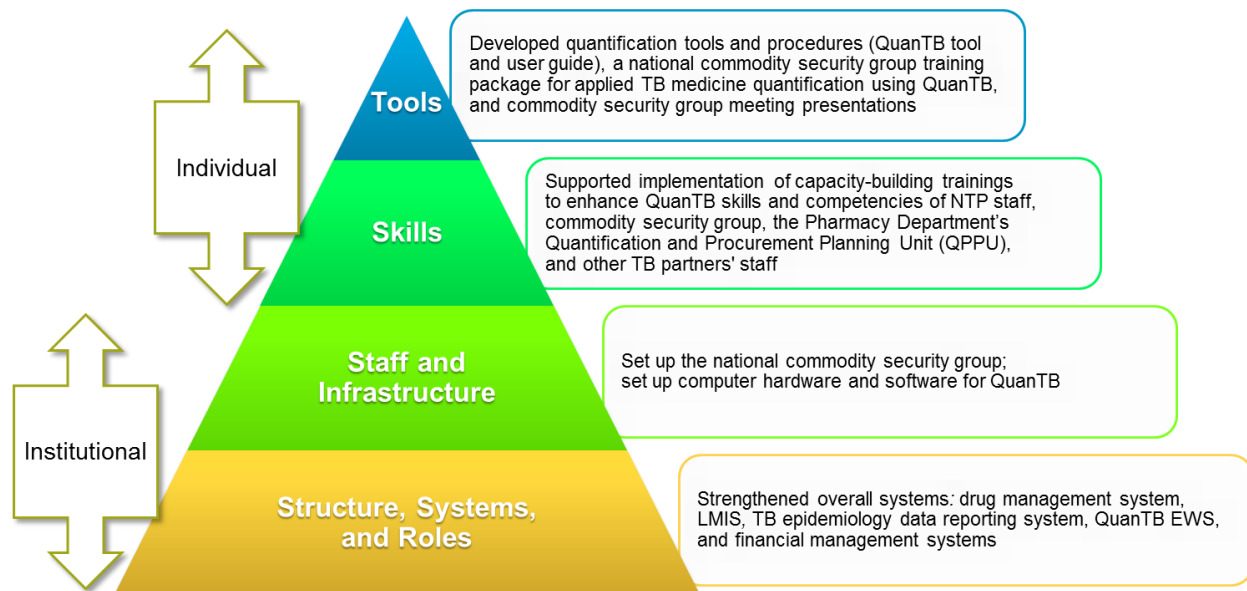
This report summarizes key aspects and results of the Uganda review.

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 structured questionnaire for SIAPS field advisors) and local beneficiaries of the technical assistance (using one structured 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 experiences and satisfaction surveys were completed by country beneficiaries and global partners. Results of the online surveys have been reported separately⁶.

Strategic Approach

SIAPS developed QuanTB to promote a systems strengthening approach to TB medicines management⁷. 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 hierarchy is key to ensuring timely reporting of valid data, timely updating of QuanTB files, 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 HR capacity building in quantification⁸

Key interventions in Uganda included:

- *Capacity building:* Key NTP staff have been trained on quantification of TB medicines using QuanTB.
- *Ongoing implementation of QuanTB in quantification and stock status monitoring and as an EWS:* The country is using QuanTB to forecast and plan supplies of TB medicines and for ongoing monitoring of stock status of the commodities, generating EWS alerts, and taking appropriate actions to mitigate stock-related risks such as overstocking and expiry of medicines. SIAPS provided technical assistance for the implementation of the tool.
- *Provision of technical assistance through GDF monitoring missions and program review:* This has strengthened quantification and the TB supply chain system.
- *Provision of technical assistance in the introduction of new TB medicines:* SIAPS conducted an assessment of country readiness for bedaquiline, including companion medicines and pharmaceutical supply management costs.

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

RESULTS

Process

SIAPS has provided TB technical assistance in Uganda since the country began using QuanTB in November 2013. At the time of this review, support was provided through a regional senior technical advisor for TB pharmaceutical supply management based in Tanzania. The MOH/NTP implements the tool with SIAPS technical assistance and in collaboration with key local TB partners and stakeholders, including the NMS, NRA, MOH Pharmacy Department's QPPU, and MSH through SURE and UHSC. The country is using QuanTB specifically for forecasting, procurement, supply planning, cost analysis, introduction of new drugs or regimens, and as an EWS. Data on TB cases is reported through a paper-based system for stock. The NMS shares raw data using an Excel spreadsheet called the "Stock Status and Issues Report". The NTP extracts and uses relevant raw data from the spreadsheet to update QuanTB. Although NTPs were supposed to conduct quarterly physical counts to get up-to-date stock on hand data instead of relying on computer records, this has been challenging for stock available at the facility level.

Beneficiary Experiences and Perspectives

Respondents rated key attributes of QuanTB favorably. They consider it simple compared to Excel sheets that quantified TB medicines one by one, user friendly, acceptable, and reliable depending on the quality of case and stock data that are uploaded. Users feel the tool is useful because it provides key pipeline information, such as months of stock on hand, stock on order, and when to expect new consignments as well as EWS dashboard alerts that help prevent stock-outs and expiry of medicines. The tool has improved the speed and timeliness of forecasting and supply planning. Monthly TB stock status reports are shared with the TB program team and bimonthly reports are shared with the national commodity security group to facilitate remedial actions.

Accomplishments

Key accomplishments and results of SIAPS TB technical assistance and the QuanTB implementation in Uganda included:

- *Adopted and institutionalized QuanTB:* The tool was adopted and institutionalized as the national quantification tool.
- *Enhanced NTP quantification capacity and skills:* SIAPS provided technical assistance in enhancing the in-country TB medicine quantification capacity and skills. Trainings on quantification using QuanTB were conducted in Kampala in November 2013 and January 2016. During these, 14 key staff were trained, including members of the national commodity security group, NTP pharmacists, monitoring and evaluation staff, the multidrug-resistant tuberculosis (MDR-TB) coordinator, and partners. Training for applied TB medicine quantification using QuanTB was provided to stakeholders and members of a technical working group who attended the SIAPS training, and they can now train additional staff.

- As part of ongoing capacity building efforts, SIAPS supported MOH staff, including the NTP manager and pharmaceutical supply management staff, to participate in the TB regional meeting in Zanzibar, Tanzania, in December 2012 and the Global TB Supply Chain Meeting in Bangkok, Thailand, in March 2015. In both meetings, participants were able to share experiences, learn from others, prioritize their key TB supply chain challenges, and agree on interventions to improve the regional situation.
- Improved forecasting and supply planning:* The MOH's Department of Pharmacy, in collaboration with the NTP, updates QuanTB bimonthly and generates useful data for forecasting and supply chain decision making. With QuanTB, quantification is reviewed bimonthly to allowing for better planning. Enrolled patient numbers and stock on hand by expiry are now included. This has been the basis for Global Fund applications and GDF procurement requests. SIAPS provided hands-on technical assistance for the quantification of first- and second-line medicines during monitoring missions. In response to a Global Fund request, SIAPS also provided assistance in validating TB medicine quantification data, which contributed to the Global Fund New Funding Model application. QuanTB data enabled the NTP to quickly estimate medicine needs during the introduction of new medicines, such as bedaquiline, and new pediatric formulations. The country can now easily estimate quantities for interim procurement by the NMS and schedule supply deliveries to cover the gap while waiting for pending GDF consignments (e.g., streptomycin, INH for pediatric cases, and RHZ were procured in 2015 and early 2016).
- Implemented an EWS to prevent stock-outs and wastage of TB medicines:* SIAPS has provided support to Uganda's MOH/NTP through quarterly monitoring of TB stock status since November 2013. The support includes reviewing and analyzing QuanTB outputs and using QuanTB dashboard alerts to propose appropriate corrective actions. TB stock status monitoring has informed corrective actions in cases of national-level stock-outs, facility over- or understocks, and expiry of stock.

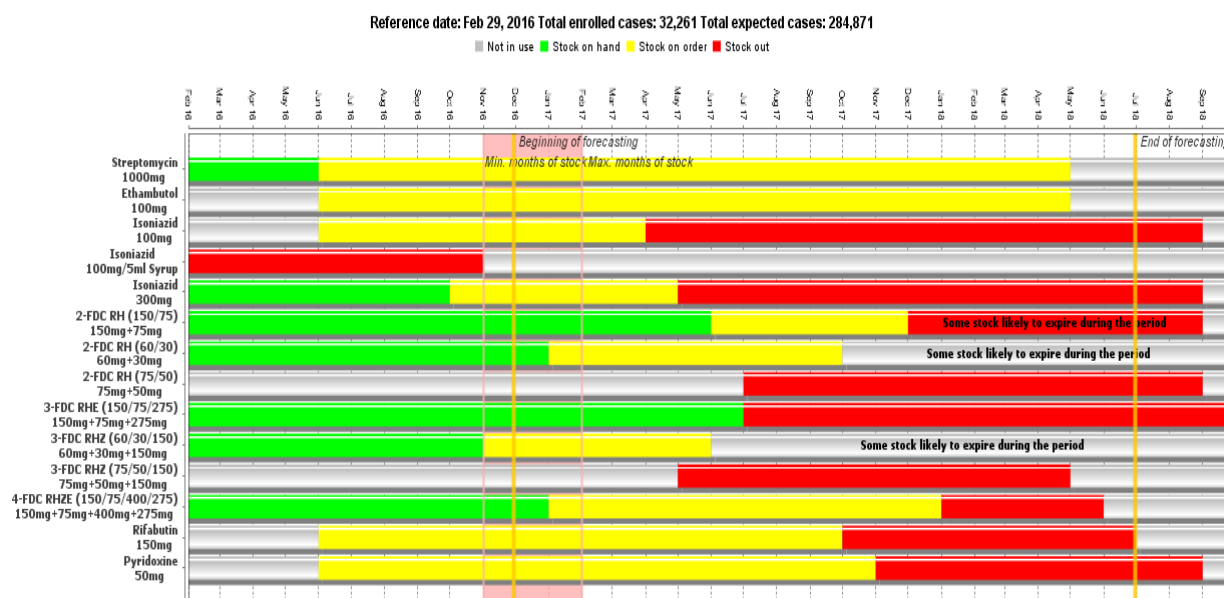


Figure 2. Sample QuanTB dashboard

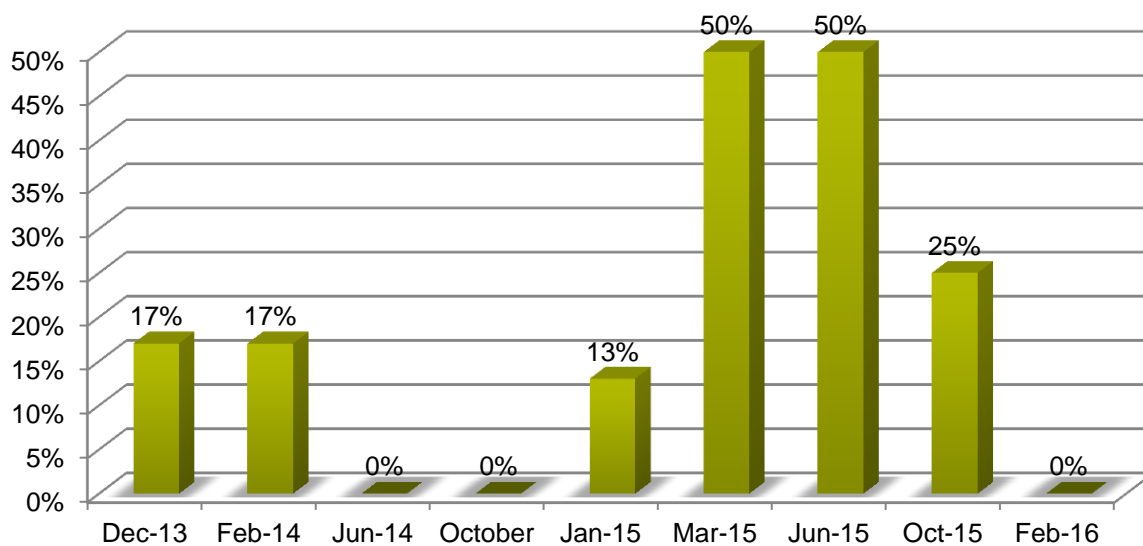


Figure 3. Percentage of stock-outs of first-line TB medicines⁹

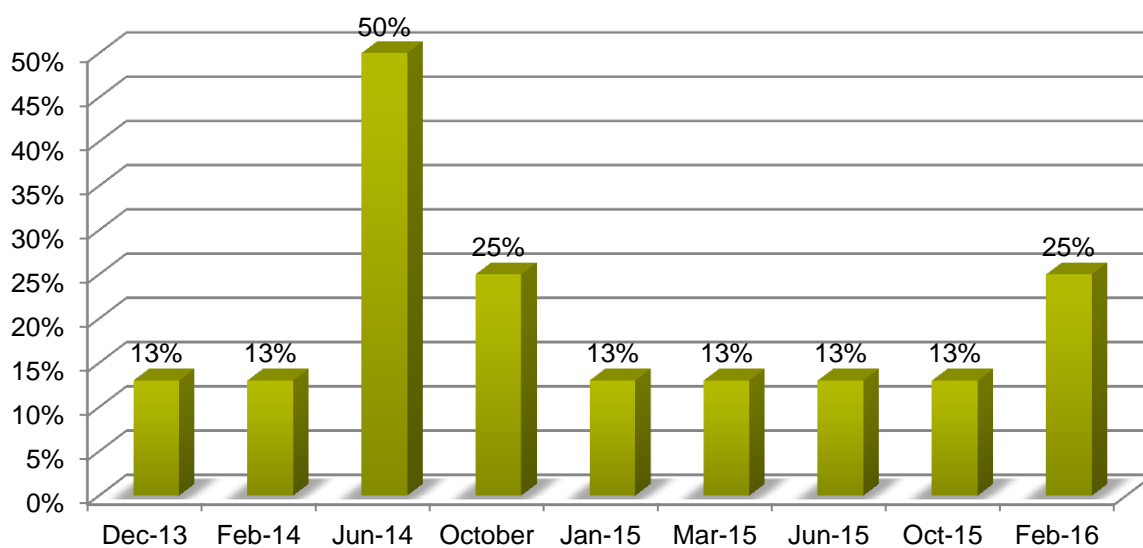


Figure 4. Percentage of stock-outs of second-line TB medicines¹⁰

Key first-line medicine stock-outs included H100mg, 300mg, RHZ 60/30/150, and RHE 150/75/275. Second-line medicine stock-outs included moxifloxacin, INH100mg syrup, capreomycin, clofazamine, and linezolid^{11,12}. Key actions taken included the NTP requesting the

⁹ SIAPS. April 2016. Monitoring TB Medicine Availability: Quarterly Report – Uganda.

¹⁰ *ibid*

¹¹ 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.

NMS to procure supplies while waiting for GDF shipments to arrive, several requests to the GDF to expedite or delay pending shipments, requesting the Global Fund to approve a revision of the pharmaceutical supply management plan to accommodate medicines that were initially not included, exploring with Kenya and other countries the possibility of borrowing some medicines that were in short supply, and revising the split ratios for the kanamycin/capreomycin-based regimen due to the rise in the number of patients being switched from one medicine to another due to ototoxicity side effects of the kanamycin injection.

- *Identified and addressed TB pharmaceutical supply management challenges through GDF monitoring missions and external TB program review:* Three annual GDF monitoring missions were conducted from 2013 to 2015. The missions identified several TB supply chain challenges and recommend interventions to address them. SIAPS participated in and led the assessment of pharmaceutical supply management-related issues during the 2013 external TB program review. Annual action plans to improve the TB supply chain were developed during GDF monitoring missions, which SIAPS participated in and discussed with NTP, between 2013 and 2015. Various actions have been taken based on the proposed recommendations.
- *Strengthened information systems and improved data quality and reporting for informed decision making:* QuanTB was used to develop a plan for successfully phasing in RH150/75mg and phasing out EH with minimal wastage of EH. The tool provided guidance while planning for the procurement of IPT medicines through the NMS. The information from QuanTB has also been used to make decisions regarding the quantity and timing of deliveries. Decisions have been made to redistribute stock based on QuanTB reports. For example, Uganda borrowed TB medicines from Kenya and Pakistan and donated capreomycin to Kenya. QuanTB was used in planning shipments of new medicines and determining when to bring in new consignments.
- *Strengthened systems:* The EWS strengthened information for decision making by connecting patient- and stock-related data to detect potential over- and understocks and improved quantification and supply planning to improve procurement. Stock status monitoring has helped to inform the redistribution of commodities within and between countries in the event of under- or overstocks, and capacity has increased through training and supportive supervision. Financial management systems have been optimized through the better estimation of national needs, which decreased wastage.
- *Improved collaboration:* Strong collaboration was established among the MOH/NTP, SIAPS, MSH bilateral projects, and other partners in Uganda.
- *Improved services:* SIAPS TB technical assistance and QuanTB have improved TB medicine availability and TB control services.

¹² 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.

Challenges and Lessons Learned

Challenges

- Uncertainty about government procurement funding commitments: The NMS is responsible for procuring TB medicines with Government of Uganda funding. Although the country develops a joint supply plan, including Global Fund-supported TB medicines, actual procurement government funding is not guaranteed.
- In-country delays in granting required approvals to ensure early procurement of TB medicines: For example, granting initial approval before submitting the order to the GDF leads to delays in the approval price quotes from the GDF, prolonged procurement lead times, and delays in approving shipments.
- Inadequate funds for the procurement of certain medicines, such INH and capreomycin, due to underestimated needs while applying for Global Fund grants led to the rapid scale up of IPT and switching more patients from kanamycin to capreomycin than previously anticipated. Global Fund funds have had to be redistributed to address the problem.
- An inadequate distribution and logistics management information system led to an oversupply of TB medicines and an artificial stock-out at the central level.
- The rapid depletion of some medicines at the NMS compared to what was indicated in QuanTB reports was one challenge the country faced while implementing QuanTB.
- IPT was rolled out more quickly than previously anticipated, which led to stock-outs.
- There was limited funding to ensure timely procurement of some medicines. For example, the country revised the kanamycin/capreomycin-based regimen split ratio after more patients experienced kanamycin-related ototoxicity. This was done after NFM funds were approved, which led to a funding gap.
- Staff attrition: The majority of staff working with the NTP are seconded by partners. Staff who were trained in November 2013 have moved to new projects, and a second training had to be organized.
- Port clearances were delayed due to funding issues, which contributed to stock-outs.
- Data issues: There were delays in getting patient and stock data from national medical stores, and the integration of TB medicines into the web-based District Health Information System (DHIS) system could help. Data quality assurance is important to ensure that intended results of implementing an EWS are achieved. Inadequate data quality has been a challenge during the QuanTB implementation.

Lessons Learned

- Strong partnerships with in-country partners are key, particularly in countries without an in-country SIAPS technical advisor or office to leverage resources and coordinate support to the MOH.
- Regular monitoring of TB stock levels against patient enrollment is key to ensuring early identification of potential wastage or stock-outs of TB medicines. However, more effort is needed to address other factors contributing to overstock or stock-outs of TB medicines.

Gaps for Future Consideration

- Address 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 issues.
- Consider including an option for quantifying issue data or actual consumption data to be able to compare, identify discrepancies, and further investigate the contributing factors.
- Link QuanTB with other electronic tools. For example, Uganda is planning to integrate TB medicines in the web-based reporting and ordering system, and the two systems should be linked.
- Consider fully automating the supply planning component of the tool.
- Integrate TB medicines into the web-based DHIS system.

CONCLUSION

With USAID/SIAPS technical assistance, Uganda's 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 pharmaceutical supply management gaps. There do not appear to be any funding gaps to sustain the use of the tool. MSH provides additional support under the UHSC project. Capacity-building refresher trainings on QuanTB and on improving the data quality and reporting issues are needed to address HR issues and the adverse impact of ongoing attrition of staff. The NTP and local stakeholders and partners should continue to collaborate to sustain the use of the tool.