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

Recommended Citation

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ACRONYMS

ARFH	Association For Reproductive and Family Health
DR-TB	drug-resistant tuberculosis
DS-TB	drug-susceptible tuberculosis
EWS	early warning system
FCMS	Federal Central Medical Store
FMOH	Federal Ministry of Health
GDF	Global Drug Facility
GHLI-L	General & Health Logistics International Limited
IHVN	Institute of Human Virology Nigeria
LMIS	logistics management information system
NACA	National Agency for the Control of AIDS
NFM	New Funding Model
NSCIP	Nigeria Supply Chain Integration Projects
NTBLCP	National Tuberculosis and Leprosy Control Programme
NTP	National TB Control Program
PSM	Procurement and Supply Management
QRRIF	Quarterly report, requisition, and issue form
SIAPS	Systems for Improved Access to Pharmaceuticals and Services
TB	tuberculosis
TWG	technical working group
USAID	US Agency for International Development
WHO	World Health Organization

ACKNOWLEDGMENTS

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 Nigeria.

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 USAID-funded SIAPS Program has provided technical assistance to National TB Control Programs (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 early warning system (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.

Nigeria is a low-income country in West Africa with a 2015 population of approximately 182 million and a life expectancy at birth of 52.4 years for males and 53.1 years for females[1]. In 2014, the prevalence of TB was 330 per 100,000 population, and 91,354 TB cases were reported[2]. The responsibility for public health care is shared by the federal, state, and local governments[3]. Health care facilities are organized into primary, secondary, and tertiary levels. In 2014, the public health expenditure comprised approximately 25.1% of the total health expenditure[4]. The health system is funded mainly through the government's public health budget and donor funds, including the Global Fund. In line with the National Strategic Health Development Plan, the Health Partners Coordinating Committee engages and coordinates stakeholder collaboration with the government through its technical arm—the Development Partners Group.[5]

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[1] World Development Indicators. Available at: http://data.worldbank.org/indicator.
[2] WHO Global TB Report Nigeria Country Profile. Available at:
https://extranet.who.int/sree/Reports?op=Replet&name=%2FWHO_HQ_Reports%2FG2%2FPROD%2FEXT%2FT BCountryProfile&ISO2=NG&LAN=EN&outtype=html.
[3] WHO. 2002. Baseline Assessment of the Nigerian Pharmaceutical Sector. Available at:
http://collections.infocollections.org/whocountry/en/d/Js7928e/8.html#Js7928e.8.
[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_ng_en.pdf?ua=1.

Key Gaps that Necessitated SIAPS TB Technical Assistance and QuanTB implementation

- Inadequate institutional and staff capacity for forecasting, quantification, supply planning, and store and commodity management. Previously, the country was using an Excel-based tool that quantified TB medicines one by one.

- The lack of an EWS to flag medicine stock risks resulted in frequent stock-outs and expiry/wastage of TB medicines.

- Supply planning and order tracking were challenging due to inadequate pipeline information.

- Data aggregation, analysis, feedback, and reporting were inconsistent and incomplete.

- Staff issues, such as inadequate skilled staff and staff attrition, hindered progress.

- Logistics, supply chain competences, and staff skills in the NTP logistics unit were inadequate.

The implementation of the QuanTB EWS is helping to address these gaps.

Goal and Objectives

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

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

This report summarizes key aspects and results of the 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 was 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; and the generation of accurate forecasts, supply planning information, and EWS alerts. The information informs proper decision making and the development and implementation of appropriate remedial action through a quantification technical working group or partner coordination forum.

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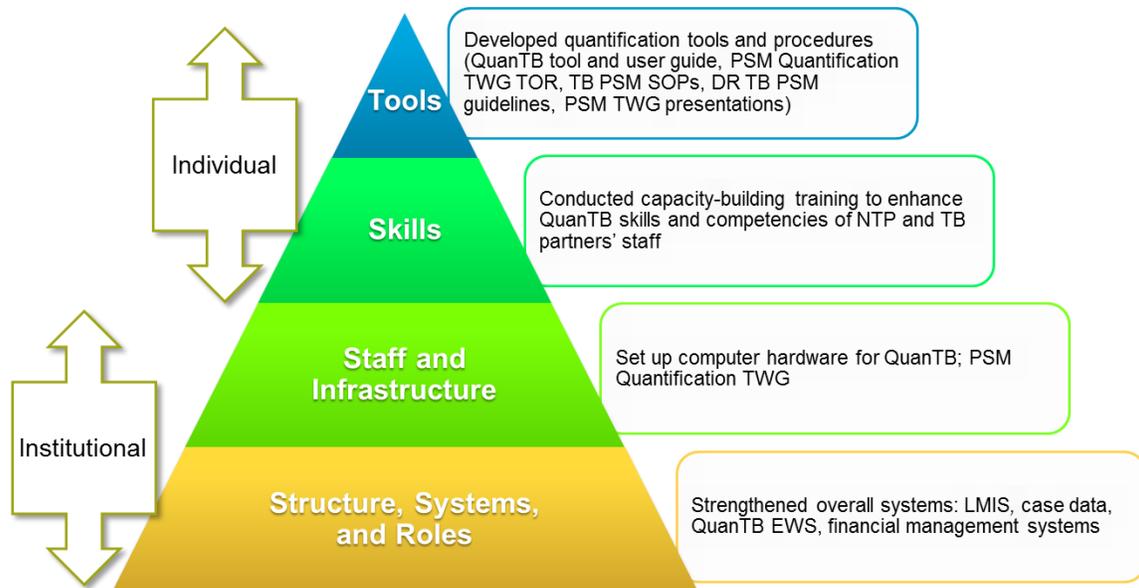
[6] Goredema W, Sawyer K, Mwatawala S, Owuna C. 2017. *Implementing an Early Warning System for TB Medicines: Global Report.* Submitted to the US Agency for International Development by the Systems for Improved Access to Pharmaceuticals and Services (SIAPS) Program. Arlington, VA: Management Sciences 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 quantification[8]

Key interventions or activities implemented in Nigeria included:

- *Enhanced the NTP's quantification capacity and improved national forecasting and supply planning system:* SIAPS supported the use of QuanTB for the quantification of all TB medicines for the new funding model (NFM) and provided individualized and targeted technical assistance to the NTBLCP and principal recipients.

- *Established and implemented QuanTB for quantification and stock status monitoring and as an EWS* to prevent stock-outs and wastage of TB medicines.

- *Strengthened information systems and improved case and stock data quality and reporting for informed decision making* through quarterly collection, analysis, validation, and use of the logistics management information system (LMIS) and case data to update QuanTB.

- *Supported the development and implementation of the NFM grant proposal and the PSM plan for drug-susceptible TB (DS-TB) and drug-resistant TB (DR-TB) for the NTP and partners.*

- *Promoted and enhanced coordination and collaboration* among the NTBLCP and TB stakeholders and partners and participated in and facilitated TB technical meetings, workshops, quantification review meetings, and guideline development.

- *Supported other TB control-related activities*, such as laboratory supply chain logistics activities, including QuanTB-based quantification, data collection, supply planning, distribution, and monitoring of the cartridge pipeline.

- *Supported the introduction of new TB medicines* by facilitating the process of acceptance and planning of the new pediatric formulation, participating in the development of an interim guide for the introduction of bedaquiline and delamanid, creating a road map to introduce the new shorter regimen, and developing standard operating procedures for pharmacovigilance and adherence.

- Participated in Global Drug Facility (GDF) monitoring missions and program review and strengthened quantification and the overall TB supply chain system.

- Built the capacity of NTP and principal recipient staff for TB programing and professional and managerial issues that resulted in quality support to lower levels (e.g., zonal, state, and local government and facilities). This resulted in improved data quality, timeliness, and store and stock management.

- Actively participated in most NTBLCP and partner meeting and contributed to decision making for TB programing in Nigeria.

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[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 in Nigeria since November 2014, and the country has been using QuanTB, which replaced an earlier tool, since that time. The support is provided through a designated in-country senior technical advisor for TB. The Federal Ministry of Health (FMOH)'s NTBLCP implements the tool with SIAPS support and in collaboration with local partners and stakeholders for TB control, including the FCMS, the National Agency for the Control of AIDS (NACA), WHO, the Global Fund, USAID, the Centers for Disease Control and Prevention and its implementing partners, the Clinton Health Access initiative, FHI 360, ARFH, the IHVA, the state MOH, and the Nigeria Supply Chain Integration Projects (NSCIP). At the time of the evaluation, the country was using QuanTB for forecasting, procurement, supply planning, pipeline monitoring, cost analysis, introduction of new medicines or regimens, exporting data to other tools, and as an EWS. Excel forms are used for reporting both case data[9] and medicine stock data[10] to the NTBLCP. For DS-TB, DOTS sites collect logistics data quarterly using hard copy quarterly reports and requisition and issue forms (QRRIFs). TB and leprosy supervisors collect data and submit it to the state, where the state logistics officer enters and aggregates the data into a PicknPack LMIS tool and sends the filled PicknPack, including a state store LMIS report, to the zonal pharmacist. The zonal pharmacist reviews the data and prepares a QRRIF and an LMIS report for the zonal level and sends them to the FMOH Central Logistics Unit. The unit verifies the data and shares them with the TB PSM TWG. For DR-TB, the treatment centers and state logistics officer collect patient and commodity data and use them to complete the quarterly medicine monitoring tool. The store report for second-line medicines is sent using the e-QRRIF from the FCMS and IHVN. The facilities and store reports are sent directly to the FMOH Central Logistics Unit, which verifies the data and shares them with the TB PSM TWG and partners. The TWG then extracts and uses relevant data from the forms to update QuanTB.

Beneficiary Experiences and Perspectives

Respondents rated key attributes of the tool favorably. They consider the tool to be simple (compared to previous Excel-based methods that quantified TB medicines one by one), user friendly, acceptable, and reliable depending on the quality of case and stock data fed into the tool. Users feel that the tool is useful because it readily 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 inform actions to prevent or minimize stock-outs and expiry of medicines. The tool improves the speed and timelines of forecasting and supply planning decision making and therefore facilitates faster actions.

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[9] MDR-TB reporting form; MDR-TB monitoring form.
[10] Combined quarterly report, requisition and issue form for drugs, lab and RR tools.

Accomplishments

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

- *Adopted and institutionalized QuanTB* as the national quantification tool.

- *Enhanced the NTBLCP's quantification capacity and skills*: SIAPS provided technical assistance to enhance the country's TB medicine quantification capacity and skills. This included training more than 25 people, including NTBLCP and principal recipient staff and others to develop competences and skills in medicine management, QuanTB, and TB medicine logistics and stock management. The goals, process, timelines, and expected results of implementing the tool were discussed. To ensure effectiveness and efficiency, responsibilities and roles were delineated and commitments were obtained from health organizations and officials at the federal, state, and local levels of government (e.g., NTBLCP, FCMS, zones, state and local government authorities, health facility staff). The NTBLCP now conducts quarterly QuanTB exercises and generates useful data for forecasting and supply chain decision making. As part of ongoing capacity-building efforts, SIAPS supported MOH staff, including the head of PSM, one PSM staff member, and one NTBLCP staff member, 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. SIAPS also facilitated training on the new version of QuanTB in August 2016. Other capacity-building activities included developing TB control procedures, guidelines, and tools (e.g., harmonization of TB standard operating procedures and DR-TB PSM guidelines, TB pediatric desk reference, decision making during TB expert meetings, national TWG presentations, guidelines, a handbook for field workers, training manuals, NTBLCP work plans, action plans).

- *Improved forecasting and supply planning*: QuanTB forecasts and related outputs, including updated data on the number of enrolled patients and stock on hand by expiry date, are reviewed quarterly and used to improve procurement, supply planning. and supply chain logistics management of TB commodities. The forecasts are used in developing PSM plans for Global Fund NFM grant applications and GDF procurement requests. During the NFM planning and budgeting period, QuanTB made it easy for the NTBLCP to adjust targets and other parameters for quick decision making. SIAPS also provided technical assistance for Global Fund proposal writing for TB and HIV/TB that led to successful forecasting of TB medicines and other commodities required for management and prevention activities for more than 500,000 Nigerians likely be infected with TB between July 2015 and December 2017; the development of the PSM/logistics work plan for the NFM; PSM activities for Global Fund and USAID TB projects on a daily basis; PSM TWG meetings, including presentations at meetings such as review meetings; monthly introduction of box kits; and the use of the supply box in second-line medicine management. SIAPS provided hands-on technical assistance during actual quantification of first- and second-line medicines. QuanTB data enabled the NTBLCP to quickly estimate medicine needs during the introduction of new medicines, such as pediatric formulations, bedaquiline, delamanid, and shorter regimen medicines. The country can now easily

estimate quantities for interim procurement and determine when to deliver the supplies to cover the gap while waiting for pending GDF consignments. SIAPS support for quantification included assisting with the NFM grant proposal development process and the development and implementation of the NTP PSM plan for DS-TB and DR-TB. SIAPS also supported the FMOH/NTBLCP to quantify second-line medicines and medicines for shorter regimens, which was funded by the Government of Nigeria

- *Implemented an EWS to prevent stock-outs and wastage of TB medicines:* SIAPS has provided support to the MOH/NTBLCP PSM TWG for ongoing monitoring of the TB medicine supply pipeline. The support includes reviewing and analyzing QuanTB dashboard outputs and raising alerts as needed on medicines that are under- or overstocked or about to expire. This has triggered corrective actions by stakeholders and suppliers to address identified problems. Decisions to redistribute, expedite, or delay GDF shipments of first-line medicines, kanamycin, and oral second-line medicines have been made based on QuanTB dashboard alerts and overall pipeline monitoring. For example, an emergency order of capreomycin, a second-line medicine, was placed when the stock level was acutely low (one month of stock on hand), and the order arrived in January 2016. The country then continued to follow up with the GDF to ensure the scheduled NFM year-two order of the medicine arrived as scheduled. Another QuanTB alert showed that cycloserine had less than three months of stock in 2015; this helped the NTBLCP to monitor and ensure that the medicine arrived on time. QuanTB alerts flagged quantities of needles and syringes that would likely have expired if they were not donated. The tool has also helped the NTBLCP and its partners in aggressively following up with the GDF for deliveries of CAT 1 medicines INH 300mg. SIAPS collated and analyzed retrospective data on INH, prepared and shared the reports with NTBLCP and partners, and pushed for the INH target to be shared by NACA and USAID/PEPFAR Implementing Partners, which led to a gap analysis and an alert on the inadequacy of the quantity of NFM INH 300mg. This encouraged the principal recipient for DS-TB, ARFH, to seek approval from the Global Fund for procurement of more INH 300mg. As a result of these efforts, at the time of the evaluation there had been no stock-outs of first-line medicines since May 2015[11,12].

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[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
[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.
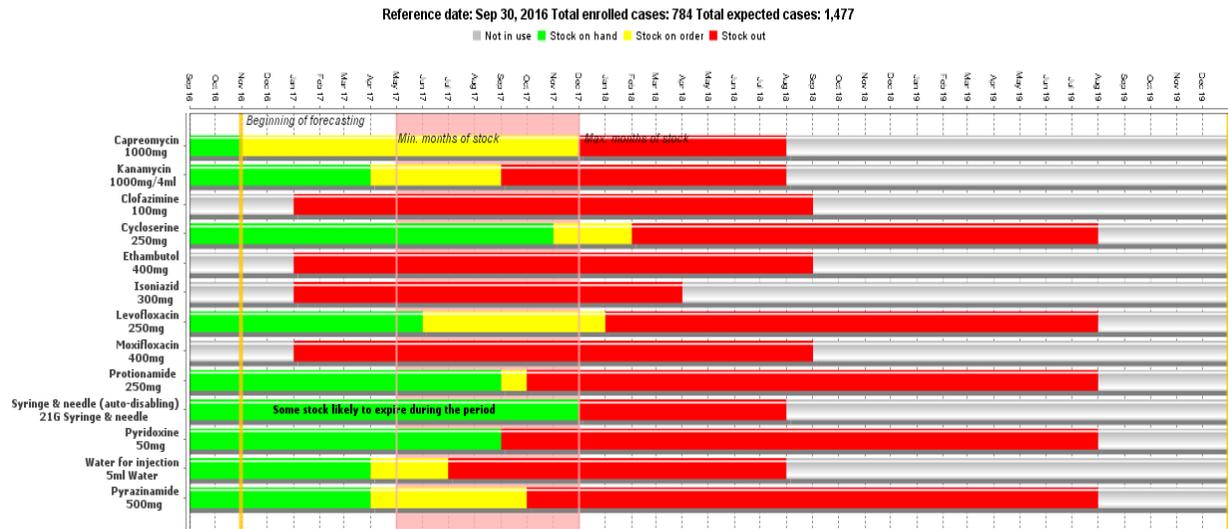
Sample QuanTB Dashboard
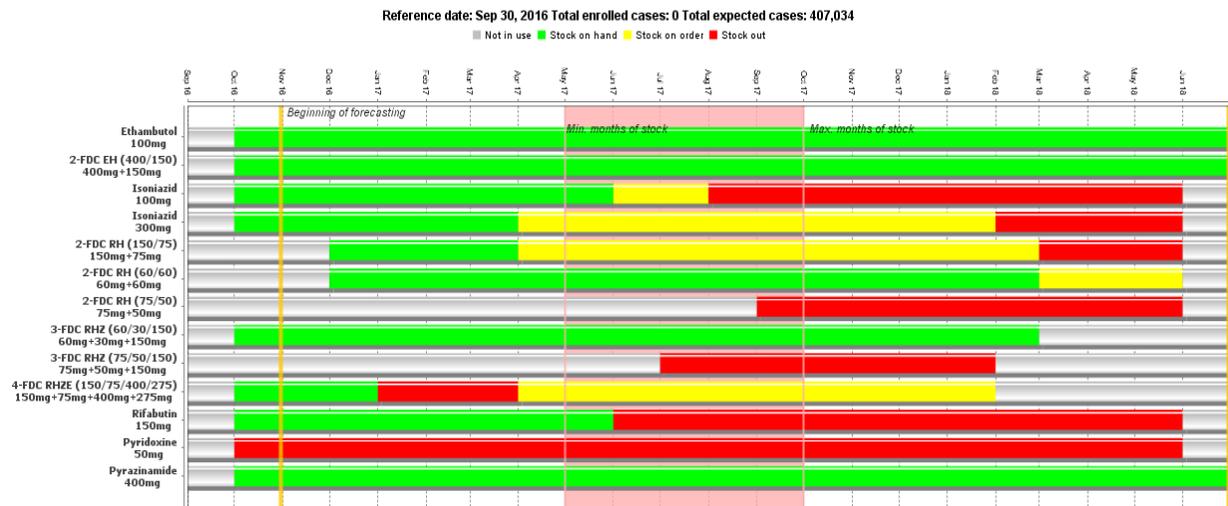

Figure 2. First-line medicines

Figure 3. Second-line medicines

- *Tracking of key supply chain indicators:* The implementation of QuanTB has enabled the NTBLCP to track key indicators, such as months of usable stock on hand, the number and percentage of medicines out of stock, procurement lead times, and months of stock of expected supplies.

Trend of Stock-outs of TB Medicines

There were no stock-outs of first-line TB medicines[13] at health facilities from the last quarter of 2014 to the last quarter of 2016.
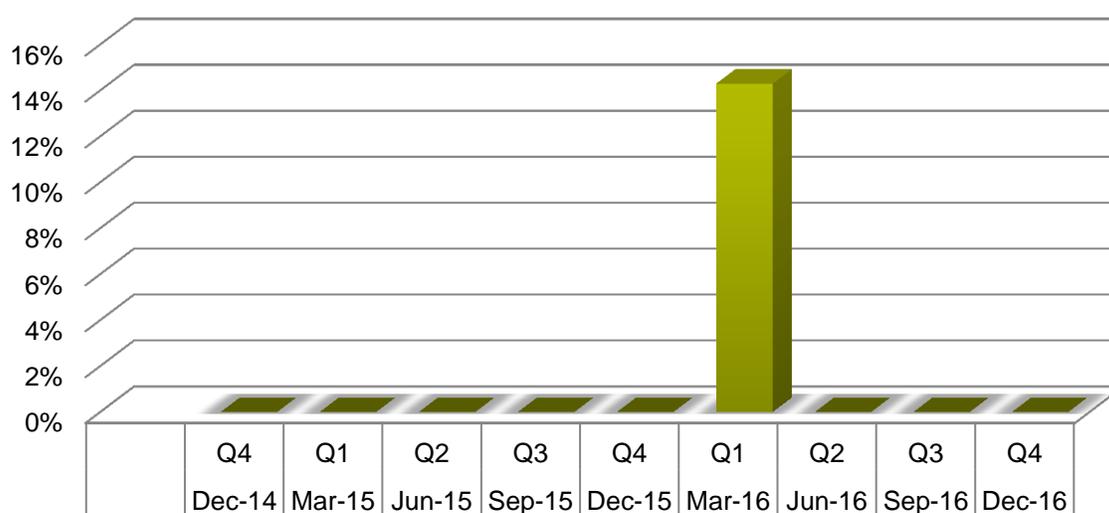

Figure 5. The central level of the supply chain system

However, there was a 14% stock-out of first-line medicines at the central level in the quarter ending March 2016 due to expired import waiver documents and a long lead time for processing and approval. The CAT 1 medicine stock-out was cushioned by in-country redistribution of RHZE to states with low stock levels and new cases. QuanTB reports captured no stock-outs because CAT 1 was available for redistribution within the country.

Percentage of Stock-outs of Second-line TB Medicines[14,15]

There were no stock-outs of second-line TB medicines[16] at health facilities from the last quarter of 2014 to the last quarter of 2016.

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[13] SIAPS. Nigeria QuanTB quarterly reports. The QuanTB tool is updated every quarter with stock on hand data from e-QRRIFs from the FCMS and six zonal stores.
[14] SIAPS. Nigeria QuanTB quarterly reports. The QuanTB tool is updated with stock-on-hand data from the treatment center medicine monitoring tool, FCMS, and IHVN/GHLI-L e-QRRIFs.
[15] 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.
[16] SIAPS. Nigeria QuanTB quarterly reports. The QuanTB tool is updated every quarter with stock on hand data from e-QRRIFs from the FCMS and six zonal stores.
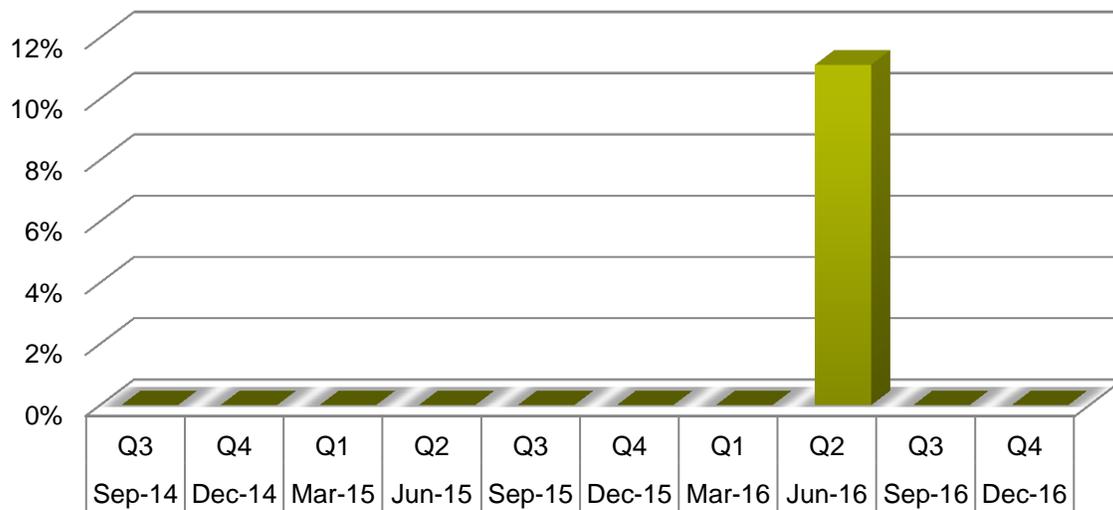
Figure 7. The central level of the supply chain system

However, there was an 11% stock-out of second-line medicines at the central level in the quarter ending June 2016 due to a delay in the shipment of government stock and escalated utilization. Medicines were distributed and made available at the lower levels.

- *Identified and addressed TB PSM challenges through GDF monitoring missions and external TB program review:* The missions identified several TB supply chain challenges and recommended interventions to address them. SIAPS provided technical assistance and collaborated with the NTP and other partners to address the identified challenges.

- *Strengthened information systems and improved data quality and reporting for informed decision making:* SIAPS assisted with a review of the LMIS training slides and manual for first-line medicines and laboratory items and facilitated the issuance of a commitment statement on LMIS data quality and report timelines by the National PSM/Logistics Unit of the NTBLCP and six zonal pharmacists for State MOHs (North Central, North West, North East, South South, South East, and South West) during QuanTB training. The implementation of QuanTB has improved the TB LMIS and reporting. Improved outcomes and impact in overall logistics management were achieved at all levels by utilizing all possible opportunities to enhance staff skills and obtain staff commitment to collect and report quality data.

- *Strengthened pharmaceutical management of TB medicines:* SIAPS provided ongoing technical assistance to the NTBLCP for the following programmatic and logistics areas, with the goal of strengthening overall pharmaceutical management for improved TB control: developed an SOP on cartridge management and various supply chain logistics management templates and tools; supported the development of NTBLCP competences and skills at the national and state levels on inventory; advocated the Essential Medicine Listing Committee for inclusion of all classes of TB medicines in the Nigeria National Essential Medicines List, which at that time had only adult first-line medicines;

advocated the National Standard Treatment Guideline Committee for inclusion of second-line medicines in the standard treatment guidelines; mentored staff on logistics and TB treatment basics; and supported the NTBLCP and PRs in decision making on procurement, medicine management and logistics issues, including the introduction of new medicines such as bedaquiline and new pediatric formulations, and related pharmacovigilance tasks

- *Promoted and advanced coordination and collaboration among NTBLCP and TB stakeholders and partners:* SIAPS coordinated and facilitated collaboration among the NTBLCP PSM/Logistics Unit, donors, local TB partners, and other TB stakeholders; facilitated meeting between partners and the logistics unit of the NTBLCP—the IHVN/GHLI-L; actively participated in and contributed to various partners meetings, including the TB/HIV USAID partners forum and the DELIVER/NTBLCP collaboration; developed a work plan for the KNCV/TB and NSCIP Global Fund program meeting; and assisted with the Challenge TB work planning and brainstorming meeting and the e-TB Manager leadership development program.

- *Tools*, procedures, and training materials designed or developed, including an update and review of treatment guidelines capacity building training materials, SOPs on adherence and pharmacovigilance of bedaquiline, PSM planning activities in DS- and DR-TB, and QuanTB quarterly reports

- *Strengthened overall systems:* The EWS strengthened information for decision making by connecting patient- and stock-related data to detect potential over- and understocks*;* improve quantification and supply planning to improve procurement; monitor stock status to help inform the redistribution of commodities within and between countries in the event of under- or overstocks; build capacity through training and supportive supervision; and optimize financial management systems through better estimation of national needs and less wastage.

- *Improved services:* SIAPS TB technical assistance and QuanTB have improved TB medicines availability and TB control services.

Key Challenges and Lessons Learned

Challenges

- Staff attrition, which necessitates budgeting enough resources, including time, to build the capacity of new staff
- Inadequate skilled personnel (e.g., logistics staff have inadequate management skills)
- Data quality issues, although much has been done to try to address the problem
- Inadequate logistics skills at the state, local, and health facility levels
- Inadequate funding to implement activities
- Delays in GF/GDF approvals at the start of the NFM
- Delay in holding review meetings
- Weak logistics skills at lower levels of the supply chain system

Lessons Learned

- Strong partnerships with in-country partners are key to leveraging resources and coordinating TB technical assistance 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 overstocks or stock-outs of TB medicines.

- Providing technical assistance in resource-constrained settings can be quite difficult and time consuming and may involve teaching local staff basic skills such as report writing, computer skills, basic logistics, and TB program information. Working with the NTP means providing support in all areas and requires excellent communication and interpersonal skills and a high level of patience and tolerance.

Gaps for Future Consideration

- Continue to build in-country capacity and experience to implement the tool. Implement ongoing staff capacity-building refresher trainings to mitigate the impact of staff attrition.

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

- Continue to improve data quality and data reporting from the periphery and include lower-level data when updating QuanTB.

CONCLUSION

With USAID/SIAPS technical assistance, the Nigeria FMOH NTBLCP has successfully institutionalized and implemented 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. The trend of stock-out rates is evidence that implementation of the tool has contributed to achieving the goal of ensuring an uninterrupted supply of TB medicines. However, continued investment is needed to address the remaining gaps. Therefore, the NTBLCP and local stakeholders and partners should continue to collaborate to sustain the use of the tool.