






# Applying a Standardized Approach to Strengthen Performances of GeneXpert Networks programme: lessons learned from Burkina Faso, 2019

Riccardo Alagna <sup>1</sup>, T. Léon Sawadogo<sup>2</sup>, Elisa Tagliani <sup>1</sup>, Adjima Combarry<sup>2</sup> and Daniela Maria Cirillo <sup>1</sup>

**Affiliations:** <sup>1</sup>IRCCS San Raffaele Scientific Institute, Milan, Italy. <sup>2</sup>National Tuberculosis Program, Ouagadougou, Burkina Faso.

**Correspondence:** Riccardo Alagna, IRCCS San Raffaele Scientific Institute, Via Olgettina 58, Milan 20132, Italy. E-mail: [alagna.riccardo@hsr.it](mailto:alagna.riccardo@hsr.it)

**ABSTRACT** GeneXpert scale-up is a historic step in the process of tuberculosis (TB) elimination. However, the global roll-out of the test has highlighted gaps that have limited its impact on the TB care cascade. Here we report the description of an innovative GeneXpert network strengthening tool called Applying a Standardized Approach to Strengthen Performances of GeneXpert Networks (ASAP-GxNet) and highlight results and challenges during implementation of the pilot in Burkina Faso.

ASAP-GxNet is a 6-month competency-based programme involving an innovative GeneXpert assessment tool as well as a series of short courses and projects designed to qualitatively improve the network while strengthening the capacity of the national GeneXpert focal point to oversee the network. Progress of the GeneXpert network is measured before and at the end of the programme and is rated using a star system (0 to 4 stars).

In Burkina Faso, implementation of the ASAP-GxNet programme resulted in improved management of the national GeneXpert network with a 21% increase in points from the start to the end of the programme.

To our knowledge, ASAP-GxNet is the first programme to give an overall picture of the quality of GeneXpert networks and to investigate performance in terms of management behaviour. ASAP-GxNet has been developed to help national TB programmes coordinate efforts and needs and highlights the expected achievements of the GeneXpert network.



@ERSpublications

**Development of ASAP-GxNet programme and lessons learned from pilot implementation in Burkina Faso #tuberculosis** <https://bit.ly/338WU3r>

**Cite this article as:** Alagna R, Sawadogo TL, Tagliani E, *et al.* Applying a Standardized Approach to Strengthen Performances of GeneXpert Networks programme: lessons learned from Burkina Faso, 2019. *ERJ Open Res* 2020; 6: 00283-2020 [<https://doi.org/10.1183/23120541.00283-2020>].



## Introduction

The World Health Organization (WHO)'s endorsement of the Xpert MTB/RIF assay in 2010 represented a significant breakthrough in TB diagnostics [1]. With the unprecedented need to take advantage of new technologies and improve TB diagnosis, investment in TB laboratory strengthening, including Xpert MTB/RIF implementation, has also increased. Since 2012, the volume of sales of Xpert MTB/RIF tests has increased dramatically from 1.3 million to nearly 12 million cartridges sold in 2018 solely to the public sector (personal communication). However, massive deployment of Xpert MTB/RIF kits at thousands of sites has highlighted that if these are not implemented with a comprehensive accompanying tools package and within the context of a strengthened health system, diagnostic tests alone are unlikely to produce the expected impact on the TB care cascade [2]. Although performing the Xpert assay is relatively simple, management of the national GeneXpert network is complex, and several settings have reported operational and programmatic challenges associated with assay implementation and routine clinical use [2].

A successful national GeneXpert network requires robust managerial skills that are able to identify strengths and weaknesses as well as efficiently and proactively respond to the network needs. In this context, national GeneXpert focal points play a crucial role in supporting the national TB programme (NTP) to coordinate efforts and needs, to monitor the implementation of national guidelines, and to guarantee continuity of test services in terms of supplies of reagents, training, maintenance, quality assurance and supervision [3]. Despite its importance, in some settings a focal point is not available or has weak managerial skills. This results in several bottlenecks such as delayed procurement and supply of cartridges, lack of regular supervision, inadequate preventive maintenance and delayed replacement of damaged modules. As a result, many national GeneXpert networks are inefficient and underutilised. Although some network assessment tools and training programmes exist, these are not suitable for the broader vision needed to manage a complex network such as the GeneXpert one.

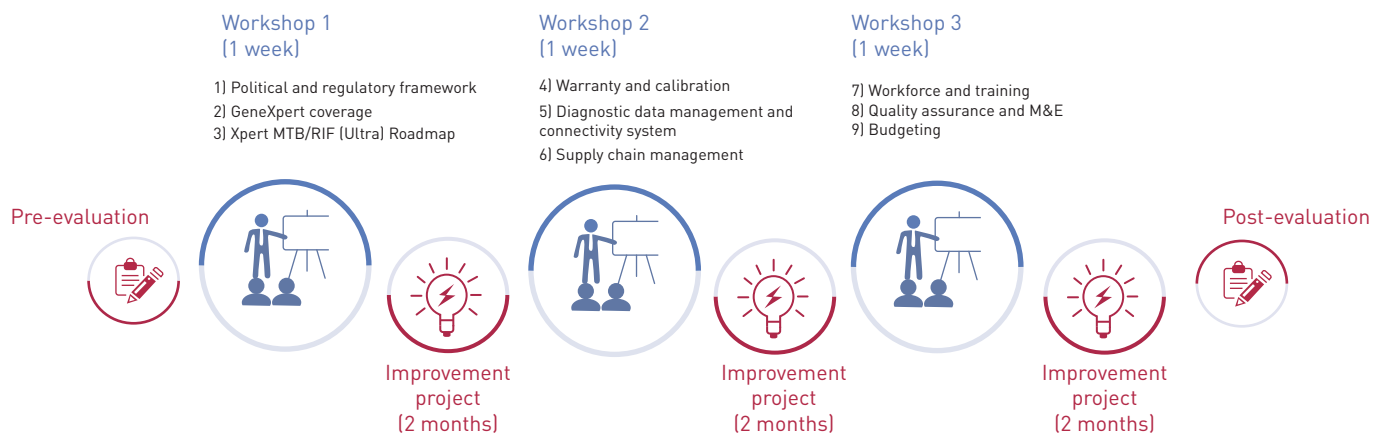
The TB Supranational Reference Laboratory (SRL) of Fondazione Centro San Raffaele of Milan, Italy and the National TB Program of Burkina Faso developed the Applying a Standardized Approach to Strengthen Performances of GeneXpert Networks (ASAP-GxNet) programme to strengthen local managerial skills and conduct a standardised impact assessment of the network. In this article, we describe the tool kit and the results from pilot implementation in Burkina Faso [2].

### *The ASAP-GxNet competency-based programme*

ASAP-GxNet is a paper and online competency-based training programme composed of an innovative GeneXpert assessment tool along with a series of short courses and work-based projects designed to quantitatively improve the network while strengthening the managerial capacity of the national GeneXpert focal point.

The programme, based on the principles of the Strengthening Laboratory Management Toward Accreditation (SLMTA) training curriculum [4], has been customised to include tools specifically addressing the key elements of the national GeneXpert network. The ASAP-GxNet programme lasts for 6 months and contains two distinct pillars: a standardised assessment tool and a training programme with improvement projects (figure 1).

A baseline assessment using the standardised tool is conducted at the beginning of the programme to identify the strengths and weaknesses of the network. The baseline score is used to identify key priority



**FIGURE 1** Applying a Standardized Approach to Strengthen Performances of GeneXpert Networks (ASAP-GxNet) implementation process. M&E: monitoring and evaluation.

areas to be addressed during the training curriculum. The training programme is then conducted in a series of three workshops, one every 8 weeks, with improvement projects carried out by the national GeneXpert focal point in the timeframe between workshops. An external mentor supports the national GeneXpert focal point along the entire programme. The primary duties of the external mentor are to conduct an objective evaluation of the national GeneXpert network, to train the national GeneXpert focal point and to guide him/her on the improvement projects.

At the end of the 6-month programme, a final assessment (exit) using the same standardised tool is conducted, and the difference between baseline and exit scores provide a quantitative measure of the impact of the ASAP-GxNet programme.

#### *Standardised assessment tool*

The standardised assessment tool enables the national GeneXpert focal point in collaboration with the NTP to evaluate the GeneXpert network functionality. The assessment tool was developed using an African Society for Laboratory Medicine/Association of Public Health Laboratories Laboratory Network (ASLM/APHL LABNET) scorecard-based approach [5]. It also incorporates critical elements described in the “Practical Guide to Implementing a Quality Assurance System for Xpert MTB/RIF Testing” [6] and includes various checklists and questionnaires developed by the Global Laboratory Initiatives (GLI) [7].

The tool allows assessment of three main “Areas”: a) GeneXpert network capacities, b) GeneXpert quality indicators and c) Managerial capacities (table 1). Each “Area” includes a set of “Core capacities” each comprising a number of specific “Components” that are assessed by a series of questions (107 questions in total) (figure 2a). Points are assigned to each “Component” based on the compliance with international recommendations, with each question totalling a maximum of 3 points.

Each “Component” is then highlighted with a specific colour based on the total number of points accumulated, to facilitate the visual identification of the areas that need strengthening (figure 2b). In addition to the colour-coded visualisation of the “Components”, a final “Score” based on the total number of points is provided to determine the network “Star rating” – from “0 stars” (0–27 points, <20%) to “4 stars” (109–135 points, 80–100%) (table 1). The assessment tool is distributed to the national or international relevant parties beforehand and completed within 2 days with the external mentor from SRL Milan.

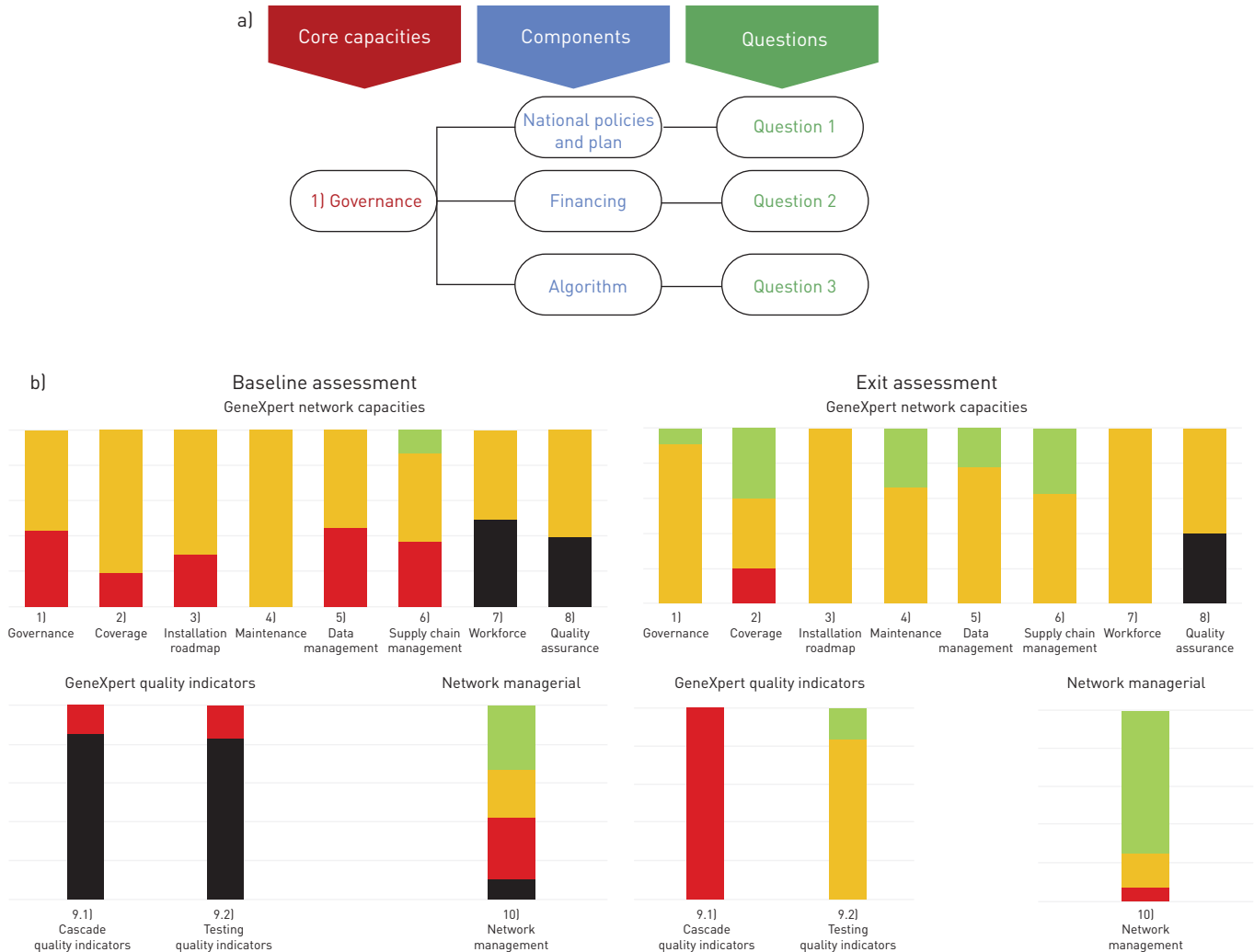
#### *Training programme and improvements projects*

The training programme aims to improve the national GeneXpert focal point capacity in coordinating and accomplishing multiple managerial tasks [8]. The curriculum was developed taking into consideration the key elements of the GLI Training Package “Diagnostic network strengthening and Xpert MTB/RIF (Ultra) implementation” [8]. Based on the principle of “learning by doing”, 15 theoretical sessions are combined

TABLE 1 Areas, core capacities and components evaluated by the standardised assessment tool

Area	Core capacities	Components	Points
<b>GeneXpert network capacity</b>	1. Governance	Governance, national policies and plan, financing, algorithm, specimen referral system	15
	2. Coverage	GeneXpert integration, current GeneXpert coverage, future GeneXpert coverage	9
	3. Installation roadmap	Pre-installation, installation, post-installation	9
	4. Maintenance	Warranty; calibration, service interruption	9
	5. Data management	Sample data management, data analysis, reporting	9
	6. Supply chain management	Forecast, procurement, distribution, stock management, service interruption	15
	7. Workforce	Network management, training	6
	8. Quality assurance	Quality assurance, external quality assurance	6
	9. Quality indicators	Diagnostic cascade quality indicators, performance quality indicators	12
<b>GeneXpert quality indicator</b>			
<b>Managerial capacity</b>	10. Management	National policies and plan, algorithm, financing, coverage, pre-installation, installation, post-installation, warranty, calibration, data management, forecast, procurement, stock management, training, quality	45
<b>Total score</b>			135

GeneXpert network “Star rating”: “0 stars” (0–27 points, <20%); “1 star” (28–54 points, 20–40%); “2 stars” (55–81 points, 40–60%); “3 stars” (82–108 points, 60–80%); “4 stars” (109–135 points, 80–100%).



**FIGURE 2** Standardised assessment tool structure and colour-coded visualisation of core capacities results. a) Structure of standardised assessment tool with questions defining components and core capacities. b) Colour-coded visualisation of core capacities: Black “0 point”, Red “1 point”, Yellow “2 points”, Green “3 points”.

with simulations and hands-on practical exercises. During the 6-month course, three 5-day workshops are organised approximately every 8 weeks, covering the ten “Core capacities”. For each workshop, 4 days are dedicated to the analysis and strengthening of two to three “Core capacities”, while 5 days are dedicated to developing or updating the related sections of the country GeneXpert operational plan.

In addition to the training curriculum, 15 practical activities are used to allow the national GeneXpert focal point to acquire the new learning concepts and use the ASAP-GxNet tools.

During the training period, improvement projects are carried out by the national GeneXpert focal point to enhance his/her managerial capacity and accountability. A total of 38 improvement projects can be carried out depending on the specific “Core capacities” covered during the workshops and based on gaps identified during the initial network assessment.

#### *Costs associated with the programme*

The ASAP-GxNet programme is available free-of-charge for any country interested in improving the managerial skills of the national GeneXpert focal point and aiming to optimise the use of the available resources to address the gaps of the GeneXpert network through an evidence-based decision-making process. Access to the ASAP-GxNet toolkit is possible through registration to the ASAP-GxNet online application. The online tool aims at guiding users on the utilisation of the ASAP-GxNet and to keep a record of the performance and improvements during the programme. It is important to note that implementation of the ASAP-GxNet programme requires the support of an external mentor with extensive experience in TB laboratory strengthening. Therefore, the main costs are related to technical assistance/mentorship.

## Methods

### *Pilot implementation of the ASAP-GxNet programme in Burkina Faso*

The Xpert MTB/RIF assay (Cepheid, Sunnyvale, CA, USA) was first introduced in Burkina Faso in June 2013 with the placement of one 4-module GeneXpert machine (GX4) at the TB National Reference Laboratory (NRL). Subsequently, in October 2016, two additional GX4 instruments were installed at two regional laboratories. By the end of 2016, the GeneXpert network was expanded to include an additional 12 GX4 machines resulting in a total of 15 instruments covering all regions in the country.

In 2017, a national GeneXpert focal point was identified and a national Xpert MTB/RIF Operational Plan for the years 2018–2022 was developed and adopted by the National TB Control Programme. According to the national TB diagnostic algorithm, the Xpert MTB/RIF assay was used as the initial diagnostic test for children, people living with HIV, high-risk multidrug-resistant TB patients, prisoners and miners.

The implementation of the ASAP-GxNet programme in Burkina Faso started in March 2019 and ended in December 2019. At that time, the national GeneXpert focal point had little experience in overseeing the GeneXpert network, as no similar programmes existed at national level to strengthen the laboratory managerial capacities of the GeneXpert focal point. The programme started with the initial assessment (*i.e.* baseline assessment) of the GeneXpert network. The assessment lasted a total of 2 days and was conducted by a mentor from the SRL of Milan.

On the first day, the auditor reviewed the national policies, as well as the national strategies and procedures pertaining to the 10 “Core capacities” of the GeneXpert network, and identified the main areas for improvement and gaps to be addressed based on the scoring system described above. On the second day, the auditor presented the results of the baseline assessment to the NRL/NTP staff, and in conjunction with the country counterpart, developed an action plan for the ASAP-GxNet training programme implementation.

A customised training programme was thus developed to address the specific areas for improvement identified by the baseline assessment. A total of 10 improvement projects were selected to close the identified gaps.

All three workshops were delivered by the same external mentor that conducted the baseline assessment and that supervised the improvement projects. Due to the country’s unstable security conditions, a few deviations from the standard 6-month ASAP-GxNet programme had to be applied. Firstly, part of the training was conducted in Burkina Faso and part in Milan, Italy, in the presence of the country national GeneXpert focal point. Secondly, the 5-day workshops were conducted at a 12-week interval, instead of 8 weeks, with the programme lasting a total of 9 months, instead of 6 months. And lastly, the final (*i.e.* exit) network assessment was conducted remotely by the same external mentor that implemented the programme with the support of the national GeneXpert focal point.

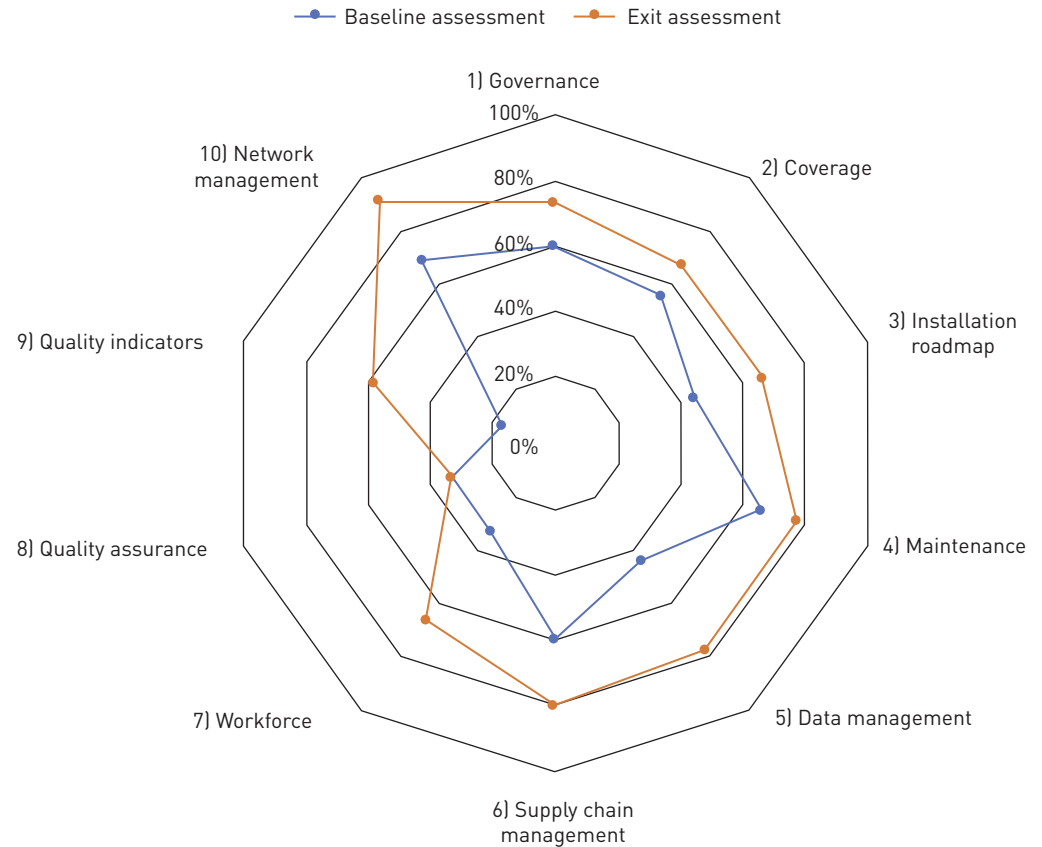
The external mentor reviewed the results of the final assessment, and the overall impact of the ASAP-GxNet programme was discussed with the national TB programme with the official presentation of the results to the national TB laboratory network in December 2019.

### *Ethical aspects*

Ethics approval was not sought as implementation of ASAP-GxNet was conducted as part of a standard of care and routine public health investigation and response, which did not require a formal ethics review in either Burkina Faso or Italy.

## Results

Upon completion of the ASAP-GxNet programme, all three “Areas” showed a significant improvement, from an overall baseline score of 74/135 points (55%), corresponding to a two star rating, to 103/135 points (76%), corresponding to a three star rating at exit, representing a 21% overall point increase from baseline to exit. In particular, significant improvements were observed in nine out of 10 “Core capacities”, with the only exception of the “Quality assurance” capacity, which remained unvaried (figure 3). At the baseline assessment the average percentage points for all core capacities was 48% with “Governance”, “Coverage”, “Maintenance”, “Supply chain management” and “Management” above 50%. As a result of improvements to projects and training (table 2), different grades of progress have been observed at the exit assessment (figure 3). Three “Core capacities” showed an improvement ranging from 34% to 41%: “Quality indicators” (from 2/12 points (17%) to 7/12 points (58%)), “Data management” (from 4/9 points (44%) to 7/9 points (78%)) and “Workforce” (from 2/6 points (33%) to 4/6 points (67%)). Three “Core capacities” showed an improvement ranging from 20% to 23%: “Installation roadmap” (from 4/9 points (44%) to 6/9 points (67%)), “Supply chain management” (from 9/15 points (60%) to 12/15 points (80%)) and “Network management” (from 31/45 points (69%) to 41/45 points (91%)). Three “Core capacities”



**FIGURE 3** Performance of various core capacities, as measured by the Applying a Standardized Approach to Strengthen Performances of GeneXpert Networks (ASAP-GxNet) assessment tool from baseline to exit audit.

showed an improvement ranging from 11% to 13%: “Governance” (from 9/15 points (60%) to 11/15 points (73%)), “Coverage” (from 5/9 points (56%) to 6/9 points (67%)) and “Maintenance” (from 6/9 points (67%) to 7/9 points (78%)).

## Discussion

The present report is a descriptive study based on a pilot implementation of a new approach to strengthen the national GeneXpert network. The implementation of the ASAP-GxNet programme resulted in an improved management of the national GeneXpert network with a 21% increase in points from start to the end of the programme within a 9-month timeframe. This result was achieved by means of a combination of training activities, targeted improvement projects and high commitment of the national GeneXpert focal point. The experience in Burkina Faso demonstrates that despite its complexity, the national GeneXpert network can be efficiently strengthened by using a structured approach that addresses challenges of various network key components.

The active engagement of the national GeneXpert focal point was crucial to efficiently translate knowledge acquired during the training and improvement projects to real laboratory implementation. The national GeneXpert focal point was also essential in ensuring national TB programme manager buy-in and commitment to rapidly adapt and implement ASAP-GxNet tools. The external mentor ensured that the improvement projects were focused on major weaknesses and achievable in the short term. This approach not only created ownership on improvement results among the NTP team, but also allowed leadership and management skills at the national focal point to be strengthened. For example, most of the improvement projects focused on adapting and implementing tools for overseeing the overall network as well as for developing a sound pluriannual national Xpert MTB/RIF (Ultra) operational plan to facilitate future planning and implementation.

The main programmatic challenges encountered during the implementation of ASAP-GxNet related to a few specific “Core capacities” that required long-term commitment as well as the provision of dedicated funding to support their full implementation and continuation over time. For instance, the “Quality

TABLE 2 Selection of questions with improved results from baseline to exit assessment and related actions

Core capacity	Baseline points	Exit points	Components	Question	Baseline answer	Exit answer	Actions
<b>1. Governance</b>	9/15 {60%}	11/15 {91%}	Financing	Is there any instrument to estimate costs related to instrument purchase and implementation?	No tool available	Tool available and used Budget aligned with operational plan	Training on the use of ASAP-GxNet financing tool
				Are costs for cartridge procurement estimated?	Detailed cost estimation is available but not aligned with operational plan	Detailed cost estimation is available and aligned with operational plan	Training on cartridges quantification
			Algorithm	Does the algorithm address the laboratory goals of the End TB strategy to increase access to rapid and accurate detection of TB and to reach universal access to DST?	The national algorithm incorporates the use of WHO-approved rapid diagnostics (WRDs) for all patients in all high-priority groups (e.g. those at risk of multidrug-resistant TB, HIV/TB or paediatric TB)	The national algorithm incorporates universal access to WRDs for all patients and all persons being evaluated for TB	Improvements not dependent by ASAP-GxNet Following network analysis country planned to move to universal use of Xpert MTB/RIF in 2020
				Specimen referral system	Is there a national TB specimen referral and transportation strategy?	There is a TB specimen referral and transportation strategy approved	There is an integrated specimen referral and transportation strategy approved
<b>2. Coverage</b>	5/9 {56%}	6/9 {67%}	Current GeneXpert coverage	Is an evidence-based method used to estimate the future needs of GeneXpert instruments?	Estimation is based on detailed evidence	Estimation is based on detailed evidence Revised every year (or when needed)	Improvement projects on "development of a document for identification of network needs" Training on the use of "ASAP-GxNet assumption tool"
<b>3. Installation roadmap</b>	4/9 {44%}	6/9 {67%}	Pre-installation	Is the selection of new GeneXpert sites based on standardised criteria?	New sites are selected by geographical reasons only	A documented list of criteria, including geographical, epidemiological and infrastructural information, is described in the Xpert implementation plan and used to select new sites	Improvement projects on "development of a document for identification of network needs" and training on the use of ASAP-GxNet matrix needs tool
				Is a standardised checklist available and used to evaluate the site prior to installation?	A standardised checklist is available and used but not detailed	A standardised checklist is available and used to evaluate the site prior installation. In line with FIND checklist template	Improvement project to revise and update national document
			Installation	Is a standardised checklist available and used to evaluate the instrument installation?	A standardised checklist is available and used but not detailed	A standardised checklist is available and used to evaluate the site prior installation. In line with FIND checklist template	Improvement project to revise and update national document

Continued

TABLE 2 Continued

Core capacity	Baseline points	Exit points	Components	Question	Baseline answer	Exit answer	Actions	
<b>3. Installation roadmap, continued</b>			Post-installation	Is a standardised checklist available and used to evaluate GeneXpert sites?	A standardised checklist is available and used but not detailed	A standardised checklist is available and used to evaluate the site. In line with FIND checklist template	Improvement project to revise and update national document	
	<b>4. Maintenance</b>	6/9 (67%)	7/9 (78%)	Warranty	Is there a mechanism in place to monitor GeneXpert instrument repairs at testing sites?	Yes, but the current mechanism is not functional	Yes, but it functions well only at some testing sites	Improvement project on implementation of Xpert tracking tool
				Calibration	Are all GeneXpert instruments calibrated every year?	Some GeneXpert instruments are calibrated every year with delay	All GeneXpert instruments are calibrated in due time	Improvement project on implementation of Xpert tracking tool Training on calibration plan and strategy
			Service interruption	Is a back-up plan (including SOPs) available in case of service interruption due to equipment failure for handling specimens during these times, identification of referral laboratory for testing and referral procedures?	Only <i>ad hoc</i> back-up plan takes place during equipment failure	Back-up plan (including SOPs) is available but not applied for handling specimens during service interruption due to equipment failure	Improvement project to develop a back-up plan for all GeneXpert sites	
<b>5. Data management</b>	4/9 (44%)	7/9 (78%)	Sample data management	Is there any connectivity system for Xpert MTB/RIF-(ULTRA) testing in place?	No connectivity system available	Connectivity system is in place, but it only partially covers the network	Improvement project to select connectivity system supplier Connectivity system implementation on-going	
			Data analysis	Are there adequately trained personnel, software and/or tool that receives laboratory data from all levels, analyses the data and generates reports?	There are trained personnel but not adequate software or tools to analyse and report Xpert MTB/RIF-(ULTRA) data	There are trained personnel, adequate software or tools to analyse data. Complete reports are generated on regular basis	Improvement project to implement ASAP-GxNet quarterly report data collection Training through the ASAP-GxNet programme	
				Are statistical data collected, analysed and used for decision-making purposes and shared within NTP?	Only a few Xpert MTB/RIF-(ULTRA) indicators are collected and analysed	A comprehensive list of Xpert MTB/RIF-(ULTRA) indicators are collected and analysed and effectively used for decision-making purposes	Improvement project to implement quality indicators Training quality indicators	
			Reporting	Is there an electronic system that enables reporting of diagnostic data to local and national programme?	Electronic reporting for GeneXpert network improvement purposes is functional in reference laboratories only	Electronic reporting for GeneXpert network improvement purposes is functional at all levels and analysed for a limited range of purposes	Improvement project to implement ASAP-GxNet quarterly report data collection	

Continued



TABLE 2 Continued

Core capacity	Baseline points	Exit points	Components	Question	Baseline answer	Exit answer	Actions
<b>6. Supply chain management</b>	9/15 (60%)	12/15 (80%)	Forecast	Is forecast of Xpert MTB/RIF-(ULTRA) needs done based on past and projected consumption?	No system and methodology are used	Past and projected consumption is used to forecast Xpert MTB/RIF-(ULTRA) needs. Forecasts are revised on a yearly basis	Training on cartridges forecast
			Service interruption	Have testing facilities provided uninterrupted GeneXpert testing services, with no disruption due to cartridge stockouts (or since last assessment)?	Some testing facilities (more than half of total number) have faced at least one instance in the last year of testing service interruption due to cartridge stockouts	Some testing facilities (less than half of total number) have faced at least one instance in the last year of testing service interruption due to cartridge stockouts	Not dependent by ASAP-GxNet training Improvement projects to develop a back-up plan for GeneXpert machine troubleshooting
<b>7. Workforce</b>	2/6 (33%)	4/6 (67%)	Network management	Does the national GeneXpert focal point have adequate managerial knowledge and skills (plan, organise, lead and control) to oversee the GeneXpert network?	The focal point has adequate knowledge of the network but limited capacity to plan and organise different tasks of the network	The focal point has adequate knowledge and skills to oversee the network	Training through the ASAP-GxNet programme
				Does the national GeneXpert focal point have a list of daily/monthly/annual routine work tasks?	No list of routine work tasks is available	A comprehensive list of daily/monthly/annual routine work tasks is available and performed in due time	Training through the ASAP-GxNet programme
				Does the GeneXpert focal point use and update the Xpert tracking or similar tool to optimise network management?	No	The Xpert tracking or similar tool is used, data exploited and regularly updated	Improvement project on implementation of Xpert tracking tool
<b>8. Quality</b>	2/6 (33%)	2/6 (33%)	Quality assurance	Is a standardised checklist available and used to evaluate GeneXpert sites?	A standardised checklist is available and used but not complete	A standardised checklist is available and used to evaluate the site. In line with FIND checklist template	Improvement project to revise and update national document
<b>9. Quality indicators</b>	2/12 (17%)	7/12 (58%)	Diagnostic cascade quality indicator	End TB Strategy laboratory target indicator 1	No data available	Data available target not achieved	Improvement project on implementation of Xpert tracking tool and data collection/analysis tool
				End TB Strategy laboratory target indicator 2		Target achievable in a reasonable time frame	
				End TB Strategy laboratory target indicator 3			
				End TB Strategy laboratory target indicator 4		Data available, target not achieved	
			End TB Strategy laboratory target indicator 7		Target achievable in a reasonable time frame		
			End TB Strategy laboratory target indicator 8		Data available, target not achieved		
			Testing quality indicators	Data completeness	All data available, full analysis		
Error rate		Media rate below the target. One or more sites with rate above the target					
			Invalid rate				

Continued

TABLE 2 Continued

Core capacity	Baseline points	Exit points	Components	Question	Baseline answer	Exit answer	Actions
<b>9. Quality indicators, continued</b>				No result rate		Media rate below the target. No site with rate above the target	
				Specimens with a result reported within 24 h		Results reported in 24 h in some sites	
<b>10. Network Management</b>	31/45 (69%)	41/45 (91%)	National policies and plan	Media of maximum Xpert testing capacity per month		Number of tests slightly below the maximum Xpert testing capacity (2–3 tests per day)	
				Does the GeneXpert focal point revise the Xpert implementation plan every year?	Not done (due to reasons directly linked or not to GeneXpert focal point capacities)	Planned	Training through the ASAP-GxNet programme
			Algorithm	Does the GeneXpert focal point monitor, through data GeneXpert sites, the adherence of national diagnostic algorithm?		Yes, done and actions are taken for those sites not adherent	
			Installation	Have you developed and/or updated a standardised training (1-day) materials?		Yes done	
			Data management	Are information from GeneXpert sites routinely updated on Xpert tracking tool?		Yes done	
				Are periodic data from GeneXpert sites routinely collected and analysed?		Yes done	
	Quality	Does the GeneXpert focal point periodically analyse quality indicators and results for all GeneXpert sites?		Yes done			

ASP-GxNet: Approach to Strengthen Performances of GeneXpert Networks; TB: tuberculosis; DST: drug-susceptibility testing; WHO: World Health Organization; FIND: The Foundation for Innovative New Diagnostics; SOPs: Standard Operating Procedures; NTP: national TB programme.

assurance” core capacity required the implementation of an external quality assurance programme, which included the provision of a proficiency panel testing. While different options currently exist [6], the enrolment in a proficiency programme through an external provider is hampered by the country’s lack of sufficient and dedicated funding. On the other hand, in-country preparation of the panels requires extensive planning and technical capacity to initiate the programme. The “Governance” core capacity pertains to aspects related to the national laboratory strategic plan, national diagnostic algorithm and specimen referral system, all activities that require long-term planning and alignment with a national TB programme funding cycle to ensure improvement. The “Coverage” core capacity aims at evaluating current and future diagnostic needs and assessing the integration of the GeneXpert platform into diagnostic services other than TB. This requires a complex feasibility study and a robust collaborative environment among different disease programmes to enable effective integration and utilisation of these devices [9–11].

Additional challenges affecting the implementation of the programme related to the numerous tasks and duties of the national GeneXpert focal point, who over the course of the programme was also appointed as Head of the National TB Reference Laboratory, thus limiting the amount of time that could be devoted to improvement projects and an implementation roadmap.

### Conclusion

Strengthening capacities to manage the national GeneXpert network and to identify service weaknesses is crucial to ensure the delivery of high-quality services and continuity of care for patients. Lessons learned from early implementation suggest that the ASAP-GxNet programme has the potential to improve the management of a complex network in a relatively short timeframe and to raise awareness at country level on the importance of developing the skills and capacity to manage a diagnostic network efficiently. Alignment of ASAP-GxNet implementation with the Global Fund grant cycle may significantly improve the capacity to implement those activities that require dedicated funding. In this context, the selection of improvement projects is critical to ensure that activities are feasible with available resources. Although the experience in Burkina Faso demonstrates that the ASAP-GxNet programme has the potential to improve capacity to deliver continuous provision of quality diagnostic services, multiple cycles of the programme need to be carried out to result in a sustained long-term impact.

Acknowledgements: The authors are grateful to the National Tuberculosis Programme Team of Burkina Faso and Virginia Quaresima from IRCSS San Raffaele Scientific Institute (Milan, Italy).

Conflict of interest: None declared.

Support statement: ASAP-GxNet is supported by the Stop TB Partnership’s TB REACH initiative, and is funded by the Government of Canada and the Bill & Melinda Gates Foundation.

### References

- 1 World Health Organization. Policy Statement: Automated Real-Time Nucleic Acid Amplification Technology for Rapid and Simultaneous Detection of Tuberculosis and Rifampicin Resistance: Xpert MTB/RIF. Policy Statement. Geneva, World Health Organization, 2011.
- 2 Albert H, Nathavitharana RR, Isaacs C, *et al.* Development, roll-out and impact of Xpert MTB/RIF for tuberculosis: what lessons have we learnt and how can we do better? *Eur Respir J* 2016; 48: 516–525.
- 3 Alagna R, Sawadogo TL, Combarry A, *et al.* ASAP-GxNet project in Burkina Faso: fulfil country capacity gaps to ensure efficient utilisation of GeneXpert instruments in tuberculosis care and cascade. *ERJ Open Res* 2019; 5: 00150–2018.
- 4 Yao K, Maruta T, Luman ET, *et al.* The SLMTA programme: transforming the laboratory landscape in developing countries. *Afr J Lab Med* 2014; 3: 194.
- 5 Ondoa P, Datema T, Keita-Sow MS, *et al.* A new matrix for scoring the functionality of national laboratory networks in Africa: introducing the LABNET scorecard. *Afr J Lab Med* 2016; 5: 498.
- 6 Global Laboratory Initiative. Practical Guide to Implementing a Quality Assurance System for Xpert MTB/RIF Testing. <http://stoptb.org/wg/gli/pgiqas.asp> Date last accessed: 2020. Date last updated: 2019.
- 7 Global Laboratory Initiative. Xpert MTB/RIF Training Package. [www.stoptb.org/wg/gli/trainingpackages.asp](http://www.stoptb.org/wg/gli/trainingpackages.asp) Date last accessed: 2020. Date last updated: 2019.
- 8 Global Laboratory Initiative. GLI Training Package: Diagnostic Network Strengthening and Xpert MTB/RIF (Ultra) Implementation. [http://www.stoptb.org/wg/gli/TrainingPackage\\_XPERT\\_MTB\\_RIF\\_Ultra.asp](http://www.stoptb.org/wg/gli/TrainingPackage_XPERT_MTB_RIF_Ultra.asp) Date last accessed: 2020. Date last updated: 2017.
- 9 Ndlovu Z, Fajardo E, Mbofana E, *et al.* Multidisease testing for HIV and TB using the GeneXpert platform: a feasibility study in rural Zimbabwe. *PLoS One* 2018; 13: e0193577.
- 10 Bassett IV, Forman LS, Govere S, *et al.* Test and Treat TB: a pilot trial of GeneXpert MTB/RIF screening on a mobile HIV testing unit in South Africa. *BMC Infect Dis* 2019; 19: 110.
- 11 Nash M, Ramapuram J, Kaiya R, *et al.* Use of the GeneXpert tuberculosis system for HIV viral load testing in India. *Lancet Glob Health* 2017; 5: e754–e755.