

Strengthening Laboratory Diagnostic Capacity in Jordan

Authors: Sadouf Farraj¹, Bara’a Qaquish² and Rasha Alza’anon³
Primary Partners: USAID Jordan,⁴ MOH⁵



Context

Challenges of addressing regional humanitarian emergencies largely from Syria, Iran, Palestine, Yemen, and Libya placed pressure on Jordan’s systems strengthening efforts, further compounded by the recent global COVID-19 pandemic. Gaps in Jordan’s limited laboratory diagnostic system were revealed; according to Qaquish et al. (2022), where about only 10 molecular testing laboratories for viral infections with limited skilled practitioners prior to COVID-19. This context solidifies the need for pragmatic efforts to strengthen the testing and diagnostic capabilities of the country’s laboratories. Preliminary consultative efforts between the USAID-funded Local Health System Sustainability (LHSS) Activity and Jordan’s health system stakeholders revealed that one factor accounting for the laboratory systems deficiency is the disconnection between private and public laboratories and laboratory technicians which do not foster knowledge sharing and national expertise building. LHSS sought to help consolidate laboratory efforts, integrate private and public laboratory workforce expertise, improve the quality of laboratory management, and standardize processes that streamline operations.

The goal was to create a locally-led robust laboratory diagnostic system to improve the reliability of pathogenic test results and scale up collaborative public-private work in ways that respond positively to the needs of Jordanian citizens’ health needs during and beyond COVID-19. Hence, LHSS was guided by three overarching questions:

1. What can be done to improve Jordan’s capacity in laboratory diagnosis?
2. How can Jordan’s public and private laboratory systems work together for improved and standardized response to COVID-19?
3. How can Jordan’s laboratory system be positioned to continue to respond to everyday health needs and future emergencies post-COVID-19?

Even though there was a high degree of urgency to responding to the identified problem, LHSS recognized that it was important to employ a systems lens, recognizing that multiple people are affected and bringing in all relevant actors throughout the process including Jordan’s Ministry of Health (MOH), the Royal Medical Services (RMS), and private sector providers. This gave the Activity an opportunity to provide services that were in the interest of the country, since these central actors are in constant interaction with their various employee unions, health care students, and practitioners.

Activity Description

In early 2020, LHSS in partnership with the Department of Cell Therapy & Applied Genomics at King Hussein Foundation/Center started its laboratory strengthening effort by conducting an assessment of Jordan’s national level diagnostic capacity, including the public, private, non-governmental, and academic sectors, to identify laboratory needs such as human resources, diagnostic equipment and commodities, information and supply chain systems, and facility infrastructure. The assessment team conducted field visits to 34 laboratories within six governorates in close collaboration with the MOH, RMS, national university hospitals, and the Private Hospitals Association (PHA). Checklists, based on the College of American Pathologist (CAP) Accreditation program, were completed for each lab and then scored based on assessment findings. This co-assessment helped the Activity identify where immediate attention was needed to strengthen the diagnostic capacity of laboratories:

1. Quality Management Systems: To implement a quality management system that complies with the requirements of the international quality standard, ISO 15189, LHSS used the Laboratory Quality Stepwise Implementation (LQSI) tool which was designed by the Royal Tropical Institute for World Health Organization (WHO, 2018). This tool helped the Activity understand the level of robustness of laboratory systems management in Jordan. The laboratories were introduced to this tool to keep them abreast with what constitutes as quality management.

2. Capacity Development in PCR and Rapid Antigen Testing and Genomic Sequencing: LHSS worked closely with key university hospitals to develop a roll-out plan, where laboratory technicians received specialized training in antigen and rapid antigen testing (RAT). At the peak of the pandemic, RAT was recommended for highly congregated settings like the university community, given its ability to quickly identify positive cases (WHO 2021). LHSS organized a one-day program that included both theoretical and practical training on antigen testing. The materials were customized in accordance with the WHO and national guidelines and approved by MOH. A total of 231 health care professionals (HCPs) were trained from all 12 governorates of Jordan, including two lab technicians, one nurse, and one emergency room doctor from participating public sector hospitals. Additionally, LHSS, in collaboration with PHA, trained 131 HCPs working in private hospital emergency departments on RAT for suspected COVID-19 cases.

Comprehensive RT-PCR testing capacity trainings were also organized throughout all 12 governorates of Jordan. The trainings were organized in two parts: a five-day bio-risk management online training session followed by a four-day practical training session on PCR. Specifically, a total of 113 laboratory technicians participated in these trainings including 79 from the MOH, 14 from the King Abdullah University Hospital (KAUH), 5 from the Jordan University Hospital (JUH) and 15 from the RMS. This distribution was a holistic representation of all health facilities in the country. The training timeline from October 2020 to September 2021 which focused on strengthening the accuracy of testing results is shown in the diagram below.

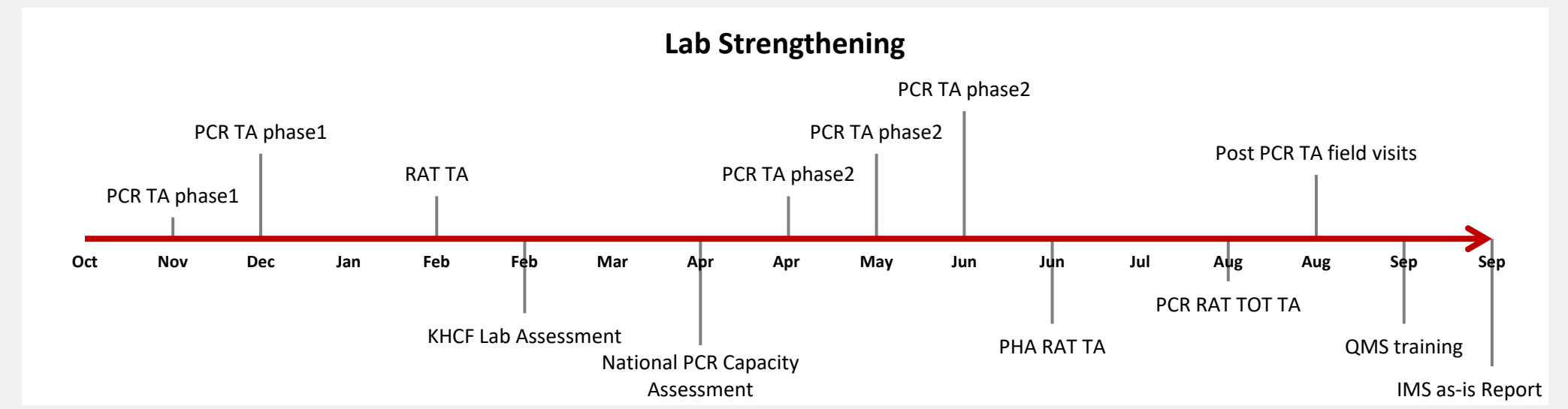


Figure 1: Timeline to keep track of activities and progress.

In line with WHO’s discovery that “whole-genome sequencing (WGS) provides a vast amount of information and the highest possible resolution for pathogen subtyping” (WHO, 2020), LHSS developed a roadmap to ensure that laboratory technicians be equipped with the capacity to 1) recognize emerging COVID-19 variants in Jordan; 2) detect novel variants with “escape” mutations that may emerge; 3) assess the proportion of variants of concern (VOC); 4) monitor distributions of variants in Jordan over time; and 5) rapidly characterize other emerging diseases such as avian influenza, novel coronaviruses, and antimicrobial resistance.

3. Developing a Public-Private Partnership in Laboratory Diagnosis Sharing: To demonstrate a public-private partnership collaboration, LHSS organized the RT-PCR training of trainers for RMS lab technicians at a private lab facility and requested the participation of experienced lab technicians during practical sessions in order to exchange know-how and experience, fostering trust, collaboration, and benefits for both actors.

Activity Impact

At the heart of LHSS is developing a sense of local ownership. In Jordan, the Activity worked to strengthen a sense of local ownership in improving national laboratory diagnostic capacity by enabling the Government of Jordan (GOJ) through the MOH, the RMS, university hospitals, and the PHA to take the lead in identifying and tackling prevailing laboratory gaps. The following identifies areas of impact from this collaborative approach:

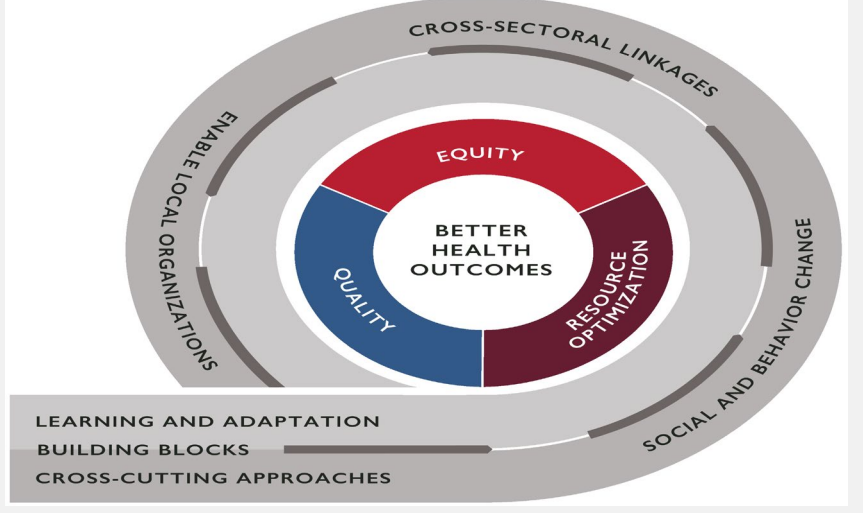
- Impact on equity:**
- Through training programs to produce accurate and timely results, LHSS contributed to an increase in RT-PCR lab testing **capacity in all 12 governorates**. Specifically, LHSS trained 344 technicians in RAT and RT-PCR (excluding training trainers) and developed an external **quality assurance (EQA)** program for COVID-19 to verify laboratory proficiency in conducting tests. While the capacity of all the laboratories was essential, specific emphasis was placed on laboratories in more populous placing like Amman.
 - With an increase in the number of laboratories and technicians qualified to perform **tests now throughout all 12 governorates**, the access gap in testing against population groups and those bared by geographical location has been bridged. This equitable achievement was made possible through LHSS’ quality trainings for not only public sector laboratories, but private ones.

- Impact on quality:**
- The **turnaround time (TAT)** for COVID-19 tests was reduced, averaging 24 to 48 hours for recency and authenticity of results which facilitated prompt contact tracing to positive cases.
 - On communication, LHSS also held mentoring sessions with MOH PCR trainers to strengthen their presentation skills and support them in **developing and standardizing** materials for on-the-job training sessions.

- Impact on resource optimization:**
- LHSS tactically engaged stakeholders and achieved a **cross-sectoral coordination** between private and public laboratory facilities and technicians which led to the sharing of knowledge and expertise for improved testing and accurate results. This bolstered the **optimization of human resources** with the ability to improve laboratory capacities.
 - On human resources, LHSS completed a training of trainers on RT-PCR for five senior laboratory technicians from the RMS who are currently finalizing materials to be used during their **on-the-job** training sessions.
 - LHSS completed a Dry Bench Genomic Sequencing training for 10 senior lab technicians working in the MOH molecular biology genomic sequencing lab. This training built MOH capacity to detect new variants and provide genomic data to guide the government in making quick and informed public health decisions as needed.
 - LHSS also released an RFP for subcontracting a training center to perform RT-PCR trainings for **60 private sector lab** technicians to strengthen their capacity to respond to COVID-19.

- Better health outcomes:**
- The result of prompt identification of cases and improved contact tracing mechanisms is that individuals who test positive can receive treatment before health conditions escalate.

- Health system resiliency:**
- This LHSS activity has whipped up both the internal and external capacities of laboratories to withstand any potential emerging public health emergencies and everyday diseases.



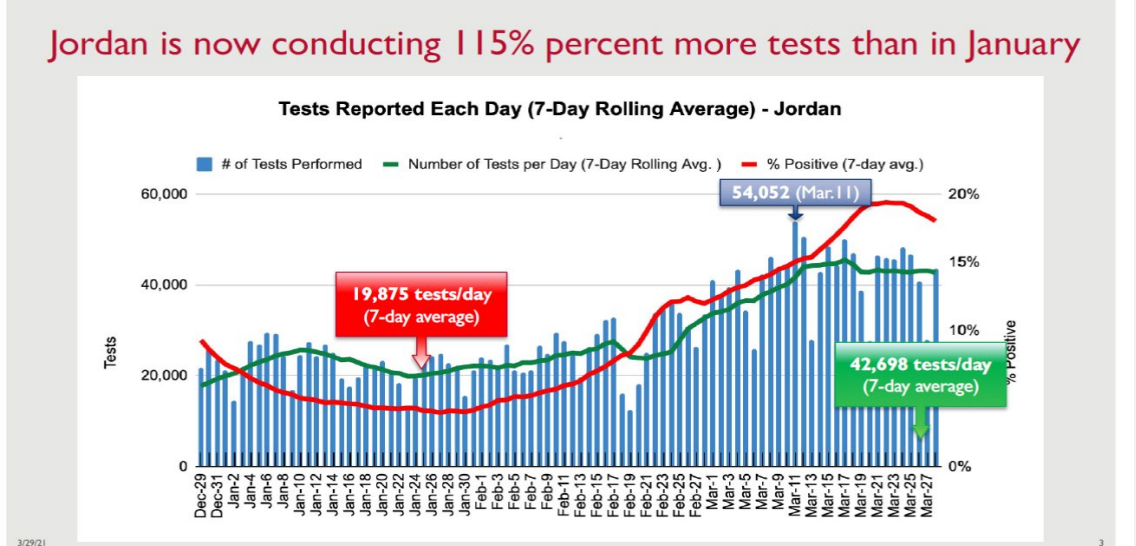
Evidence

All the goals set by the Activity to strengthen the diagnostic capacity of public and private laboratories were achieved. Grounded on the baseline indicator relating to the number of daily PCR tests performed before phase I PCR training, maximum PCR testing capacity was reported by the first week of April 2021. This shows a huge success. For example, the number of MOH PCR tests performed increased by 5,150 tests after phase I training, and the maximum MOH PCR capacity increased by 5,176 tests after phase II training.

National daily testing increased after LHSS’ strengthening laboratory capacities trainings. Qaquish and colleagues succinctly said, “National Average Daily COVID-19 Tests Increased from 225 Tests per 100,000 People in November 2020 to 349 Tests per 100,000 in April 2021” (Qaquish, et al., 2022).

Additionally, the result of the Activity’s active research for contextually best laboratory capacity strengthening practice led to the publication of a peer-reviewed article. This open access journal article is titled, “LHSS’s assessment, COVID-19 Molecular Testing Capacity in Jordan: A Cross-Sectional Study at the Country Level”. The intention is for this to be a forever available reference point for the Government of Jordan, governments with similar situations, academics and legislators to use to directly impact policies and practices on COVID-19, emerging pandemics and other public health emergencies which may occur.

Figure 2: 115% increase in COVID-19 testing. This is supported by a recent study (Qaquish, et al., 2022)



Also, the highly unexploited testing capacity among private laboratories reduced and testing increased due to the activity’s engagement of both public and private laboratories in various strengthening trainings which led to the sharing of know-how and expertise.

When LHSS conducted a Rapid assessment of the laboratory sector in partnership with KHCF and identified the need for QMS training, the Activity worked with Health Care Accreditation Council (HCAC) to lead a total of 4 QMS training sessions and 1 intensive session. There was a double attainment of project goals in this activity because when the Activity gathered participants from both public and private laboratory sectors, it allowed for enriched training experience and knowledge exchange which was one of LHSS’ priorities. The intensive QMS training participants were MOH laboratory senior staff (QC officer, supervisors and inspectors) from all over Jordan, this allow for finding common system related challenges and shed lights on governorate specific ones.

Facilitators

- The main facilitator for this laboratory strengthening Activity was the collaboration among other laboratory stakeholders including HCAC, WHO, CDC and DTRA that were core to work with for sustainable solution. Prior to the start of the Activity, LHSS was already working with some of these stakeholders on other projects. This facilitated the collaboration towards strengthening the laboratories.

- For example, HCAC as partners have always been instrumental in undertaking training sessions for capacity strengthening and since this Activity involved a lot of training, this coordination was handy.

- The training program guidelines were developed in line with WHO and CDC guidelines. To ensure this, we worked closely with representatives from these organizations to ensure that outcome was the best, standardized and of high quality.

Challenges

- In the first quarter of the Activity implementation, while we began conducting assessment of the laboratories to ascertain the laboratory situations to come up with goals, the Central Public Health Laboratories requested an official letter from the MOH Secretary General cooperate with LHSS, which created delays in LHSS’s laboratory- strengthening tasks.

- In the second quarter, the team’s Finance and Operations Director and Procurement Manager resigned on a short notice. Therefore, TDY was provided from the home office to support financial processes.

Lessons Learned

Lessons learned included:

- Inter-sectoral Partnership is an important approach to mobilizing little resources (human and technical) in emergency situations. This was experienced when LHSS identified the need for a public-private collaboration to share expertise to improve and increase diagnostic testing capacities. Having bridged the gap between the private and public sector working together, other non-COVID-19 related laboratory requiring diagnosis can be performed with good quality. The sharing of knowledge will also continue as laboratories work together which will lead to the training of new technicians.

- An existing and positive relationship with the Ministry of Health and domestic stakeholders facilitate the smooth implementation according to timelines. This means, when there is no prior relationship with respective institutions, longer time is needed to establish such working relationships which delays implementation. With this knowledge, LHSS will continue to solidify its working relationship with the Government of Jordan through the Ministry of Health and other stakeholders who significantly matter in health systems strengthening throughout the country. This way, it will always be easy to drive locally led projects.

- Emergency response can help identify health system deficiencies and contribute to building the system’s capacity for resilience against future incidence. COVID-19 revealed that Jordan was struggling with their molecular testing capacity. Now, there are currently over 62 active molecular testing laboratories accessible to all citizens.

In summary, the lessons learnt from the implementation of strengthening the diagnostic capacity of all laboratories in Jordan speaks to the significance of implementing organizations to co-assess and co-implement in a contextually and culturally sensitive way. This Activity particularly encourages other implementers and health system actors to use LHSS Jordan’s approach as a guide, actively engaging local stakeholders to know what is beneficial and what is not. Implementing Activities through this lens increases local ownership and promotes lasting and sustainable projects.

