

Mapping Diagnostics for Impact: How African Countries Are Using GIS to Strengthen Laboratory Systems

Countries across Africa continue to advance laboratory system strengthening through evidence driven approaches, with recent achievements in Mozambique, Cameroon, and Zambia highlighting the transformative role of GIS based laboratory capacity mapping.

In Mozambique, a comprehensive capacity mapping of 511 laboratories enabled the Ministry of Health to identify critical gaps and incorporate these insights into the new National Laboratory Strategic Plan (2026–2035). This ensures that diagnostic investments are targeted, efficient, and aligned with long term public health priorities.



Mozambique Advances Laboratory Strengthening with National Clinical Laboratory Strategy (2026–2035)

In Cameroon, 548 laboratories were mapped in 2025 using sustainable data collection approaches, including remote trainings, which reduced implementation costs and strengthened national ownership. Remote training involves 3-4 weeks training period with the course modules hosted in ASLM Academy.

Once participants complete the course and deemed competent they map capacity within the laboratory where they are based and any nearby laboratory thus reducing the cost if a team from central level was to travel across the country to conduct the mapping (<https://aslm.org/resource/november-2025-labcop-extended-echo-session-dissemination-of-the-framework-for-gis-mapping-of-laboratory-systems-and-network-capacities-in-africa/>).



Stakeholders in Mozambique convene to strengthen laboratory systems using GIS-based capacity mapping.

These insights directly informed the development of Cameroon's National Laboratory Strategic Plan (2026–2030), improving multisectoral coordination and diagnostic coverage across the country.

aims to sustain and optimize laboratory and information-sharing systems using GIS-Laboratory mapping for effective and efficient clinical and public health laboratory services for early disease detection and surveillance of public health threats in Africa.



A group Photo of participants from the stakeholders meeting on validating Cameroon's National Laboratory Strategic Plan (2026–2030)

Meanwhile, Zambia has demonstrated strong leadership by mapping over 678 laboratories in 2024, significantly expanding visibility into the country's diagnostic landscape. Zambia implemented a completely multisectoral mapping exercise covering public health, clinical, veterinary, environmental, and private-sector laboratories coordinated under the One Health Technical Working Group (OHTWG). This coordination approach allowed Zambia to harmonize data from diverse sectors and avoid duplication. The OHTWG has since reviewed the data and adopted the report, ensuring that the findings are validated, widely understood, and ready to inform the revisions of the National One Health Strategic Plan 2022-2026 and MOH laboratory strategic plan 2022-2026. In addition, the findings have already informed decision making with outputs from the mapping exercise used to re-align activities under Pandemic Fund to ensure investments are targeted toward the most critical laboratory system gaps. Together, these milestones reflect a continentwide shift toward data driven laboratory system strengthening, with GIS mapping emerging as a foundation for closing diagnostic gaps, optimizing networks, guiding resource allocation, and enhancing preparedness for public health threats. Launched on 5th November 2025, the framework for GIS mapping of laboratories systems and network capacities in Africa. <https://africacdc.org/download/laboratory-systems-and-network-capacities-in-africa-framework-for-gis-mapping/>

Next Steps: ASLM's Continuing Role

ASLM will continue to play a central role in advancing GIS based laboratory mapping across the continent by:

- Advocating for the inclusion of GIS mapping in national laboratory policies and strategic plans to support evidence based resource mobilization.
- Supporting countries to institutionalize self assessment and remote training models, leveraging ASLM Academy and the ECHO platform.
- Providing technical assistance for integrating GIS mapping outputs into national diagnostic network optimization and laboratory based surveillance.
- Championing multisectoral collaboration, especially in the context of One Health.

ASLM remains committed to expanding GIS driven approaches that strengthen national laboratory networks and improve health security across Africa.



One Health TWG Meeting reviewing GIS Mapping insights in Zambia

LabCoP ECHO Session Summary October - December 2025

In Q4 2025, the Laboratory Systems Strengthening Community of Practice (LabCoP) project, supported by the Gates Foundation and partner organizations, hosted four webinars. The sessions highlighted new diagnostic tools, launched key frameworks, and explored current developments in the dynamic funding landscape.

The webinars attracted 1,107 participants from 79 countries, averaging 276 attendees per session, including laboratory professionals, policymakers, and public health stakeholders. Median participation time was 56 minutes (IQR 31-76)

with service needs to be taken as essential, rather than optional. External funding could be viewed as supplemental rather than core to protect programming.

Key considerations for transitioning to sustainable programs that countries should consider include stakeholder engagement in determining the scope and support for national programs, prioritizing critical services without compromising the overall care quality, and securing clarity and guarantees in new funding approaches, including the bilateral funding MoUs with the United States Government.

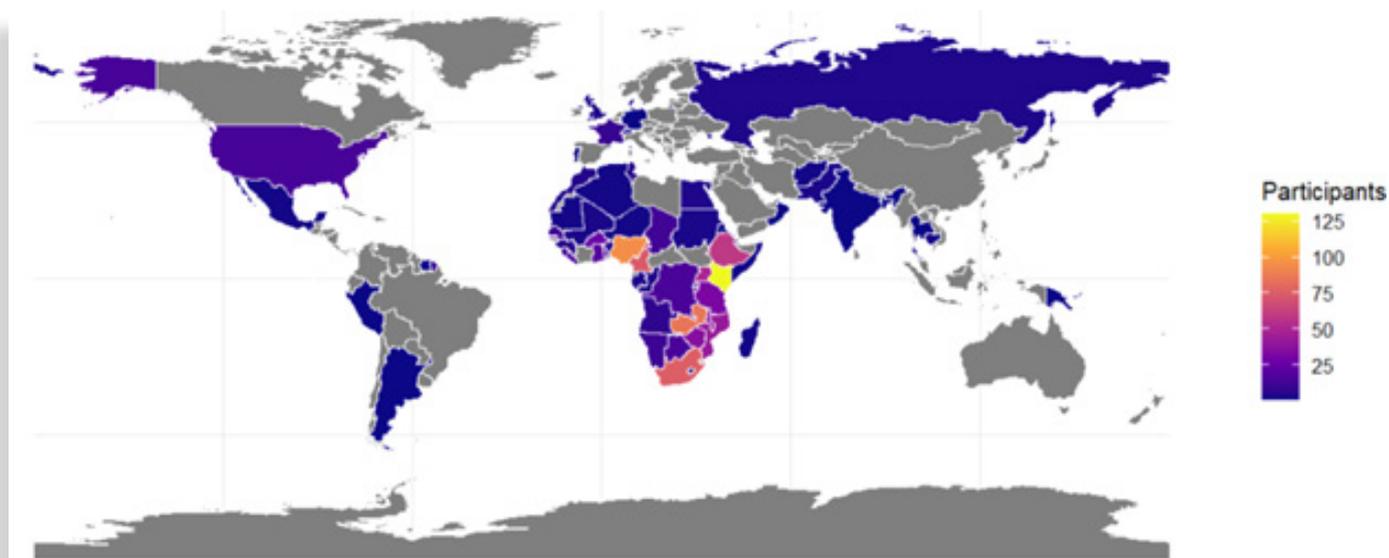


Fig 1. Heat Map Showing number of participants attending the 4 sessions by country

Session Highlights

Current external funding dynamics: impacts, implications and looking ahead

Two sessions focused on historical dependence on external funding, impacts of funding withdrawals, and current initiatives addressing short-term and long-term strategies. Mozambique shared progress in building resilient laboratory systems amid reduced funding; while Zambia discussed navigating the path forward via a forthcoming bilateral MOU with the United States Government.

These discussions highlighted the impact of funding freeze on almost all facets of general health and laboratory programs and hence the need for strategic domestic funding aligned

Decentralizing Diagnosis of Drug Resistance Testing: Insights for Effective Implementation

Timely and accurate diagnosis is essential for the effective management of drug-resistant tuberculosis (TB). The WHO recommends low-complexity automated nucleic acid amplification tests (e.g. Xpert MTB/RIF Ultra, Truenat MTB and MTB-RIF Dx) for the initial detection of tuberculosis and rifampicin resistance as well as for the detection of resistance to isoniazid and second-line drugs (Xpert MTB/XDR).

This session, organised in collaboration with Cepheid, highlighted Ethiopia's implementation experience in expanding access to the advantages of rapid molecular testing for drug-resistant TB.

GIS Mapping of Laboratory Systems: Launch of the Framework

Xpert MTB/XDR for the early identification of pre-XDR/XDR patients. Dr Endale Mengesha, Senior TB Laboratory Diagnostic Services Advisor, emphasized that deploying Xpert MTB/XDR aligned with national priorities to provide all individuals at risk of drug-resistant infection with drug susceptibility testing. The deployment leveraged existing high-volume GeneXpert facilities to optimize infrastructure use. Site selection focused on locations with elevated rates of rifampicin resistance and high patient volumes.

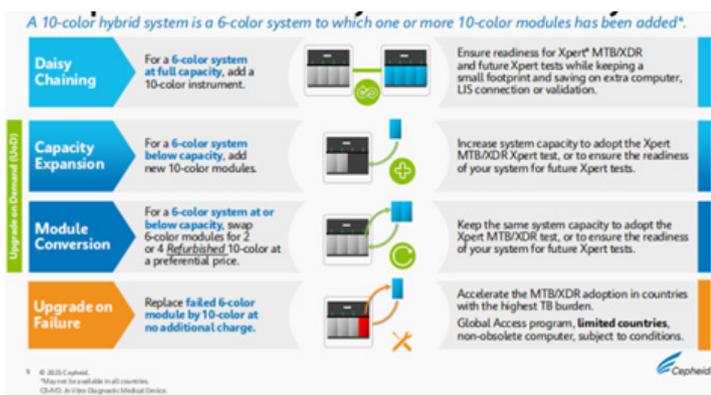
Furthermore, relevant policies and guidelines were revised to ensure Xpert MTB/XDR was the primary method for testing of susceptibility to isoniazid and second line drugs. Simultaneously, staff training, resource quantification and forecasting, enhancement of data management systems, and enrollment of sites into external quality assurance programs was done. By the end of the roll-out, the Xpert MTB/XDR assay had been deployed to 122 sites resulting in >98% of patients with rifampicin resistance being tested. However, challenges related to electricity and supply chain challenges (including consumables), data management, and staffing must be addressed to fully realize the advantages of rapid molecular testing for drug-resistant TB.

Rapid diagnostics using low-complexity NAAT is required in closing the gap in early TB and drug resistance detection.

The African Society for Laboratory Medicine (ASLM) and Africa Centres for Disease Control and Prevention (Africa CDC) launched the Framework for GIS Mapping of Laboratory Systems and Network Capacities in Africa. The framework aims to optimize diagnostic networks and strengthen health systems through standardized mapping practices, emphasizing country ownership and sustainable, nationally-led programs.

This framework launch and dissemination session further highlighted the crucial need for valid lab network mapping data to guide national planning, surveillance, national sample transport network logistics, and diagnostic network optimization. The launch also covered proposed sampling strategies for countries that may not have adequate resources to map all laboratories yet require mapping data for informed decision making.

The final segment of this session focused on experience sharing from Cameroon and Tunisia. The two countries highlighted practical application of the framework, in their hybrid training and data collection, data use in the update of national policy and guideline documents and the scale up of mapping to lower level laboratories.



Pathways from 6-color to 10-color systems



Launch of the GIS Mapping of Laboratory System Framework

Capacity Building for Healthcare Workers in Sub-Saharan Africa to perform point-of-care diagnostic tests for identification individuals with Advanced HIV Disease

Advanced HIV Disease (AHD) remains a major contributor to HIV-related morbidity and mortality in sub-Saharan Africa. According to WHO guidelines, individuals living with HIV with a CD4 count below 200 cells/ μ L are classified as having AHD and are at high risk for opportunistic infections such as tuberculosis (TB) and cryptococcal disease. Timely CD4 testing, alongside TB and cryptococcal screening, is critical for early identification and management of these patients. However, limited access to point-of-care diagnostics and insufficient workforce capacity continue to hinder effective AHD care in many decentralized and resource-limited settings.

To address this gap, the African Society for Laboratory Medicine (ASLM), with funding from the Gates Foundation and in collaboration with AccuBio Ltd and Smart Spot Quality, is implementing a six-month Advanced HIV Disease Package Training Project (September 2025–March 2026). The project

supports 11 African countries—Angola, Cameroon, Côte d'Ivoire, Ghana, Kenya, Liberia, Malawi, Sierra Leone, Tanzania, Togo, and Zimbabwe—under the leadership of Ministries of Health, National AIDS Control Programs, and National Laboratory Directorates. The project aims to strengthen hands-on capacity of healthcare workers (HCWs) to perform VISITECT® CD4 point-of-care testing, TB-LAM, and Cryptococcal Antigen (CrAg) rapid diagnostic tests for improved AHD identification and management.

Implementation follows a phased Training-of-Trainers (ToT) cascade model. In Phase One, ASLM Academy conducts national and regional ToT workshops to equip selected trainers with the skills and competencies to deliver high-quality AHD diagnostic training. Trainees are nominated by Ministries of Health and are expected to have prior experience in HIV/TB



Hands-on practical demonstration for Visitect CD4 testing during a ToT workshop in Angola



Hands-on practical demonstration for Visitect CD4 testing during a ToT workshop in Kenya

rapid diagnostic testing, quality improvement processes, or participation in ASLM's Laboratory Systems Strengthening Community of Practice (LabCoP). Phase Two involves trained ToTs cascading knowledge and skills to HCWs at health facilities through step-down trainings, conducted primarily onsite or, where appropriate, in centralized settings. Training methodology combines online theoretical modules hosted on the ASLM Academy platform with face-to-face practical sessions. It takes the participants 1-5 days to complete the online course allowing flexibility to learn at a personal pace while practical sessions take 1-2 days depending on country context. Participants must achieve $\geq 95\%$ in theoretical assessments to proceed to practical training (Fig. 1).

Competency assessments are conducted during both phases, and successful participants receive certification to perform VISITECT® CD4, TB-LAM, and CrAg testing. Training materials were adopted from manufacturers (AccuBio Ltd, Abbott, and IMMY) and aligned with national AHD guidelines.



Practicals on Visitect CD4 sampling during one of the ToT workshops

By mid-February 2026, all 11 countries had completed Phase One, training 235 ToTs achieving 102% of the target 230, with all countries surpassing the $\geq 90\%$ project benchmark. Phase Two aims to train approximately 2,400 HCWs between February and March 2026.

Participants across countries highlighted the value of the training design and learning approach. In Cameroon, one participant noted, "The ability to progress at one's own pace and to review lessons at any time was particularly appreciated." Meanwhile, in Kenya, feedback emphasized the practical structure of the course: "Arrangement of the modules, pictorial job aids, especially the pipette for sample collection quizzes in between the modules for knowledge check, and an instant certificate after completion of the online training."

Despite strong progress, challenges included procurement and supply chain disruptions affecting VISITECT® CD4 kit availability, competing Ministry of Health priorities causing rescheduling, and limited internet connectivity delaying online course completion in some areas.

Overall, the project demonstrates a scalable, country-led approach to strengthening workforce capacity and expanding access to essential diagnostics for Advanced HIV Disease care across Africa.

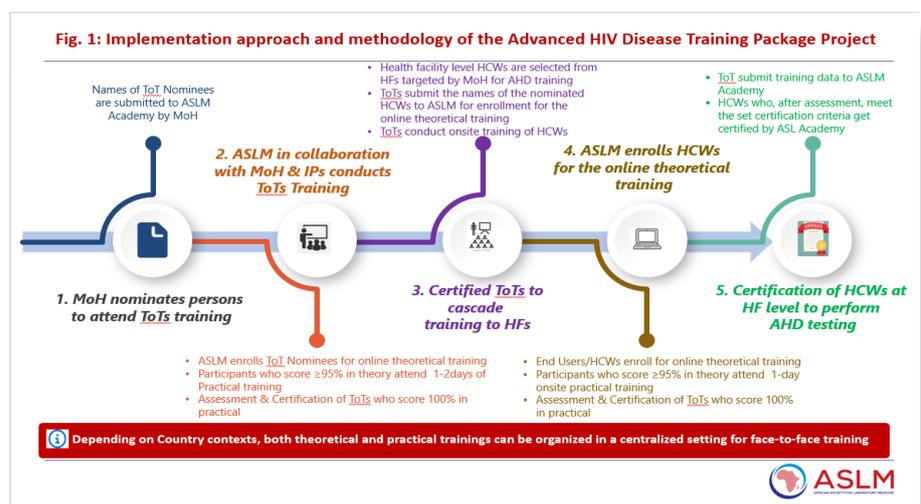


Fig. 1: Implementation approach and methodology of the Advanced HIV Disease Training Package Project

Sputum Pooling: Maximising Impact with an Old Tool

Tuberculosis (TB) has affected humanity for millennia. Observed on 24 March, World TB Day highlights both progress and remaining challenges in TB control. This year bring renewed optimism with new WHO [guidelines](#) recommending near point of care (NPOC) nucleic acid amplification tests (NAAT) and the use of [tongue swabs](#) and [pooled sputum](#) testing with existing molecular tests.

Specimen pooling, combining samples from several patients into one test, has been used for syphilis, HIV, COVID-19, blood donation screening, and influenza surveillance but is less common for TB due to concerns about lower diagnostic accuracy and higher false negatives. Recent studies showed that pooling four sputum samples for Xpert MTB/RIF

Ultra testing resulted in 84.8% sensitivity and 98.1% specificity. Pooled testing lowered costs from \$7.97 to \$11.33 per individual test to \$3.04 to \$9.95. A minor drop in sensitivity (~ 3%) was deemed an acceptable trade-off to enable broader testing with low complexity automated nucleic acid amplification tests (LC-aNAAT) (Table 1).

Pooled sputum testing utilises the current LC-aNAAT infrastructure and personnel, resulting in minimal additional training requirements. Nevertheless, TB laboratories should assess the following factors to facilitate effective implementation and fully realise the cost benefits provided by the pooled sputum approach:

Category	Recommended ✓	Not Indicated ✗
Settings	Where resource constraints do not allow for testing individual samples.	
Population	Adults & adolescents with signs/symptoms of pulmonary TB.	High-risk groups: PLHIV, children, and those at high risk for drug resistant TB.
Specimen Type	Induced and expectorated sputum	Swabs of sputum.
Sputum collection	Facility-based collection (<i>maintains high diagnostic sensitivity</i>)	Community-based collection (<i>significant loss of sensitivity, as low as 25%</i>).
Testing Goal	Initial diagnosis using LC-aNAATs (<i>based on Xpert Ultra</i>).	Treatment monitoring or follow-up testing.
Pooling Ratio	Small pools of up to 4 samples (1:4 ratio).	Large pools exceeding 4 samples per test.
Workflow	Two-step algorithm: Positive pools must be re-tested individually. No further testing required for negative pools.	

Table 1: WHO recommendation for pulmonary TB detection on pooled sputa



1. Evaluations: Current recommendations are based on Xpert Ultra data. Further evaluations are needed for Truenat and TB-LAMP.

2. Settings: Sputum pooling is not efficient in all contexts. Cost and time savings drop above 30% test positivity, with reviewed studies showing benefits up to 24%.

3. Training: Staff familiar with LC-aNAAT require minimal retraining, but all staff should be instructed on maintaining a 1:4 pooling ratio, proper sample handling, quality control, pool assignment, and result interpretation.

4. Workflows: Pooling adds steps to standard testing. Laboratories should refine workflows for sample splitting, labelling, and retesting, possibly piloting at select sites before broader implementation.

5. Specimen quality: High quality samples are essential, therefore, training clinical staff and educating patients on producing a good quality sample is important.

6. Result management: Update LIS to record both pool and individual IDs. Monitor turnaround times to quickly address workflow issues.

To support countries in implementing these new guidelines, WHO will soon release practical guidance and a toolkit outlining key steps to facilitate program uptake. ASLM has organised [webinars](#) to sensitise national programs and stakeholders on the performance characteristics of NPOC-NAAT and share early country experiences. Furthermore, ASLM has worked with 7 countries in Africa to support [market shaping efforts](#), ensuring countries are prepared for procurement and deployment. ASLM will continue to provide targeted support to optimise national diagnostic networks, ensuring that NPOC-NAATs are placed where they will have the greatest impact. In addition, ASLM will provide technical assistance to refine workflow processes, strengthen quality assurance systems, and ensure high-quality testing for pooled sputa and swab-based testing on LC-aNAAT platforms.

As funding gaps challenge global health goals, sputum pooling is not just a technical work-around but a strategic necessity, enabling programs to “do more with less”. Optimising limited resources ensures that rapid TB detection is available to everyone, everywhere.

Expert Experience



The LabCoP management team recently asked Sandra Chipuka (MPH), Acting National HIV Program Laboratory Coordinator, Ministry of Health and Child Care, AIDS and TB Unit to discuss the Critical Role of CD4 Testing and Decentralized Diagnostic in Resource-Limited Settings

ASLM: Why does Advanced HIV Disease (AHD) remain a major public health challenge despite expanded ART access?

Sandra: *PLHIV continue to present late for care hence about a quarter of all newly tested HIV Positive clients in Zimbabwe have AHD. We also continue to see ART clients defaulting with 2% of our ART population interrupting ART for at least 90 days and 25% of them returning to care with AHD.*

ASLM: Why is CD4 testing still essential in the era of universal ART and viral load monitoring?

Sandra: *CD4 testing remains critical to ensure accurate and early identification of AHD in PLHIV. CD4 testing is no longer used for monitoring treatment efficacy but is now a means to identify AHD and ensure PLHIV are subsequently screened for OIs prior to ART initiation or re initiation to avoid*

IRIS which leads to high morbidity and mortality

ASLM: How has point-of-care CD4 testing transformed AHD identification in decentralized settings?

Sandra: *This has been a game changer in accurate diagnosis of AHD, in the absence of POC, CD4 testing would have to be centralised in the lab and access issues become an issue. Despite a robust IST system, not all facilities get a biker daily and given the fragile nature of the CD4 sample this option would not work as some of our RoC travel long distances to get to the facility and asking them to return on a later date for bleeding and results on a different date would be too much to ask for.*

ASLM: How can countries ensure quality and competency in decentralized CD4 testing?

Sandra: *Training, retraining, continuous support and mentorship of both laboratory and clinical staff. Availing IQC and EQA*

would also go a long way in improving quality of testing.

ASLM: How can countries build sustainable capacity for AHD diagnostics beyond donor-funded projects?

Sandra: *Domestic funding, potentially cost recovery measures where if possible RoC can pay a minimal charge for the services.*

ASLM: If you could recommend one priority action for Ministries of Health, what would it be?

Sandra: *Avail domestic funding, reduce staff attrition through improving conditions of service to ensure testing capacity at all facilities. Strengthen HIV self-testing for early identification and ART initiation to improve outcomes*

What's New

ASLM Launches Laboratory Quality Management System (LQMS) Implementation Strategy 2025–2029

The ASLM Laboratory Quality Management System (LQMS) Implementation Strategy 2025–2029 outlines ASLM's coordinated, standardized, and sustainable approach to strengthening laboratory quality management across Africa and beyond. The strategy provides a comprehensive framework for harmonizing LQMS implementation across ASLM programs and supporting countries to institutionalize quality systems within national laboratory structures.

Responding to declining donor funding and the need for country ownership, the strategy shifts LQMS from project based interventions to nationally embedded systems supported by governance, policy, workforce development, and sustainable financing. It defines six strategic priority areas, including coordination of LQMS activities, standardization of implementation approaches, expansion of training and mentorship, institutionalization of LQMS at country level, resource mobilization, and advocacy.

Through this strategy, ASLM reinforces its role as a continental leader in laboratory quality improvement, supporting Member States to strengthen diagnostic reliability, progress toward national certification and ISO accreditation, and build resilient laboratory systems that underpin health security, universal health coverage, and quality patient care.

Download the ASLM LQMS Implementation Strategy 2025–2029 [here](#)



Looking Ahead

Strengthening Health Security Through a Minimum Package of Essential Laboratory and Surveillance Services

The LabCoP will support countries to define and prioritize a minimum package of essential laboratory and surveillance services that must be protected to ensure continuity of care and outbreak preparedness. This will involve a desk review of relevant national documents, an online survey and structured self and facilitated assessments across selected LabCoP countries. Findings will generate actionable intelligence to inform national planning and guide targeted investments from both domestic and external sources in diagnostics, surveillance platforms, and primary health care integration. Stay tuned!

Upcoming ECHO sessions

Some exciting ECHO sessions are scheduled in the coming weeks. Topics will range from the Introduction of new TB diagnostics in Africa: Results of a critical pathway analysis, task shifting policy review: results from a multi-country survey, opportunities for Patient Centric Sampling in African Diagnostics and the dissemination of the LQMS tool kit. These sessions provide opportunities to explore practical solutions and share experiences from across the continent. If you missed earlier webinars, you can catch up in the LabCoP ECHO archive [here](#).

