

# Extending Capacity for Pediatric Stool Processing: The Uganda Supranational Reference Laboratory's (SRL) Program for Multi-Country Training and Capacity Building.

Namutebi Joanita<sup>1\*</sup>, Hasfah Nakato<sup>1</sup>, Kabugo Joel<sup>2</sup>, Charles Manyonge<sup>2</sup>, Moorine Ssekade Vincent Kamara<sup>1</sup>, Nyombi Abdnoor<sup>2</sup> and Moses Joloba<sup>1</sup>

<sup>1</sup>National Tuberculosis Reference Laboratory/Supranational Reference Laboratory, Uganda

<sup>2</sup>National Tuberculosis and Leprosy Control Program, Uganda

## \*Corresponding author

Namutebi Joanita, National Tuberculosis Reference Laboratory/Supranational Reference Laboratory, Uganda.

**Received:** September 12, 2025; **Accepted:** September 18, 2025; **Published:** September 25, 2025

## ABSTRACT

**Background:** TB diagnosis in children aged 0-14 years remains a challenge; a majority of pediatric TB cases are clinically diagnosed or are missed altogether. In 2022, WHO recommended stool as an alternative sample method for diagnosing TB in children. However, country uptake of stool sample collection and analysis for TB has been suboptimal. To address this gap, the Uganda Supranational Reference Laboratory (SRL) implemented a capacity strengthening approach consisting of a regional training-of-trainers, virtual community of practice and targeted technical assistance (TA). This work was made possible through the U.S. Agency for International Development under the Tuberculosis Implementation Framework Agreement.

**Intervention:** In March 2023, SRL developed training materials following an IACET accreditation structure using resources from WHO and KNCV. A five-day training included theoretical and practical sessions on pediatric TB screening, diagnosis, management, and treatment and comprised 13 modules - available in three languages - PowerPoint presentations, facilitator guides, and exercises. Trainees from 12 countries, including pediatricians and laboratory personnel, completed a pre- and post-test to evaluate knowledge and skills acquired. SRL supplemented the training with a virtual community of practice and targeted TA to facilitate adoption and rollout of stool-based testing for pediatric TB management.

**Results/Impact:** Twenty-nine (29) personnel were certified as trainer-of-trainers. All participants scored above 80% in the post-test compared to pre-test scores of 34-74%. Twelve country National TB programs developed and endorsed country-specific stool-based testing implementation plans and initiated stool-based testing using the SOS technique. Six community of practice virtual sessions were held, and four countries were selected to receive TA to support country stakeholder engagement meetings, trainings and data management.

**Conclusions:** Regional-based technical support hubs are critical to extending new and improved diagnostics across countries. Capacity strengthening support including, but not limited to training are needed to support countries to overcome hurdles to rolling-out new diagnostic methods.

## Background

TB diagnosis in children aged 0-14 years remains a challenge; a majority of pediatric TB cases are clinically diagnosed or are missed altogether. In 2022, WHO recommended stool as an alternative sample method for diagnosing TB in children. However, country uptake of stool sample collection and analysis for TB has been suboptimal. To address this gap, the Uganda Supranational Reference Laboratory (SRL) implemented a capacity strengthening approach consisting of a regional training-

of-trainers, virtual community of practice and targeted technical assistance (TA). This work was made possible through the U.S. Agency for International Development under the Tuberculosis Implementation Framework Agreement.

The Uganda Supranational Reference Laboratory (SRL) has been offering technical assistance to over 21 countries in the sub-Saharan region over the last years and these countries include Botswana, Burundi, Eritrea, Kenya, Lesotho Malawi, Mauritius,

**Citation:** Namutebi Joanita, Hasfah Nakato, Kabugo Joel, Charles Manyonge, Moorine Ssekade Vincent Kamara, et al. Extending Capacity for Pediatric Stool Processing: The Uganda Supranational Reference Laboratory's (SRL) Program for Multi-Country Training and Capacity Building. *J Infect Dis Treat*. 2025. 3(3): 1-5. DOI: [doi.org/10.61440/JIDT.2025.v3.42](https://doi.org/10.61440/JIDT.2025.v3.42)

Mozambique, Namibia, Rwanda, Seychelles, Somalia, South Sudan, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe, Liberia, Ethiopia, South Sudan, and Angola. Following earlier engagements with these countries, it was sought necessary to have participants come to the SRL hence to provide an avenue for knowledge exchange between the participating TB programs in the addition to the technical support provided.

The Uganda SRL training program is accredited to IACET international training standard and offers a wide range of trainings that incorporate adult learning principles which include; laboratory management, Laboratory quality management system, Laboratory information system (LIS), Bench marking, External Quality Assessment (EQA), TB Specimen Referral System, Monitoring & Evaluation, Technical trainings that include (GeneXpert Assay, Microscopy, LJ culture, MGIT, LJ DST, MGIT DST, Line Probe assay and sequencing ).

The Uganda NTRL/SRL is an accredited ISO 17043 international standard for provision of proficiency testing materials. The scope under the current scheme covers GeneXpert, Microscopy, Culture, Drug susceptibility testing for both genotypic and phenotypic TB diagnostics assays, LPA, True Nat, TB LF-LAM and SARS Cov 2. The Countries under the SRL network are further supported through training and technique transfer to be able to support PT activities in their respective countries.

JSI Research & Training Institute, Inc. (JSI) sub awarded a TB commitment grant to the Uganda National Tuberculosis Reference Laboratory (NTRL) as a Subrecipient, under the United States Agency for International Development (USAID) Tuberculosis Implementation Framework Agreement (TIFA) for the purpose of supporting the early implementation of the Simple One Step (SOS) stool testing technique using GeneXpert in the sub-Saharan Africa region.

The training goal to impart knowledge and competency skills to personnel in using GeneXpert technique to test for TB in children using stool as the preferred choice of specimen as per WHO guidelines.

By the end of the training participants were expected to be able to:

- Understand the applicability of the GeneXpert techniques and platforms in the diagnosis of TB in children
- Apply the appropriate safety precautions in stool sample collection, transportation and management of stool samples
- Correctly pick amount of stool needed to perform expert MTB RIF/ Ultra assay, interpret and report results.
- Develop country specific Simple one step stool testing implementation plans.

### **Intervention/Methodology**

In march 2023, SRL developed training materials following an IACET accreditation structure using resources from WHO and KNCV.

### **Training Duration**

A Five-day training included theoretical and practical sessions on pediatric TB screening, diagnosis, management, and treatment

and comprised 13 modules - available in three languages - PowerPoint presentations, facilitator guides, and exercises.

Trainees from 12 countries, including pediatricians and laboratory personnel, completed a pre- and post-test to evaluate knowledge and skills acquired. SRL supplemented the training with a virtual community of practice and targeted TA to facilitate adoption and rollout of stool-based testing for pediatric TB management.

### **Participant Selection and Enrollment Criteria**

The training was attended by 29 participants from 12 countries (Uganda, Rwanda, Benin, Mozambique, Philippines, Cambodia, Sierra Leone, Liberia, Botswana, Somalia, Somaliland and Tanzania). The participants consisted of 9 senior laboratory scientists, 9 laboratory country focal persons, and 5 pediatric and childhood TB experts, 2 Laboratory managers and one lab advisor.

### **Composition of Trainers**

The team of trainers was composed of 5 Laboratory specialists, a pediatric TB consultant, and a data management specialist, all from Uganda. The team was guided by a consultant who supported the development of this method to oversee the quality of the training.

### **Training Schedule**

The 5-day training was conducted and the training schedule detailing the time, modules, and sessions covered and the facilitators/ trainers for each.

### **Training Interpretation**

Interpretation services were also available for French and Portuguese to cater for participants from Benin, Rwanda and Mozambique

### **Training Content**

The training curriculum for SOS was composed of 13 modules and listed: Epidemiology of tuberculosis in children, Programmatic management of TB in Children, WHO recommended diagnostic assays and algorithms, Biosafety, Introduction to GeneXpert assay technologies towards patient care, Collection and transportation of stool samples , Stepwise SOS stool Method using the Xpert® MTB/RIF/ Ultra Assay Procedure, Results reporting and analysis, Troubleshooting and quality assurance, GeneXpert system maintenance, Monitoring and evaluation for SOS, Review and maintenance of supply stock status for Stool testing supplies, Development of implementation plans and key considerations

### **Training Methodology**

The training agreed upon several guidelines for the training and this included, the goal, objectives and outcome of the training, criteria for certification, course content, evaluations, disclosure, confidentiality and access of learner records

The participants were then asked about their expectations from the training and what they expected to learn. The expectations were noted and shared with the trainers and were referred to during the entire training. Some of the expectations include;

- How is stool used to test for TB on the GeneXpert
- How can countries adopt these techniques in their respective networks
- Understand the quality and safety measures to follow during stool testing
- How to manage children that test positive on stool
- Networking among NTRLs
- Gain knowledge and skills on SOS
- How to integrate SOS in the national TB lab network
- understand silent critical issues that occurs in SOS
- sample retention times during collection transportation analysis and after analysis
- Quality assurance aspects in SOS
- how to perform SOS
- understand the principal behind SOS in stool diagnosis
- utilization of data following implementation of SOS
- Advantages of SOS in comparison to conventional TB diagnostics in children

The training methodology was in five major approaches (Lecture, Demonstrations, discussions, Exercises, Practical)

### Lecture sessions

The training involved theory sessions delivered through power point presentations. The trainers explained the main purpose of the training and what the trainees will learn from the module to be covered, by pointing out the objectives of the modules.

### Discussions

Major points of discussion arose from the presentations. Trainers and trainees shared their views and experiences about the topics discussed. Other facilitation techniques used by the trainers' included exercises, question and answer, brainstorming and discussions.

### Exercises

There was a pre-test administered at the beginning of the training aimed at analyzing the trainees' existing knowledge of the training subject matter. Each power point presentation had a section on knowledge check that aimed at ensuring that the trainer and participants were progressing together and at the end of the presentation there was an assessment on the major topics covered within the session.

### Demonstrations

These were done during the training for modules where the practical sessions were not possible.

### Results/ Impact

#### Training Assessment

Training assessment was done to provide information on learner's knowledge, skills and behaviors to inform the next stage of learning and also to provide feedback and opportunities for learner's reflection and/or self-assessment to support future learning.

The training event was assessed using different methods i.e., pre and posttest, attendance, and practical assessment.

**Table 3: Showing Pre and Post Test Results of the 29 participants**

| Participant's Name | Participant's Country | Pre-Test | Post Test Mark | Post Test Group |
|--------------------|-----------------------|----------|----------------|-----------------|
| Participant 1      | Uganda                | 80%      | 98%            | >80             |
| Participant 2      | Uganda                | 74%      | 96%            | >80             |
| Participant 3      | Sierra Leone          | 40%      | 96%            | >80             |
| Participant 4      | Uganda                | 74%      | 95%            | >80             |
| Participant 5      | Uganda                | 49%      | 95%            | >80             |
| Participant 6      | Botswana              | 68%      | 93%            | >80             |
| Participant 7      | Philippines           | 66%      | 93%            | >80             |
| Participant 8      | Botswana              | 40%      | 93%            | >80             |
| Participant 9      | Liberia               | 48%      | 92%            | >80             |
| Participant 10     | Uganda                | 65%      | 90%            | >80             |
| Participant 11     | Mozambique            | 66%      | 88%            | >80             |
| Participant 12     | Liberia               | 54%      | 88%            | >80             |
| Participant 13     | Uganda                | 62%      | 87%            | >80             |
| Participant 14     | Cambodia              | 38%      | 87%            | >80             |
| Participant 15     | Tanzania              | 72%      | 85%            | >80             |
| Participant 16     | Mozambique            | 51%      | 85%            | >80             |
| Participant 17     | Tanzania              | 68%      | 84%            | >80             |
| Participant 18     | Benin                 | 52%      | 84%            | >80             |
| Participant 19     | Sierra Leone          | 49%      | 84%            | >80             |
| Participant 20     | Mozambique            | 43%      | 84%            | >80             |
| Participant 21     | Rwanda                | 43%      | 84%            | >80             |
| Participant 22     | Cambodia              | 52%      | 82%            | >80             |
| Participant 23     | Uganda                | 49%      | 82%            | >80             |
| Participant 24     | Somali                | 54%      | 81%            | >80             |
| Participant 25     | Somaliland            | 38%      | 80%            | >80             |
| Participant 26     | Rwanda                | 34%      | 80%            | >80             |
| Participant 27     | Somaliland            | 46%      | 80%            | >80             |
| Participant 28     | Somali                | 45%      | 80%            | >80             |
| Participant 29     | Mozambique            | N/A      | 80%            | >80             |

From the table above one participant did not take the pretest but they did attend all the sessions, the practical ns in class theory and managed to score above 80% in the post test.

#### Tots

Twenty-nine (29) personnel were certified as trainer-of-trainers after success ful score of > 80%All participants scored above 80% in the post-test compared to pre-test scores of 34-74%.

#### County Implementation Workplans

Twelve country National TB programs developed and endorsed country-specific stool-based testing implementation plans and initiated stool-based testing using the SOS technique.

#### Community of Practice

Six community of practice virtual sessions were held, and four countries were selected to receive TA to support country stakeholder engagement meetings, trainings and data management.

## Training Evaluation

For every training event, there were learning objectives/outcomes set prior which were evaluated during and the end of the learning event. The Uganda NTRL/SRL CET evaluates each learning event to assess the impact of the training in imparting knowledge on course.

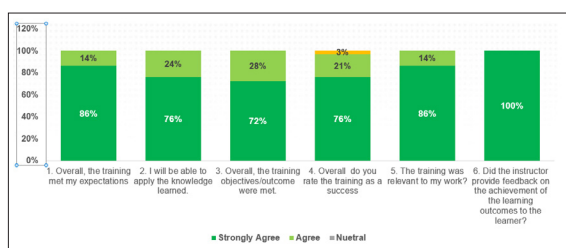
Evaluation data was collected using standardized tools which include; daily evaluation forms and end course evaluation a sample of this form has been appended to this report.

## Daily evaluation

At the end of each day, there was a daily feedback form provided which was aimed at knowing about the participants' views about the day's proceedings, what they learnt and what they would like to share for improvement of the training.

## End of course evaluation

An overall course evaluation was conducted at the end of the course. This evaluation was intended to obtain participants' views about different aspects of the training – from the venue to the effectiveness and coverage of the topics, and from the trainer's knowledge and preparedness to their overall impression of the whole experience. The summary of the responses from the participants has also been appended to this report:

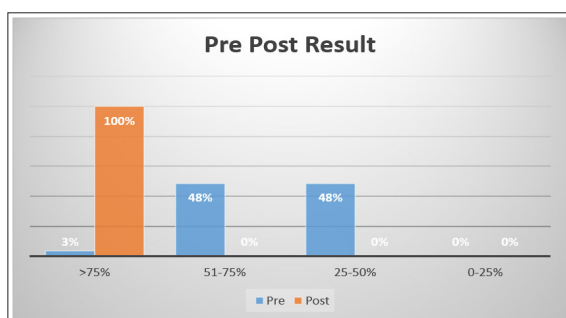


**Graph 1:** Showing the Overall Training Evaluation

## Facilitator's Evaluation Feedback

Key highlights from the facilitator evaluation from different modules that were noted include;

- The participant was keen to learn and there was active participation.
- There is need to follow-up on the implementation SOS stool testing in the countries that participated in this training.
- The participants requested for PowerPoint presentation and related materials and forms and all were shared.
- The participants need more guidance on refining their country implementation plans that were developed and presented at the end of the training.



**Graph 2:** Comparing the Pre and Post Results

From the graph above we observed a tremendous improvement among participants for the pretest to achieving above 80% in the post test.

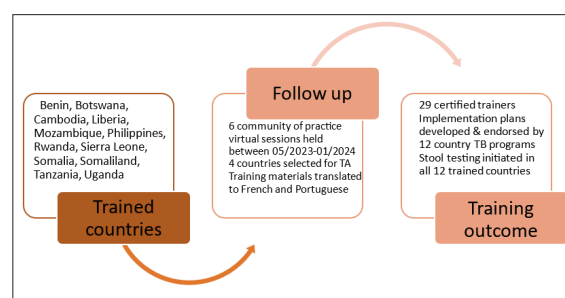
## Certification Criteria

The Uganda SRL awards certificates on completion of trainings conducted. For this particular training, the following criteria were applied;

- Certificate of attendance: Learner scores less than 80%
- Certificate of achievement: Learner scores at least 80%

All the 29 participants attained above 80% in the post test and had 100% attendance of all the sessions and were awarded certificates of achievement.

## Summary of Training Results



## Discussion

The personnel trained represented different countries from the African and Asian continents. This coverage provides an advantage to other countries and facilitates the introduction of new diagnostics into their networks.

TOTs, the trained personnel are technical experts who are meant to support their country programs with the expertise to transfer knowledge.

Implementation plans were developed and endorsed by the respective programs as an indication to ease implementation.

The community of practice created served as an essential platform for following up with the different countries on the implementation process and critical steps.

## Recommendations

The participants and trainers are encouraged to keep in touch so as to share progress on their SOS implementation road maps in their respective country networks.

## Conclusion

The training was completed with all the trainees attaining the acceptable pass mark of above 80%. This implies that the trainees appreciated and understood the principles behind SOS testing using the GeneXpert platform and were also able to share their experiences and SOS implementation draft plans during the training. Several documents were also shared with the participants to guide the development and customization of their own materials. Regional-based technical support hubs are critical to extending new and improved diagnostics across countries. Capacity strengthening support, including but not

limited to training, is needed to help countries overcome hurdles in rolling out new diagnostic methods.

??