

# Workplace-Based, Accreditation-Focused Laboratory Mentorship: An Effective Way to Improve Laboratory Quality Towards WHO-AFRO Stepwise Laboratory Accreditation

## Success Story

I-TECH Ethiopia  
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*Quality laboratory services ensuring that results are accurate, reliable, reproducible, and rapid enough to be useful is crucial to improved health outcomes and moreover are key to improving global health and reaching Millennium Development Goals. —WHO*

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## ACRONYMS AND ABBREVIATIONS

EPHI	Ethiopian Public Health Institute
EQA	External Quality Assessment
FMOH	Federal Ministry of Health
ISO	International Organization for Standardization
I-TECH	International Training and Education Center on Health
IQC	Internal Quality Control
QMS	Quality-Management System(s)
RHB	Regional Health Bureau
SLIPTA	Stepwise Laboratory (Quality) Improvement Process Towards Accreditation
SLMTA	Strengthening Laboratory Management towards Accreditation
WHO	World Health Organization
WHO-AFRO	World Health Organization Regional Office for Africa

# INTRODUCTION

A strong health service delivery system requires a strong laboratory service system. Therefore, expanding the breadth of laboratory services accessible to clients, and ensuring that results are accurate, reliable, reproducible, and obtained rapidly enough to be useful, is crucial to achieving improved health outcomes.

The World Health Organization (WHO) recognizes quality laboratory services as key to improving global health and reaching Millennium Development Goals. Therefore, under its authority to set standards for building institutional capacity, the World Health Organization Regional Office for Africa (WHO-AFRO) has established the Stepwise Laboratory (Quality) Improvement Process Towards Accreditation (SLIPTA) program to strengthen lab systems. SLIPTA is a framework for improving quality of public health laboratories in developing countries, in order for them to achieve ISO 15189 standards (1, 2). It is a systemic approach, a process that enables labs to develop and document their ability to detect, identify, and promptly report all diseases of public health significance that may be present in clinical specimens.

Until recently, the majority of Ethiopian public health laboratories delivered suboptimal service, and were thus not in a position to contribute to a quality health care system. Many labs performed poorly, hindered by dilapidated infrastructure, and poor development and implementation of quality-management systems (QMS), with inadequate participation in external quality assessment (EQA) programs. The culture of QMS has been uncommon in Ethiopian labs; as such, there is a need to build this culture.

However, in recent years, under the leadership of the Federal Ministry of Health (FMOH), via the Ethiopian Public Health Institute (EPHI), and through the concerted efforts of international and local partners, public health laboratories in Ethiopia have begun to implement national and international QMS to provide quality lab services by adapting the WHO-AFRO SLIPTA programs.

Since June 2007, I-TECH Ethiopia has partnered with the FMOH through the EPHI, regional health bureaus (RHBs) and local partners to provide the support needed to strengthen the national laboratory system in the three northern regions of Ethiopia: Amhara, Tigray, and Afar. The I-TECH lab program has focused on three major areas of support—upgrading infrastructure, building up professional skills, improving labs and preparing them to earn accreditation. I-TECH implemented the program through its field lab support programs.

In 2010, a National Laboratory Strategic Plan was developed in Ethiopia to strengthen laboratory QMS and prepare laboratories to earn accreditation (3, 4). As a result, the Strengthening Laboratory Management Towards Accreditation (SLMTA) program was initiated. Between 2010 and 2012, a total of 45 labs were enrolled in the program, to help them facilitate improvements in quality and accelerate preparations for stepwise accreditation (3).

The first national SLMTA program was implemented between June 2010 and October 2011; 24 public health laboratories in Ethiopia, of which five were supported by I-TECH, were enrolled (5). Twenty-one labs, of which five were I-TECH-supported labs, participated in the second program, implemented between January 2011 and May 2012.

The I-TECH Ethiopia laboratory team has implemented SLMTA, and its goals of meeting global standards, to help these 10 labs from the three I-TECH-supported regions improve the quality of their services through the five steps of the WHO-AFRO stepwise laboratory quality improvement protocol. The stepwise approach acknowledges the current standing of each lab, supports them with a series of evaluations to measure improvement, and both recognizes and rewards their progress.

Following the National Laboratory Strategic Plan towards accreditation, I-TECH implemented a workplace-based, accreditation-focused mentorship model, intended to provide an effective means of accelerating the implementation of QMS to help labs prepare for accreditation. I-TECH mentors were embedded in each lab enrolled in the SLMTA program for extended periods of time, so they could develop in-depth understanding of lab operations, and provide day-to-day assistance in implementing QMS and preparing for accreditation.

*The workplace-based, accreditation-focused mentorship is an efficient tool in implementing SLMTA that impacted every laboratory process; I believe that positive and sustainable changes occurred at all levels in our laboratory. —Regional referral laboratory manager*

## OBJECTIVES

- Strengthening the laboratory QMS in I-TECH-supported labs.
- Helping labs to improve quality of service, enabling them to assess both their own quality and their competence in implementing the ISO15189 requirement through WHO-AFRO's SLIPTA program, and to pursue international accreditation.

## IMPLEMENTATION

Prior to initiation of the mentorship program, laboratory technicians were trained according to SLMTA principles, applying the SLIPTA checklist and scoring system. This checklist sets out quality and competency requirements, aimed at developing and raising the quality of lab services to established national standards. The elements of this checklist are based on ISO standard 15189:2007(E).

### Accreditation-Focused Mentorship

I-TECH laboratory mentors (who had taken SLMTA “Training of Trainers” courses) participated in the daily routines of each lab, providing 10 consecutive days of mentorship, with follow-up site visits thereafter.

Ten I-TECH-supported laboratories were enrolled in the national SLMTA programs. During each program, each lab received a total of 30 days of mentorship, spread out over three rounds, with intervals of four weeks in between.



Figure 1. Providing on-the-job mentorship to laboratory professionals

To effectively implement SLMTA according to the 12 Quality Improvement Essentials, laboratory staff were mentored on a continuing basis, the aim being to achieve international standards for accreditation. Mentorship included support for implementing internal quality-control (IQC) procedures and external quality assessments (EQAs). Mentors also monitored lab performance using standardized checklists and tracked performance improvements.

### **Quality-Improvement Projects**

Quality-improvement projects were designed by each laboratory, based on common gaps identified and addressed during the baseline audit. The projects were implemented by all staff, monitored for effectiveness using the WHO-AFRO checklist and completed before the next exit audit. Progress was monitored and reported by EPHI.

### **Supportive Site Visits**

Supportive site visits were conducted by EPHI, regional referral laboratories and United States (US) government partners, who monitored the progress of quality improvement projects using checklists prepared for each specific project.

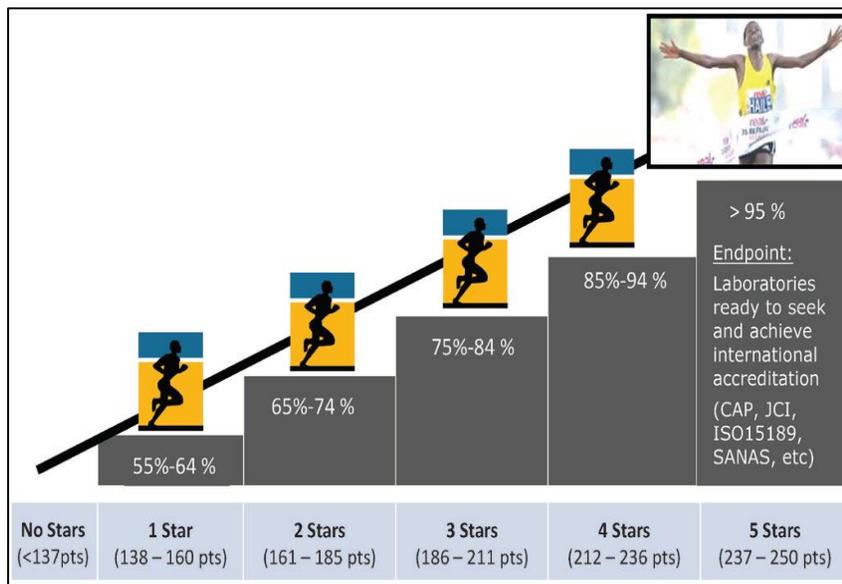
### **Progress Evaluations**

National external audits conducted by the responsible accreditation authority (EPHI, in this case) assessed the quality of each laboratory enrolled in the first and second national SLMTA programs. This was done through a series of evaluations, using a comprehensive, standardized SLIPTA checklist and scoring system. Each lab was awarded a rating of one to five stars, based on performance. The audit checklist covered 12 quality-system components. Overall scores were calculated as percentages of the maximum points possible. To provide benchmarks for measuring progress, these scores were also defined with corresponding star levels (2):

- Zero stars: <137 points
- One star: 55%, or 138 points
- Two stars: 65%, or 161 points
- Three stars: 75%, or 186 points
- Four stars: 85%, or 212 points
- Five stars: 95%, or 237 points

Under this scoring system, laboratories that demonstrate outstanding performance by achieving a five-star rating are entitled to enroll in an established international accreditation scheme.

This five-step accreditation process is critical for improving quality so that labs will be able to gradually receive credit for their improvements and eventually attain accreditation.



**Figure 2. WHO-AFRO Laboratory Accreditation scheme: A stepwise approach towards quality improvement. (Gershy-Damet et al., 2010)**

At the end of each mentoring period, mentors, mentees and lab managers worked together to conduct exit audits to measure improvements in quality. (Exit audit results are also used to establish baselines for the next round of mentorships.)

Differences between the baseline and exit audit scores were used to confirm improvements in quality.

# RESULTS

## Overall Performance

Improvement in overall performance was observed at all but one of the laboratories enrolled in the two national SLMTA programs.

### The First National SLMTA Program (June 2010 – October 2011)

Twenty-four public health laboratories in Ethiopia were enrolled in the first SLMTA program, of which five were supported by I-TECH. I-TECH provided a total of 30 days of focused mentorship, spread out over three rounds with intervals of eight weeks between each round. Audits were conducted before (baseline) and after (exit) SLMTA implementation, using the SLIPTA checklist.

### Internal Audits

The five I-TECH-supported laboratories enrolled in the first national SLMTA program scored 0 (<1) stars on the baseline audit. Following the three rounds of focused mentorship, all five labs had improved their scores by one to three stars, according to the SLIPTA checklist and scores (Table 1).

### External (National) Audits

External audit results showed that one laboratory (at the University of Gondar Hospital) earned a score of three stars; three labs earned two stars, and one laboratory earned one star.

According to the overall national evaluation of the SLIPTA results for laboratories participating in the first program, the I-TECH-supported University of Gondar Hospital lab earned three stars, making it the best of the 24 labs participating. The Axum Hospital laboratory came in second, earning two stars.

**Table 1. SLIPTA scores of laboratories enrolled in the first national SLMTA program.**

I-TECH-Supported Laboratories <sup>1</sup>	Baseline (Internal) Audit Result <sup>2</sup> (stars)	First Internal Audit Result <sup>3</sup> (stars (points))	Second Internal Audit Result (stars (points))	Third Internal Audit Result (stars (points))	National (EPHI) Audit Result(stars)
Axum HL	0	2 (170)	2 (178)	2 (173)	2
<b>Gondar UHL</b>	<b>0</b>	<b>1 (144)</b>	<b>2 (170)</b>	<b>3 (210)</b>	<b>3</b>
Bahir Dar RL	0	1 (146)	2 (172)	2 (170)	2
Dessie RL	0	1 (138)	2 (168)	2 (165)	1
Mekelle RL	0	1 (132)	1 (157)	2 (167)	2

1. HL: hospital laboratory. UHL: university hospital laboratory. RL: regional laboratory.

2. Audits conducted prior to mentorship intervention.

3. Internal audits conducted by I-TECH mentors.

## The Second National SLMTA Program (January 2011 – May 2012)

Twenty-one laboratories participated in the second program, of which five were I-TECH-supported labs. Initially, all labs were at the zero-star level (i.e., with scores of <55%).

### Internal Audits

Results showed that three of the I-TECH-supported laboratories (Dupti, Dessie, and Mekelle Hospitals) improved their average SLIPTA scores by one to two stars. The Maychew Hospital lab raised its score to three stars. On the other end of the scale, the Felege Hiwot Hospital lab averaged zero stars.

### External (National) Audits

Mirroring the internal audit results, the Maychew Hospital laboratory earned three stars; the Dupti, Dessie, and Mekelle Hospital labs earned two stars; and the Felege Hiwot Hospital lab earned zero stars (Table 2). The major contributor to Felege Hiwot's score was the laboratory's poor infrastructure.

**Table 2. SLIPTA scores of laboratories enrolled in the second national SLMTA program.**

I-TECH-Supported Laboratories <sup>1</sup>	Baseline (Internal) Audit Result <sup>2</sup> (stars)	First Internal Audit Result <sup>3</sup> (stars (points))	Second Internal Audit Result (stars (points))	Third Internal Audit Result (stars (points))	National (EPHI) Audit Result(stars)
Dupti HL	0	2 (166)	2 (168)	2 (172)	2
Dessie HL	0	1 (154)	1 (157)	1 (159)	2
F/Hiwot HL	0	<1 (103)	<1 (125)	1 (128)	0*
<b>Maychew HL</b>	<b>0</b>	<b>1 (146)</b>	<b>2 (171)</b>	<b>3 (192)</b>	<b>3</b>
Mekelle HL	0	1 (156)	2 (165)	2 (182)	2

1. HL: hospital laboratory.

2. Audits conducted prior to mentorship intervention.

3. Internal audits conducted by I-TECH mentors.

According to the overall national evaluation of the 21 laboratories participating in the second program, the I-TECH-supported Maychew Hospital lab achieved the best score, being the first among the 21 laboratories earning three stars. Maychew earned 208 out of 250 SLIPTA points on the national exit audit of quality-system essentials. Another I-TECH-supported lab, at Dupti Hospital, came in second.

The lack of improvement at Felege Hiwot hospital was related to a very poor infrastructure that was not conducive to change. The Hospital administration and ITECH embarked on a laboratory renovation project to improve the situation.

The focused mentorship and SLMTA implementation helped to engage hospital and senior management, creating a strong commitment to ensure ownership and accountability of the

program, team spirit among lab staff and willingness to build a culture focused on quality and problem solving.

## CHALLENGES

- High turnover of laboratory staff, especially among staff trained in quality-management and SLMTA procedures, and in biosafety, often caused inconsistency in the quality of mentorship and delays in the SLMTA process.
- Lack of strong commitment and ownership of the accreditation process among facility management, who tended to consider SLMTA and the WHO-AFRO SLIPTA as US government partner programs. Moreover, the inability of facility management to assume responsibility for the program made it difficult to address site-specific deficiencies.
- Lack of a sense of urgency among stakeholders and responsible authorities (e.g., the RHBs) to adequately implement the stepwise quality improvement process and assume the costs of implementing and sustaining SLMTA.
- Changing poor laboratory habits has been a slow process, contributing to delays in improvement:
  - The program required more time and resources than the labs had anticipated.
  - Maintenance of broken equipment was often delayed or not performed.
  - Poor physical infrastructure at some of the labs impeded workflow and safety procedures that, in turn, impeded the quality-improvement process.

*The SLMTA program implementation and the routine laboratory service provision are not integrated, and this disintegration resulted in a delay of SLMTA implementation, consequently lowering SLIPTA scores. —Referral hospital laboratory manager*

## LESSONS LEARNED

Laboratory mentorship is a dynamic process, aimed at improving the diagnostic skills of lab technicians, the quality of services provided, and patient care. Achieving international quality standards (through accreditation) is a continuous process of improvement.

An accreditation-focused, workplace-based approach to mentorship was developed (adapted) and implemented in I-TECH-supported laboratories, in collaboration with regional labs. I-TECH has provided laboratory mentorship in many resource-limited countries, but the level of mentorship provided by I-TECH Ethiopia is unique in its focus on accreditation through stepwise quality improvements, helping to ensure that what is learned through training and mentoring is actually implemented in the field.

This focused mentorship intervention is expected to guarantee that laboratory staff who have benefited from mentoring will be confident, and capable of evaluating both the quality of their own labs and their competence in implementing the ISO 15189 requirements through the WHO-AFRO stepwise laboratory quality improvement protocols.

The stepwise approach recognizes that improvement takes time and often occurs in increments—especially in resource-limited settings like Ethiopia.

External evaluation is the hallmark of accreditation, ensuring customers that laboratory services meet acceptable quality and safety standards.

Embedding full-time mentors within the daily routines of laboratories over extended periods of time enabled mentors to more fully understand the work culture, practices and people at those labs, giving them enough time to foster positive changes.



**I-TECH mentor providing accreditation-focused mentorship to laboratory technicians at Maychew Hospital**

Involvement of facility management in the mentorship process is critical to the success of QMS implementation, as the direct support of management is required in significant areas—e.g., funding for procurement of supplies, staffing, and challenges that may occur during the mentoring process.

*Unless management is fully committed to understand and support the process, whatever efforts [are] made in implementing SLMTA towards WHO-AFRO/SLIPTA will never succeed. —Regional referral laboratory manager*

Sufficient engagement on the part of mentees is also critical, since it enables mentors to assist with the smooth, uninterrupted implementation of SLMTA and shortens the amount of time required for labs to function on their own.

Staff motivation was also noted as a key driver in SLMTA implementation.

The perception of SLMTA/WHO-AFRO/SLIPTA among laboratory quality-assurance officers and facility managers is critical.

In general, improvement projects that were initiated and developed during SLMTA training stimulated creativity, ownership and action among laboratory staff, and were great assets to the quality-improvement programs.

## CONCLUSIONS AND RECOMMENDATIONS

The basic components of a laboratory QMS must be implemented at all levels of the laboratory pyramid. I-TECH's experience demonstrates that significant improvements in this system, which will contribute to increased efficiency in both delivery and quality of service, can be achieved through structured, workplace-based, accreditation-focused mentorship. The accreditation focus of the mentorship program was shown to accelerate SLMTA implementation, enabling labs to develop effective QMS that produced rapid and measurable change—as evidenced by the jump from zero stars on the baseline audit to two and three stars on the exit audit.

Quality laboratory services have wide-reaching benefits for Ethiopia's health care system improvement goals. Increased access to effective, reliable diagnostic services will support better patient care, improve the health care system and support achievement of Millennium Development Goals.

The workplace-based, focused mentorships resulted in measurable improvement towards preparation for the WHO-AFRO SLIPTA process in less than six months. The WHO-AFRO stepwise quality improvement program uses internationally accepted standards, adapted to local environments and scalable to meet lab complexity requirements. It also uses an incremental, stepwise approach that is objectively measurable over time, employs a positive-reinforcement approach to continuous quality improvement—and is affordable.

Accreditation also brings Ethiopia's laboratories closer to the international community of laboratory experts, allowing lab technicians and leaders to contribute to and learn from global expertise on effective lab procedures, challenges and best practices.

Focused mentorship is also an effective means of 1) determining whether a laboratory is providing accurate and reliable results; 2) determining whether the lab is well managed and adhering to good lab practices; and 3) identifying areas for improvement.

It is recommended that the workplace-based, accreditation-focused mentorship be incorporated into laboratory quality-management training programs such as SLMTA. This will accelerate the quality-improvement process and the progress of labs towards achieving accreditation.

The critical elements to be considered when setting up a long-term, sustainable and well-structured mentorship program include: well-defined goals, sufficient length of on-site mentor engagement, selection and training of mentors, a standard approach across laboratories, and

measurement of progress using standardized tools, well-structured reporting mechanisms, as well as alignment of the program with overall national (FMOH) plans.

Given the results achieved during the two national SLMTA programs, it is clear that the focused mentorship program played a key role in implementation of the SLMTA program, and must be sustained. In addition, the regional laboratories must be empowered to oversee and follow-up on the progress of SLMTA implementation.

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