

Effectiveness and Determinants of Laboratory Quality Management System Mentorship in Oromia Region Health Facilities, Ethiopia

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ABSTRACT

Mentorship in the laboratory refers to a structured relationship where seasoned professionals guide those who are less experienced, enhancing their skills and knowledge. It plays a vital role in the implementation of a Quality Management System, which fosters continuous improvement and guarantees reliable services. Despite 16 years of efforts to establish Laboratory Quality Management Systems (LQMS) in Ethiopia, expected improvements in laboratory services have not been achieved.

The current study aimed to assess the impact of mentorship and the factors affecting the Laboratory Quality Management System on the quality of laboratory services in health facilities within the Oromia region. A combination of qualitative and quantitative data was utilized, including in-depth interviews. Data were gathered from 2014 to 2016, with additional collection in 2025 using a tool called Kobo, and subsequently analyzed using SPSS. Our findings indicate that mentorship has a significant impact, with a sample size of $n=44$. (30.6%) of facilities saw an improvement in their star ratings due to mentorship. Regular visits from mentors (AOR=9.51(1.96, 46.20), ongoing training and careful planning (AOR=4.43(1.20, 16.43), effective management review (AOR=6.40(1.50, 27.66), and sufficient infrastructure (AOR=13.74(1.62, 116.66) had significant positive impacts. Conversely, increased documentation requirements (AOR=0.59(0.23, 1.47) and routine workloads (AOR=4.09(0.94-17.73) were negatively correlated. The findings highlight that mentorship plays a crucial role in enhancing laboratory services and quality. The results of this research can guide efforts to improve laboratory quality in the Oromia region. By prioritizing mentorship and addressing existing challenges, institutions can foster a culture of quality enhancement.

This study primarily provides region-specific evidence on the effectiveness of Laboratory Quality Management System (LQMS) mentorship in health facilities within the Oromia Region and highlights the key factors involved.

Abbreviations

CEO	: Chief Executive Officer
CI	: Confidence Interval
DC	: Data collector
EAS	: Ethiopian Accreditation service
ETB	: Ethiopian Birr
LQMS	: Laboratory Quality Management System
MOH	: Ministry of Health
NGO	: Non-governmental Organization
OHB	: Oromia Health Bureau
QSE	: Quality System Essentials

SLIPTA	: Stepwise Laboratory Quality Improvement Process toward Accreditation
SLMTA	: Strengthening Laboratory Management toward accreditation
UHC	: Shashemene Public Health Research and Referral Laboratory Center
UHC	: Universal Health Coverage
WHO-AFRO	: World Health Organization Regional Office for Africa

Keywords: LQMS, Mentorship, Effects, Oromia Region Health Facilities, Public Health Research and Referral Laboratories.

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Background

The laboratory requires structured mentorship where experienced individuals are guided by less-experienced individuals to gain knowledge and skills [1]. Mentorship is vital for establishing a Quality Management System (QMS), and good QMS enhances the capacity of laboratories to offer precise services and continue to develop [2]. The process includes documentation and measurement of processes and effective utilization of the available resources, which are among several elements of an ideal QMS [3]. Such elements entail consideration of customers, leadership, and people involvement besides continuous improvement and decision-making based on evidence and strong manager-employee relationships [4]. Effective QMS implementation results in reduced error rates and increased confidence from healthcare organizations [5].

The importance of quality laboratory services cannot be overemphasized as far as better diagnosis is concerned [6]. Quality laboratory results facilitate clinical decision-making. This is because lab results contribute around 60% to 90% of the critical information that health professionals require when making decisions [7]. Nevertheless, many healthcare providers in low and middle-income countries, including Ethiopia, often rely on poor-quality laboratory results in making their diagnoses and other clinical decisions. Such practices negatively impact the efficacy and credibility of healthcare services [8]. Laboratory services must be of high quality. This means that laboratories need to shift their focus from conventional approaches to systems approach that embraces ISO 15189 standards [9, 10]. Introduction of a QMS, and the use of the WHO AFRO SLIPTA Checklist can help achieve quality laboratory services [11]. WHO AFRO SLIPTA Checklist is instrumental in quality improvements and meeting ISO 15189 standards [12].

Effective prevention, detection, and response to disease outbreaks that could cause a pandemic rely on laboratories providing accurate and reliable test results [13]. Many laboratories in resource-limited countries, however, do not have the ability to identify important pathogens and often give poor-quality supportive testing that is both unreliable and delayed [14].

There are big gaps in lab quality management in Ethiopia. Regional health bureaus, the Ministry of Health and the World Health Organization are working to improve laboratory quality systems and they're using initiatives like the SLIPTA process, mentorship programs to improve clinical competence and quality management [15,16]. However, in Ethiopia, laboratory services have received little attention within the health facilities and quality management system is not well addressed [17]. Poor-quality results accounting for up to 61.2% of clinical laboratory services and contributing to approximately 43% of treatment delays and 61% of longer hospital stays were reported [17, 18]. Factors significantly associated with higher quality laboratory services included communication with physicians, the opportunity to attend continuing professional education and development programs, participation in laboratory refresher training, availability of adequate laboratory equipment, and sufficient active laboratory staff has been identified in Ethiopia [19].

While some hospitals and health centers in Oromia have begun implementing these standards, there is much more that could

be achieved. One of the major objectives of this research is to determine the effect of mentoring in LQMS implementation within Oromia. The results from this research will provide useful information about the positive influence mentoring can have on laboratory services and quality patient care.

Methods and Materials

Study Area

Oromia, the largest of Ethiopia's regional states, covers about 30 percent of the country's total land mass. The 2016 Oromia Health Bureau data shows that Oromia has 5 public health research and referral laboratories, 126 hospitals, 13 blood banks, and 1434 health centers providing laboratory services. These 5 public health research and referral laboratories offer mentorship to their respective catchment health facilities. For this study, health facilities enrolled in the Laboratory Quality Management System and mentored over the last three years were selected. The study area included 9 health centers and 16 hospitals from the Shashemene catchment, 29 hospitals and 25 health centers from Adama, 28 hospitals and 24 health centers from Nekemte, 7 hospitals and 15 health centers from Fiche, and 8 hospitals and 7 health centers from Bulehora

Study Design and Period

The study used an institutional-based retrospective and cross-sectional design, collecting both qualitative and quantitative data from May 30 to June 30, 2025.

Study Population and Source

The study population consisted of health facilities that had implemented the Laboratory Quality Management System and received mentorship from public health research and referral laboratories over the last three years. The sample size was calculated using the formula for single population proportion, considering a previous study's findings on the impact of mentorship on quality service.

Sample Size and Sampling Techniques

This sample size was computed as $n = (Z\alpha/2)^2 P(1-P)/d^2$, where n basically is the sample size, z is the Z-score at 95% confidence interval, p is 20.2% previous study on impact of mentorship on quality service (Daba et al., 2023) and d is the margin of error.

The sample size n is computed as:

$$n = (Z\alpha/2)^2 P(1-P)/d^2$$

This yielded a maximum sample size of 172 health professionals. Purposive sampling was used to select health facilities that had participated in implementing the Laboratory Quality Management System and received mentorship over the last three years. From each health facility, key informants such as laboratory heads, quality officers, and technical staff were selected for in-depth interviews. A total of 169 health facilities were assigned proportionally to all public health laboratories, and study health facilities were recruited using a lottery method. The number of questionnaire respondents was also taken from each health facility laboratory.

Data collections and procedures

Data was collected using semi-structured questionnaires and in-depth interviews. The semi-structured questionnaire was developed based on the ISO 15189: 2012 standard, specifically

focusing on the impact of mentorship. It was refined following a 5% pre-testing process, during which any unclear options were removed. This questionnaire was composed of five distinct sections, including socio-demographic information, knowledge, attitude, and practice questions. Quantitative data was collected from laboratory professionals using the semi-structured questionnaire, while qualitative data was gathered through in-depth interviews with facility managers, all of which were conducted by trained data collectors.

Quality Assurance

For the quality of qualitative data in this research was ensured by implementing measures to establish trustworthiness through the following criteria: credibility, transferability, dependability, and conformability. These criteria used to validate the findings and enhance the overall integrity of the qualitative component of the study. This was used to establish that findings are based on participants' perspectives rather than researcher bias

Data Analysis

Before doing the analysis, the entire data field was cross-checked for reliability and completeness on both the collected hard copy and soft copy of the data entered. After reviewing for completeness, coding was performed by the Principal Investigator and followed by data entry into EPI data Version 3.3 and SPSS version 27 software (IBM Corporation, Chicago, IL, USA) for cleaning and analysis. Descriptive statistical values including frequencies, percentages, mean and standard deviations were used primarily to summarize results as well as describe the data. Cross tabulations were used to determine if there is an insufficient cell count within each of the variable categories. The crude and adjusted odds ratio (COR&AOR) with confidence intervals (CIs) and p-values was used to determine the statistical and significant associations b/n implementation of accreditation and demographic variable. Bi-variate and multi-variate logistic regression analyses were computed to examine the relationship b/n the explanatory variables and response variables. The qualitative data from in-depth interviews was categorized and discussed thematically.

Ethical Considerations

Ethical clearance was obtained from OHB, IRB and Letter was written to each zonal Health department and hospital followed by an ethical approval ref no 26/06/2017 BFO/HQ/186/2017 Written consent was obtained from each participant prior to conducting the study. Additionally, confidentiality was assured for all the information provided and personal identifiers are not included in the report.

Results

Socio demographic characteristics of study participants

Out of a total 159 participants, 152(86%) were male, 55(31%) of laboratory professionals were within the age of 30-34years old. Majority of the study participants 110(63%) were degree holders and most of the respondents work position 56(32%) were laboratory managers.

Awareness, Participation, support by Mentors, and Training Experience related to LQMS Implementation Process

The results of the study reveal a high level of awareness

regarding organizational efforts for LQMS implementation, with 88% of participants demonstrating understanding. A substantial portion of laboratory professionals (84%) were involved in the process, with a notable segment (49%) having been involved for < 3years. While a majority (46%) reported full involvement, a significant proportion of participants (69%) had received training on LQMS. Interestingly, a substantial number of professionals (42%) perceived the extent of mentor support as high. However, a considerable percentage (64%) reported that expected quality assistance was not delivered. Furthermore, a large majority of respondents (78%) indicated that mentors' stays at health facilities were limited to a single day. Finally, the study found that participants overwhelmingly (79%) reported mentor visits occurring twice per year (Table 2).

Table 1: Socio Demographic Characteristics of the Study Participants among Oromia Region Health Facilities from May 30-June 30, 2025 (n=159)

	Study Variables	Frequency	Percentage (%)
Sex	Male	137	86
	Female	22	14
Age	20-24yrs	8	5
	25-29yrs	45	28
	30-34yrs	48	30
	35-39yrs	40	25
	>40yrs	18	12
Educational Level	MSc and above	16	10
	Degree	102	64
	Diploma/level 4	41	26
Work position	Section head	25	16
	Laboratory Manager	56	35
	Quality Officer	42	26
	Safety Officer	5	3
	Laboratory Technical staff	31	20

Table 2: Awareness, Participation, Support by Mentors, and Training Experience related to LQMS Implementation process among Oromia Region Health Facilities from May 30-June 30, 2025

Study Variables	Responses	Frequency	Percentage (%)
Awareness on LQMS implementation	Yes	140	88
	No	19	12
Participation in the LQMS implementation Process	Yes	133	84
	No	26	16
Duration of Involvement in the Process	<=3years	78	49
	4-7years	63	40
	8-11years	15	9
	>=12years	3	2

Category of Participation in the LQMS implementation Process	P a r t i a l l y Involved	86	54
	Fully Involved	73	46
Training Related to LQMS	Yes	109	69
	No	50	31
Mentors' extent of assist on LQMS implementation	High Support	66	42
	M e d i u m Support	68	43
	Low Support	25	16
Expected Quality Assistance delivered	Yes	57	36
	No	102	64
Duration of Mentor stay	One day	124	78
	Two days	25	16
	Three days	10	6
Number of visits between mentor and mentee for technical assistance	Once per Year	23	14
	Twice per year	126	79
	Only offsite mentor	1	1
	Never at all	9	6

Efforts of laboratory Management on LQMS Implementation

The degree of staff awareness creation and sensitization regarding the benefits of LQMS was assessed to evaluate the efforts of laboratory management on LQMS implementation. Participants' responses indicated varying levels of implementation. Majority (89%) of participants were responded as adequate awareness of staff created. These results suggest that while some level of awareness creation and sensitization exists within the laboratories, the extent of implementation varies, with a significant proportion indicating only partial or moderate efforts by laboratory management.

Table 3: Efforts of laboratory Management on LQMS Implementation within Oromia Region Health Facilities from May 30-June 30, 2025

Variables	Responses	Frequency	Percentage
Adequate awareness creation and sensitization of staff on benefits of LQMS implementation	No	18	11%
	Yes	141	89%
Commitment of top management to fulfill all LQMS standards	No	52	33%
	Yes	107	67%
A quality manual with clear quality policy statement and objectives was developed and communicated	No	39	24%
	Yes	120	76%
Laboratory logistics system is established to manage laboratory supplies to avoid over stock and under stock for essential laboratory supplies	No	46	29%
	Yes	113	71%
The laboratory is conducting internal audits at planned intervals to check the compliance of all required standards	No	78	49%
	Yes	81	51%
Adequate Laboratory space	No	75	48%
	Yes	84	52%
Adequate storage space for Laboratory supplies	No	100	63%
	Yes	59	37%
Adequate sample collection space for clients and wash rooms for staff	No	63	40%
	Yes	96	60%
Regular monitoring of environmental condition	No	79	50%
	Yes	80	50%

The majority of respondents (67%) expressed agreement or strong agreement, suggesting a generally positive perception of top management's commitment to LQMS standards, although a notable proportion remained neutral or disagreed.

The majority of respondents (76%) indicated positive perceptions toward the development and communication of the quality policy manual, suggesting a generally favorable view of laboratory management efforts in this area. However, a small proportion of participants expressed disagreement or neutrality, indicating some variability in perceptions or implementation.

Regarding the establishment of a laboratory logistics system to manage laboratory supplies effectively and prevent both overstocking and understocking of essential supplies, participants' responses were distributed within different level. This distribution indicates that a majority of participants (about 71%) perceived that a laboratory logistics system is established to manage supplies effectively, with a significant portion expressing agreement or strong agreement. Conversely, a small proportion of participants disagreed or strongly disagreed, suggesting some variability in perceptions regarding the implementation of this aspect of laboratory management.

In other way, according to the finding of this research a majority of respondents (51%) expressed agreement or strong agreement with the Laboratories internal audit, suggesting a generally positive perception of the laboratory's efforts in conducting internal audits at planned intervals to ensure compliance with standards. Concerning the development of action plans based on internal audit findings many participants 48% agree that action plans are developed following internal audits, there is still a segment of respondents who are neutral or disagree, indicating variability in the perceived implementation of corrective actions (Table 3).

System for selection, purchasing and managing laboratory supplies	No	64	40%
	Yes	95	60%
Independent equipment verification practice	No	83	52%
	Yes	76	48%
A system in place to inspect and verify all laboratory supplies before using for patient testing	No	72	45%
	Yes	87	55%
Verification of new methods before introducing into routine uses	No	79	50%
	Yes	80	50%
Internal Quality control for all tests	No	56	35%
	Yes	103	65%
Review and release of Laboratory tests by authorized personnel	No	72	45%
	Yes	87	55%

Star/Level Achieved by Health Facilities in the Previous Three Years

The finding of this research indicates that, following three years of mentorship 25.9% of the health centers remained unchanged in status and only 36.5% of Hospital exhibiting improvements. The overall star/level score change fall to only 31%.

Table 4: Star/Level achieved by Health Facilities in Oromia region within previous three years, Data were collected from May 30-June 30, 2025

Health Facility	Status	Frequency (n)	Percentage (%)
Hospital	Improved	23	36.5
	Not improved	40	63.5
Health Center	Improved	21	25.9
		60	74.1
	Total	144	100

Determinants of Mentorship on LQMS Implementations Process

The binary logistic regression analysis identified several determinants significantly associated with the effect of mentorship on Laboratory Quality Management System (LQMS) implementation among Oromia region health facilities. Efforts of laboratory management (COR=2.48, 1.29-4.75), frequency of mentor-mentee visits (COR=3.66, 1.54-8.74), staff participation

(COR=3.66, 1.36-5.19), continuous training (COR=4.50, 2.01-10.09), understanding of LQMS requirements (COR=3.74, 1.89-7.40), planning (COR=5.77, 2.89-11.54), management reviews (COR=10.04, 4.58-21.98), and workload (COR=4.26, 1.90-9.56) were all significantly associated with successful mentorship ($p<0.05$). These findings highlight the critical role of management efforts, staff engagement, ongoing training, proper planning, and management oversight in enhancing LQMS implementation in the facilities.

In multivariate Logistic regression analysis was performed to assess the effects of mentorship on LQMS implementation process among health facilities in Oromia Region. Variables which had association with dependent variable in bivariate analysis at p -value less than 0.25 were included in the final model.

Multivariate analysis identified several key factors independently associated with successful mentorship on implementation of the Laboratory Quality Management System (LQMS). Significant positive influences included frequent mentor-mentee visits for technical assistance (AOR=9.51, 1.96-46.20), proper planning (AOR=4.43, 1.20-16.43), management review (AOR=6.36, 1.46-27.66), and adequate infrastructure such as workspace and storage (AOR=13.74, 1.62-116.66). Conversely, higher documentation demands (AOR=0.02(0.00-0.17) was negatively associated with LQMS implementation. Routine workload (AOR=4.09, 0.94-17.73) showed a borderline significance (Table 5).

Table 5 : Effects of Mentorship on LQMS Implementation Process among Oromia Region Health Facilities from May 30-June 30, 2025

Variables	Response	Improved (n)	Not improved (n)	P- value	Crude Odds ratio(95%CI)	P- value	Adjusted Odds ratio(95%CI)
High cost in implementing LQMS	Yes	66	20	0.082	0.48(0.21-1.10)	0.099	2.35(0.85-6.50)
	No	10	63		2		2
Duration of mentor stay with mentee	Adequate	20	15		1		1
	Not adequate	56	68	0.212	1.62(0.76-3.45)	0.429	0.60(0.16-2.17)
Efforts of Laboratory Management	Good	53	40		1		1
	Poor	23	43	0.006	2.45(1.29-4.75) *	0.011	0.10 (0.02-.59) **
# of Visit between mentor and Mentee	Adequate	68	58				
	Not adequate	8	25	0.003	3.66(1.54-8.74) *	0.005	9.51(1.96-46.20) **

Staff resisting change	Yes	58	58	0.362	0.72(0.36-1.46)	0.362	0.72(0.36-1.46)
	No	18	25		2		2
Lack of staff participation	Yes	40	62	0.004	3.66(1.36-5.19)*	0.399	1.91(0.51-7.13)
	No	36	21		2		2
Lack of support from top management	Yes	60	59	0.255	1.53(0.74-3.16)	0.255	0.15(0.03-0.80)
	No	16	24		1		1
Lack of continuous training and other pertinent	Yes	47	73	0.000	4.69(2.01-10.09) *	0.026	4.43(1.20-16.43) **
	No	29	10		2		2
Lack of understanding the requirements	Yes	36	64	0.001	3.74(1.89-7.40) *	0.279	1.95(0.58-6.53)
	No	40	19		2		2
Lack of understanding the requirements	Yes	28	64	0.000	5.77(2.89-11.54) *	0.008	5.94(1.59-22.18) **
	No	48	19		2		2
Turnover of trained staff	Yes	49	61	0.220	1.53(0.78-3.01)	0.982	1.01(0.32-3.22)
	No	27	22		2		2
Lack of management reviews	Yes	30	72	0.000	10.04(4.58-21.98) *	0.014	6.36(1.46-27.66) *
	No	46	11		2		2
Lack of adequate in frastructure	Yes	62	74	0.179	1.86(0.75-4.58)	0.016	13.74(1.62-116.66) *
	No	14	9		2		2
Massive documentation requirements	Yes	68	69	0.251	0.58(0.23-1.47)	0.001	0.02(0.00-0.17)**
	No	8	14		2		2
Routine work load	Yes	48	73	0.001	4.26(1.90-9.56)*	0.060	4.09(0.94-17.73)
	No	28	10		2		2

Discussion

This study assessed the role of mentoring in the adoption of the Laboratory Quality Management System within health laboratories in the Oromia Region. The study identified an intricate blend of awareness, managerial activity, mentoring processes, resources and infrastructure. Majority of laboratory personnel (88%) demonstrated high awareness and these findings have a parallel to previous studies conducted in Addis Ababa where quality systems in laboratories became increasingly recognized [20].

There seems to be a considerable disparity between awareness and implementation. The majority of participants, 64%, indicated that there was insufficient support of high quality from mentors. In addition, mentorship visits lasted one day only and did not occur frequently. Efforts by the lab management were viewed positively in regard to the awareness creation process and putting the system in place. However, these efforts were hampered by various factors such as lack of infrastructure, space, and other resources. The situation is indicative of the greater problems in the Ethiopian public health care system. Similar observation was also reported in Ethiopia by which showed that inadequate laboratory infrastructure and lack of awareness creation can affect laboratory quality management system implementation [21].

The study showed that, frequent interaction between mentors and mentee was identified as the single most critical determinant of successful mentorship. Such findings underscore the need for

continuous mentorship programs, which may be expensive and logistically challenging, but can have a profound effect. This suggestion is in line with which stated mentorship interventions were effective when there is frequent interaction between mentors and mentee [22].

It was also established that there is a relationship between continuous training and managerial supervision, a finding similar to what has been observed in other areas. Similar study also reported the laboratory professionals need continuous supervision in Ethiopia. On the other hand, an increase in documentation was significantly associated with the implementation of LQMS. However, documentation of processes was viewed by laboratory technicians as an additional burden not related to their work routine also reported similar findings [23,24].

The study discusses the issues they're still ongoing such as not having enough staff having too much work to do and not having good enough equipment and buildings. This shows that just teaching people about Leadership and Quality Management System is not enough. We also need to have programs that help people learn from others and make the health system better to deal with these issues.

One important thing that the study found is that smaller health facilities have a time. This is probably because hospitals have money, staff who are experts in their fields and better equipment and buildings. This is a deal for making sure everyone gets the

same quality of healthcare. This indicates that relying on a single mentoring approach is insufficient. A similar finding was also reported by Obeta et al. (2019) in Nigeria.

Leadership and Quality Management Systems play a critical role in healthcare. They directly influence the overall quality of care delivered in health facilities. To improve healthcare outcomes, it is essential to strengthen leadership and implement effective quality management practices. This is particularly important for patients seeking care in these facilities.

By addressing existing gaps in leadership and quality systems, we can ensure that all individuals receive timely, safe, and effective healthcare services. Ultimately, strong leadership combined with robust quality management is key to delivering accessible and high-quality care for everyone.

Limitations of the Study

This research has a number of limitations that must be taken into account when evaluating the findings. Notably, it relied significantly on self-reported information from participants, which can be influenced by social desirability bias (such as exaggerating management practices or awareness) and recall bias (for instance, accurately recollecting star levels from past years). Additionally, the purposive sampling of health facilities, while essential for selecting those with mentorship experience, may restrict the applicability of the results to all health facilities in the Oromia region, especially those not currently participating in LQMS programs

Conclusion and Recommendation

Mentorship is among the leading factors that facilitate the successful implementation of LQMS at health facilities in Oromia. Mentorship promotes the sharing of information and skills among the involved parties, which improves the overall quality of laboratory services.

Several issues need to be considered for successful mentorship. These include the need for effective management and high-quality resources such as funds, modern machines and equipment, and highly-skilled personnel. The health facilities should be well-prepared and equipped with the required machines and technology. Moreover, health workers should be willing to adopt behavioral and cultural changes and implement strategies aimed at improving the quality of laboratory services.

Recommendations

Health facilities should make laboratory quality management systems implementation and mentorship a priority. They should invest in long-term training programs or mentorship on capacity building to improve the health workers' knowledge and skills. Health facilities must promote a positive organizational culture that encourages teamwork, responsibility, and improvement initiatives. They must consider mentoring and capacity-building activities a key aspect of quality improvement and not a short-term solution.

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Author contributions

BT and SU conceptualized and collected the data; GN and WB prepared the methodology; drafted and wrote the manuscript, and DM, BG and MK reviewed and edited the manuscript.

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References

1. Maruta T, Rotz P, Peter T. Setting up a structured laboratory mentoring programme. *African Journal of Laboratory Medicine*. 2013. 1: 2: 1-7.
2. Dahlberg ML, Byars-Winston A. The science of effective mentorship in STEMM. National Academies Press. 2020.
3. World Health Organization. Laboratory quality management system: handbook. World Health Organization. 2011.
4. Pillai SP, Fox E. Laboratory quality management system fundamentals. *Frontiers in Bioengineering and Biotechnology*. 2025. 13: 1578654.
5. Akase S, Kpera T. Ensuring accuracy, ensuring life: a crucial role of quality management systems in medical laboratories. *Science Open Preprints*. 2024.
6. Lubin IM, Astles JR, Shahangian S, Madison B, Parry R. Bringing the clinical laboratory into the strategy to advance diagnostic excellence. *Diagnosis*. 2021. 8: 281-294.
7. Aslan D. Which skills are needed and how they should be gained by laboratory medicine professionals for successful ISO 15189 accreditation. *EJIFCC*. 2018. 29: 264.
8. Mesganaw B, Fenta A, Hibstu Z, Belew H, Misganaw K. Medical laboratories quality management and challenges in Ethiopia: A systematic review. *Pathology and Laboratory Medicine International*. 2023: 13-26.
9. Ong SK, Donovan GT, Ndefru N, Song S, Leang C. Strengthening the clinical laboratory workforce in Cambodia: a case study of a mixed-method in-service training program to improve laboratory quality management system oversight. *Human Resources for Health*. 2020. 18: 84.
10. Ojo E, Nwaokorie FO. Overview of the implementation of quality management system in Nigerian medical laboratories. *University of Lagos Journal of Basic Medical Sciences*. 2018. 6: 20-29.
11. Ndiokubwayo JB, Maruta T, Ndlovu N, Moyo S, Yahaya AA. Implementation of the World Health Organization Regional Office for Africa stepwise laboratory quality improvement process towards accreditation. *African Journal of Laboratory Medicine*. 2016. 5: 1-8.
12. Ndiokubwayo JB, Maruta T, Ndlovu N, Moyo S, Yahaya AA. Implementation of the World Health Organization Regional Office for Africa stepwise laboratory quality improvement process towards accreditation. *African Journal of Laboratory Medicine*. 2015. 5: 1-8.
13. Lippi G, Jackson B, Plebani M. Improving diagnosis in health care: laboratory medicine. *Diagnosis*. 2025. 12: 570-

- 577.
14. Orozco JD, Greenberg LA, Desai IK, Anglade F, Ruhangaza D. Building laboratory capacity to strengthen health systems: the Partners in Health experience. *Clinics in Laboratory Medicine*. 2018. 38: 101-117.
 15. Desalegn DM, Abay S, Abebe A, Lulie AD, Dejene D. Quality of focused antenatal care laboratory services provided at public health facilities in Addis Ababa, Ethiopia. *Quality in Primary Care*. 2017. 26: 81-89.
 16. Mesfin EA, Taye B, Belay G, Ashenafi A, Girma V. Factors affecting quality of laboratory services in public and private health facilities in Addis Ababa, Ethiopia. *EJIFCC*. 2017. 28: 205.
 17. Nigatu T, Deress T, Mezgebu B, Adane K. Determinants of quality laboratory service provision among government comprehensive specialized hospitals in Northwest Ethiopia.
 18. Zakir D, Mekonnen GK, Negash B, Marami D. Level of health laboratory service quality, service interruptions, and its predictors in public hospitals in Harar town, eastern Ethiopia. *Frontiers in Health Services*. 2024. 4: 1492766.
 19. Mulleta D, Jaleta F, Banti H, Bekele B, Abebe W. The impact of laboratory quality management system implementation on quality laboratory service delivery in health center laboratories of Oromia region, Ethiopia. *Pathology and Laboratory Medicine International*. 2021: 7-19.
 20. Hassen F. Assessment of knowledge, attitude and practices of medical laboratory professionals on the use of internal quality control for laboratory tests among selected health centers in Addis Ababa, Ethiopia. *Primary Health Care*. 2018.
 21. Lulie AD, Hiwotu TM, Mulugeta A, Kebede A. Perceptions and attitudes toward SLMTA amongst laboratory and hospital professionals in Ethiopia. *African Journal of Laboratory Medicine*. 2016. 5: 1-6.
 22. Negussie A, Sisay A, Shibabaw A, Kebede E, Tesfaye F. Perceptions, attitudes, and challenges regarding continuing professional development among Ethiopian medical laboratory professionals: a mixed-methods study. *BMC Medical Education*. 2025. 25: 1049.
 23. Biadgo B, Zakir A, Malede T, Getachew E, Girma M. Assessment of quality of medical laboratory services provision and associated factors in public health facilities at Gondar Town, Amhara Regional State, Northwest Ethiopia. *Clinical Laboratory*. 2019. 65.
 24. Mesganaw B, Fenta A, Hibstu Z, Belew H, Misganaw K. Medical laboratories quality management and challenges in Ethiopia: A systematic review. *Pathology and Laboratory Medicine International*. 2023: 13-26.