

Leadership development programmes for public health medical laboratory specialists in sub-Saharan Africa: A scoping review



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Orientation: Although leadership development is fundamental to public health laboratory systems, structured leadership development opportunities for public health medical laboratory specialists in sub-Saharan Africa (SSA) remain limited.

Research purpose: This study maps and synthesises existing Laboratory Leadership Development Programmes (LLDPs) in SSA, examining their structure, content, delivery models, and evaluation practices to generate evidence that informs context-appropriate, effective, and sustainable leadership policy and programme design.

Motivation for the study: Despite major investments in laboratory systems, leadership capacity remains a challenge. Limited evidence on LLDP design and evaluation in SSA constrains informed policy and practice.

Research approach/design and method: A scoping review following Arksey and O'Malley's framework was conducted. Searches of academic databases and grey literature (2008–2025) identified eligible studies, which were thematically analysed according to programme orientation, design, evaluation and implementation.

Main findings: Twenty-eight studies describing nine LLDPs were included. Most LLDPs focused on team and organisational leadership, with limited emphasis on personal leadership and public health systems integration. Competency-based training predominated, but leadership theories and locally grounded frameworks were rarely explicit. Evaluations focused on short-term learning, while donor dependence and weak alignment with national strategies limited sustainability.

Practical/managerial implications: National laboratory systems should institutionalise context-specific LLDPs and competency frameworks. Existing LLDPs should emphasise personal leadership and long-term evaluation to strengthen sustainable leadership capacity.

Contribution/value-add: This review provides the first comprehensive synthesis of LLDPs in SSA, informing laboratory leadership development, policy and programme design.

Keywords: laboratory leadership; medical laboratory specialists; leadership development programmes; sub-Saharan-Africa; public health laboratories; laboratory management.

Introduction

Leadership is widely recognised as the ability to inspire, guide and mobilise others towards achieving shared goals, ultimately improving organisational performance and impact (Antonakis & Day, 2018; House et al., 2004). In public health laboratories (PHLs), leadership plays a vital role in managing resources, ensuring diagnostic accuracy and translating scientific outputs into actionable public health responses (Perrone et al., 2016; World Health Organization [WHO], 2019). Laboratory leaders are tasked with navigating complex responsibilities, including disease surveillance, regulatory compliance, operational efficiency and crisis management (Garcia et al., 2024; Ruyan, 2024), functions that are increasingly critical in sub-Saharan Africa (SSA), a region frequently impacted by infectious disease outbreaks and constrained health systems.

These leadership demands are particularly acute in SSA, where laboratory networks operate within resource-constrained environments characterised by workforce shortages, limited infrastructure and recurrent public health emergencies (Tran et al., 2026). Leadership capability

Note: Additional supporting information may be found in the online version of this article as Online Appendix 1, Online Appendix 2, Online Appendix 3 and Online Appendix 4.

directly influences laboratory efficiency, system resilience and the effective translation of scientific data into public health action, whereas weak leadership capacity can contribute to underutilised diagnostic services, poor integration with healthcare systems and reduced preparedness for outbreaks (Khayat et al., 2025; Nkengasong et al., 2010).

Despite the growing recognition of leadership as a cornerstone of laboratory system strengthening, investment in structured leadership development for PHL professionals in SSA remains limited (Gopolang et al., 2021; Perrone et al., 2016). Many laboratory specialists transition into supervisory or managerial roles primarily based on technical expertise rather than formal preparation for leadership responsibilities (McCutchen et al., 2025). Consequently, laboratory networks often lack leaders equipped with the strategic, relational and systems-level competencies required to manage change, engage stakeholders and improve organisational performance (Gopolang et al., 2021; Perrone et al., 2016).

Furthermore, healthcare leadership initiatives in SSA have largely focused on physicians and nurses, with comparatively little attention given to medical laboratory specialists (Johnson et al., 2021; MacKechnie et al., 2022). Given the central role that laboratories play in health security and disease surveillance, this oversight represents an important gap in workforce development. While several laboratory leadership development programmes (LLDPs) have emerged across the region, their scope, design and contribution to strengthening leadership capacity are not well documented (Africa Centers for Disease Control and Prevention [CDC], 2024; Perrone et al., 2016). Greater clarity on the nature and characteristics of these initiatives is needed to inform more coherent, contextually responsive and sustainable leadership development strategies for PHL systems in SSA.

Research purpose and objectives

The purpose of this study is to map and synthesise the landscape of LLDPs for public health medical laboratory specialists in SSA. This is relevant given that effective leadership capacity is critical to strengthening laboratory systems to respond to healthcare threats. To achieve this purpose, the study pursued the following objectives:

- To examine the characteristics of existing LLDPs, including their structure, content and delivery methods.
- To identify gaps in existing LLDPs' contextual relevance and evaluation practices, particularly regarding sustainability and measurable impact on health systems.

Literature review

Public health laboratories are central to effective health systems, providing diagnostic testing, disease surveillance and evidence to guide public health decision-making. Laboratory data underpin most clinical and epidemiological actions, making laboratories critical to both patient care and population health (Chaudhry et al., 2023; Inbanathan et al.,

2024). Leadership development has therefore emerged as a central workforce strategy for strengthening capability within healthcare. Leadership development programmes (LDPs) aim to enhance the knowledge, behaviours and relational competencies required to guide teams, manage change and improve service delivery (Day, 2000; Day et al., 2014; Kjellström et al., 2020). This need is particularly acute in SSA, where health systems operate under chronic workforce shortages, infrastructure limitations and financial constraints, compounded by recurrent epidemics and public health emergencies (Fallah et al., 2024; Masiira et al., 2020). Within such contexts, effective leadership is essential for prioritising scarce resources, sustaining service continuity and coordinating multi-level laboratory networks.

Approaches to leadership development remain conceptually and operationally diverse. Traditional LDPs typically adopt leader-centric, competency-based models that focus on strengthening individual skills, cognitive abilities and technical knowledge (Eva et al., 2019). Although these approaches are widely implemented, they have been criticised for treating leadership as an individual attribute detached from organisational and systemic contexts, thereby overlooking the relational and collective dimensions of leadership practice (Psychogios & Dimitriadis, 2021). Such models may be particularly limited in resource-constrained settings where leaders must navigate fluid roles, institutional uncertainty and complex stakeholder dynamics that require adaptive and collaborative capabilities (Hotho & Dowling, 2010).

In contrast, socio-constructivist and leadership-centric perspectives conceptualise leadership as a dynamic, socially embedded process that develops through interaction, shared learning and engagement with real-world challenges (Billsberry, 2016; Fatien Diochon & Nizet, 2019). These approaches emphasise mentorship, experiential learning and systems thinking, aligning more closely with the realities of complex health systems. Integrative models highlight that effective leadership development should combine individual capacity-building with collective and organisational learning processes (Turner & Baker, 2017; Yammarino et al., 2020). Nevertheless, the broader evidence base remains inconsistent, characterised by considerable variation in programme design, theoretical grounding, duration and evaluation methods, making it difficult to determine which approaches produce sustainable outcomes (Day & Liu, 2018; McGowan et al., 2020).

In public health, transformational leadership is frequently associated with improved team performance and service quality, yet debates persist regarding which leadership styles and training modalities are most effective (Boamah et al., 2018; McGowan et al., 2020). A recurring structural challenge is that health professionals are often promoted to management positions based on technical expertise or seniority rather than leadership readiness (Gopolang et al., 2021; McCutchen et al., 2025). This practice results in role strain, inadequate preparation and diminished organisational effectiveness

(Johnson et al., 2021). Consequently, leadership is increasingly viewed not simply as the acquisition of skills but as a developmental transition requiring staged preparation and support (Kjellström et al., 2020).

Transition-oriented frameworks provide useful guidance in this regard. The Leadership Pipeline Framework highlights progressive shifts from managing self, to leading others, and ultimately leading organisations, requiring distinct behavioural and mindset changes at each stage (Charan et al., 2011, 2024). Complementary perspectives emphasise the influence of situational demands, organisational culture and support structures, such as coaching and mentorship, in shaping leadership effectiveness (Avolio et al., 2009; Wiggins, 2019). However, many leadership initiatives in low-resource settings lack explicit theoretical foundations and instead prioritise short-term workshops or competency checklists, resulting in fragmented efforts with limited evidence of sustained behavioural or system-level change (Johnson et al., 2021).

To date, evidence on how leadership is developed for medical laboratory specialists, including the types of programmes available, their structure and their effectiveness in achieving meaningful outcomes, remains fragmented and insufficiently synthesised.

Research design

This review adopted a well-established methodological approach, drawing on the structured frameworks developed by Arksey and O'Malley (2005) and further refined by Levac et al. (2010). The process systematically followed five key stages: (1) formulating the research question, (2) identifying relevant literature, (3) screening studies for eligibility, (4) charting the data and (5) synthesising and presenting the findings. This study adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews guidelines to ensure comprehensive and standardised reporting of results (McGowan et al., 2020). This scoping review has been registered with the Open Science Framework registries under registration <https://osf.io/nq587> and the International Prospective Register of Systematic Reviews under registration number CRD420251106619.

Formulating the research question

Guided by the Population-Concept-Context framework (Peters et al., 2020), the research question was formulated to explore a population of medical laboratory specialists and professionals (managers, directors and trainees) in SSA. In this study, the concept is limited to structured leadership development initiatives (e.g. training programmes). The context of the study focuses on the SSA region, considering its unique health system challenges, resource limitations and PHL networks. Consequently, the study addresses the following primary research question (RQ):

RQ1: *What are the characteristics (structure, content and delivery methods) of existing leadership development programmes for public health medical laboratory specialists in sub-Saharan Africa?*

RQ2: *What gaps persist in existing laboratory leadership development programmes with respect to contextual relevance, and measurable impact on health systems?*

Identifying relevant literature

To ensure a comprehensive search, a systematic exploration of published literature and grey literature was conducted. A literature search was conducted across key academic databases, including PubMed and Medline, Scopus, EBSCO, Google Scholar and African Journals Online, for papers published in English, French and Portuguese. Grey literature sources, including institutional reports and conference proceedings, were also screened to minimise publication bias. Search strategies combined targeted keywords (leadership development, medical laboratory specialists and SSA), controlled vocabulary (e.g. MeSH terms) and Boolean operators to capture all relevant studies (Table 1). The protocol included iterative refinement of search strings for each database to balance sensitivity (broad coverage) and specificity (relevance) (Online Appendix 1). The search covered papers published between 01 February 2008 (The date after the Maputo Declaration on Strengthening Laboratory Systems, published in January 2008 by the WHO) and 30 July 2025.

Screening studies for eligibility

The screening procedure employed a rigorous, multi-stage approach with independent reviews to ensure objectivity. The lead investigator first screened all identified records against predetermined inclusion and exclusion criteria (Table 1). Potentially relevant articles were imported into EndNote V.21 for duplicate removal. Two researchers then

TABLE 1: Eligibility criteria and search string.

Inclusion criteria	Exclusion criteria
Target population – Medical laboratory specialists and professionals (managers, directors, supervisors) in SSA.	Non-laboratory healthcare workers (e.g. doctors, nurses), unless mixed with laboratory staff.
Intervention – Leadership development or training programmes, short courses, workshops, fellowships with laboratory leadership and/or management component or modules.	General laboratory training without a leadership component.
Context – Programme implemented in sub-Saharan countries.	The programme is conducted outside the SSA even if it targets African participants.
Outcome – Description of programme structure, content, delivery or gaps (effect and outcome).	No details of programme structure, content, delivery or gaps.
Source type – Peer-reviewed articles, reports, conferences and grey literature, programme documents.	Opinion piece and social media posts without programme description.
Published between February 2008 and July 2025.	Published before 2008.
Language – English, French and Portuguese.	Other languages other.
The programme was implemented in collaboration with the Ministries of Health and was intended to strengthen national public health laboratory systems through leadership and management.	Programmes not affiliated with or implemented in collaboration with a Ministry of Health.
Search string leadership OR management AND development AND training AND laboratory scientists OR medical laboratory specialists AND Africa South of the Sahara"[Mesh] OR "Africa"[Mesh].	

SSA, sub-Saharan Africa.

independently reviewed the remaining abstracts using the study's inclusion and exclusion criteria. For eligible abstracts, both reviewers conducted full-text evaluations with a pre-validated screening tool.

Inter-rater reliability was assessed at both the title, abstract and full-text stages, with agreement between reviewers quantified using Cohen's Kappa (κ). Disagreements were resolved by consensus, and unresolved cases were arbitrated by a third reviewer. In addition, all grey literature was evaluated for methodological quality using the AACODS checklist assessing: (1) authority, (2) accuracy, (3) coverage, (4) objectivity, (5) date and (6) significance. Each report was independently scored by two reviewers, with discrepancies resolved through consensus.

Charting the data

The researchers systematically extracted data using a structured Microsoft Excel spreadsheet designed to capture comprehensive details of each LLDP. The charting process focused on five thematic areas, as previously outlined by Johnson et al. (2021), each encompassing specific domains relevant to our research objectives: (1) programme identification, (2) participant and contextual details, (3) curriculum and theoretical foundations, (4) evaluation and outcomes and (5) programme sustainability and gaps. To ensure accuracy, two reviewers independently extracted data using a piloted template and resolved discrepancies through consensus.

Synthesising and presenting the findings

The extracted data were analysed thematically as previously done by Johnson et al. (2021), with results organised into five key thematic sections aligned with the review objectives: (1) programme structure, (2) learning content including training model and conceptual approach, (3) learning methods, (4) evaluation approaches and (5) common challenges across LLDPs. The findings were narratively summarised and supported by comparative tables. The synthesised findings were then analysed in relation to the review's primary research question regarding identity and context of LLDPs in SSA. Commonalities and divergences across programmes were synthesised and presented.

Ethical considerations

Ethical clearance to conduct this study was obtained from the University of the Witwatersrand Human Research Ethics Committee (Ref. No. H25/09/31).

Results

Screening results

The systematic search identified 436 potential records through comprehensive searching strategies. The initial yield included 419 records from five electronic databases (PubMed and

Medline, Scopus, EBSCO, Google Scholar and African Journals Online), supplemented by six organisational reports and 11 additional studies identified through citation searching. Relevant studies from Francophone and Lusophone countries were predominantly published in English.

Following the removal of 63 duplicate records through automated and manual verification processes, the researchers proceeded to screen 373 unique records. The title and abstract screening phase excluded 311 records that did not meet our predetermined eligibility criteria, leaving 62 potentially relevant records and reports for full-text retrieval. The remaining 62 full-text articles underwent rigorous eligibility assessment by two independent reviewers. During full-text evaluation, the researchers excluded 34 reports for the following reasons: (1) nine studies focused on the incorrect target population, (2) 13 examined training programmes unrelated to laboratory leadership, (3) 11 lacked sufficient detail about programme content and structure and (4) 1 study was conducted outside our specified geographical area. Online Appendix 2 provides a detailed classification table of the excluded literature to enhance transparency and credibility. Agreement between reviewers was high, with Cohen's Kappa (κ) values of 0.85 for title and abstract screening and 0.87 for full-text screening, indicating substantial agreement.

The six institutional reports included in the review were appraised using the AACODS checklist. Scores ranged from five to six out of six, with strengths noted in authority and significance and limitations commonly identified in objectivity (Online Appendix 3).

The final review incorporated 28 studies that met all the inclusion criteria. These studies represented nine distinct LLDPs (some studies reported on the same LLDP). Figure 1 provides a schematic overview of the article screening and selection procedure.

Descriptive characteristics of included Laboratory Leadership Development Programmes

Table 2 presents the descriptive characteristics of the nine identified LLDPs targeting medical laboratory specialists across 41 SSA countries. Collectively, the programmes demonstrated broad geographic reach, with most implemented across multiple countries rather than single national settings. This was because of the regional mandate of the implementing organisation, such as the Africa CDC, the WHO Global Laboratory Leadership Programme (GLLP) and the African Society for Laboratory Medicine Laboratory Network. Nonetheless, participation was disproportionately concentrated. Zambia had the highest participation, featuring in seven programmes, followed by Malawi and Zimbabwe (six programmes each). Ethiopia, Mozambique, Nigeria and Kenya were each represented in five programmes. These findings indicate uneven regional uptake, with repeated engagement of a subset of countries across multiple initiatives.

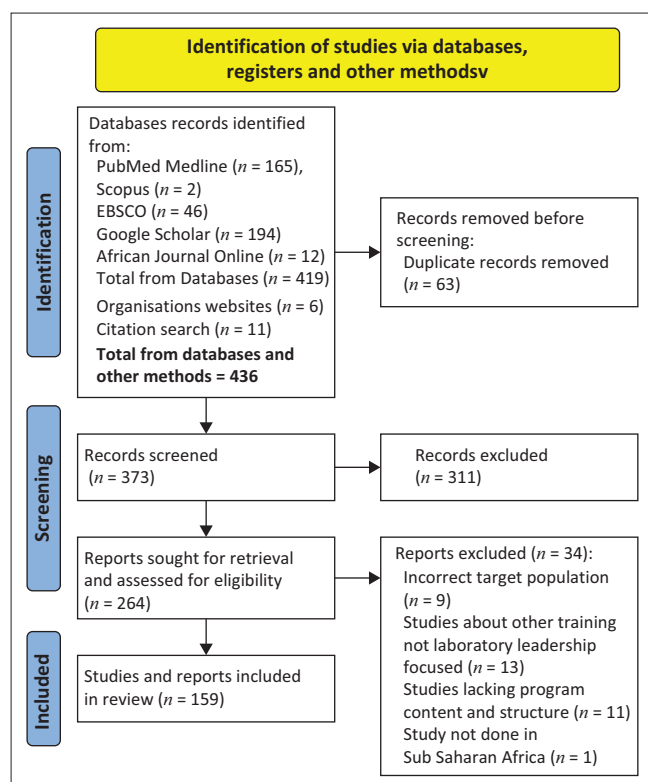


FIGURE 1: Preferred Reporting Items for Systematic reviews and Meta-Analyses flow diagram documenting the study identification, screening, eligibility assessment and inclusion process.

All LLDPs share the overarching goal of strengthening leadership and management capacity; however, their design and delivery vary according to programme scope and identified laboratory system needs, with objectives commonly targeting the strengthening of national laboratory systems, diagnostic and technical capacity, applied epidemiology and outbreak response, quality management systems and laboratory network governance.

Participants ranged from early-career professionals to senior laboratory managers and national directors, with most programmes prioritising individuals already in supervisory or leadership roles. The LLDPs vary in duration, reflecting their differing objectives and depth of training. Delivery formats varied substantially, from short, intensive workshops of 5 days–6 days to blended or longitudinal models that extended over several months or up to 2 years. Most programmes awarded certificates of completion, while the Field Epidemiology and Laboratory Training Programme (FELTP) uniquely offered master's-level qualifications through university partnerships. Overall, the included programmes reflect diverse structures, contexts and durations while sharing a common focus on applied, practice-oriented leadership and management development to strengthen laboratory system performance across SSA.

Learning content of the Laboratory Leadership Development Programmes

The LLDPs' training content was grouped into nine thematic areas as shown in Table 3, with further clarification on the

courses under each theme provided in Online Appendix 4. The leadership development thematic area was the most consistently addressed theme across all nine programmes, positioning leadership capability as the primary mechanism for improving laboratory performance. Management and operational excellence, covered by eight programmes, was similarly prioritised, indicating a strong focus on supervisory practice, workflow efficiency and service delivery. Many initiatives also incorporated components of collaboration, communication and advocacy, reflecting the need for laboratory leaders to engage stakeholders across national and regional health systems. Quality management and accreditation featured prominently in seven LLDPs, aligning leadership training with standards-based improvement and accountability requirements. In contrast, content related to laboratory systems strengthening and technical or diagnostic excellence appeared less consistently, while public health integration and research or innovation were comparatively limited to five and four LLDPs, respectively. Overall, the pattern suggests that learning content is clustered around foundational leadership and operational competencies, with progressively less emphasis on technical and innovation domains.

The leadership development theme was further analysed using Charan's Leadership Pipeline Framework (Charan et al., 2011, 2024). This framework distinguishes three progressive leadership levels: managing self (personal leadership), managing others (team leadership) and managing organisations (organisational leadership). Table 4 shows that all nine LLDPs addressed managing others, demonstrating a strong emphasis on equipping laboratory leaders with interpersonal skills essential for team leadership. Similarly, all nine LLDPs incorporated elements of organisational management, underscoring the importance of preparing laboratory leaders to contribute to strategic visioning, organisational change, business continuity and leadership in health systems. In contrast, only seven programmes (GLLP, Foundations of Laboratory Leadership and Management [FLLM], Public Health Laboratory Leaders Programme [PHLLP], Afro-ACDx, Certificate Programme in Laboratory Leadership and Management [CPLLM] and LabSkills Africa) explicitly addressed managing self (personal leadership). The distribution showed that programmes prioritise team and organisational effectiveness, while foundational self-leadership capacities receive secondary attention.

Training models and conceptual approaches of the Laboratory Leadership Development Programmes

Seven programmes (Afro-ACDx, FELTP, FLLM, GLLP, Laboratory Network Leadership Course [LabNetLead], LabSkills Africa and PHLLP) use a competency-based training model to ensure that participants acquire the competencies necessary to perform effectively in leadership roles across various contexts. The CPLLM programme is distinguished by its application of Kouzes and Posner's leadership model (Gopolang et al., 2021), which emphasises exemplary practices such as modelling the way,

TABLE 2: Summary of the public health laboratory leadership development programmes and their context.

Name of programme	Author or Source	Country	Target group of participants	Context and intended outcome	Length	Qualification
Advanced Course on Diagnostics (Afro-ACDx)	Mérieux Foundation (2021)	Senegal, Côte d'Ivoire, Burkina Faso, Mali, Guinea, Benin, Togo, Cameroon, Democratic Republic of the Congo (DRC), Gabon, Chad and Niger	French-speaking directors or managers of diagnostic laboratories (human or animal health)	Strengthening diagnostic laboratory leadership and technical capacity	6-day intensive course	Certificate programme
Certificate Programme in Laboratory Leadership and Management (CPLLM)	Gopolang et al. (2021)	Zambia	Early to mid-career laboratory managers and quality assurance officers in supervisory roles	Leadership and quality management skills of a cohort of laboratory supervisors in Zambia	5-day in-person orientation, 32 weeks of online coursework and 5-day in-person finale (Total of 10 months)	Certificate programme
Field Epidemiology and Laboratory Training Programme (FELTP)	Andze et al. (2011); Baltazar et al. (2017); Bando et al. (2019); Becker et al. (2012); Gatei et al. (2018); Kuonza et al. (2011); Mmbuji et al. (2011); Mosha et al. (2011); Mutabaruka et al. (2011); Nguku et al. (2014); Nsubuga et al. (2011); Ntahobakurira et al. (2011); Rumisha et al. (2020); Rush (2012); Wurapa et al. (2011); Ario et al. (2018)	Cameroon, Central African Republic (CAR), Democratic Republic of Congo (DRC), Ghana, Nigeria, Liberia, The Gambia, Togo, Mali, Burkina Faso, Niger, Kenya, Uganda, Tanzania, Rwanda, Ethiopia, South Sudan, Sudan, Mozambique, South Africa, Zimbabwe, Zambia and Malawi	Public health professionals, including: Medical doctors, Veterinarians, Laboratory scientists, Nurses, Environmental health officers and surveillance officers	Building workforce capacity in applied epidemiology and public health laboratory services. Focusing on applied epidemiology, outbreak investigation and surveillance, laboratory management and leadership	2-year Master-level or full-time residency programme or short courses lasting 2 weeks to 6 months	Masters degree (MSc, MPH, or MPhil) in Applied Epidemiology or Laboratory Management – awarded by affiliated universities. Short-course certificates on completion
Foundations of Laboratory Leadership and Management (FLLM)	Association of Public Health Laboratories (2023)	Botswana, Ethiopia, Gambia, Kenya, Lesotho, Mozambique, Nigeria, Rwanda, South Africa, Uganda, Zambia and Zimbabwe	Early-career lab professionals	Strengthening laboratory leadership and management skills	5 days (workshop) and 10 days for Training of Trainers	Certificate programme
Global Laboratory Leadership Programme (GLLP)	Albetkova et al. (2019); WHO (2019)	Chad, Central African Republic, Congo, the Democratic Republic of the Congo, Gabon, Ethiopia, Guinea-Bissau, Liberia, Burkina Faso, Malawi, Zambia, Tanzania, Mozambique, Sierra Leone, Mali and Uganda	Mid-career laboratory professionals (leaders, managers, subject matter experts) across human, animal and environmental health sectors	Strengthening national health laboratory systems through leadership development	200 h (Full), 100 h (Core) over 18–24 months.	Certificate programme
Laboratory Network Leadership Course (LabNetLead)	African Society for Laboratory Medicine (2022)	Nigeria, Malawi, Zimbabwe and the Ivory Coast	Members of National Laboratory Technical Working Groups (e.g. laboratory leaders and managers, regional laboratory staff and implementing partners)	Strengthening leadership and strategic management in national tiered laboratory networks	Face-to-face sessions last 5 days. Delivered in 5 phases.	Certificate programme
LabSkills Africa	Royal College of Pathologists (2014)	Kenya, Tanzania, Uganda, Zambia and Zimbabwe	Senior laboratory personnel (pathologists, laboratory managers, chief technologists, biomedical scientists)	Improving laboratory medicine to support the diagnosis and management of health conditions	24 months (2-year pilot).	Certificate programme
Public Health Laboratory Leaders Program (PHLLP) implemented in collaboration with Africa CDC Laboratory Leadership Programme	UK Health Security Agency (2024)	Eswatini, Gambia, South Sudan, Eritrea, Seychelles, Malawi, Liberia, Namibia, Botswana, Lesotho, Zambia, Angola, Benin, Burkina Faso, Cape Verde, Ghana, Guinea, Guinea-Bissau, Côte d'Ivoire, Mali, Mozambique, Niger, Senegal, Ethiopia, Kenya, Uganda, Nigeria, Sierra Leone, South Africa, Tanzania, Togo, Zimbabwe and Ethiopia	Laboratory managers and Senior laboratory leaders (e.g. Lab Directors, National Public Health Institute staff)	Addresses gaps in leadership skills for managing national public health laboratories	5-day in-person workshops + possible virtual sessions	Certificate programme
Strengthening Laboratory Management Toward Accreditation (SLMTA)	Yao et al. (2010, 2014a, 2014b); Mothabeng et al. (2012)	Kenya, Tanzania, Ethiopia, Uganda, Zimbabwe, Botswana, Mozambique, Namibia, South Africa, Nigeria, Ghana, Cameroon, Eswatini, Côte d'Ivoire, Rwanda, Malawi, South Sudan, Lesotho, Democratic Republic of Congo, Angola, Burundi and Zambia	Laboratory managers and staff in resource-limited settings, primarily in public health laboratories (national, regional, district levels)	Address laboratory management strengthening to achieve immediate laboratory improvement and accelerate preparedness towards accreditation	Duration 6 months–18 months, depending on the cohort and country context. Most implementations include three short workshops (3 days–4 days each)	Certificate programme

Note: Please see the full reference list of this article Mvududu, D.T.K., Samanga, R., & Gobind, J. (2026). Leadership development programmes for public health medical laboratory specialists in sub-Saharan Africa: A scoping review. *SA Journal of Human Resource Management/SA Tydskrif vir Menslikehulpbronbestuur*, 24(0), a3438. <https://doi.org/10.4102/sajhrm.v24i0.3438> for more information. CDC, Centers for Disease Control and Prevention; WHO, World Health Organization; UK, United Kingdom; MSc, Masters of Science; MPH, Master of Public Health; MPhil, Master of Philosophy.

TABLE 3: Learning content of the Laboratory Leadership Development Programmes grouped by theme.

Programme name	Leadership development (Personal, team and organisational)	Management and operational excellence	Regional and global collaboration	Communication and advocacy	Laboratory quality management and accreditation	Laboratory systems strengthening	Technical and diagnostic excellence	Public health integration	Research and innovation
Afro-ACDx	✓	✓	✓	✓	✓	-	✓	✓	✓
CPLLM	✓	✓	-	✓	✓	-	✓	-	-
FELTP	✓	✓	✓	✓	✓	✓	✓	✓	✓
FLLM	✓	✓	✓	✓	-	✓	-	-	✓
GLLP	✓	✓	✓	✓	✓	✓	✓	✓	✓
LabNetLead	✓	✓	✓	✓	-	✓	-	✓	-
LabSkills Africa	✓	-	✓	-	✓	-	✓	-	-
PHLLP	✓	✓	✓	✓	✓	✓	✓	✓	-
SLMTA	✓	✓	✓	-	✓	✓	-	-	-
Total	9	8	8	7	7	6	6	5	4

Afro-ACDx, Advanced Course on Diagnostics; CPLLM, Certificate Programme in Laboratory Leadership and Management; FELTP, Field Epidemiology and Laboratory Training Programme; FLLM, Foundations of Laboratory Leadership and Management; GLLP, Global Laboratory Leadership Programme; LabNetLead, Laboratory Network Leadership; PHLLP, Public Health Laboratory Leaders Programme; SLMTA, Strengthening Laboratory Management Toward Accreditation.

TABLE 4: Learning development theme content disaggregation.

Programme name	Managing self (Focus: Self-leadership, motivation, growth mindset, unconscious bias, gender inclusivity, self-awareness, critical thinking, ethics, problem-solving, change readiness at personal level and behavioural social styles)	Managing others (Focus: Team dynamics, conflict resolution, feedback, delegation, leadership styles, enable others to act, encourage the heart, communication, supervise others, people management, leading others through change)	Managing organisations (Focus: Strategic vision, change management, organisational structure, business continuity planning, health system leadership, challenge the process, inspire a shared vision, organisational improvement and leading in a system)
Afro-ACDx	✓	✓	✓
CPLLM	✓	✓	✓
FELTP	-	✓	✓
FLLM	✓	✓	✓
GLLP	✓	✓	✓
LabNetLead	-	✓	✓
LabSkills Africa	✓	✓	✓
PHLLP	✓	✓	✓
SLMTA	✓	✓	✓
Total	7	9	9

Afro-ACDx, Advanced Course on Diagnostics; CPLLM, Certificate Programme in Laboratory Leadership and Management; FELTP, Field Epidemiology and Laboratory Training Programme; FLLM, Foundations of Laboratory Leadership and Management; GLLP, Global Laboratory Leadership Programme; LabNetLead, Laboratory Network Leadership; PHLLP, Public Health Laboratory Leaders Programme; SLMTA, Strengthening Laboratory Management Toward Accreditation.

inspiring a shared vision and enabling others to act. Meanwhile, Strengthening Laboratory Management Toward Accreditation (SLMTA) uniquely applies a task-based framework, prioritising hands-on, action-oriented learning that directly strengthens laboratory management processes and supports accreditation readiness.

Although none of the LLDPs explicitly stated the leadership concepts underpinning the programme content, the researchers analysed the programme courses against a structured definition of leadership concepts from literature (as outlined in Box 1). Table 5 shows that participative leadership principles were evident across all nine LLDPs, suggesting a consistent emphasis on shared decision-making, teamwork and inclusive engagement as the normative basis for laboratory leadership practice. Transformational leadership was also widely reflected in

BOX 1: Definitions of conceptual approaches to leadership referenced in the studies.

Transformational leadership	Transformational leadership is a leadership style where leaders inspire and motivate followers to exceed expectations by transforming their attitudes, beliefs and goals. It emphasises vision-setting, intellectual stimulation, individualised consideration and idealised influence (Bass & Riggio, 2006).
Participative leadership	Participative leaders encourage and support employees to participate in the decision-making process in order to make effective organisational decisions and to solve work problems together through a range of measures (Kahai et al., 1997).
Situational leadership	The situational leadership depends on the context and the leader's ability to identify a task, set goals, determine the task maturity of the individual or group, select an appropriate leadership style and modify the style as change occurs (Waller et al., 1989).
Servant leadership	Servant leadership is a people-centred approach that emphasises the leader's role as a servant first prioritising the needs of team members, fostering personal growth and building a sense of community and shared purpose (Greenleaf, 1977).

Note: Please see the full reference list of this article Mvududu, D.T.K., Samanga, R., & Gobind, J. (2026). Leadership development programmes for public health medical laboratory specialists in sub-Saharan Africa: A scoping review. *SA Journal of Human Resource Management/SA Tydskrif vir Menslikehulpbronbestuur*, 24(0), a3438. <https://doi.org/10.4102/sajhrm.v24i0.3438> for more information.

eight LLDPs, with curricula commonly promoting vision-setting, motivation and change-oriented behaviours intended to drive service improvement and organisational performance. Situational leadership was frequently observed, underscoring the need for flexibility and context-sensitive responses in resource-constrained, rapidly evolving health systems. In contrast, servant leadership was incorporated in five LLDPs, indicating comparatively limited explicit focus on service-oriented or follower-centred philosophies. Overall, the distribution suggests that programmes conceptualise effective laboratory leadership primarily as collaborative, change-focused and adaptive, with less systematic integration of values-driven or service-based leadership paradigms.

Learning and delivery methods of the Laboratory Leadership Development Programmes

The learning and delivery methods across the LLDPs were systematically grouped into seven distinct categories based

on their instructional design and delivery approaches (Table 6). All nine LLDPs incorporated instructor-led didactic sessions, confirming that expert-facilitated workshops and modular teaching remain the foundational modes of delivery. However, most initiatives extended beyond classroom-based approaches by integrating case-based, peer and project-based learning, signalling an intentional shift towards applied problem-solving and collaborative knowledge exchange. These methods position leadership development within real-world laboratory challenges rather than abstract competencies.

Blended and modular formats were also common in seven LLDPs, reflecting efforts to accommodate working professionals through flexible combinations of in-person and online learning. In contrast, mentored experiential learning and reflective practices appear in only five LLDPs, suggesting greater variability in the emphasis on individualised coaching and structured reflection. Overall, the distribution demonstrates that programmes predominantly prioritise collective, task-focused and action-learning strategies, with comparatively less systematic investment in sustained mentorship or deeper reflective development.

TABLE 5: Leadership concepts underpinning the development of the Laboratory Leadership Development Programme.

Programme name	Leadership concept	Participative leadership	Transformational leadership	Situational leadership	Servant leadership
Afro-ACDx	Implied	✓	✓	✓	-
CPLLM	Implied	✓	✓	✓	✓
FELTP	Implied	✓	✓	✓	✓
FLLM	Implied	✓	-	✓	-
GLLP	Implied	✓	✓	✓	-
LabNetLead	Implied	✓	✓	✓	-
LabSkills Africa	Implied	✓	✓	-	✓
PHLLP	Implied	✓	✓	✓	✓
SLMTA	Implied	✓	✓	-	✓
Total		9	8	7	5

Afro-ACDx, Advanced Course on Diagnostics; CPLLM, Certificate Programme in Laboratory Leadership and Management; FELTP, Field Epidemiology and Laboratory Training Programme; FLLM, Foundations of Laboratory Leadership and Management; GLLP, Global Laboratory Leadership Programme; LabNetLead, Laboratory Network Leadership; PHLLP, Public Health Laboratory Leaders Programme; SLMTA, Strengthening Laboratory Management Toward Accreditation.

TABLE 6: Laboratory Leadership Development Programme learning and delivery methods.

Learning and delivery method	FELTP	CPLLM	SLMTA	LabSkills Africa	Afro-ACDx	LabNet Lead	GLLP	PHLLP	FLLM	Total
Instructor-led didactic sessions (expert-led lectures, workshops, classroom training, modular approach)	✓	✓	✓	✓	✓	✓	✓	✓	✓	9
Case-based and scenario learning (structured problem-solving using real or simulated case studies)	✓	-	✓	-	✓	✓	✓	✓	✓	8
Peer and collaborative learning (cross-country teams, buddy systems, peer reviews)	✓	✓	-	✓	✓	✓	✓	✓	✓	8
Project-based learning (capstone or improvement projects)	✓	✓	✓	✓	-	✓	✓	-	✓	8
Blended and modular approaches (mix of online, in-person and modular or self paced learning)	✓	✓	✓	✓	-	✓	✓	✓	-	7
Mentored experiential learning (real-world learning with mentorship)	✓	✓	✓	✓	-	-	✓	-	-	5
Reflective learning (use of logbooks, journaling, reflection sessions or discussion boards)	✓	✓	-	-	-	✓	✓	-	✓	5

Afro-ACDx, Advanced Course on Diagnostics; CPLLM, Certificate Programme in Laboratory Leadership and Management; FELTP, Field Epidemiology and Laboratory Training Programme; FLLM, Foundations of Laboratory Leadership and Management; GLLP, Global Laboratory Leadership Programme; LabNetLead, Laboratory Network Leadership; PHLLP, Public Health Laboratory Leaders Programme; SLMTA, Strengthening Laboratory Management Toward Accreditation.

Evaluation methodology of the Laboratory Leadership Development Programmes

The programme evaluation methodology of the LLDPs was examined using the Kirkpatrick framework (Kirkpatrick & Kirkpatrick, 2006), as previously employed by Johnson et al. (2021) and Frich et al. (2015). Kirkpatrick framework evaluates training across four levels: participant satisfaction (Level 1), learning outcomes (Level 2), application of skills (Level 3) and broader system or patient-level results (Level 4). Table 7 shows that all programmes reported evaluation using Level 1, Level 2 and Level 3, indicating consistent use of satisfaction feedback, knowledge assessments and evidence of workplace implementation to demonstrate immediate training effects. These approaches emphasise short-term improvements in individual competence and practice change within laboratory settings.

In contrast, evaluation of broader organisational or public health impact was rare. Only one LLDP (FELTP) extended assessment to results-level outcomes, such as measurable

TABLE 7: Programme evaluation methodology of the Laboratory Leadership Development Programme.

Programme name	Level 1: Reaction	Level 2: Learning (increase in participant knowledge)	Level 3: Behaviour (evidence of participants; applied learning and skills acquisition) and application of skills	Level 4: Results (effects on patient outcomes or laboratory governance maturity)
Afro-ACDx	✓	✓	✓	-
CPLLM	✓	✓	✓	-
FELTP	✓	✓	✓	✓
FLLM	✓	✓	✓	-
GLLP	✓	✓	✓	-
LabNetLead	✓	✓	✓	-
LabSkills Africa	✓	✓	✓	-
PHLLP	✓	✓	✓	-
SLMTA	✓	✓	✓	-
Total	9	9	9	1

Afro-ACDx, Advanced Course on Diagnostics; CPLLM, Certificate Programme in Laboratory Leadership and Management; FELTP, Field Epidemiology and Laboratory Training Programme; FLLM, Foundations of Laboratory Leadership and Management; GLLP, Global Laboratory Leadership Programme; LabNetLead, Laboratory Network Leadership; PHLLP, Public Health Laboratory Leaders Programme; SLMTA, Strengthening Laboratory Management Toward Accreditation.

improvements in laboratory governance or service performance. Overall, LLDPs' evaluation methodology shows that evaluation frameworks prioritise participant-level accountability and skill acquisition, with comparatively limited evidence linking leadership development to sustained institutional or health system outcomes.

Implementation experiences and common challenges

Across programmes, implementation challenges consistently affected sustainability, reach and effectiveness. All initiatives relied heavily on external donor funding, raising concerns about long-term continuity beyond short funding cycles. Mentorship constraints, limited supervisor availability and competing workloads reduced sustained learner support in programmes like CPLLM, FELTP and GLLP. Logistical barriers, including travel restrictions, visa delays, unreliable connectivity and inadequate training infrastructure, further disrupted delivery in programmes such as FELTP, PHLLP and LabNetLead.

Human resources and staff turnover affected continuity in programmes such as CPLLM and FELTP. The loss of trained personnel weakened institutional memory and disrupted follow-through on quality improvement initiatives, as noted in various FELTP studies (Gatei et al., 2018; Kuonza et al., 2011; Mutabaruka et al., 2011). Programme design and scalability presented further constraints. The GLLP, LabSkills Africa and SLMTA programmes, although comprehensive, required intensive time and resource commitments, which slowed down scaling up in low-resource settings. Institutional integration and policy alignment were also challenging in several programmes, including CPLLM, GLLP and SLMTA. A significant issue was that seven of the nine LLDPs were designed or initiated outside SSA, thereby limiting their alignment with local policies and national workforce development plans. This external origin often delayed national ownership and integration into public health training systems.

Discussion

This scoping review synthesised data from 28 studies reporting on nine LLDPs implemented across 41 SSA countries. The findings highlight both the diversity and convergence across programmes in terms of structure, content, delivery methods, evaluation and contextual challenges, offering critical insights into the state of laboratory leadership capacity-building in the region.

Diverse design through common intent

Despite differences in programme structure, duration and target groups, all LLDPs shared a unifying goal: To enhance laboratory leadership and management capacity to strengthen laboratory and health systems. This highlights

recent efforts to strengthen laboratory leadership in SSA, a region facing a high burden of infectious disease outbreaks (Africa CDC, 2024; Ashenafi et al., 2024), alongside persistent laboratory system challenges such as underutilisation of capacity (Mesfin et al., 2017; Nkengasong et al., 2010; Ondo et al., 2025).

Programmes were designed to serve participants across career stages, reflecting recognition that leadership development must address the layered structure of PHL workforces. However, substantial variation in programme duration, from short, workshop-based formats to extended, longitudinal initiatives, suggests inconsistent assumptions about how leadership capabilities develop over time. While this flexibility may improve accessibility and responsiveness to local needs, it also indicates limited theoretical guidance on the timescales required for meaningful competency development. As Day and Liu (2018) point out, there is a lack of robust theoretical guidance on the optimal timescales and competency maturation timelines required for effective leadership development. Consequently, differences in duration may reflect pragmatic design decisions rather than evidence-informed developmental pathways, potentially affecting the depth and sustainability of leadership gains.

Although the nine LLDPs were implemented across 41 SSA countries, the review was unable to obtain the number of participants trained per country or their in-country distribution. Without precise tracking of this data, there is a potential that the same individuals may be repeatedly selected for multiple programmes. Centrally managed participant selection processes increase the likelihood of repeated selection at the ministry level, which may be susceptible to bias, favouritism or self-selection, particularly when participation is associated with per diem incentives. As noted by Nkamleu and Kamgnia (2014), per diems create incentives for sending inappropriate delegates, often resulting in the exclusion of those who would benefit most.

Thematic coverage and content prioritisation of the Laboratory Leadership Development Programmes

The content of the reviewed programmes covered a broad range of themes, with the leadership development theme emerging as the most frequently addressed. Content on management and operational excellence, quality assurance and global collaboration further underscored the training's strategic and compliance-oriented focus. However, the review could not determine the extent to which leadership and management training were prioritised relative to technical, compliance and other themes, owing to limited data on instructional time and curriculum weighting. It has been noted that programmes such as FELTP and SLMTA, though intended to support leadership and management development, have historically centred on outbreak response functions and quality management system implementation, often lacking depth in structured leadership and management

development (African Society for Laboratory Medicine, 2024; Perrone et al., 2016). This raises concerns about whether current LLDPs sufficiently prepare laboratory professionals for the leadership demands of their roles, particularly given SSA's context of ad hoc leadership transitions.

Further analysis reveals a concerning underrepresentation of critical competencies in current LLDPs: Only 44% addressed research and innovation, and 56% covered public health integration, despite their documented importance in strengthening laboratory systems. This curricular gap represents a significant missed opportunity, as research training fosters evidence-based problem-solving (Albetkova et al., 2019), whereas poor integration of laboratory and public health contributes to diagnostic delays and suboptimal alignment with public health objectives (Nkengasong et al., 2010; Onyebujoh et al., 2016).

The study further employed Charan's Leadership Pipeline Framework (Charan et al., 2011, 2024) as an analytical tool to categorise and assess leadership development content across personal, team and organisational levels. All programmes addressed team and organisational leadership, while only 78% explicitly included personal leadership development. This gap is noteworthy, as intrapersonal leadership lays the foundation for higher-level leadership roles by fostering self-awareness, emotional intelligence, ethical decision-making and adaptability (Aquino et al., 2025; Khayat et al., 2025). Given that laboratory leaders often advance from technical to leadership and managerial roles with limited exposure to leadership (Gopolang et al., 2021; McCutchen et al., 2025), omitting this foundational leadership layer may limit leadership effectiveness and resilience.

Training models and theoretical underpinnings of the Laboratory Leadership Development Programmes

The review indicates that most LLDPs rely on competency-based training models, reflecting a preference for structured, measurable skill acquisition and observable behavioural outcomes. While this approach supports standardisation and accountability, critiques in the broader literature postulate that competency-based models can sometimes adopt an overly narrow focus, prioritising isolated techniques over their application within the nuanced flow of healthcare practice (Swing & International CBME Collaborators, 2010). The incorporation of Kouzes and Posner's model and task-based training methods by two LLDPs suggests attempts to address these limitations by promoting behavioural change and practical problem-solving. This variation reflects differing assumptions about leadership needs and underscores the need to develop more context-responsive models that integrate technical, relational and systems-level competencies among laboratory professionals in resource-limited settings.

While many programmes adopted the competency-based training approach, most did not specify the leadership competencies they aimed to develop throughout the LLDP.

Only GLLP and Afro-ACDx explicitly referenced a defined set of nine competencies based on the GLLP framework, which was developed through global expert consensus rooted in high-income contexts (Albetkova et al., 2019). The reliance on externally developed health initiatives and frameworks raises concerns about contextual relevance, as demonstrated by evidence from The Gambia, where implementing Good Clinical Practice standards required extensive local adaptation to remain feasible in a resource-constrained system (Imam et al., 2021). Without similar contextualisation, competency frameworks risk misalignment with the practical realities faced by laboratory leaders. Consistent with calls for context-sensitive leadership development (Johnson et al., 2021), these findings underscore the importance of locally grounded, theoretically explicit frameworks that better align leadership preparation with the lived realities of SSA laboratory systems.

Although none of the programmes explicitly articulated the leadership theories underpinning their design, an omission previously criticised in leadership development research (Avolio et al., 2009), content analysis indicated a consistent alignment with participative and transformational theories, with more limited elements of situational and servant leadership. This implicit orientation suggests that programmes conceptualise leadership primarily as collaborative, change-oriented and relational rather than hierarchical or authority driven. Such approaches are well suited to PHLs, where performance depends on motivating multidisciplinary teams, coordinating stakeholders and navigating resource constraints (White et al., 2021). However, the lack of explicit articulation of leadership theory in programme design may hinder the intentional development of leadership behaviours (Avolio et al., 2009). Without clear conceptual anchors, leadership development risks becoming ad hoc rather than strategically structured. Integrating articulated and contextually relevant leadership theories strengthens programme coherence, supports culturally responsive practice and enhances the deliberate cultivation of leadership behaviours within SSA laboratory settings (Schyns et al., 2012).

Evaluation methodology of the Laboratory Leadership Development Programmes

Application of the Kirkpatrick framework highlights a clear imbalance in evaluation priorities across programmes. Most initiatives emphasised proximal indicators of success, i.e. participant satisfaction, knowledge gains and self-reported behavioural change while rarely assessing broader organisational or system-level outcomes. Although these measures demonstrate immediate learning effects, they provide limited evidence of sustained practice change or health system improvement.

Prior research cautions that high satisfaction scores (Level 1) may not correlate with actual learning (Gessler, 2009), while self-assessed competencies (Level 3) often fail to predict real-world application (Khan et al., 2021). Several LLDPs provide

indirect evidence of system-level impact, such as improved accreditation readiness and laboratory quality, shaping national laboratory policies and strengthening technical working groups and coordination. This evaluation gap reflects deeper structural and conceptual challenges in the current LLDPs. This prevailing leadership development 'functionalist approach', which equates programme success with skill acquisition rather than longitudinal outcomes (Joseph-Richard & McCray, 2022), reflects two LLDP structural weaknesses. These are: (1) donor-driven myopia, which manifests in short-term funding cycles prioritising immediate deliverables over longitudinal health system outcomes and (2) institutional fragmentation, marked by poor integration of LLDPs into national workforce development strategies, thereby undermining sustainability and continuity (Frich et al., 2015; Johnson et al., 2021).

Strengthening the impact of leadership development requires multi-level evaluation frameworks, explicit theories of change and longitudinal monitoring that link individual learning to organisational and health system performance (Johnson et al., 2021). In parallel, Ministries of Health should prioritise longitudinal monitoring and institutional integration, recognising leadership development as a continuous, long-term investment (Fassiotto et al., 2018). Without such approaches, the sustained value and effectiveness of leadership training remain uncertain.

Study limitations

This review identified a limited number of eligible programmes despite a comprehensive database, grey literature and multilingual searches and unpublished or locally documented initiatives may therefore have been missed. Incomplete reporting across programmes, particularly regarding participant numbers and country-level coverage, restricted assessment of reach, equity and implementation depth. In several cases, interpretations relied on inferred information because of documentation gaps, which may have affected the completeness of programme characterisation. These constraints limit the ability to draw conclusions about comparative effectiveness or system-level impact. Accordingly, the findings should be interpreted as a descriptive mapping of the LLDP landscape rather than a definitive evaluation of programme outcomes.

Recommendations

This review highlights several priorities for advancing LLDPs in SSA. Firstly, research is needed to develop context-specific leadership competency frameworks grounded in the lived experiences of SSA laboratory professionals, ensuring alignment with the operational, organisational and resource constraints of public sector laboratories. Secondly, greater attention should be given to programme reach, equity and sustainability. Longitudinal and comparative studies are required to assess implementation depth, track participant outcomes over time, evaluate the sustained organisational and system-level effects of LLDPs and

establish theoretically grounded, context-sensitive timelines that align developmental trajectories with the complex demands of laboratory leadership roles. Strengthening transparent monitoring and embedding LLDPs within national workforce and capacity-building strategies may further support institutionalisation.

Thirdly, the predominance of externally derived models underscores the need for locally grounded and theoretically informed approaches that better integrate personal leadership development, systems thinking and public health competencies. Research examining how laboratory specialists transition from technical to leadership roles could inform the design of tailored support mechanisms and programmes. Collectively, these directions can guide more context-responsive, sustainable and impactful leadership development across SSA laboratory systems.

Practical implications

This review highlights the need for policy reforms and practical measures to enhance laboratory leadership in SSA. Key recommendations include developing context-specific leadership competency frameworks informed by local realities, integrating personal leadership and public health priorities into training and promoting national ownership of LLDPs. To improve accountability and feasibility, these recommendations can be adapted into Specific, Measurable, Achievable, Relevant, Time-bound goals within national contexts. For example, by 2028, at least 80% of provincial laboratory managers could be required to complete accredited LLDP modules integrated into national continuing professional development systems. Similarly, between 2026 and 2030, Ministries of Health could establish and implement leadership transition pathways to ensure that at least 70% of laboratory supervisors receive management training before promotion. Long-term monitoring and evaluation frameworks should be adopted to track such outcomes, and countries should ensure equitable access and geographical coverage, with indicators such as the proportion of female and rural-based laboratory professionals enrolled in LLDPs. Collectively, these measures provide a structured foundation for Ministries of Health and regional bodies to adapt into nationally owned implementation plans, thereby enhancing leadership capacity and supporting sustainable, resilient PHL systems in the region.

Conclusion

This scoping review highlights the growing but uneven landscape of LLDPs in SSA, underscoring both progress and gaps. While nine distinct LLDPs were identified, targeting varied professional cadres and employing diverse delivery models, most programmes lacked context-specific leadership frameworks, robust evaluation strategies and long-term impact data. Competency-based approaches were common, yet few programmes defined clear, locally grounded leadership competencies or embedded personal leadership development. Programme evaluation often

focuses on participant satisfaction and short-term outcomes, with limited evidence of system-level improvements. Furthermore, reliance on externally driven models raises concerns about contextual fit, ownership and sustainability. To build resilient laboratory systems, LLDPs must evolve beyond technical training to embrace structured, context-responsive leadership development. This includes integrating self-leadership, research, public health priorities and in-country institutional adoption and alignment. Strengthening local leadership pipelines will require Ministries of Health and their partners to invest in long-term, theory-grounded training models linked to national strategies and workforce planning. Future research should prioritise longitudinal evaluations, explore leadership transitions from technical roles and co-create competency frameworks that reflect the realities of resource-limited settings. These actions are critical to transforming laboratory leadership into a catalyst for sustainable health system strengthening across the region.

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The authors, Don T.K. Mvududu; Rufaro Samanga and Jenika Gobind, declares that no financial or personal relationships inappropriately influenced the writing of this article.

CRedit authorship contribution

Don T.K. Mvududu: Conceptualisation, Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. Rufaro Samanga: Formal analysis, Methodology, Writing – original draft. Jenika Gobind: Supervision, Writing – review & editing. All authors reviewed the article, contributed to the discussion of results, approved the final version for submission and publication and take responsibility for the integrity of its findings.

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Data availability

The data that support the findings of this study are not openly available and are available from the corresponding author, Don T.K. Mvududu, upon reasonable request.

Disclaimer

The views and opinions expressed in this article are those of the authors and are the product of professional research. They do not necessarily reflect the official policy or position of any affiliated institution, funder, agency or that of the publisher. The authors are responsible for this study's results, findings, and content.

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