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Knowledge, attitudes, and practices regarding the regionalisation of laboratory services at the subnational level in Uganda, 2024

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Abstract

Introduction: Regionalization involved devolving laboratory technical assistance, coordination, and oversight roles from the National Health Laboratory and Diagnostic Services, Ministry of Health, to regional referral hospitals, aiming to standardize quality, efficiency, and accountability. We assessed the knowledge, attitudes, and practices regarding this program.

Methods: We conducted in-depth semi-structured interviews with closed- and open-ended questions to explore participants' knowledge, attitudes, and practices related to regionalization. Twelve districts from three health regions involved in the regionalization program were selected for this qualitative study.

Results: All respondents demonstrated adequate knowledge and a positive attitude towards the regionalization program, presenting an opportunity to improve practices and achieve the intended goals. The majority had participated in at least three of the five regionalization core program activities. Trained personnel, supportive regional referral hospital leadership, and effective coordination among implementing partners at both national and regional levels were identified as the main enablers. The delayed release of funds for quarterly planned activities was the main challenge affecting the timely implementation.

Conclusions: Regional and district teams had adequate knowledge and positive attitudes toward the regionalization program. However, we recommend realignment of activity schedules with the anticipated funding timeline.

Keywords: Regionalisation, KAP, laboratory services, sub-national, Uganda

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Introduction

Quality and cost-effective laboratory services in resource-limited settings are critical for meeting the health-related Millennium Development Goals (MDGs) of the United Nations [1]. The development and execution of functional laboratory services at each tier of health care provision, from primary health centres to regional and national referral laboratories, are critical for successful care and treatment programs. They are vital in addressing future infectious diseases, surveillance and outbreaks, and long-term chronic disease prevention and treatment [2, 3].

Health laboratories, mostly those in developing countries, were established as auxiliaries for clinical services with limited funding [4]. This contributed to their poor public health function and underdevelopment until the advent of the HIV and TB epidemics, which were widespread and required enhanced laboratory diagnostics [1]. Uganda operates a tiered laboratory network up to health centre IIIs as well as several reference and specialized laboratories that provide specialized laboratory services, surveillance, operational research, training, mentorship, equipment management, and quality assurance support supervision. However, the network experienced several challenges, including non-standardised quality of laboratory services, ineffectiveness in coordination and supervision, selective and disease/program specific capacity building, and accountability gaps, among others.

In 2018, the Ministry of Health requested that all health development partners (HDPs) consolidate resources for laboratory services through the National Health Laboratory and Diagnostic Services (NHLDS) to sustain national laboratory services in the country. This is aimed at harmonizing packages and standardizing the quality, efficiency, and accountability of the resources provided, and strengthening laboratory services delivery across the country. Prior to this initiative, various health development partners used district and regional implementing partners to directly support disease-specific laboratory services, e.g., zonal TB response through German TB/Leprosy relief support and regional comprehensive HIV support through PEPFAR, such as the HIV Early Infant Diagnosis Program [5]. Later, other areas, such as the centralized national sample referral, transport, and referral network to support diagnosis and testing at reference laboratories and public health responses to disease outbreaks and emergencies, were established [6].

Regionalization is a strategy adopted to devolve technical assistance, oversight, and coordination of laboratory services to the regional level through Regional Referral Hospitals across the country. The areas to cover included coordinating sample transport and referral network coordination, external quality assurance programs, multiplex testing, point-of-care testing, data quality and reporting, logistics and equipment maintenance, and information and communication technology (ICT) infrastructure and support.

The strategy allows the public health laboratory system to deliver efficient, cost-effective, and sustainable laboratory services through improved management and coordination at the national, regional, and district levels. For this to be a success, the Ministry of Health, through the NHLDS, has established technical capacity at all the health regional levels to strengthen, manage, and oversee laboratory services and promote the government of Uganda's ownership across the laboratory network. The NHLDS, through the National Laboratory Technical and Advisory Committee (NLTC), works with Regional Laboratory Coordination Committees (RLCCs) at each of the Regional Referral Hospitals (RRHs) and the District Laboratory Focal Persons (DLFPs) from the respective districts. The RLCC is responsible for planning quarterly activities depending on the regional or district's needs. The regional laboratory coordinator will make requisitions for funds to implement the planned specific activities in the region every quarter. Accountability for the previous quarter is normally first given before the release of funds for the next quarter.

The regionalization approach enabled NHLDS to strategically establish and operationalize laboratory diagnostics and network optimization, optimize the national capacity for efficient and effective delivery of laboratory services, and strengthen effective global, regional, and local partnerships and collaborations with technical experts and other professionals. In addition, regionalization enhanced logistics and equipment management, utilization of the national sample referral and transport network, multiplexing and point-of-care testing to increase the test menu at regional and district health facilities, data quality and reporting, participation in external quality assurance, and ICT support. However, since the acquisition of this responsibility and building capacity at the regional level, the knowledge, attitudes, and practices (KAPs) among regionalization implementers towards the regionalization strategies and activities remain unknown. We assessed the knowledge, attitudes, and practices of implementers at the regional and district levels towards regionalization strategies and activities in Uganda's three health regions.

Methods

Study design and setting

The regionalization program was implemented sub-nationally, based at the RRHs in Uganda, and all RRHs have participated in implementation. We conducted a descriptive qualitative cross-sectional study from August to September, 2024 among regional and district implementers of the regionalization program from three randomly selected health regions: Lira in North, Masaka in Central,

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and the Mbarara health regions in Uganda. Due to program-specific context and relatively homogeneous implementation of the regionalization program in Uganda, a non-probabilistic sampling method was used for the data collection. The study sites and participants were purposefully selected because of their involvement in the regionalization program. Four districts were selected from each health region, including the districts where the RRHs are found. These included: Lira, Kole, Apac, and Kwania from the northern region; Masaka, Lyantonde, Kyotera, and Rakai from the central region; and Mbarara, Kiruhura, Ibanda, and Bushenyi from the western region.

Study population, study variables, data collection, and analysis

We purposively selected thirty-five participants involved in the regionalization program, considering their positions and experience. These included regional referral hospital directors, regional laboratory coordinators, district laboratory focal persons, hub coordinators, and laboratory staff at both regional and district health facilities. We used a semi-structured questionnaire with both closed- and open-ended questions, specifically developed based on the national laboratory services' regionalization objectives, expected outcomes, and the roles and responsibilities of each stakeholder[7]. It focused on knowledge, attitudes, and practices, allowing the respondents freedom to express their views in their own terms to gather information and the story behind each participant's experiences with the regionalization approach in laboratory service delivery.

We designed a questionnaire to collect data on (i) knowledge–awareness and understanding of regionalization and its role in regionalization; (ii) attitudes–perceptions and feelings about regionalization and its impact on the quality of laboratory services; and (iii) practices–involvement in regionalization activities, frequency of participation, and improvements or changes in service delivery. It was uploaded to the electronic Kobo collect tool for data entry. A team well-versed in the regionalization activities was recruited, consisting of a monitoring and evaluation officer for programs, a national logistics officer, and a laboratory quality systems officer to support data collection. We trained them on the data collection tool and interview skills, including the protection of confidentiality, anonymity, and the privacy of each participant.

Additionally, we used the questionnaire to understand and identify the enablers and challenges faced by participants when implementing the regionalization program activities. Two questions in the tool consisted of five barriers and seven enablers formatted as Likert-type statements, to which participants responded with a rating of 1−5, where 5 indicated Strongly Agree, 4 indicated Agree, 3 indicated neutral, 2 indicated Disagree, and 1 indicated Strongly Disagree.

We assessed knowledge through five questions, and the scores were computed by aggregating the variables related to knowledge of the regionalization approach. The questions asked: whether participants understood what regionalization is, its intended objectives and expected outcomes, their ability to identify their roles and responsibilities regarding the program, their awareness of the processes involved in decision making and resource allocation, and the overall future direction of laboratory service delivery. Participants' overall knowledge was measured using a modified Bloom's cut-off point, with the adequate knowledge score between 80% and above (4-5 points), 79% to 50% for moderate knowledge (2.5-3.9 points), and 49% below (0-2.4 points) for poor knowledge.

To assess the participants' attitude, we asked two questions. The first was whether regionalization has been beneficial for improving the quality and efficiency of laboratory services in a region or district. The second question asked the participants how satisfied they were with the communication and coordination between the regional and district levels in terms of supervision and oversight activities involved in regionalization. The questions were scored on a 5-point Likert scale (not sure, not adequate, fairly adequate, adequate, and very adequate). The responses were scored 0 for not sure, 1 for not adequate, 2 for fairly adequate, 3 for adequate, and 4 for very adequate. The cumulative score for all questions was 0–10 points per participant. Overall attitude level was categorized, using Bloom's cut-off point. Respondents had a positive attitude if they scored ≥80% (8-10 points) and a poor or negative attitude towards regionalization delegated tasks if they scored 79% and below (0-7 points).

In addition, the participants provided an explanation of their answers in free text on the basis of their perspective on the program. The participants' explanations were considered 'supportive' of the regionalization approach when their responses contained at least two areas targeted for improving laboratory services under the regionalization approach. Otherwise, the attitudes were considered 'not supportive'.

Four questions were used to assess participants' practices. The first question asked what laboratory regionalization activities they had participated in. We scored one if the participant mentioned at least two activities involved in regionalization, whereas failure to do so was scored zero. How often does the participant receive or conduct support supervision? The participant scored one if they engaged at least once in a quarter and otherwise would score zero. How the participant engages with workmates in regionalization work. The participants were given a score of one if they mentioned at least two ways in which they engaged their workmates; otherwise, they were given a score of zero. Does the participant follow any of the recommendations of the national or regional teams? The participant scored one if they had implemented at least two

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changes following supervision, training, or audits in a quarter; otherwise, they scored zero. We presented the key results in a narrative format supported by quotations from the interviews. The interviews were transcribed verbatim. We extracted and analysed relevant data on the key themes, namely, knowledge, attitudes, and practices, to form the transcripts.

Ethical consideration

This research adhered to the principles of the Helsinki Declaration for medical research involving human participants. We obtained non-research determination approval from the U.S. Centers for Disease Control and Prevention, which was reviewed by the CDC and conducted according to applicable federal law and CDC policy. §§See, e.g.,45 C.F.R. part 46, 21 C.F.R. part 56; 42 U.S.C. §241(d); 5 U.S.C. §552a; 44 U.S.C. §3501 et seq. In addition, this study was approved by the Ministry of Health through the Uganda National Institute of Public Health and National Health Laboratories and Diagnostic Services. Participants were informed they could decline to answer questions they felt uncomfortable with and could stop the interview at any time.

Results

Characteristics of responders categorised by position or cadre

We selected thirty-five participants from the three health regions. They included: two hospital directors of Mbarara and Lira RRHs, three regional laboratory coordinators from Masaka, Mbarara, and Lira health regions, eleven DLFPs from Kyotera, Lyantonde, Rakai, Mbarara, Bushenyi, Ibanda, Kiruhura, Lira, Kole, Kwania, and Apac districts. We also included: two regional implementing partner laboratory advisors from Masaka and Lira regions who have been cardinal in this program, six laboratory managers from Kalisizo, Apac, Rakai general hospitals, Rushere Community hospital, Lyantonde, Kwania Health Centre IVs, five hub coordinators from Masaka, Lira, Mbarara, Apac, and Rushere hubs, four laboratory technologists from Rushere, Apac general hospital, Lira RRH, Masaka RRH, and two laboratory technicians from Lyantonde and Kwania Health Centre IVs (Table 1).

Table 1. Characteristics of participants during a study to assess knowledge, attitudes, and practices towards the regionalization approach in laboratory service delivery in twelve districts from three health regions in Uganda between August to September, 2024

Characteristic	Frequency (n=35)	Percent (%)
Gender		
Male	28	80.0
Female	7	20.0
Designation		
Hospital director	2	5.7
Regional Laboratory Coordinator	3	8.6
District Laboratory Focal Person	11	31.4
Hub Coordinator	5	14.3
Implementing partner Lab Advisor	2	5.7
Laboratory Manager	6	17.1
Laboratory Technologist	4	11.4
Laboratory Technician	2	5.7
Level of Education		
Masters	11	31.4
Bachelors	22	62.9
Diploma	2	5.7
Years of experience		
< 5	3	8.6
5–10	8	22.9
> 10	24	68.5

Knowledge of participants regarding the regionalization approach

All the respondents scored above 80% and affirmed having had adequate knowledge about the regionalization approach and its intended aim in laboratory service delivery.

A DLFP stated that he was aware of the regionalization approach.

We are informed about the regionalization approach in laboratory service delivery in Uganda. We have attended several meetings called by NHLDS regarding the exercise and now understand the objectives of the program and what is expected of us".

Another respondent, a laboratory manager at a district general hospital, stated that he had participated in regionalization meetings.

"I have participated in several meetings in the region called by the regional coordinator to discuss what and how to implement activities and the expected outcome. The facilitators explained and emphasized our role in the regionalization program".

Regional coordinators were asked whether they had any records of communication from the national coordination team, records of training and mentorship, audit reports, improvement performance reports, or other program-related activities. All three regional coordinators had emails and memos printed and put in the program on file. On this matter, a regional coordinator said he exchanges communications with his director:

"The hospital director shares communications by email,

and we normally have quarterly meetings to discuss and lay out strategies for successful program implementation".

The records from quarterly meetings, biosafety audit reports, support supervision, and mentorship reports were available on file.

Attitudes and perceptions of participants on the regionalization program

Overall, 21 (60%) reported that the program was adequate at improving laboratory service delivery, 4 (11.4%) were fairly adequate, 4 (11.4%) reported that the program was very adequate, 6 (17.2%) were not sure, and none reported that it was inadequate. In the respondent's explanation, the activities summarized in Table 2 were commended for improving laboratory service delivery under the regionalization program.

The study sought to gauge the relationship between the regional team(s) as lead implementers of regionalization at the sub-national level and the district laboratory team(s). For this purpose, 11 respondents, including 8 DLFPs and 03 district hospital laboratory managers, reported having a mutual connection. The findings indicate that communication and collaboration are satisfactory according to the majority of respondents (9/11), whereas 2/11 said that communication is sometimes on short notice, which affects their planning due to other competing activities. However, both groups highlighted the need for timely official communication with facility heads before inviting staff to activities.

A DLFP explained, *"I think we need to plan together the activities according to the needs of each district for proper implementation of the regionalization program. I feel the regional team decides who and what to implement, yet sometimes we have areas that are more lacking and need to be prioritized".*

Practices- contributions and implementation of the regionalization program

All the hub coordinators (5/5) participated in training, support supervision, and mentorship, and 10/11 (91%) of the DLFPs participated as trainers, biosafety and biorisk management auditors, and support supervision. Regional laboratory advisors have participated in human resource support, facilitating training and mentorships, whereas hospital laboratory managers have participated in the implementation of Lab SPARS, LQMS, point-of-care testing, audits, training, and mentorship in other district health facilities.

A hospital laboratory manager added,

Table 2. Perceptions of respondents regarding the impact of regionalization as per the intended different activities involved in the program (n=35)

Response option(s)	Number of respondents, n (%)
Improved efficiency and coordination of EQA implementation within the region	13 (37.1)
Standardized data and information management	8 (22.9)
Efficient Hubs operations	18 (51.4)
Improved equipment maintenance and logistics management	20 (57.1)
Implementation of the biosafety and biosecurity program	11 (31.4)
Streamlining oversight and technical mentorship, and support	22 (62.9)

"I have implemented two continuous improvement projects, one in external quality assurance performance and the second in biosafety and biosecurity, from the non-conformances raised during the audit. With the support and mentorship from our DLFP, we managed to close the non-conformities and are now monitoring the situation".

A regional coordinator expressed support for the regionalization program:

"We do our best and fully support the implementation of this program in our region, including maximum utilization of the available resources, technical skills, and networks to build the capacity in the region and the lower health facilities".

Similarly, a regional referral hospital director added,

"I know we still have challenges here and there, but regionalization has greatly eased the coordination of laboratory services, and a lot of capacity is now available in the region. For example, we now have trained biosafety and biosecurity auditors, regional trainers, and mentors".

Practices—effectiveness of resources and skills transfer to the district and, finally, to lower facility teams.

We asked respondents about their current resources and skills transferred from the regional to the district level. In their response, the majority (21/35) reported insufficient or delayed resources, especially facilitation to support implementation as planned in some quarters and sometimes in the lower district facilities. Specifically, 8/21 respondents deem that a delay in resources is a major challenge affecting the planned schedule for

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implementation.

To explain this point, a DLFP said, "Sometimes funds are released late, almost at the end of the quarter, with limited time left to effectively implement and do the follow-ups or review".

Weak ownership of the program, which was noted among some DLFPs, as indicated by one DLFP who reported, "Sometimes my district goes for two quarters without implementing any activity, yet other districts are implementing. We should be equally informed on why some districts selectively implement program activities to remove the feeling of bias."

Concerning the enablers, personnel training and support supervision were identified as the most important enablers for the regionalization program, followed by supportive regional and district leadership, government support, and collaborative health partnerships. Finally, effective communication, coordination, and planning by the regional laboratory coordination committees that prioritize the program activities also enabled the successful implementation of the program. However, the late release of funds for implementation in some quarters of the year was listed as the only main challenge. This was cited to affect the timely implementation, monitoring, and evaluation of program activities.

Discussion

We assessed laboratory personnel's knowledge, attitudes, and practices regarding a regionalization approach in the delivery of laboratory services in Uganda. All the respondents expressed awareness and understanding of the regionalization approach and its intended objective in laboratory service delivery. In addition, the respondents embraced the aspirations of the regionalization programme, which aims to strengthen the public health laboratory system and deliver efficient, cost-effective, and sustainable quality laboratory services. It is achievable through improved management and coordination at the national, regional, and district levels. They also believe that capacitating regional teams at regional referral hospitals to offer technical assistance and coordination of laboratory services in the respective districts is central to improving the quality of laboratory services. Specialized expertise at all levels with technical training and knowledge allows for fundamental control of resources through the use of expert knowledge, which increases the odds of successful implementation.

Other studies from low- and middle-income countries have suggested that decentralization of health systems has positive and negative effects on both governance and service utilization, and predominantly has negative effects on medicine/equipment availability and human resources [8]. A similar study highlighted knowledge and awareness of the program and its intended objectives as a critical step for effective program implementation, especially in public structures [9]. In addition, a study in Spain reported positive impacts on health systems at the point of service delivery [10]. Similarly, a study on health system reforms in Turkey reported that decentralization in health systems improved certain health outcomes but did not solve existing problems of health inequality [11].

Most respondents had a positive attitude towards the regionalization program and were willing to extend their capacity to the laboratory facilities below. The positive attitude is probably a result of the expected outcomes from regionalization, including strengthening of the laboratory public health system, quality management and implementation, an integrated laboratory information management system, coordinated sample transport through a tiered hub laboratory system, laboratory biosafety and biosecurity oversight, and sustainable laboratory service delivery. Therefore, the opinions expressed by the respondents in our study are likely to support the regionalization approach for better laboratory service delivery because of the expected outcomes and their awareness and understanding of the program.

A similar study highlights how the attitudes or perceptions of key stakeholders are important for the success of a particular policy/program, depending on anticipated outcomes and benefits [12].

Considering the practices and involvement in the regionalization program, most of the respondents directly participated in the process because, according to their current positions of employment, they were entitled to take part in the program implementation. The most cited role or contribution was to train and mentor, supervise, and offer technical support during the implementation of the program. In addition, the results indicated that stakeholders' knowledge and awareness regarding the expected outcomes from regionalization and devolution of technical supervision roles to the sub-national level enhanced positive buy-in and support for the program. The study also revealed good collaboration between regional and district leadership regarding the implementation of the program. This was accomplished mainly through good communication and the involvement of district teams in implementation and support, as well as supervision by regional teams.

Another study from the Philippines concluded that decentralization "must not only transfer decision-making responsibility to local levels but also ensure that those granted the decision space could perform decision-making with adequate capacities and grasp the importance of health services and increased accountability, making gains in areas of quality, cost, and equity [13], [14]. Furthermore, a study in Pakistan reported disparities in health services

among different provinces following decentralization [15]. Therefore, the regionalization program could have several limitations at the district level, which, if not addressed below, might affect its effective implementation and sustainability.

Policy implementers encounter several challenges from the national to the sub-national level, with the discretionary power of local governments highly influencing the success of policy implementation [16]. For example, a misunderstanding of the roles and responsibilities of different stakeholders in the regionalization process, especially at the regional and district levels, can heavily impede a program's implementation. It is important to define each stakeholder's role in addition to formal collaboration to improve the coordination toward program implementation. Furthermore, adherence to the planned implementation strategy and schedule is key to minimizing frustration among stakeholders and ensuring the commitment and ownership of the program and its outcomes [17].

Study limitations

This qualitative study offers insight into the regionalization approach in laboratory service delivery in Uganda. However, our findings reflect the selected regions and key stakeholders' KAP towards regionalization rather than providing a representative picture of the entire country. Therefore, site-specific bias may lead to conclusions that apply only to those sites rather than the whole country. A more rigorous study is needed to evaluate the impact of the regionalization approach on laboratory service delivery in Uganda.

Conclusions

The findings show that the teams are knowledgeable and understand the goals and expected outcomes after implementing the regionalization program. Additionally, the participants expressed a positive attitude toward and support for the program, as evidenced by their involvement in several activities. Proper training of regional and district teams, effective communication and coordination, and strong leadership at the regional and district levels enabled the successful rollout of the program. Therefore, the regionalization approach is suitable for enhancing and providing quality laboratory services in the studied regions. However, we recommend a larger study that covers all health regions in Uganda to provide a comprehensive picture of the program nationwide.

What is Already Known About this Topic

- Uganda's laboratory system is organized as a tiered network from Health Centre III laboratories up to regional and national reference laboratories.
- Specialized testing is concentrated at higher-level facilities, while lower-level facilities normally refer specimens through an established hub-and-spoke network.
- The laboratory regionalization system is structured and operationally performs based on regional referral hospital teams overseeing and offering technical supervision to the lower health facilities within their catchment area, as designated by the Ministry of Health.

What This Study Adds

- Identifying possible operational challenges at regional and lower health facility levels to inform stakeholders in planning and targeted prioritization of resources to improve laboratory services in specific regions
- Providing data on current practices, such as efficient hub-and spoke model utilization, information and data management, biosafety and biosecurity, equipment maintenance, EQA implementation program, as well as laboratory capacities at the different levels to support cost-effectiveness and sustainability
- In addition, the study identified behavioural practices and system factors that affect patients' outcomes. These include: duplicate testing, access to specialized testing, accurate diagnosis, and public health disease surveillance.

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Authors' Contributions

AK: Conceptualized, designed, collected the data, analysed the data, and wrote the manuscript; SG, LNB, and CM participated in developing the data collection tools; WN, DN, AA, and VK participated in field data collection; RN, WN, and GB reviewed the drafts of the manuscript for intellectual content and made multiple edits; SN and ARA reviewed the final manuscript to ensure intellectual content and scientific integrity. All authors read and approved the final manuscript.

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Conflict of Interest Statement

The authors of this work declare no competing interests.

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