

## Health Leadership Training Needs of Pharmacists for Effective Antimicrobial Stewardship in Sub-Saharan Africa: A Mixed-Methods Scoping Study

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### Abstract

Antimicrobial stewardship (AMS) poses a critical global public health threat and is currently addressed through Commonwealth Pharmacists Association (CPA) initiatives. Pharmacists occupy a strategic position to direct AMS strategies that promote the judicious utilization of antimicrobials; nevertheless, these efforts are often impeded by a recognized deficiency in health leadership capabilities. Drawing insights from the Continuing professional development (CPD) Fellowship scheme in the United Kingdom, the Commonwealth Partnerships in Antimicrobial Stewardship (CwPAMS) aims to establish a health leadership capacity-building framework for pharmacists across eight sub-Saharan African nations. Consequently, this investigation examines the demand-driven leadership competencies required of pharmacists to deliver efficient AMS, thereby informing the CPA's formulation of a dedicated leadership curriculum, the "Commonwealth Partnerships in AMS, Health Leadership Programme" (CwPAMS/LP). A mixed-methods research design was implemented. Quantitative information was gathered through a multi-country survey administered across 8 sub-Saharan African nations and evaluated using descriptive statistics. Qualitative insights were derived from 5 online focus group sessions conducted between February and July 2021, featuring stakeholder pharmacists from diverse professional domains across the 8 target countries; these data underwent thematic analysis. The quantitative and qualitative findings were subsequently triangulated to identify the essential focal domains for the training curriculum. The quantitative assessment yielded 484 completed survey questionnaires, while the qualitative focus groups comprised 40 participants representing the 8 participating nations. Data synthesis demonstrated an explicit demand for a specialized health leadership curriculum, with 61% of those surveyed indicating that prior leadership development initiatives had been advantageous or highly advantageous. A subset of the survey cohort (37%) and the focus group participants emphasized the limited availability of leadership development options within their respective jurisdictions. Clinical pharmacy (34%) and health leadership (31%) emerged as the top two highest-ranking priority domains requiring subsequent training for pharmacy professionals. Within these designated sectors, strategic thinking (65%), clinical knowledge (57%), coaching and mentoring (51%), and project management (58%) were identified as the most vital competencies. This investigation underscores the professional development requirements of pharmacists and defines key focal areas in health leadership necessary to propel AMS forward within the African environment. Characterizing these priority domains based on local contexts facilitates a needs-oriented curriculum design, thereby optimizing the impact of African pharmacists on AMS to achieve enhanced, enduring patient outcomes. The findings suggest integrating conflict resolution, behavioral change methodologies, and professional advocacy, among other core subjects, into training modules to prepare pharmacy leaders to advance AMS initiatives efficiently.

**Keywords:** Antimicrobial resistance (AMR), Antimicrobial stewardship (AMS), Commonwealth pharmacists association (CPA), Health leadership, Pharmacists

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### Introduction

Antimicrobial stewardship (AMS) encompasses a coordinated suite of interventions designed to guarantee the judicious application of antimicrobial agents [1]. Through these mechanisms, AMS actively counters antimicrobial resistance (AMR), an issue now acknowledged as a critical threat to international public

health, the detrimental impacts of which are unequally borne by low- and middle-income nations (LMICs) [2]. Healthcare practitioners can implement stewardship practices at all professional levels. Given that pharmacists occupy strategic, highly accessible positions and frequently serve as the primary point of contact for individuals seeking medical care [3], they are uniquely positioned to make substantial contributions to maximizing the efficacy of antimicrobial regimens and mitigating AMR [4, 5].

Prior literature from multiple jurisdictions has extensively documented the functional role of pharmacists within AMS and their broader societal impact [4, 5]. Nevertheless, systemic, organizational, and individual impediments—compounded by a recognized deficit in healthcare leadership competencies—have consistently obstructed the full execution of this professional role [6, 7].

The critical necessity for proficient healthcare leadership became particularly pronounced during the COVID-19 pandemic [7]. Such leadership is foundational to contemporary pharmacy practice worldwide, serving as an essential element for the administration of high-quality healthcare operations that enhance institutional efficiency, workforce satisfaction, and personnel retention [8], while ultimately advancing the quality of patient care [7].

Despite this, pharmacy professionals within LMICs are frequently deprived of structured leadership education and training. Investigations conducted in sub-Saharan Africa highlight deficient health-systems leadership regarding AMS [5, 6], an issue that repeatedly restricts pharmacists' capacity to deliver optimized, patient-centric services capable of robustly addressing AMR. Cultivating advanced healthcare leadership capabilities promises to strengthen the pharmacy sector and positively influence healthcare systems, local communities, and the patient populations served.

Concurrently, there remains a distinct shortage of contextually relevant healthcare leadership curricula tailored specifically for the African continent. While the existing literature extensively covers generic leadership development models, there is a clear scarcity of methodologies for designing and implementing healthcare-specific training frameworks in African settings [9].

The UK Department of Health and Social Care's Fleming Fund represents an aid initiative supporting up to 25 nations across Africa and Asia in their efforts to mitigate

AMR. This fund provides financial backing to the Commonwealth Partnerships for Antimicrobial Stewardship (CwPAMS) scheme, which is jointly administered by the Commonwealth Pharmacists Association (CPA) and the Tropical Health Education Trust (THET). As a health partnership initiative, CwPAMS maintains the explicit objective of enhancing the rational prescription of antibiotics, thereby lowering the morbidity and mortality rates linked to AMR across eight sub-Saharan African countries: Ghana, Kenya, Malawi, Nigeria, Sierra Leone, Tanzania, Uganda, and Zambia. Under this framework, the CPA is establishing a dedicated health leadership curriculum (CwPAMS/LP) to augment further the professional capacity of the African pharmacy workforce, which continues to be underutilized in the systemic response to AMR [2].

The International Pharmaceutical Federation (FIP), the World Health Organization (WHO), and the United Nations Educational, Scientific and Cultural Organization (UNESCO) collectively assert that educational models and strategies intended to cultivate the clinical competencies of pharmacists across diverse operational landscapes (e.g., community, institutional, research and development, and academic sectors)—regardless of educational tier (e.g., undergraduate, postgraduate, or continuous professional development)—must be fundamentally driven by quality and oriented toward meeting prevailing societal health requirements [10].

On this basis, the present investigation sought to examine the scope and to establish a robust, context-bound healthcare leadership training framework across eight African nations to elevate pharmacists' capacity to address AMR in the region. This initiative employed a needs-based strategy, engaging key stakeholders to pinpoint critical leadership competency gaps and ascertain optimal instructional delivery modalities, thereby aligning the resulting curricula with national strategic priorities. This collaborative paradigm was used to ensure equitable representation, distribute operational ownership of the decision-making process, and allocate appropriate consideration to available infrastructural resources, thereby encouraging program adoption and ensuring that the structural requirements for long-term success are integrated during the implementation phase [11].

## Materials and Methods

### *Country selection*

Eight African nations—specifically Ghana, Kenya, Malawi, Nigeria, Sierra Leone, Tanzania, Uganda, and Zambia—were designated for empirical data collection. This selection was predicated on their active integration within the CwPAMS initiative, under which the CPA is currently engineering the health leadership curriculum (CwPAMS/LP).

### *Study design*

This investigation deployed a mixed-methods participatory action research design. Quantitative data were collected via a structured survey instrument. At the same time, qualitative insights were generated through online focus group interactions with participants representing CPA stakeholders engaged in AMS initiatives across the eight targeted African nations. The resulting datasets were triangulated to construct a comprehensive, multi-dimensional framework for a tailored, context-specific health leadership development program.

### *Quantitative investigation*

#### *Sampling method*

A random sampling approach was implemented during this empirical stage, yielding a minimum calculated sample size of 379; this determination was predicated on a significance level of 0.05, where  $t = 1.96$ ,  $sd$  (sensitivity)  $= 0.05$ , and both  $sp$  and  $sq$  values were established at 0.5 [12].

### *Data collection*

A structured survey instrument was engineered to investigate stakeholder perspectives regarding requirements for health leadership development [13]. This questionnaire was constructed by three co-authors (II, VR, DA) of the present investigation, drawing upon an extensive literature review and expert consensus. Before formal administration, the survey was piloted among a subgroup of the target pharmacist cohort ( $n = 30$ ) to evaluate user interface, structural flow, thematic importance, contextual relevance, administration duration, ease of completion, and general comprehensibility, thereby establishing content, construct, and face validity. Feedback from the pilot phase indicated that most participants found the instrument comprehensible and straightforward. A small number of pilot respondents noted that clinical pharmacy constituted a major educational deficiency that required

attention; consequently, this domain was integrated into the final instrument distributed to the study cohort. The data obtained during the pilot phase were excluded from the final analysis in this study.

The finalized questionnaire comprised six distinct segments. The first and second components addressed informed consent and foundational respondent demographics. The third segment contained 4 items exploring respondents' historical experiences with and access to comparable leadership development programs and, if applicable, digital learning frameworks. It assessed the perceived utility of health leadership curricula and mentorship initiatives utilizing a 7-point Likert scale ranging from "highly beneficial" to "not beneficial." In a matching manner, the availability of digital learning frameworks was measured via a 7-point Likert scale ranging from "very accessible" to "not accessible." An additional item sought to clarify preferred pathways for engaging in professional development. In the fourth segment, investigators examined participants' expectations regarding the degree of proficiency they anticipated achieving post-training, their targeted domains for professional development, and the capacity-building needs required to facilitate health leadership functionality. One specific item focused on their perceptions of the curriculum's relevance to their contemporary professional responsibilities, including AMS, clinical pharmacy, health leadership, service development/improvement, and pharmaceutical public health. The fifth segment comprised a self-appraisal of the pharmacists' proficiency relative to the proposed curriculum, requiring them to rate their current capability level on a 9-point Likert scale from "no competency" to "high competency." The sixth segment was structured to identify preferences for the instructional delivery of the CwPAMS/LP, including anticipated program duration and preferred pedagogical delivery models. The instrument was engineered to require an average completion time of 15 minutes. No personally identifiable information was gathered from the respondents.

### *Participant recruitment*

Both operational phases of this investigation applied stakeholder theory [14] to distinguish, invite, and enroll eligible subjects across the 8 participating CwPAMS nations to guarantee balanced representation. The SurveyMonkey® platform (Momentive, California) was used to distribute the electronic questionnaire to subjects

across all participating regions. The CPA managed dissemination through its designated national consultants, who served as primary institutional liaisons in each nation for the CPA's existing AMS initiatives. These national consultants circulated the survey link to local pharmacists via both internal corporate networks and external digital channels (social media). The survey portal remained active for 8 weeks between April and May 2021, with follow-up prompts sent three times a week via the national CPA consultants, leveraging their established recruitment networks to optimize response rates. No financial compensation or inconvenience stipends were provided to the individuals participating in this study.

#### *Data analysis*

The gathered survey metrics were evaluated using descriptive statistics in SurveyMonkey® and Microsoft Excel®.

#### *Qualitative investigation*

##### *Data collection*

An interview protocol was developed based on the questionnaire's primary thematic elements to guide the focus group sessions. Additionally, insights from peer-reviewed literature and expert consultations were integrated to enrich the discussion guide.

A purposive critical case sampling methodology was employed to ensure a diverse participant pool and to include stakeholders spanning mid-career practitioners to high-ranking, influential policymakers across the 8 targeted nations—perspectives vital for shaping the design of the CwPAMS/LP curriculum. Prospective subjects were invited to take part in the investigation by the national CPA consultants. To ensure highly focused deliberations, all focus group members had either completed or reviewed the preliminary survey instrument.

All focus group individuals provided explicit authorization for video and audio recording via the Zoom® platform (Zoom Inc, USA). Five focus group sessions (lasting approximately 50 to 90 minutes) were conducted, featuring 5 to 12 pharmacists per group, representing either one or two countries, scheduled at mutually agreed dates and times. The maximum number of participants per session was restricted to 12 to promote active engagement and discussion among all members [15].

The focus group sessions were led by one investigator (II) and moderated by other co-authors (MH, BW). No financial incentives or compensatory tokens were allocated for participating in the investigation. Qualitative data collection proceeded until subsequent focus group interactions yielded no novel thematic insights, indicating data saturation.

#### *Data analysis*

The focus group recordings were transcribed verbatim and subjected to thematic analysis [16], using the survey instrument's structured domains as an interpretive framework. To preserve anonymity, transcripts were de-identified by assigning internal research codes structured as "FG" (denoting focus group), followed by the session number and the participant's specific domain of professional practice (e.g., FG-1-Community practice). Immersive engagement with the transcripts through iterative reading and re-reading facilitated familiarity with the data; the text was subsequently content-coded, classified into sub-themes and core themes, and triangulated with the quantitative survey data. Because this project was conducted as an exploratory, descriptive service optimization initiative, no overarching theoretical framework was developed.

#### *Triangulation*

Data from all interviews and focus groups were systematically triangulated, and the corresponding insights have been integrated and reported collectively within the results section. Sub-group analyses stratified by individual nations (quantitative) were planned if the qualitative focus group discussions indicated substantial cross-country variance in the gathered data.

#### *Data trustworthiness and reflexivity*

Investigators possessing extensive training in qualitative research methodologies participated directly in formulating the discussion guides, gathering data, and executing the analysis. This collective methodological expertise injected structural rigour and trustworthiness into the investigation. Both the quantitative survey metrics and the qualitative focus group transcripts were de-identified and presented to key stakeholders as a preliminary draft report; this member-checking technique was utilized to confirm the fidelity of the interpreted findings. No analytical discrepancies were identified, and the participants proposed no structural modifications.

### Consent forms, ethics, and permissions

Every individual who completed the survey and attended the focus group sessions provided informed consent, which was secured either through an embedded digital agreement within the survey interface or via a pre-executed consent document completed before the focus group sessions. Participation across both phases was entirely voluntary, and all respondents granted permission for the collected datasets to be used for internal healthcare service quality optimization and for formal research dissemination. The study was determined to be exempt from formal institutional review board (IRB) ethical review, as it was classified as an internal service improvement initiative designed for the CPA.

## Results and Discussion

### Demographics of survey participants

A total of 484 individuals across all eight nations took part in the survey (**Table 1**). Approximately half of the sample consisted of respondents from Kenya (n = 269), reflecting the highly productive, registration-linked recruitment strategy used by the local consultant. The remaining cohort comprised 66 individuals from Nigeria, 38 from Zambia, 36 from Tanzania, 14 from Ghana, 14 from Malawi, 6 from Sierra Leone, and 11 individuals who did not declare their nation of origin. The sample featured representation from diverse pharmaceutical sectors, spanning academia, community practice, institutional hospital environments, the Ministry of Health, and National Pharmacists Association Antimicrobial resistance s (NPAs). The gender distribution among the respondents was nearly equal. The data indicated that the substantial majority of participants were mid-career pharmacists with line management responsibilities, matching the primary target audience for the educational initiative. The complete demographic profile of the survey respondents is outlined in **Table 1**.

**Table 1.** Demographics of participants from all eight countries who responded to the survey.

| Variable                | Category                            | Percentage (%) | Frequency (N) |
|-------------------------|-------------------------------------|----------------|---------------|
| Age (years)             | 18–24                               | 1.24           | 6             |
|                         | 25–34                               | 42.36          | 205           |
|                         | 35–44                               | 35.12          | 170           |
|                         | 45–54                               | 11.16          | 54            |
|                         | 55–64                               | 8.47           | 41            |
|                         | 65 and above                        | 1.65           | 8             |
| Gender                  | Male                                | 56             | 271           |
|                         | Female                              | 44             | 212           |
|                         | Prefer not to disclose              | 0.21           | 1             |
| Country of origin       | Ghana                               | 2.89           | 14            |
|                         | Kenya                               | 55.58          | 269           |
|                         | Malawi                              | 2.89           | 14            |
|                         | Nigeria                             | 13.64          | 66            |
|                         | Sierra Leone                        | 1.24           | 6             |
|                         | Tanzania                            | 7.44           | 36            |
|                         | Uganda                              | 6.20           | 30            |
|                         | Zambia                              | 7.85           | 38            |
|                         | Not stated                          | 2.27           | 11            |
| Primary practice sector | Hospital-based practice             | 50.62          | 245           |
|                         | Community pharmacy                  | 22.52          | 109           |
|                         | Administrative/Regulatory           | 8.88           | 43            |
|                         | Academic sector                     | 7.02           | 34            |
|                         | Pharmaceutical industry             | 2.69           | 13            |
|                         | Non-governmental organization (NGO) | 4.96           | 24            |
| Years of practice       | Other                               | 3.31           | 16            |
|                         | Less than 1 year                    | 2.48           | 12            |
|                         | 1–2 years                           | 9.71           | 47            |

|                                      |                         |       |     |
|--------------------------------------|-------------------------|-------|-----|
|                                      | 3–5 years               | 27.48 | 133 |
|                                      | 6–10 years              | 21.90 | 106 |
|                                      | 11–20 years             | 23.55 | 114 |
|                                      | More than 20 years      | 14.88 | 72  |
| <b>Current workplace position</b>    | Staff pharmacist        | 35.82 | 173 |
|                                      | Manager                 | 37.47 | 181 |
|                                      | Director                | 13.87 | 67  |
|                                      | Chief Executive Officer | 3.11  | 15  |
|                                      | Other roles             | 9.73  | 47  |
|                                      | Prefer not to disclose  | 0.21  | 1   |
| <b>Management experience (years)</b> | None                    | 9.50  | 46  |
|                                      | Less than 1 year        | 8.68  | 42  |
|                                      | 1–2 years               | 21.07 | 102 |
|                                      | 3–5 years               | 29.34 | 142 |
|                                      | 6–10 years              | 14.88 | 72  |
|                                      | More than 10 years      | 16.53 | 80  |

#### Demographics of focus group discussion participants

A cohort of 40 representatives drawn from each of the eight countries engaged in semi-structured focus group

discussions. This participant group demonstrated gender balance, with 22 males and 18 females, as detailed in **Table 2**.

**Table 2.** Demographics of the focus group discussion participants.

| Variable                             | Category                                                          | Percentage (%) | Frequency (N) |
|--------------------------------------|-------------------------------------------------------------------|----------------|---------------|
| <b>Gender</b>                        | Male                                                              | 55.0           | 22            |
|                                      | Female                                                            | 45.0           | 18            |
| <b>Country of origin</b>             | Ghana                                                             | 10.0           | 4             |
|                                      | Kenya                                                             | 15.0           | 6             |
|                                      | Malawi                                                            | 10.0           | 4             |
|                                      | Nigeria                                                           | 15.0           | 6             |
|                                      | Sierra Leone                                                      | 12.5           | 5             |
|                                      | Tanzania                                                          | 12.5           | 5             |
|                                      | Uganda                                                            | 10.0           | 4             |
|                                      | Zambia                                                            | 15.0           | 6             |
| <b>Area of professional practice</b> | Hospital chief pharmacists                                        | 20.0           | 8             |
|                                      | Hospital mid-career pharmacists                                   | 15.0           | 6             |
|                                      | Community mid-career pharmacists                                  | 10.0           | 4             |
|                                      | Academic pharmacists                                              | 22.5           | 9             |
|                                      | National Pharmacy Association (NPA) representatives               | 5.0            | 2             |
|                                      | Ministry of Health representatives                                | 2.5            | 1             |
|                                      | Commonwealth Pharmacists Association (CPA) in-country consultants | 20.0           | 8             |
|                                      | Antimicrobial stewardship (AMS) focal persons                     | 5.0            | 2             |

NPA: National Pharmacist Association, CPA: Commonwealth Pharmacy Association, AMS: Antimicrobial stewardship

#### Main findings of this study

The survey's empirical outcomes are detailed in the subsequent text and corresponding illustrations. To

contextualize these quantitative results, illustrative verbatim quotations extracted from the qualitative datasets are consolidated in **Table 3**.

**Table 3.** Main themes and related sub-themes derived from the qualitative data

| Themes                                                               | Sub-themes                                                                                                                  | Quotes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Programme relevance (recognised need for the programme)</b>       | Availability of training opportunities; unequal access to leadership development across practice settings                   | “The key emphasis should be on applying health leadership to deliver outcomes and influence behavioural change” (FG1–Academia) “I have not participated in any structured leadership training before; most of what we do is self-directed learning through experience” (FG3–Hospital practice) “Working in the private sector, there is very limited access—sometimes no access at all—to formal leadership development programmes” (FG4–Community practice)                                                                                                                                                                                                                                                                                                                                                         |
| <b>Programme content (design of leadership modules)</b>              | Relevance and suitability of proposed training modules                                                                      | “All the proposed areas appear highly relevant; pharmacists need to build strong competencies so they are not overlooked, particularly in settings where interprofessional tensions exist and their expertise is undervalued compared to physicians” (FG1–Health Ministry). “Pharmacists should clearly understand their function within antimicrobial stewardship. The training should demonstrate how they can meaningfully contribute to AMS activities” (FG1–Hospital practice)                                                                                                                                                                                                                                                                                                                                  |
| <b>Programme delivery (blended and accessible learning approach)</b> | Connectivity limitations; need for flexible/blended delivery; motivational incentives; institutional support and engagement | “During the pandemic, live online teaching was not effective for all learners due to poor internet access. A modular system where participants study independently and are assessed after each unit would be more practical” (FG3–Academia) “A blended learning model would be ideal, as some practical components cannot be effectively taught online and require hands-on experience” (FG2–Academia) “If participants are required to pay, uptake will likely be low. It would be more motivating if the programme were supported like a scholarship opportunity” (FG4–Academia) “Successful implementation requires engagement across all levels of management so that the programme is understood as developmental rather than punitive, which would enhance participation in future initiatives” (FG3–AMS lead) |

### Programme relevance

In total, 83% of the surveyed pharmacists assessed the proposed healthcare leadership coursework as either highly beneficial or beneficial to their continuing professional advancement. Instructional modules covering health leadership and clinical pharmacy were rated as the most relevant to respondents' current professional practices, though only by a narrow margin over alternative subject areas (AMS, service development/improvement, and pharmaceutical public health). This hierarchy of relevance was corroborated by the focus group contributors, who identified healthcare leadership as a primary deficiency in current training, as illustrated in **Table 3**.

A subset of the survey sample (37%) had never undertaken domestic leadership development courses, and 43% had never participated in formalized mentorship initiatives. Focus group interlocutors primarily ascribed these figures to an absence of available national or alternative training frameworks (**Table 3**).

Every focus group contributor expressed a strong demand for structured, premium-quality educational pathways for healthcare leadership. The qualitative data indicated that, relative to peers practicing in community or private enterprise environments, pharmacists in public

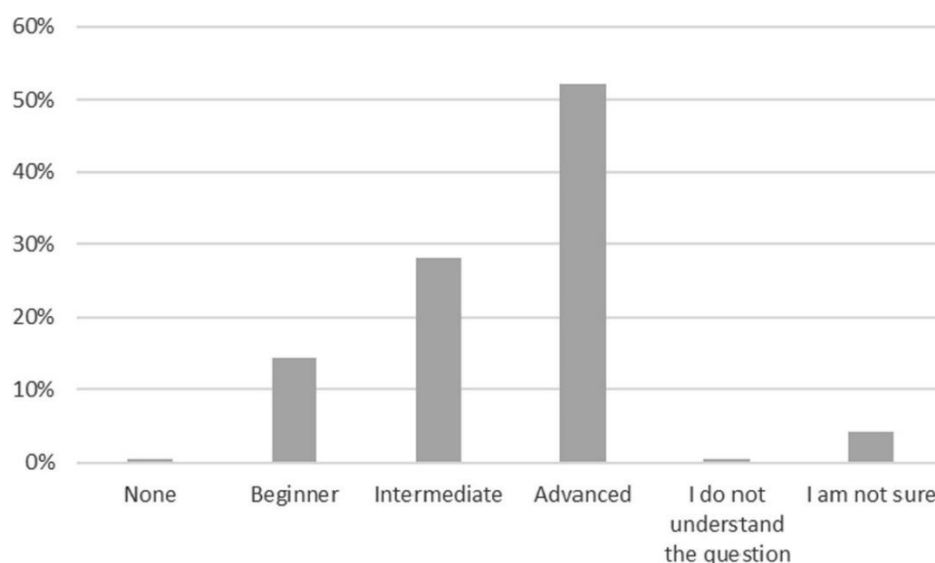
entities—particularly within academic and hospital settings—experience greater exposure to organizational or institutional orientation and managerial skills training. Among the survey cohort, 16% documented past ad hoc utilization of professional development resources via private enterprises, young pharmacist associations, NPAs, faith-based entities, digital research alliances, professional networks, mobile messaging groups (WhatsApp), individual peers, and non-governmental organizations (NGOs). Within the specific context of community pharmacy, the deficit in training access was underscored as a major impediment to mid-career practitioners participating effectively in AMS.

The survey metrics further demonstrated that respondents predominantly pursued and secured educational opportunities independently (67%), contrasting sharply with provision by employers (18%), state authorities (13%), or international institutions (8%), such as the CPA. The focus group deliberations emphasized that pharmacists operating in LMICs would derive substantial value from methodologies for AMS knowledge acquisition and capacity enhancement, modeled after standard operating practices in high-income nations such as the United Kingdom. Such benchmarking could equip practitioners with the capabilities to deploy efficient

AMS interventions, potentially facilitating the achievement of intended clinical and service-level objectives.

Both survey respondents and focus group participants indicated that, upon completion of the health leadership training initiative, they anticipated functioning at an

advanced level of professional practice. This expectation stemmed from the perception that the curricular modules effectively deliver the specific skill sets and core competencies vital to an advanced healthcare leader, as delineated in **Figure 1**.



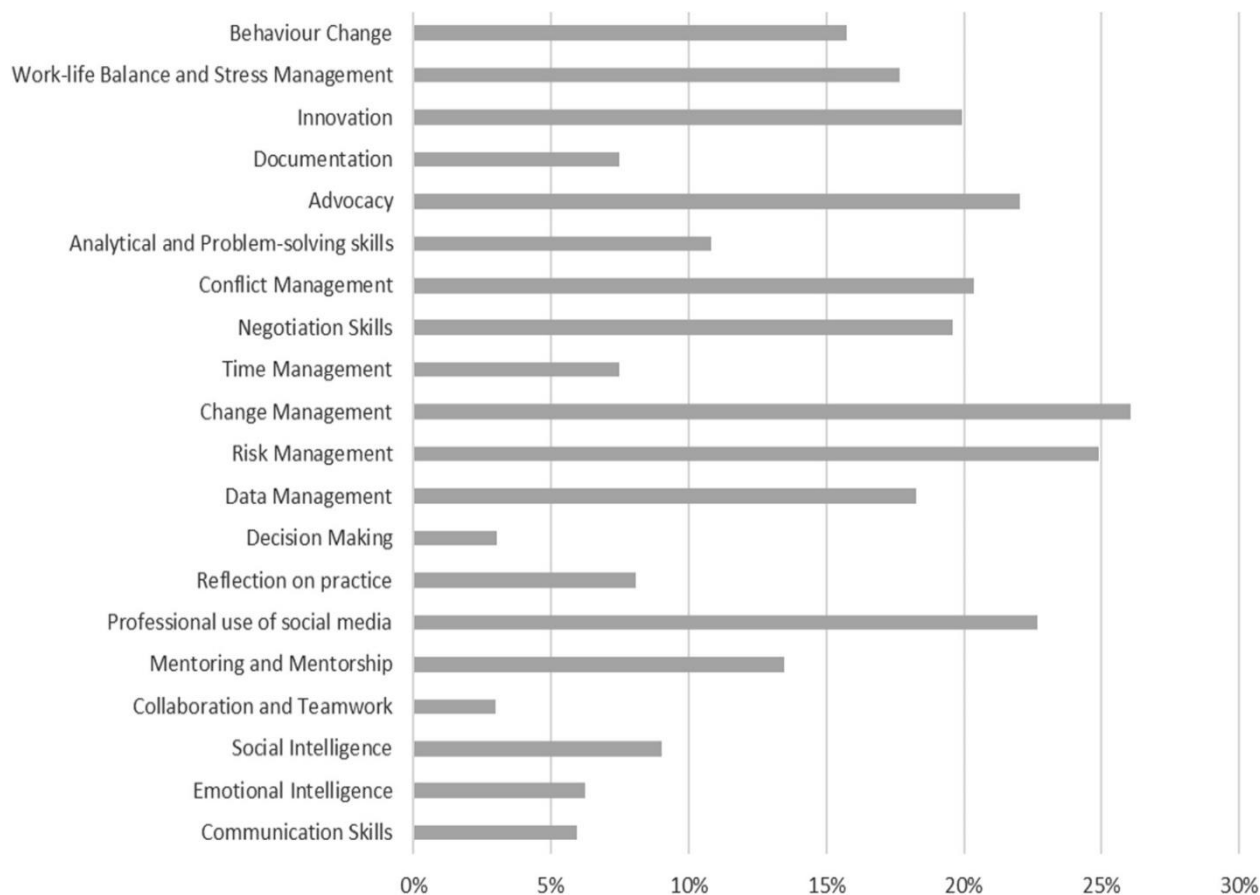
**Figure 1.** Level of expertise the pharmacists expect to achieve from the health leadership training.

#### *Curricular content of the educational initiative*

Broadly, both survey respondents and focus group interlocutors agreed that the subsequent instructional modules accurately aligned with their professional development requirements: healthcare leadership, AMS, clinical pharmacy, service development and optimization, and pharmaceutical public health. Furthermore, it was advised that research methodology instruction be integrated into the curriculum to empower AMS leaders to actively participate in generating empirical evidence.

Priority domains within these respective modules were identified by analyzing areas where participants

demonstrated low self-reported proficiency during the surveys and discussions. Within the healthcare leadership module, as illustrated in **Figure 2**, the specific domains recommended for further educational intervention included change management (26%), risk management (25%), professional utilization of social media (23%), advocacy (22%), conflict resolution (20%), innovation (20%), data management (18%), work-life balance and stress mitigation (18%), and behavioral change (16%). Additionally, focus group contributors recommended prioritizing instruction in governance and clinical auditing.



**Figure 2.** Prioritized pedagogical requirements identified by pharmacists' self-assessed competency deficits.

Survey data further indicated that only 4% of respondents felt confident in their understanding of the rational use of antimicrobials. Within the AMS module, targeted areas highlighted for inclusion comprised antibiogram development (38%), the epidemiology of AMR (36%), translating AMS data into actionable strategies (35%), diagnostic stewardship and surveillance (34%), multidisciplinary methodologies tackling AMR (31%), and familiarity with national and global AMS regulatory frameworks (31%). Focus group interlocutors also advised that AMS educational frameworks should be broadly implemented across institutional hospital environments within their respective countries (**Table 3**). Regarding the pharmaceutical public health component, survey respondents indicated they would benefit from knowledge acquisition and skill-building focused on mental health (40%), climate change (36%), epidemic preparedness (36%), environmental sustainability (30%), and health disparities (28%). Within the clinical pharmacy module, distinct areas characterized by lower self-perceived competence

included population health (31%), nutritional support (29%), research methodologies (26%), therapeutic drug monitoring (21%), and medical records administration (20%). Crucially, focus group participants posited that targeted training in these specific clinical pharmacy domains could elevate the quality of healthcare delivery championed by pharmacists acting as healthcare leaders. Within the service development and optimization module, identified areas of lower proficiency encompassed project management (27%), the application of e-health systems (35%), program evaluation (33%), policy formulation (33%), and clinical auditing (27%).

#### *Modalities of program delivery*

The curriculum was explicitly structured for online delivery as a pragmatic framework to administer the initiative simultaneously across eight distinct nations, particularly given that the implementation occurred during the travel constraints imposed by the COVID-19 pandemic. The respondents exhibited familiarity with

digital learning platforms, having used them both before and more frequently during the pandemic.

A notable proportion of survey respondents (32%) considered online platforms to be readily accessible. Conversely, several reservations emerged during focus group discussions regarding substantial impediments, including deficient internet connectivity, inconsistent network coverage across geographic zones, and the financial burden of purchasing data packages required for training, as detailed in **Table 3**.

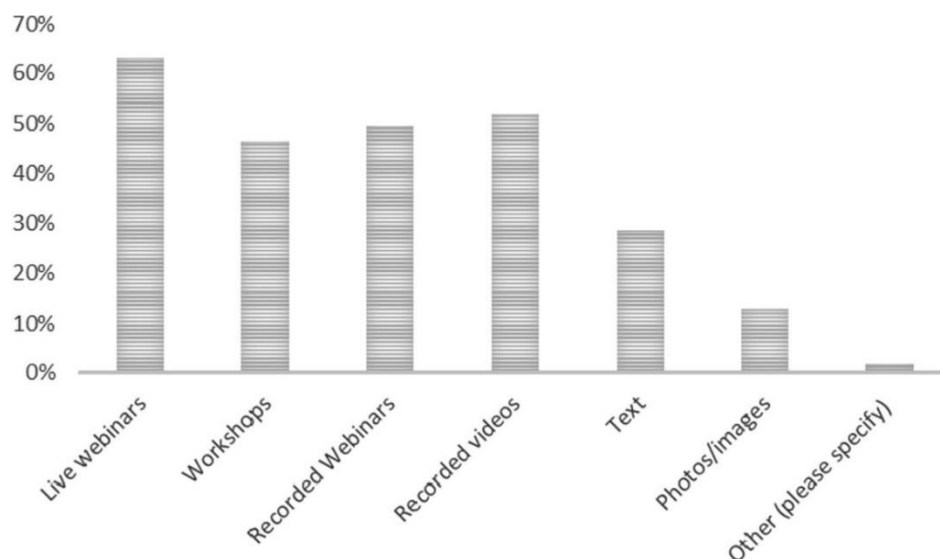
This infrastructure barrier was empirically validated during the study itself, as focus group participants repeatedly experienced difficulties maintaining continuous connectivity during online discussions. Other focus group interlocutors, while acknowledging these internet connectivity disruptions, characterized them as minor obstacles that could be easily mitigated. Ultimately, the focus group cohorts did not advocate for any fundamental alterations to the training curriculum's delivery framework (**Table 3**).

Among the survey cohort, 42% favored a program duration of 4–6 months, whereas 33% favored a shorter 1–3-month timeline. A smaller segment (17%) suggested

a 10–12-month duration would be appropriate. Focus group participants deliberated on program length and concluded that a duration of less than 3 months would be insufficient to cover the designated modules comprehensively. In contrast, a 12-month timeline risked escalating attrition rates or learner disengagement. Consequently, a 6-month instructional period was collectively deemed the most appropriate timeframe.

The primary consensus among survey respondents (35%) was the capacity to allocate 1–3 days per week to the curriculum, including workplace-integrated learning tasks; this was the most frequently selected response category. Significantly, neither survey respondents nor focus group participants cited a deficit of time as a barrier to program engagement, suggesting that the initiative was perceived as possessing high professional utility.

Regarding the specific formats of digital delivery, the majority of surveyed individuals (62%) preferred synchronous webinars, followed by asynchronous recorded webinars (50%), prerecorded instructional videos (52%), and interactive digital workshops (46%), as shown in **Figure 3**.



**Figure 3.** Preferred pedagogical modalities via a digital learning platform.

Focus group participants emphasized that time availability varies widely among individuals; therefore, they recommended limiting the number of live sessions and prioritizing recorded content alongside self-paced learning to optimize participant engagement. To achieve this, a hybrid educational model was proposed that

combined self-paced online components with face-to-face instructional sessions (**Table 3**).

Regarding the summative assessment methodology at the conclusion of the program, 84% of survey respondents favored multiple-choice questionnaires, while oral examinations were the least favored option (18%).

The three primary incentives identified for driving program engagement, completion, and assessment compliance were the issuance of certificates (74%), formal endorsement from their respective NPA (64%), and professional networking and collaborative alliances (64%). Securing continuing professional development (CPD) credits was also highly valued, with 53% of respondents selecting this parameter. Notably, no participants selected the option in which program completion would culminate in membership in a 'global leadership academy.' This outcome may indicate that practitioners favor visible social recognition over formal institutional affiliations.

Alternative incentives articulated during the focus group sessions included the acquisition of post-nominal titles to denote specialized expertise, formal induction into an elite expert network, guaranteed career advancement, and official NPA accreditation of the curriculum. Providing fee-free enrollment to the training initiative was likewise identified as an essential driver of engagement (**Table 3**). Finally, participants advised that strategic outreach and engagement with institutional and organizational leadership cohorts by the CPA would substantially bolster localized organizational buy-in and institutional support for the program.

This scoping investigation has been characterized as the foundational research of its configuration. It examined domains of pharmaceutical proficiency alongside prioritized educational requirements to advance the pharmacy workforce and thereby expand health leadership capacity for AMS within the African pharmaceutical landscape. The empirical insights from this study guided the architectural design of a contextualized educational curriculum for pharmacists across eight sub-Saharan African nations, aiming to equip them with healthcare leadership capabilities to optimize AMS capacity. It is anticipated that characterizing the relative requirements of pharmacists, followed by the design of a custom curriculum, will amplify the intervention's subsequent systemic impact during its execution [17].

Sub-group statistical evaluations for individual country datasets were intentionally omitted from this study, as the underlying objective was to investigate the educational requirements for health leadership capable of preparing pharmacists collectively across all eight participating nations. This methodological approach was further corroborated during the qualitative focus group sessions,

where interlocutors refrained from suggesting instructional content specific to any singular country.

The substantial majority of survey respondents and focus group interlocutors documented a complete absence of prior formalized healthcare leadership instruction, a deficit fundamentally driven by the scarcity of accessible educational frameworks within African nations. In instances where participants had previously completed any form of institutional or organizational leadership instruction or introductory orientation, they characterized the experience as highly advantageous, thereby fostering a pronounced demand for a structured, readily obtainable curriculum. Focus group contributors posited that constrained access to educational pathways could be traced to a historical deficit in prioritizing capacity-building for pharmacists by both state authorities and professional pharmacy bodies [18]. This institutional oversight has culminated in a substantial proficiency deficit within the contemporary pharmacy workforce of these nations, thereby impairing pharmacists' capacity to deliver optimal, patient-centric healthcare services systematically.

Furthermore, this investigation highlights a pressing need to scrutinize the alignment between broader population health demands and current pharmacy leadership education and training across the African continent. The advancement of pharmacy leadership has been recognized as a critical international necessity, an imperative underscored by the integration of a dedicated leadership domain within the FIP's global advanced pharmacy framework. This particular framework, released after the initiation of the current study, is structured to be adaptable across distinct local environments; the high degree of alignment between the empirical outcomes of this study and the FIP framework provides external validation for these research findings [19]. This investigation also underscores the vital role of healthcare leadership in fostering the professional advancement of mid-career pharmacists, enabling them to transition into localized or team-level leaders who are driven to spearhead and manage initiatives designed to optimize public healthcare outcomes [19].

Both the surveyed individuals and the focus group cohorts maintained elevated expectations for the healthcare leadership curriculum, a sentiment rooted in their prior favorable educational experiences with CPD modules and alternative skill-development workshops organized by the CPA. Healthcare leadership, AMS, service development, and pharmaceutical public health

were collectively identified and established as the core instructional modules within this curriculum. Although pedagogical modules centered on clinical pharmacy were likewise identified as an explicit educational requirement for African pharmacists—paralleling observations documented in alternative international settings [20-22]—the architectural design of generalized clinical pharmacy training modules was determined to be outside the structural scope of this specific initiative.

A qualitative investigation examining the operational priorities and core focus areas of NPAs across the Commonwealth revealed an explicit requirement and expectation for CPD frameworks to be localized and to equip pharmacists with targeted leadership capabilities [23]; conversely, no literature originating from African nations assessing the specific expectations of pharmacists regarding the delivery modalities of CPD training was identified. The empirical findings of the present study demonstrate that participants predominantly self-identified and independently secured educational pathways, rather than relying on state mechanisms, employers, or professional networks like the CPA as primary access routes. This behavioral pattern may stem from a generalized deficit in pharmacists' awareness of the need to request external institutional sponsorship for continuous professional development.

Nevertheless, participants in the focus group sessions categorized the CPA's structural role in the program's administrative oversight as critical, given the widespread perception that the CPA possesses the requisite networks, professional expertise, and organizational drive to administer competency advancement in healthcare leadership tailored for AMS effectively. Consequently, subsequent empirical research investigating the mechanics of access or the delivery logistics of professional development training aimed at elevating pharmacy practice across LMICs warrants deeper exploration.

A United States-based investigation focusing on the cultivation and education of healthcare leadership suggests that a greater volume of training programs with optimized accessibility parameters is necessary to expand the pool of healthcare executives and elevate the overall quality of clinical operations, pedagogical delivery, and investigative research capacity [24]. The core attributes of efficient healthcare leadership and management outlined within the existing literature [25] remain entirely congruent with the specific competencies identified in the current study, including proficiency in change

management, institutional governance, policy formulation, and clinical auditing. Furthermore, the insights generated by this study corroborate contemporary research on successful leadership paradigms, which posits that interpersonal empathy and the capacity to develop subordinates through structured mentoring and coaching constitute foundational skill sets for effective leaders [24].

A separate study conducted in 2018 analyzed the foundational attitudes of community pharmacists toward leadership and administrative capabilities, reporting that a distinct absence of occupational rewards or financial remuneration following skill acquisition [26] could negatively influence a practitioner's motivation to advance competency. This observation contrasts sharply with the empirical findings of the current investigation, which reported no such institutional barriers or professional reservations. Rather, all stakeholders reached consensus on the intrinsic value of allocating dedicated time to leadership cultivation, noting that it directly enhanced their broader professional capabilities. The present study identifies a supplementary advantage of healthcare leadership development: the optimization of collaborative workflows and interdisciplinary teamwork, which directly reinforces the efficiency of healthcare service delivery. Alternative research suggests that a deficit in leadership capabilities among clinical practitioners constitutes a primary driver of interprofessional friction within multidisciplinary medical teams. This impediment is frequently documented in relation to the expansion of pharmacy services in LMICs [27]. Given that AMR represents an escalating global crisis, an optimized response would logically entail multi-level interventions that leverage the distinctive skills and clinical capabilities of every constituent member of the healthcare workforce. However, in environments characterized by a deficit in collaborative communication skills, the professional utility of pharmacists may be under-realized, thereby diminishing the ultimate efficacy of localized AMR initiatives.

Survey respondents and focus group participants noted that certified leaders could attain social recognition, thereby facilitating professional progression. Extant literature similarly indicates that completing professional development initiatives improves employment prospects, increases career satisfaction [24], and bolsters both individual and institutional performance [28]. Traditionally, formal training initiatives are accessed via

employers, academic scholarships, foundations, and financial grants [26]. Leadership development curricula that implement varied instructional modalities, including blended learning formats, exhibit high efficacy rates and remain vital for emerging healthcare leadership positions [25]. Conversely, restricted internet connectivity among pharmacists has been documented to negatively impact the efficacy of web-based initiatives and the use of digital learning portfolios [20]. While the present investigation highlighted a demand for blended instructional strategies, a prior study examining subjective and objective learning outcomes observed no significant variance between exclusively online and blended instructional methods [29].

The current research indicates that pharmacists at both early and advanced career stages would derive utility from leadership instruction. This aligns with another study [30], which recommends professional development for pharmacists across all career milestones to cultivate highly proficient healthcare executives throughout their professional evolution. Crucially, this research delineates the cultivation of health leadership capabilities for antimicrobial stewardship (AMS) while simultaneously demonstrating their utility in establishing a foundational skill set essential to the delivery of effective pharmacy services. It underscores that healthcare leadership capabilities should be integrated as fundamental or core competencies applicable across diverse clinical environments. This versatile strategy ensures the curriculum remains highly generalizable across various medication-centric or disease-specific pharmaceutical services within both institutional and community settings, thereby advancing medication safety and refining patient care delivery. A primary advantage of this leadership curriculum lies in its objective-led, needs-based architecture. Aligning the curriculum with the specific nuances of African pharmacy practice enhances the probability of generating a constructive and enduring influence. The ultimate objective is to develop a specialized framework for cultivating pharmacist executives in clinical environments, thereby establishing a network of leaders capable of driving sustainable healthcare system improvements in their respective nations through the competencies they acquire.

## Conclusion

The insights generated from this research guided the conceptualization and construction of a customized

health leadership development curriculum tailored to the professional requirements of pharmacists across eight African nations. Central programmatic themes encompass dispute resolution, behavioral modification, advocacy, and expanding pharmacists' capacity to actively shape national and international antimicrobial resistance (AMR) policies. The structural framework of this instructional initiative aims to empower both hospital and community pharmacists to enhance their administrative contributions within AMS, ultimately mitigating AMR challenges across African jurisdictions.

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