



**African Library &  
Information Associations  
& Institutions**



# **ASSESSMENT OF OPEN DATA INFRASTRUCTURE AWARENESS AND ADOPTION IN AFRICAN LIBRARIES**

**A baseline survey for the Open Data Infrastructure Course for  
African Libraries (ODICAL) Project funded by DataCite**

**SEPTEMBER 2025**

# Executive Summary

This report presents the findings of a baseline survey conducted under the *Open Data Infrastructure Course for African Libraries (ODICAL)* project, implemented by the African Library and Information Associations and Institutions (AfLIA) with funding support from DataCite. The study assessed the level of awareness, adoption, and capacity needs related to open data infrastructure and DataCite's tools and services among library and information professionals across Africa. The survey provides evidence to inform the design of a targeted training programme and to support broader efforts to advance open science on the continent.

The survey targeted academic and research librarians, ICT specialists working in library environments, and other information professionals across multiple African countries. Data were collected through an online questionnaire distributed via AfLIA's professional networks and communication platforms. A total of 194 responses were analysed. The questionnaire combined closed-ended and open-ended questions covering demographic characteristics, awareness of open infrastructure, institutional policies and practices, barriers to adoption, and training and capacity-building needs.

Findings show that respondents were largely experienced professionals, with most having over ten years of work experience. While institutional digital infrastructure was rated as moderate on average, significant gaps remain in technical readiness for open science implementation. Awareness of open infrastructure concepts was relatively high, particularly for platforms such as DOAJ, ORCID, and OpenDOAR. However, familiarity with DataCite's tools and services was limited, and actual use of DOI registration, metadata management, and data citation services was low. Institutional readiness for open data infrastructure was generally weak. Most respondents reported that their institutions lacked formal research data management policies. Awareness of the UNESCO Recommendation on Open Science was moderate, but this had not translated into consistent institutional investment. Only a small proportion of institutions actively invested in open science infrastructure or assigned DOIs to research datasets. The use of persistent identifiers remained inconsistent and, in many cases, poorly understood. The study identified several barriers to adoption of open data infrastructure. These included limited funding, lack of technical expertise, weak policy frameworks, inadequate digital infrastructure, poor internet connectivity, and insufficient management support. Qualitative responses further highlighted skills gaps and low awareness among researchers and institutional leadership as critical constraints. Training and capacity-building needs emerged as a central theme. Nearly half of respondents had not received prior training in open infrastructure or research data management. High demand was recorded for training in research data repositories, metadata and interoperability, DOI registration and management, open access policies, and open licensing. Respondents expressed strong preferences for flexible and blended training formats, combining self-paced online learning, live virtual sessions, hands-on practical training, and in-person workshops.

Overall, the findings confirm a strong recognition of the importance of open infrastructure for advancing open science and increasing the visibility of African research. However, significant gaps persist between awareness and practice. The ODICAL project is therefore timely and well positioned to address these gaps through targeted, practical, and scalable training interventions. The baseline results provide a solid foundation for programme design, monitoring, and future impact assessment, and they underscore the strategic role of libraries in strengthening Africa's participation in the global open science ecosystem.

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# 1. Background and Context

The global research ecosystem is undergoing a significant transformation driven by the principles of Open Science. Open Science promotes transparency, accessibility, reusability, and collaboration across the research lifecycle. Central to this transformation is the availability of reliable open data infrastructure, including persistent identifier (PID) systems, standardized metadata, and interoperable platforms that support the discovery, citation, and long-term preservation of research outputs.

Persistent identifiers, such as Digital Object Identifiers (DOIs), play a critical role in modern scholarly communication. They ensure that research outputs are uniquely identifiable, citable, and traceable over time. Organizations such as DataCite have developed globally recognized infrastructure and tools that support research data management, metadata registration, and integration with research workflows. These tools are now foundational to open research practices in many regions of the world.

Despite the growing global momentum around Open Science, African libraries and research institutions remain underrepresented in the use and governance of open research infrastructure. Many academic and research libraries across the continent face persistent challenges, including limited technical capacity, inadequate awareness of open infrastructure services, and weak integration of persistent identifiers into institutional workflows. In several contexts, research outputs produced in Africa remain poorly visible, inconsistently described, and difficult to track within the global scholarly ecosystem.

Libraries and library professionals occupy a strategic position in addressing these challenges. Academic and research librarians are increasingly expected to support research data management, open access publishing, metadata creation, and compliance with funder and institutional open science policies. However, the capacity of library and information professionals to effectively perform these roles varies widely across institutions and countries. In many cases, librarians and ICT professionals working in library environments have limited exposure to DataCite tools, PID infrastructure, application programming interfaces (APIs), and related open data standards.

The African Library and Information Associations and Institutions (AfLIA), as the continental body representing libraries and information professionals in Africa, has a long-standing mandate to strengthen professional capacity, promote access to information, and support sustainable scholarly communication systems. AfLIA's selection as a recipient of the DataCite Global Access Fund under the Outreach and Engagement category reflects the strategic importance of building awareness and capacity around open data infrastructure in the African library community.

With support from DataCite, AfLIA is implementing the **Open Data Infrastructure Course for African Libraries (ODICAL)** project. The project seeks to equip academic and research librarians, as well as ICT professionals working in library contexts, with practical skills and knowledge related to open data infrastructure. These include the use of DataCite tools and

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services, DOIs, metadata standards, and APIs. The course is designed to be delivered in English and released under an open license to ensure broad accessibility across linguistic and regional contexts.

The project will be piloted during the 6th AfLIA Conference and the 8th African Library Summit in Windhoek, Namibia, using both in-person and virtual formats. Lessons from these pilot sessions will inform further refinement of the course. In addition, the project aims to establish a sustainable model by training national library association representatives to act as Open Data infrastructure champions within their countries. Through the creation of a Community of Practice and a Network of Open Data Advocates, the initiative seeks to promote peer learning, policy development, and long-term engagement with Open Science initiatives across Africa.

However, the effective design and delivery of such a capacity-building intervention requires a clear understanding of the current landscape. There is limited systematic evidence on the level of awareness, adoption, and use of open data infrastructure and DataCite services among African library professionals. There is also insufficient empirical data on institutional policies, existing practices related to persistent identifiers, and the specific training needs of librarians and ICT professionals across different institutional and regional contexts. Addressing this evidence gap is essential to ensure that the ODICAL project responds to real needs, avoids a one-size-fits-all approach, and maximizes its impact.

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## 2. Rationale and Objectives of the Baseline Survey

The baseline survey on Open Data Infrastructure in Africa was designed as a foundational research activity for the ODICAL project. Its primary rationale is to generate empirical evidence on the current state of awareness, adoption, and use of open data infrastructure among academic and research librarians, as well as ICT professionals working in library environments across Africa.

A baseline assessment is necessary to establish an informed starting point against which project interventions and outcomes can be measured. Without such data, training programs risk being misaligned with participants' existing knowledge levels, institutional realities, and practical constraints. The survey therefore serves as a diagnostic tool to inform the design, content, and delivery approach of the Open Data Infrastructure Course.

Specifically, the baseline survey seeks to understand the extent to which library and information professionals are familiar with key Open Science concepts, open infrastructure systems, and DataCite's tools and services. It also aims to assess how, and to what extent, persistent identifiers such as DOIs are currently used within library and research workflows. This includes examining institutional practices related to research data management, metadata creation, open data policies, and the management of research outputs.

Another key rationale for the survey is to identify gaps and challenges faced by libraries in adopting open data infrastructure. These challenges may include technical limitations, skills gaps, lack of institutional support, policy constraints, or resource-related barriers. Understanding these constraints is critical for designing targeted and realistic capacity-building interventions that can be effectively implemented across diverse African contexts.

In addition, the survey provides insights into the training and capacity-building needs of respondents. Collecting data on preferred learning formats, priority topics, and perceived skill gaps ensured that the survey is designed to support the development of a learner-centred training program. The findings from the baseline survey will also contribute to AfLIA's broader strategic goal of strengthening the role of libraries in advancing Open Science and increasing the visibility of African research. Evidence generated through the survey will inform not only the immediate training program but also future policy engagement, community-building efforts, and partnerships around open scholarly communication in Africa.

### 2.1 Objectives of the baseline survey

The specific objectives of the baseline survey are to:

1. Examine the level of awareness and understanding of Open Science principles, open data infrastructure, and DataCite's tools and services among respondents.

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2. Determine the extent to which persistent identifiers and open infrastructure are currently integrated into institutional policies and library practices.
3. Identify key challenges and barriers to the adoption and effective use of open data infrastructure in African libraries.
4. Assess the training and capacity-building needs of library and information professionals in relation to research data management, metadata, persistent identifiers, and open scholarly communication.
5. Generate baseline evidence to inform the design, implementation, and evaluation of the Open Data Infrastructure Course for African Libraries and related advocacy initiatives.

## 3. Methodology

### 3.1 Study design

The study adopted a descriptive survey design to collect baseline data on awareness, adoption, and use of open data infrastructure and DataCite's tools and services among library and information professionals in Africa. A survey approach was considered appropriate because it enables the systematic collection of data from a geographically dispersed population within a relatively short period. It also allows for the generation of both quantitative and qualitative insights relevant to the objectives of the ODICAL project.

### 3.2 Survey instrument

Data for the study were collected using a structured questionnaire developed specifically for the baseline assessment. The questionnaire was designed to align closely with the study objectives and the information needs of the project. It consisted of a combination of closed-ended and open-ended questions to ensure a comprehensive understanding of respondents' perspectives, experiences, and institutional contexts.

Closed-ended questions were used to capture standardized information that could be easily quantified and compared across respondents. These included questions on demographic and institutional characteristics, levels of awareness of open infrastructure and DataCite services, and the existence of institutional policies and practices related to open data and persistent identifiers. Open-ended questions were included to allow respondents to elaborate on challenges, contextual factors, and capacity-building needs that could not be fully captured through predefined response options.

The questionnaire also included a mix of compulsory and optional questions. Compulsory questions were carefully selected to ensure that, even in cases where respondents chose to skip optional items, essential data required to address the core study objectives would still be captured. Optional questions provided respondents with the flexibility to share additional information based on their knowledge, experience, and willingness to engage.

### 3.3 Instrument review and pre-deployment validation

Prior to deployment, the draft questionnaire was subjected to an internal review process by members of the project team. This review focused on the clarity of questions, alignment with the study objectives, appropriateness of terminology, and overall coherence of the instrument. Feedback from the review process was used to refine question wording, adjust response options, and improve the logical flow of the questionnaire. This process contributed to enhancing the content validity and usability of the survey instrument.

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### 3.4 Data collection procedure

Following the review and finalization of the questionnaire, the survey was administered online using Google Forms. The use of an online survey platform enabled broad geographic reach and facilitated efficient data collection and management.

The survey was conducted anonymously to encourage honest and open responses. No personally identifiable information was collected, and respondents were assured that their responses would be treated confidentially and used solely for research and training development purposes. Participation in the survey was voluntary, and respondents were informed that they could exit the survey at any point without any consequences.

Invitations to participate in the survey were disseminated through multiple AfLIA communication channels to ensure wide coverage among the target population. These channels included AfLIA membership mailing lists, AfLIA's official WhatsApp groups and interactive platforms, direct email invitations, and AfLIA's social media platforms, including Facebook and Twitter. This multi-channel dissemination strategy was intended to maximize visibility and participation across different regions and institutional contexts.

To accommodate varying schedules and professional commitments of potential respondents, the survey remained open for approximately four weeks. This data collection window allowed respondents sufficient time to complete the questionnaire at their convenience.

### 3.5 Data management and analysis

At the close of the survey period, all responses were exported from Google Forms for data processing and analysis. The dataset underwent a comprehensive review process, which included de-duplication, consistency checks, and data cleaning to ensure accuracy and completeness.

Quantitative data derived from closed-ended questions were analyzed using descriptive statistical techniques, including frequencies and percentages, to identify patterns and trends relevant to the study objectives. Qualitative data obtained from open-ended questions were reviewed and analyzed thematically to identify recurring issues, challenges, and capacity-building needs expressed by respondents.

The combined analysis of quantitative and qualitative data provided a robust evidence base for interpreting the current state of open data infrastructure awareness and adoption among African library professionals. These findings form the basis for subsequent sections of the report, including the presentation of results and their discussion in relation to the objectives of the ODICAL project.

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## 4. Results and Discussion

### 4.1 Overview of respondents

The baseline survey attracted responses from library and information professionals across multiple African countries. Respondents were drawn from Botswana, Ghana, Kenya, Malawi, Namibia, Nigeria, Rwanda, Somalia, South Africa, Tanzania, Tunisia, Uganda, Zambia, Zimbabwe, and Egypt. The total number of survey respondents was 194. The geographic spread provides useful insight into the state of open data infrastructure awareness across diverse institutional and national contexts in Africa. For consistency in reporting and interpretation, responses are mostly reported in percentages throughout the analysis to make comparability across variables meaningful.

### 4.2 Professional roles of respondents

The survey findings indicate that the majority of respondents were librarians working in academic, research, or special library settings. Of the 194 respondents, approximately 85.7 percent of responses identified as librarians from academic, research, or special libraries. ICT specialists working in library or research institutions accounted for approximately 7.9 percent of responses. A smaller group, comprising librarians from national, public, and community libraries as well as Library and Information Science educators, accounted for 6.4 percent (Table 4.1; Fig 4.1). The academic and research librarians were dominant among respondents. These professionals are often directly involved in supporting research workflows, managing institutional repositories, and advising researchers on data management and scholarly communication.

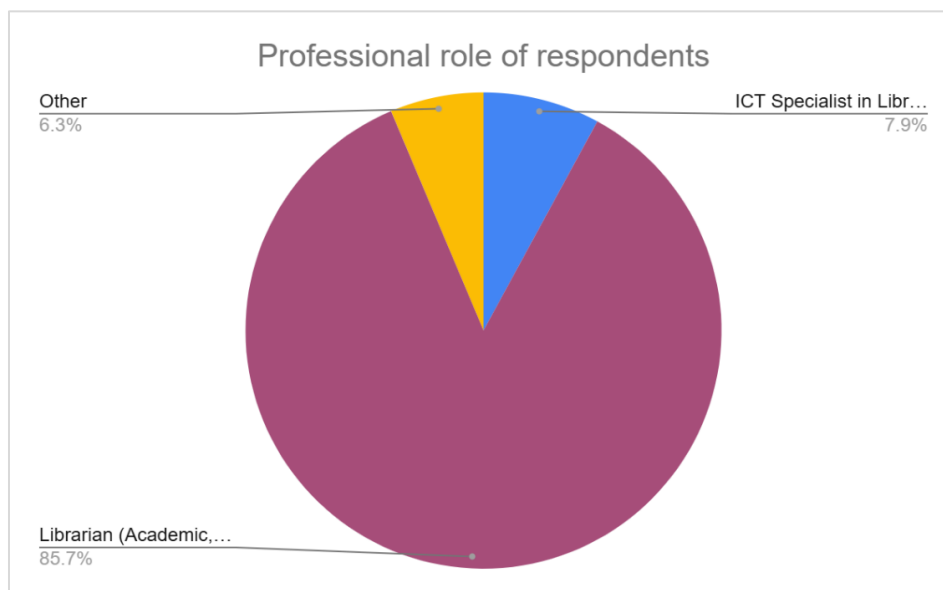


Fig 4.1: Professional roles of respondents

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### 4.3 Years of professional experience

Analysis of respondents' years of professional experience shows a workforce with substantial experience in the library and information sector. About 69.8 percent of the respondents reported having more than 10 years of experience. Respondents with 6–10 years of experience accounted for 20.6 per cent. Those with 3–5 years of experience represented 6.3 per cent whereas early-career professionals with 0–2 years of experience were the smallest group, constituting 3.2 percent of the responses (Table 4.1; Fig 4.2). From the findings, the survey largely captured the perspectives of senior and mid-career professionals. This is significant because such individuals often hold decision-making or advisory roles within their institutions and are well positioned to influence policy development and workflow changes related to open data infrastructure.

At the same time, the relatively low participation of early-career professionals may have implications for long-term sustainability. Early-career librarians and ICT staff are likely to be future custodians of open data systems. Their limited representation suggests an opportunity for the ODICAL and other related projects to intentionally engage this group through targeted outreach and tailored training approaches.

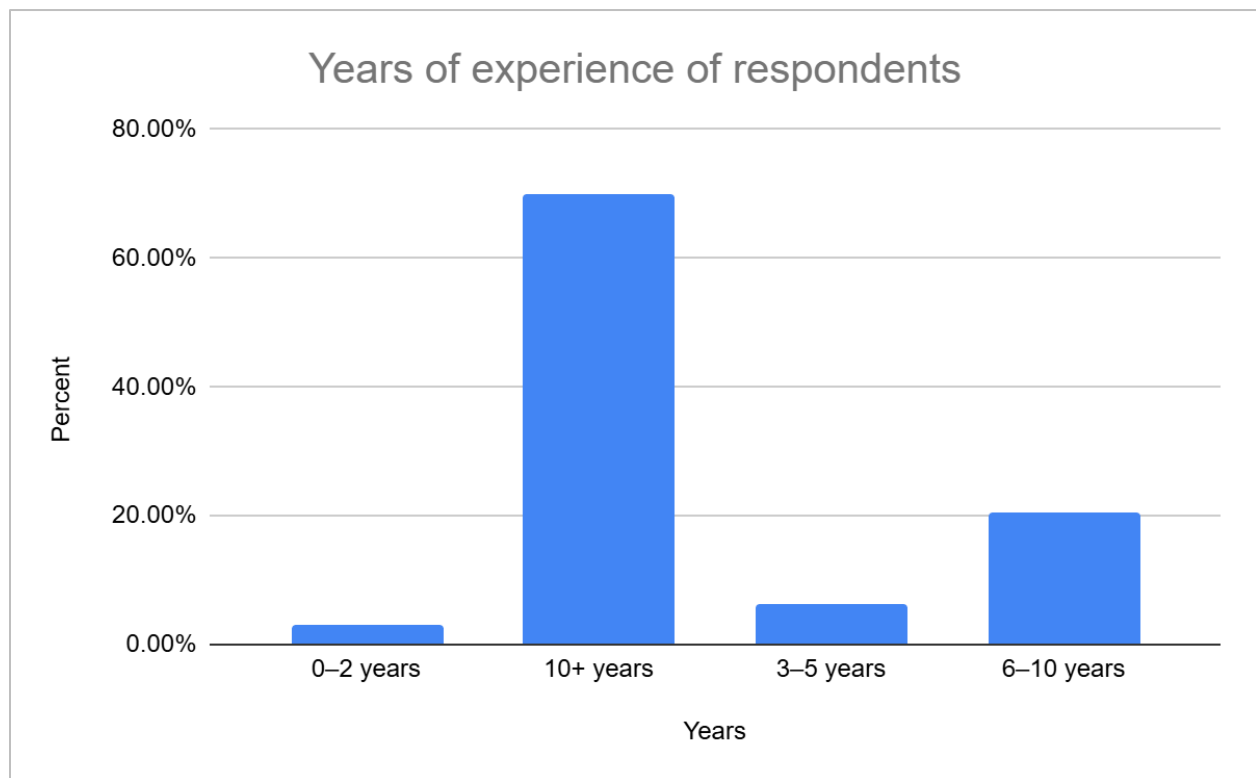


Fig 4.2: Years of professional experience

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## 4.4 Perceived level of digital infrastructure in institutions

Respondents were asked to rate the level of digital infrastructure in their libraries or institutions using a five-point scale, where 1 represented “very poor” and 5 represented “excellent.” The results show that 90 respondents, representing approximately 46.4 per cent, rated their institutional digital infrastructure at level 3, indicating a moderate or average level. A further 76 respondents, or approximately 39.2 per cent, rated their infrastructure at level 4, suggesting a relatively good level of digital capacity. Only 10 respondents, representing 5.2 percent, rated their infrastructure as excellent. At the lower end of the scale, 6 respondents (3.1 percent) rated their digital infrastructure as very poor, while 1 respondent (0.5 percent) rated it at level 2 (Table 4.1; Fig 4.3).

The average digital infrastructure score across all respondents was 3.1, and this suggests that, overall, respondents perceive their institutions to possess moderate digital capacity. Thus, while basic digital systems may be in place, there are likely limitations in terms of robustness, interoperability, and readiness for advanced open data infrastructure such as persistent identifiers, metadata standards, and API-based integrations. The relatively small proportion of institutions rating their infrastructure as excellent highlights a structural constraint to the adoption of open data infrastructure across Africa. Even where awareness and willingness exist, limited infrastructure may hinder effective implementation. This finding therefore reinforces the importance of designing the ODICAL training program in a way that is sensitive to varying levels of institutional capacity and emphasises low-barrier and practical implementation approaches.

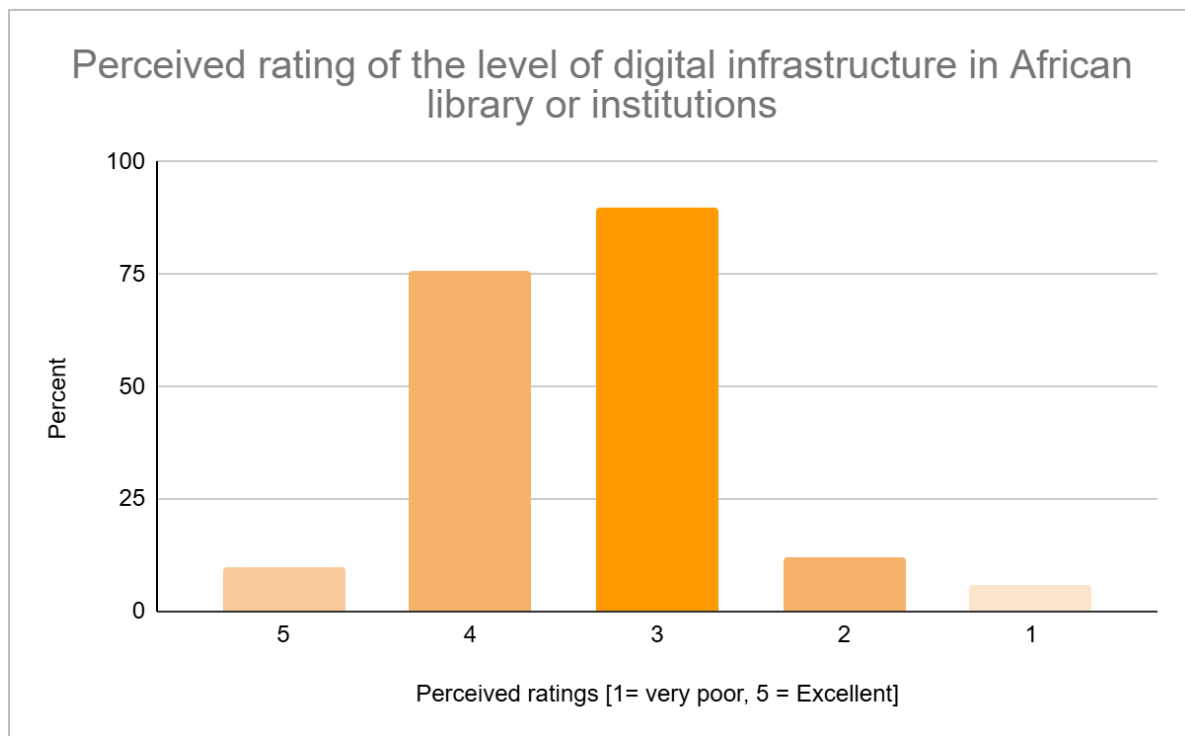


Fig 4.3: Ratings on level of digital infrastructure in African Libraries

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On the other hand, the substantial proportion of respondents rating their infrastructure as good or average suggests that many institutions have a foundation upon which open data infrastructure can be built. More importantly this finding signals an opportunity for targeted capacity-building interventions that focus on optimizing existing systems rather than introducing entirely new ones.

Table 4.1: Composite profile of respondents and institutional digital infrastructure

| Variable  | Category   | Frequency (n) | Percentage (%) |
|---|--|---------------|----------------|
| <b>Professional Role of Respondent</b>                          | Librarian (Academic, Research, Special)                      | 166           | 85.6           |
|   | ICT Specialist (Library/Research Institution)                | 15            | 7.7            |
|   | Other (National, Public, Community Libraries, LIS Educators) | 13            | 6.7            |
|   | <b>Total</b>   | <b>194</b>    | <b>100.0</b>   |
| <b>Years of Professional Experience</b>                         | 0–2 years  | 6             | 3.1            |
|   | 3–5 years  | 12            | 6.2            |
|   | 6–10 years   | 40            | 20.6           |
|   | 10+ years  | 136           | 70.1           |
|   | <b>Total</b>   | <b>194</b>    | <b>100.0</b>   |
| <b>Perceived Level of Digital Infrastructure in Institution</b> | 1 – Very Poor  | 6             | 3.1            |
|   | 2 – Poor   | 1             | 0.5            |
|   | 3 – Average  | 90            | 46.4           |
|   | 4 – Good   | 76            | 39.2           |
|   | 5 – Excellent  | 10            | 5.2            |
|   | <b>Total</b>   | <b>194</b>    | <b>100.0</b>   |

Source: ODICAL Course Baseline Survey (2025)

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## 4.6 Awareness of open infrastructure and DataCite

### 4.6.1 Awareness of open infrastructure in scholarly communication

Respondents were asked whether they had heard of the term “*open infrastructure*” in the context of scholarly communication. Of the respondents, 76.3 percent indicated that they had heard of the term. Approximately 14.5 percent also indicated that they had not heard of the term, equivalent to about 28 respondents. A further 9.2 percent reported that they were not sure (Table 4.2).

This finding suggests a relatively high level of general awareness of the concept of open infrastructure among respondents which is encouraging because conceptual awareness is a necessary first step toward meaningful engagement with open science systems and tools. The presence of a smaller but notable proportion of respondents who were either unaware or uncertain indicates that understanding of open infrastructure is not yet universal within the African library community. It is therefore crucial to design and run series of foundational training initiatives to clarify key concepts and terminology. Without a shared understanding of what constitutes open infrastructure, libraries may struggle to strategically engage with specific tools, platforms, and services that support open scholarly communication.

Table 4.2: Awareness of the term “Open Infrastructure” in scholarly communication

| Response     | Frequency (n) | Percentage (%) |
|--------------|---------------|----------------|
| Yes          | 148           | 76.3           |
| No           | 28            | 14.4           |
| Not sure     | 18            | 9.3            |
| <b>Total</b> | <b>194</b>    | <b>100.0</b>   |

Source: ODICAL Course Baseline Survey (2025)

### 4.6.2 Awareness of specific open infrastructure platforms

Respondents were asked to indicate which open infrastructure platforms they were aware of. This was a multiple-response question, and percentages are therefore reported based on the total number of respondents selecting each option rather than scaled frequencies. The most widely recognized platforms were DOAJ and ORCID, each cited by 68.8 percent of the respondents. OPENDOAR was identified by approximately 53 percent, while Crossref was identified by 46.8 percent. Figshare was cited by 37.7 percent of the respondents. Only a small number of respondents (approximately 3.9 percent) identified other platforms, including CERN Open Science and DSpace (Table 4.3).

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The prominence of DOAJ and ORCID is a strong reflection of their visibility and integration into library workflows, particularly in relation to open access publishing and researcher identification. These platforms are often embedded in institutional policies and publisher requirements, which may explain their higher levels of recognition.

In contrast, the lower levels of awareness of platforms such as Crossref, OPENDOAR, and Figshare suggest uneven exposure to different components of the open infrastructure ecosystem. The very limited mention of repository platforms such as DSpace is noteworthy, given their widespread use in academic libraries. This may indicate that while repositories are used operationally, they are perhaps not always recognized or framed explicitly as elements of open infrastructure. These findings suggest that awareness of open infrastructure among librarians is fragmented and platform-specific rather than systemic.

Table 4.3: Awareness of selected open infrastructure platforms (multiple response)

| Open Infrastructure Platform       | Frequency (n) | Percentage (%) |
|------------------------------------|---------------|----------------|
| DOAJ                               | 53            | 69.7           |
| ORCID                              | 53            | 69.7           |
| OPENDOAR                           | 41            | 53.9           |
| Crossref                           | 36            | 47.4           |
| Figshare                           | 29            | 38.2           |
| Others (CERN Open Science, DSpace) | 3             | 3.9            |

Source: ODICAL Course Baseline Survey (2025)

### 4.6.3 Familiarity with DataCite's tools and services

Respondents were also asked to rate their level of familiarity with DataCite's tools and services using a five-point scale, where 1 represented "not familiar" and 5 represented "very familiar." A total of 76 valid responses were recorded and proportionally scaled to 194 respondents. In comparison, 28.9 percent of the respondents can be rated as 'no familiarity'. About 30.4 percent rated their familiarity at level 2. A further 28.9 per cent selected level 3, indicating moderate familiarity. Only 21 respondents (10.8 per cent) rated their familiarity at level 4, while approximately 1.0 percent indicated a very high level of familiarity at level 5 (Fig 4.3).

The distribution of responses indicates generally low to moderate familiarity with DataCite's tools and services among respondents. While a significant proportion reported moderate familiarity, very few respondents indicated a high or very high level of familiarity. This suggests that DataCite is less well understood compared with some other open infrastructure platforms, despite its central role in research data citation and metadata management. The concentration of responses at the lower end of the familiarity scale points to a substantial capacity gap. This gap is particularly important given the increasing emphasis on data citation, persistent

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identifiers, and metadata quality in open science policies and research assessment frameworks. The findings strongly support the relevance of targeted training focused specifically on DataCite’s services and their practical application within library workflows.

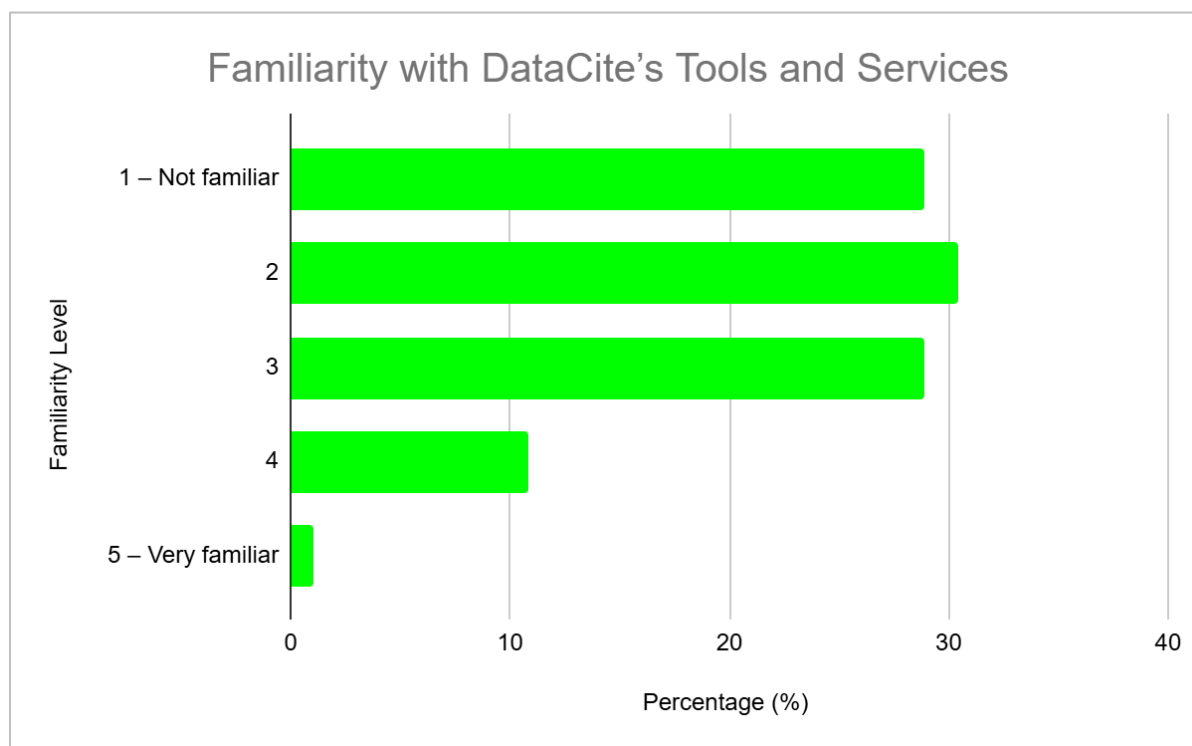


Fig 4.3: Familiarity with DataCite’s tools and services

#### 4.6.4 Use of DataCite services

Respondents were also asked to indicate which DataCite services they had previously used or interacted with. Approximately 30.4 percent of the respondents reported experience with DOI registration. Metadata management services were reported by 34.5 percent of the respondents. Further, data citation tools were identified by 36.1 per cent of the sample. Notably, or 37.1 per cent of the total sample indicated that they had not used any DataCite services (Table 4.4).

Table 4.4: Use of DataCite services among respondents

| DataCite Service    | Scaled Frequency (n) | Percentage (%) |
|---------------------|----------------------|----------------|
| DOI registration    | 59                   | 30.4           |
| Metadata management | 67                   | 34.5           |
| Data citation tools | 70                   | 36.1           |

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|              |            |              |
|--------------|------------|--------------|
| None         | 72         | 37.1         |
| <b>Total</b> | <b>194</b> | <b>100.0</b> |

Source: ODICAL Course Baseline Survey (2025)

The findings indicate that direct engagement with DataCite services remains limited among respondents. While a minority of respondents reported experience with specific services such as DOI registration, metadata management, and data citation tools, a substantial proportion reported no prior interaction with any DataCite services. This pattern implies that even where awareness of open infrastructure exists, it does not necessarily translate into hands-on use of DataCite tools. Possible explanations include institutional constraints, limited technical support, lack of training, or the absence of clear mandates for data citation and DOI registration within institutional policies. Generally, these results reinforce the importance of moving beyond awareness-raising toward practical, skills-based training. They also highlight the need for institutional engagement alongside individual capacity building, as sustainable adoption of DataCite services requires supportive policies, infrastructure, and cross-functional collaboration within libraries and research institutions.

## 4.7 Institutional policies, practices, and perceptions related to Open Science

### 4.7.1 Institutional policies on Research Data Management

Respondents were asked whether their institutions have a formal policy on research data management (RDM). The results show that close to 18.6 percent indicated that their institutions have an RDM policy. A much larger proportion, corresponding to about 115 respondents (59.3 percent), reported that their institutions do not have such a policy. A further 22.2 percent indicated that they were not sure whether an RDM policy exists in their institution (Table 4.5).

The findings interestingly indicate that formal research data management policies are largely absent in the institutions represented in this study. The high proportion of respondents reporting the absence of an RDM policy implies that structured approaches to managing research data remain underdeveloped across many African research institutions.

Again, the sizeable group of respondents who were unsure about the existence of an RDM policy points to weak internal communication or limited staff engagement with institutional policy frameworks. This lack of clarity may further undermine effective implementation of open data practices, even where policies exist. As such there is need for both policy development and institutional awareness-building as complementary interventions.

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Table 4.5: Existence of Institutional Research Data Management (RDM) Policy

| Response     | Frequency (n) | Percentage (%) |
|--------------|---------------|----------------|
| Yes          | 36            | 18.6           |
| No           | 115           | 59.3           |
| Not sure     | 43            | 22.2           |
| <b>Total</b> | <b>194</b>    | <b>100.0</b>   |

Source: ODICAL Course Baseline Survey (2025)

#### 4.7.2 Awareness of the UNESCO Recommendation on Open Science

Respondents were asked whether they were aware of the UNESCO Recommendation on Open Science. A total of 130 respondents (67.0 per cent) indicated that they were aware of the UNESCO Recommendation whereas 33.0 percent reported that they were not aware of it. The relatively high level of awareness of the UNESCO Recommendation on Open Science is a positive finding. It suggests that global policy frameworks on Open Science are beginning to reach library and information professionals across Africa (Table 4.6).

That notwithstanding, awareness alone does not necessarily translate into institutional adoption or implementation. The contrast between relatively high awareness of the UNESCO Recommendation and the low prevalence of institutional RDM policies suggests a gap between global policy discourse and local institutional practice. This gap underscores the importance of translating international recommendations into actionable institutional policies and workflows.

Table 4.6: Awareness of the UNESCO Recommendation on Open Science

| Response     | Frequency (n) | Percentage (%) |
|--------------|---------------|----------------|
| Yes          | 130           | 67.0           |
| No           | 64            | 33.0           |
| <b>Total</b> | <b>194</b>    | <b>100.0</b>   |

Source: ODICAL Course Baseline Survey (2025)

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### 4.7.3 Institutional investment in Open Science infrastructure

Respondents were also asked about the extent to which their institutions actively invest in Open Science infrastructure, including repositories, DOI registration, and open data platforms. Approximately 10 percent reported that their institutions have dedicated funding for Open Science infrastructure, while 40.7 percent mentioned that their institutions invest in Open Science infrastructure, but only on a limited scale. A further 33.0 per cent indicated that their institutions do not currently invest but plan to do so in the future. In contrast, 13.4 percent indicated that their institutions neither invest in Open Science infrastructure nor have plans to do so. A significantly smaller number of respondents (2.6 percent), indicated that they were not sure (Fig 4.4).

It can be seen from the findings that while some level of institutional investment in Open Science infrastructure exists, it is often limited in scope and scale. Dedicated funding remains relatively rare, indicating that Open Science infrastructure is not yet a strategic priority in many institutions. The relatively large proportion of institutions planning future investment is encouraging. It suggests a growing recognition of the importance of Open Science infrastructure, even if current resource constraints delay implementation. However, the presence of institutions with no current or planned investment highlights persistent structural and financial challenges that may require advocacy at institutional and national policy levels.

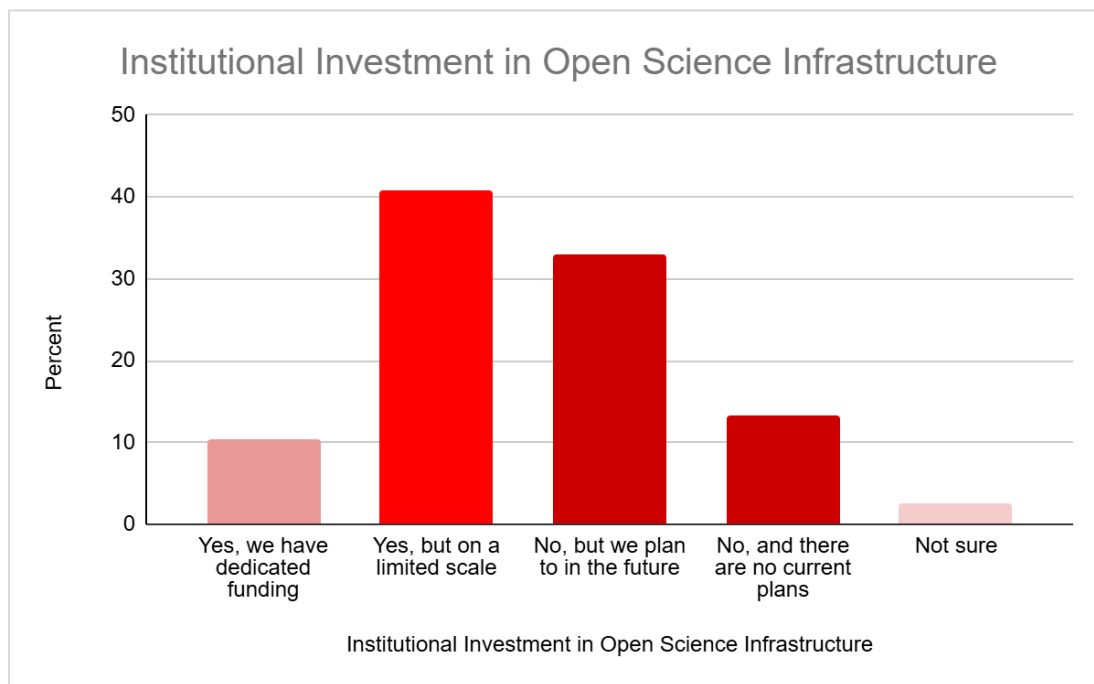


Fig 4.4: Institutional investment in Open Science infrastructure

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#### 4.7.4 Assignment of DOIs for research datasets

In comparison, 11.9 percent reported that their institutions assign DOIs to research datasets, as against a majority corresponding to 55.2 per cent who indicated that their institutions do not necessarily assign DOIs to research datasets. The rest of the respondents, representing 33.0 percent, reported that they were not sure (Table 4.7). The limited assignment of DOIs to research datasets indicates that data citation practices are still at an early stage of development in many African institutions. The high proportion of respondents indicating uncertainty further suggests that DOI assignment, where it exists, may not be well integrated into library workflows or widely communicated to staff. This finding provides empirical evidence that without systematic DOI assignment, research datasets produced in Africa risk remaining invisible and under-cited within the global research ecosystem.

Table 4.7: Assignment of DOIs for research datasets

| Response     | Frequency (n) | Percentage (%) |
|--------------|---------------|----------------|
| Yes          | 23            | 11.9           |
| No           | 107           | 55.2           |
| Not sure     | 64            | 33.0           |
| <b>Total</b> | <b>194</b>    | <b>100.0</b>   |

Source: ODICAL Course Baseline Survey (2025)

#### 4.7.5 Use of Persistent Identifiers in African Library institutions

Respondents were asked to identify the persistent identifiers commonly used in their institutions, and the findings reveal an uneven adoption of persistent identifiers across institutions. The results shows that 26.3 percent reported the use of DOIs. ORCID identifiers were reported by approximately 30.4 per cent. ROR identifiers were reported by about 2.6 percent. A large proportion, corresponding to approximately 59 percent, indicated that no persistent identifiers were used or that they were unsure. Other identifiers, such as Handle prefixes, were reported by 1.5 percent of the respondents (Fig 4.5).

While ORCID and DOIs are used in some contexts, their adoption is far from universal. The limited use of organizational identifiers such as ROR suggests that institutional-level metadata practices remain weak. The high proportion of respondents reporting no use of PIDs or lack of awareness highlights a critical gap in the foundational infrastructure required for Open Science. This gap strengthens the need for coordinated training and institutional policy support to normalize PID use across research workflows.

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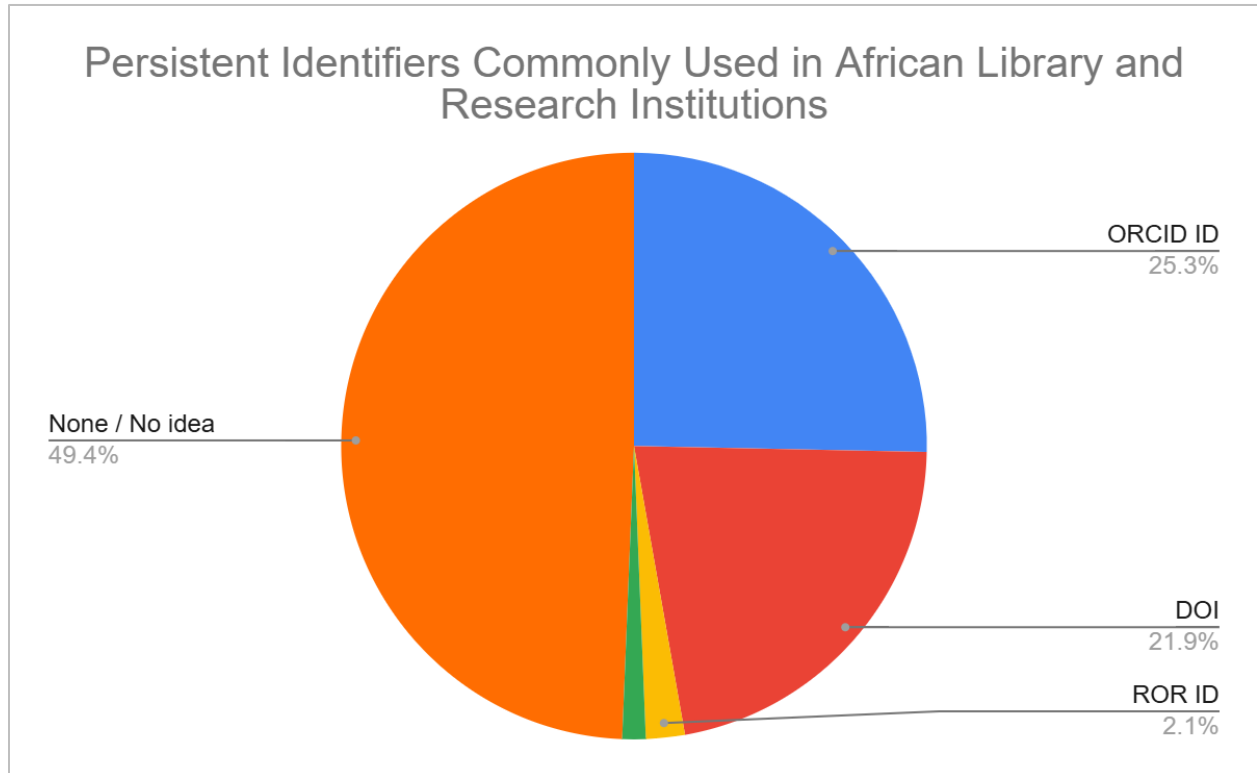


Fig 4.5: Persistent identifiers commonly used in African Library and Research Institutions

#### 4.7.6 Barriers to investing in Open Science infrastructure

Respondents identified the major barriers to investing in Open Science infrastructure. This was a multiple-response question, and results are reported as frequencies. The most frequently cited barrier was lack of awareness or expertise. Limited funding was cited as the second commonest barrier, followed by technical challenges and policy restrictions respectively (Table 4.8). The findings indicate that barriers to Open Science infrastructure adoption are multi-dimensional. While financial constraints are significant, human capacity and awareness gaps emerge as equally critical challenges. This suggests that increasing funding alone may not be sufficient to drive adoption without parallel investments in skills development and institutional learning.

The presence of policy-related barriers further indicates the importance of governance frameworks that enable, rather than restrict, Open Science practices. Addressing these barriers will require coordinated efforts across institutional leadership, libraries, ICT units, and policy-making bodies.

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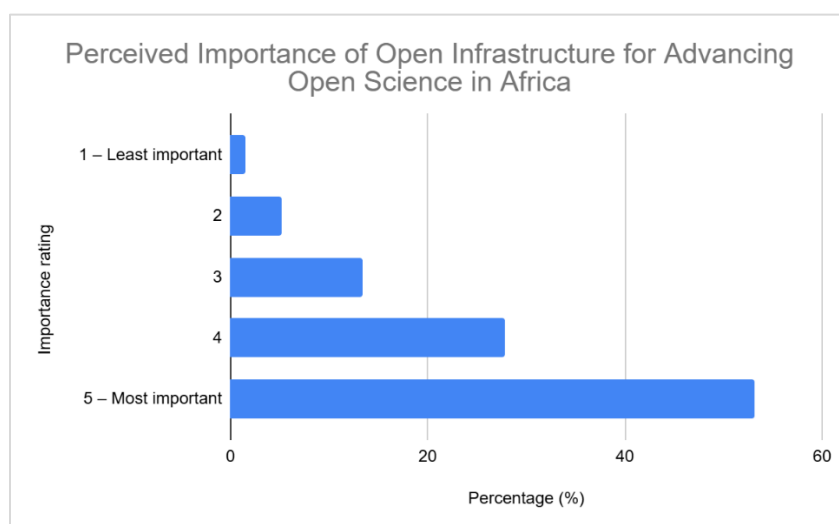
Table 4.8: Key barriers to investing in Open Science infrastructure (multiple responses)

| Barrier                        | Frequency (n) | Percentage (%) |
|--------------------------------|---------------|----------------|
| Lack of awareness or expertise | 58            | 76.3           |
| Limited funding                | 55            | 72.4           |
| Technical challenges           | 46            | 60.5           |
| Policy restrictions            | 24            | 31.6           |

Source: ODICAL Course Baseline Survey (2025)

#### 4.7.7 Perceived importance of open infrastructure for Advancing Open Science in Africa

When asked to rate the importance of open infrastructure for advancing Open Science in Africa on a five-point scale, 53.1 percent rated open infrastructure as very important. A further 27.8 percent rated it as important. About 26 respondents (13.4 per cent) selected a moderate importance rating. Only a small proportion, representing 5.2 percent rated it as low importance (Fig 4.6). The overwhelming majority of respondents perceive open infrastructure as important or very important for advancing Open Science in Africa. This strong normative support contrasts sharply with the limited institutional policies, infrastructure investment, and PID adoption observed elsewhere in the findings. The observed disconnect between perceived importance and actual implementation highlights a critical opportunity for intervention. It suggests that resistance is not primarily attitudinal, but structural and capacity-related. The ODICAL project is therefore well positioned to help bridge this gap by translating strong professional support into practical skills and sustainable adoption of open infrastructure.



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Fig 4.6: Perceived importance of open infrastructure for advancing Open Science in Africa

## 4.8 Thematic synthesis of barriers to adopting DataCite services

Qualitative responses from respondents reveal several interrelated barriers to the adoption of DataCite's services within African academic and research institutions. These barriers cut across technical, institutional, financial, and human capacity dimensions. While a small number of respondents reported no barriers, the majority identified multiple constraints that limit effective adoption and use of DataCite tools. Overall, the qualitative findings indicate that barriers to adopting DataCite services are systemic rather than isolated.

### 4.8.1 Limited awareness and understanding

A dominant theme across responses is limited awareness of DataCite's services and their benefits. Several respondents noted low levels of understanding among staff and researchers regarding the importance of assigning DOIs to datasets and the role of metadata in enhancing research visibility and reuse. In some cases, this lack of awareness was described as extending beyond library staff to institutional leadership and researchers.

This limited understanding reduces demand for DataCite services and weakens institutional motivation to invest in related infrastructure. For newer universities, respondents highlighted that awareness challenges are compounded by the absence of established research support systems.

### 4.8.2 Policy and governance gaps

The absence of formal institutional policies emerged as a key barrier to adoption. Respondents reported a lack of policies mandating or guiding the use of DataCite services, persistent identifiers, or research data management more broadly. Without clear policy direction, implementation of DataCite services tends to remain ad hoc and dependent on individual initiative rather than institutional commitment.

Some respondents also pointed to weak management endorsement and limited leadership support. In such contexts, libraries face challenges in prioritizing DataCite-related activities within broader institutional agendas.

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### 4.8.3 Financial constraints and resource limitations

Financial constraints were frequently cited as a major barrier. Respondents reported limited funding to support DOI registration, metadata management, staff training, and the acquisition or maintenance of supporting digital infrastructure. Inadequate financial resources were often linked to broader institutional budget constraints and competing priorities.

In multiple cases, respondents emphasized that even where interest exists, the lack of sustained funding undermines efforts to adopt and institutionalize DataCite services.

### 4.8.4 Technical and infrastructure challenges

Technical challenges were another prominent theme. Respondents highlighted poor internet connectivity, unstable power supply, and underdeveloped digital infrastructure as significant obstacles. Some institutions are still in the process of developing repositories or systems capable of hosting and managing research outputs in ways that align with DataCite and DOI requirements.

Poor technological planning and limited integration between library systems and institutional ICT infrastructure were also identified as barriers. These challenges restrict the practical implementation of DataCite services, even where awareness and interest are present.

### 4.8.5 Skills and human capacity gaps

Several responses pointed to a lack of technical expertise and trained staff as a constraint. Skills gaps were reported in areas such as metadata creation, DOI workflows, and system integration. In some institutions, the limited number of trained staff places additional pressure on existing personnel and constrains collaboration between librarians and ICT units. This skills deficit reinforces reliance on external support and reduces institutional confidence in adopting new infrastructure services.

### 4.8.6 Institutional culture and collaboration

A smaller but notable theme relates to institutional culture and internal collaboration. Some respondents cited limited staff collaboration and varying levels of interest among institutional proprietors or management as barriers. These factors influence how quickly new services are adopted and whether they are sustained over time.

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### 4.8.7 Absence of barriers in isolated cases

It is worth mentioning that a few respondents reported that there were no significant barriers to adopting DataCite's services in their institutions. While these cases appear to be exceptions, they suggest that where awareness, leadership support, infrastructure, and capacity align, adoption is feasible even within resource-constrained environments.

## 4.9 Training and capacity-building needs

### 4.9.1 Prior training on Open Infrastructure and Research Data Management

The findings indicate mixed levels of prior exposure to training on open infrastructure and RDM. According to the results, 54.1 percent reported that they had received some form of training in open infrastructure or research data management while 45.9% indicated that they had not received any such training (Table 4.9). This distribution highlights a significant capacity gap within African library and research institutions. Although just over half of respondents have been exposed to relevant training, a substantial proportion remain untrained. This implies that existing training opportunities are unevenly distributed and may be limited to specific institutions, countries, or professional networks. The finding aligns with earlier results showing moderate awareness of open infrastructure concepts but low institutional adoption of services such as DOI registration and metadata management, hence reveals the need for structured, accessible, and scalable training interventions that reach both early-career professionals and experienced practitioners.

Table 4.9: Prior Training on Open Infrastructure or Research Data Management

| Response     | Frequency  | Percentage (%) |
|--------------|------------|----------------|
| Yes          | 105        | 54.1           |
| No           | 89         | 45.9           |
| <b>Total</b> | <b>194</b> | <b>100.0</b>   |

Source: ODICAL Course Baseline Survey (2025)

### 4.9.2 Priority areas for training in Open Data infrastructure

Respondents identified multiple areas where additional training is required. Training demand was highest in research data repositories, corresponding to about 85.6 percent. This signals widespread uncertainty about repository selection, configuration, sustainability, and alignment with global standards. It also signals a need for practical guidance on repository workflows, governance models, and integration with institutional research systems. Closely related is the

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demand for training in metadata and interoperability, identified by an estimated 80.4 percent of the respondents (Fig 4.7).

Again, this finding is significant, given that metadata quality underpins discoverability, reuse, and long-term preservation of research outputs. The high demand suggests that librarians and ICT professionals recognise metadata as a critical but complex area requiring both conceptual understanding and technical competence.

Training in DOI registration and management was also strongly prioritised, among 75.3 percent of the respondents indicating a need for further capacity development. This result is consistent with earlier findings showing limited institutional assignment of DOIs for research datasets. It suggests that while awareness of DOIs exists, practical skills related to DOI workflows, metadata submission, and integration with platforms such as DataCite remain underdeveloped.

Similarly, open access publishing and policy frameworks attracted substantial interest, with about 72.7 percent expressing training needs. Training on open licensing and copyright was identified by an estimated 67.5 percent. This indicates persistent uncertainty around intellectual property rights, licensing choices, and the legal implications of sharing research data openly. Such gaps may contribute to institutional hesitancy in adopting open science practices.

Notably, demand for training on ORCID integration into the research landscape was minimal. This likely reflects either prior familiarity with ORCID among respondents or limited recognition of its strategic value beyond individual researcher identification. It also suggests that future training should contextualise ORCID within broader PID ecosystems rather than treating it as a standalone topic. This finding has direct implications for the design of the ODICAL curriculum.

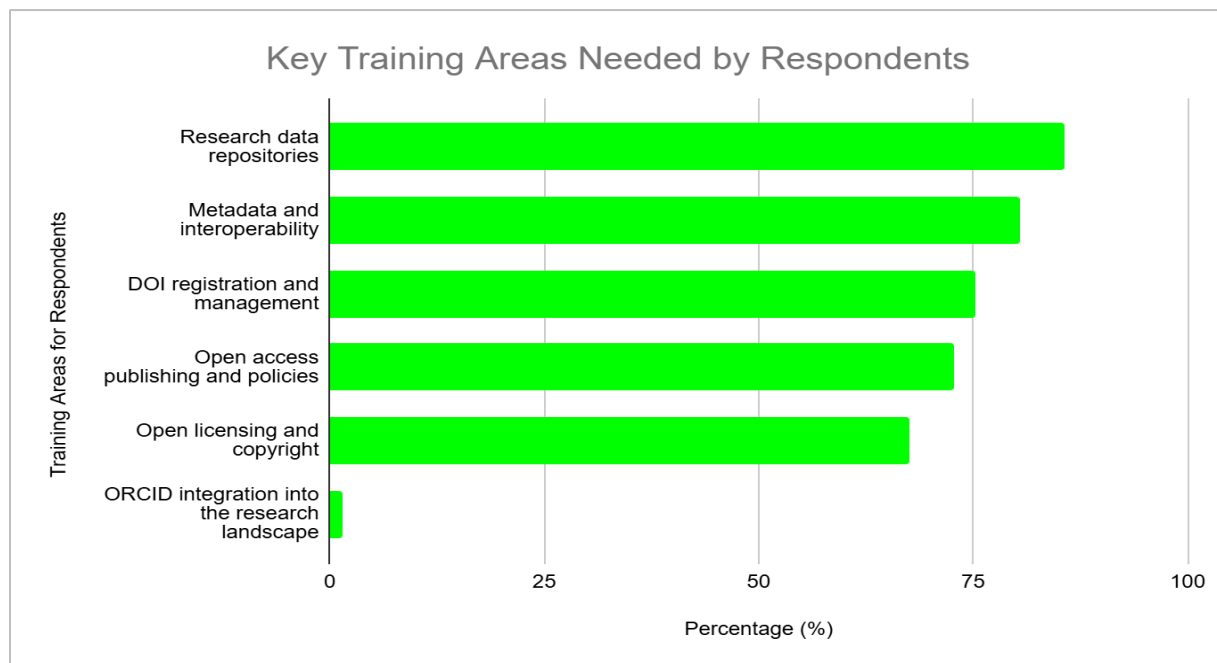


Fig 4.7: Key training areas needed by respondents

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### 4.9.2 Preferred training formats for the ODICAL course

Respondents expressed diverse preferences regarding training delivery modes, highlighting the importance of adopting a blended and flexible approach. When analysed in perspective, online self-paced learning and webinars or live virtual sessions were the most preferred by 34.5 percent of the respondents respectively (Table 4.10). There is an observed growth in acceptance of remote learning modalities and their suitability for geographically dispersed professionals across Africa. Preferences for learning by doing (hands-on training) were expressed by about 29.9 percent of the respondents, indicating a strong desire for practical, skills-based learning experiences. This finding is in keeping with the high demand for training in repositories, metadata, and DOI workflows, which require experiential learning rather than passive instruction.

Interest in in-person workshops, as the preferred training format was reported by approximately 27 percent of the respondents. While lower than online formats, this remains significant and stresses the continued value of face-to-face engagement, particularly for intensive training, peer learning, and community building. The overall distribution of preferences for the ODICAL training suggests that no single training format is sufficient. Instead, a hybrid training model that combines self-paced modules, live virtual engagement, hands-on exercises, and targeted in-person sessions is likely to be most effective.

Table 4.10: Preferred training formats for the ODICAL Course

| Training format                       | Frequency | Percentage (%) |
|---------------------------------------|-----------|----------------|
| Online self-paced learning            | 67        | 34.5           |
| Webinars and live virtual sessions    | 67        | 34.5           |
| Learning by doing (hands-on training) | 58        | 29.9           |
| In-person workshops                   | 52        | 26.8           |
| Total                                 | 194       | 100            |

Source: ODICAL Course Baseline Survey (2025)

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## 5. Conclusion

This baseline study was conducted to assess the awareness, adoption, and capacity needs related to open data infrastructure and DataCite's tools and services among library and information professionals in Africa. The study forms a foundational component of the Open Data Infrastructure Course for African Libraries (ODICAL) project implemented by AfLIA with support from DataCite. The findings provide critical evidence to inform training design, advocacy strategies, and long-term capacity-building interventions for advancing open science across the continent.

The results show that respondents were predominantly academic and research librarians with substantial professional experience. Most participants had worked in the library and information sector for more than ten years. This suggests that the findings reflect informed institutional perspectives rather than entry-level views. Despite this experience base, the digital infrastructure of many institutions was rated as moderate. The average infrastructure score indicates partial readiness for open science implementation, but also reveals persistent structural and technological limitations.

Awareness of open infrastructure concepts was relatively high among respondents. Many participants were familiar with widely used platforms such as DOAJ, ORCID, and OpenDOAR. However, familiarity with DataCite's tools and services was generally low. Most respondents reported limited or no interaction with DOI registration, metadata management, or data citation tools. This gap between general awareness and practical engagement highlights a critical implementation deficit within African library and research institutions.

Institutional policies and practices further constrained adoption. The majority of respondents reported that their institutions did not have formal research data management policies. Awareness of the UNESCO Recommendation on Open Science was moderate, but this awareness had not translated into institutional action. Only a small proportion of institutions actively invested in open science infrastructure or assigned DOIs to research datasets. Persistent identifiers such as DOIs and ORCID iDs were inconsistently used, and many respondents indicated uncertainty or lack of institutional guidance.

The study also revealed significant structural barriers to open infrastructure adoption. Limited funding, lack of expertise, technical challenges, and weak policy frameworks emerged as dominant constraints. Qualitative responses further underscored issues of poor internet connectivity, inadequate digital infrastructure, skills gaps, and limited management support. These barriers reflect broader systemic challenges within the African research ecosystem and help explain the low uptake of open data infrastructure services despite growing global momentum for open science.

Training and capacity-building needs were pronounced. Nearly half of the respondents had not received any prior training in open infrastructure or research data management. Demand for further training was particularly strong in areas such as research data repositories, metadata and interoperability, DOI registration and management, open access policies, and licensing.

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Respondents expressed a clear preference for flexible and blended training formats, combining self-paced online learning, live virtual sessions, hands-on practice, and in-person workshops.

Overall, the findings demonstrate a strong recognition of the importance of open infrastructure for advancing open science in Africa. Respondents consistently rated open infrastructure as highly important for improving research visibility, accessibility, and global integration. However, this recognition is not yet matched by institutional capacity, policy readiness, or technical implementation.

In conclusion, this baseline study confirms the relevance and urgency of the ODICAL project. It provides robust empirical evidence of existing gaps in awareness, skills, infrastructure, and institutional support. Addressing these gaps through targeted, practice-oriented, and context-sensitive training will be essential for strengthening the role of libraries in open science and for enhancing Africa's participation in the global research ecosystem. The findings establish a clear foundation for monitoring progress, measuring impact, and guiding future interventions aimed at building sustainable open data infrastructure across African libraries and research institutions.