ARUA
African Research Universities Alliance

2015 – 2023

RESEARCH PROFILES OF ARUA UNIVERSITIES

Phase III Report

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RESEARCH PROFILES OF ARUA UNIVERSITIES: 2015 – 2023

PHASE III

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Preface

In July 2024, ARUA launched its third Universities Profiles Report (2022–2023), marking another important milestone in our ongoing effort to track and strengthen the research performance of ARUA universities. This edition reaffirms ARUA's commitment to promoting data-informed decision-making across the continent's leading research institutions. Building on the foundations of the previous reports, it offers an updated and more nuanced view of institutional progress from 2015 to 2023. The report presents a comprehensive analysis of key indicators—including enrolment trends, staff qualifications, gender dynamics, and research output—that together provide a clearer understanding of the evolving capacity and character of Africa's research-intensive universities.

The report is presented in two main parts. The first part explores institutional progress across ARUA member universities, with a strong focus on developments in data management systems and practices. The section also examines shifts in postgraduate enrolments, including field-level trends and gender distributions, as well as changes in the academic workforce. Encouragingly, several universities have registered increases in female enrolments and graduations, even in historically male-dominated fields such as Engineering and Medical Sciences. There has also been a notable rise in the number of academic staff holding doctoral degrees, although disparities remain, especially at the most senior levels.

The second part of the report offers a focused analysis of research output and impact across ARUA universities. Scientific output has grown steadily, with South African institutions continuing to contribute a significant share of this growth. Many universities are achieving knowledge impact levels comparable to global standards, particularly in high-priority areas such as Public Health, Environmental Sciences, and Infectious Diseases. The report also highlights collaboration trends, with strong international partnerships evident across the network, and growing—but still uneven—regional and industry engagement. Patterns in funding sources provide further insight into the sustainability and resilience of research systems across ARUA universities.

Like its predecessors, this report is not a ranking exercise, rather, it serves as a benchmarking tool for university leaders to assess their institutions' trajectories in critical areas—from postgraduate enrolments and academic staffing to research output, funding, and innovation. For governments, funders, and development partners, it offers an evidence-based snapshot of how ARUA universities are evolving as hubs of research excellence and training.

We are especially thankful to the Carnegie Corporation of New York, whose support has enabled vital capacity-building efforts across our member institutions. Their investment has been instrumental in helping universities strengthen their data systems, and in ensuring that the information shared in this report meets the standards expected by stakeholders across the higher education and research landscape.

I would like to thank all ARUA member universities for their continued collaboration and transparency. The strength of this report lies in their willingness to share data, reflect on challenges, and commit to improvement. We hope that the findings herein will serve as a useful resource for university leaders, policymakers, and partners working to advance Africa's research and innovation agenda.

We are deeply grateful to Professor Gerald Ouma of the University of Pretoria for his dedicated leadership in steering this phase of the project. His sustained commitment and expertise have been invaluable. He received valuable support from Dr Emmanuel Adu-Danso and Dr Emmanuel Abbey of the University of Ghana, who served as ARUA Consultants. Their close collaboration with institutional data teams was instrumental in enhancing both the quality of data and the depth of analysis across the network. We also wish to acknowledge the crucial backroom support provided by various teams at the University of the Witwatersrand, the University of Pretoria and Stellenbosch University, whose contributions significantly enhanced the overall execution of the project.

Finally, I would like to acknowledge the significant role played by my predecessor, Professor Ernest Aryeetey, whose leadership, and foresight have been central to the growth of this initiative. His consistent emphasis on the importance of reliable, credible data for institutional transformation has shaped the ethos of this project. His tenure also saw the successful development of the ARUA data portal, which has become a cornerstone of our reporting infrastructure.

Professor John O. Gyapong
Secretary General, ARUA

Executive Summary

This report outlines the findings of Phase III of the Data Gathering and Benchmarking project by the African Research Universities Alliance (ARUA), covering the period from 2022 to 2023. The project aims to assess and track the research performance of ARUA universities through key indicators such as postgraduate student enrolment, graduate outputs, academic staff composition, research funding sources, and patent registrations, as well as publication output and co-authorship patterns. This phase builds on the earlier phases (Phase 1:2015-2017 and Phase 2: 2018-2021) to provide a comprehensive trend analysis.

Phase I of the study was based on data from 13 ARUA universities, while Phase 2 expanded to include 16 universities. Phase 3 included all 23-member universities, adding Kwame Nkrumah University of Science and Technology, University of Cape Coast, Obafemi Awolowo University, Eduardo Mondlane University, Université de Kinshasa, University of Nigeria, Nsukka, and University Mohammed VI Polytechnic.

Objectives

The project focuses on the following objectives:

a) Examining patterns and trends in postgraduate enrolments by qualification type, gender, and field of study.

b) Tracking graduate outputs by level, gender, and field of study.

c) Analysing the composition of academic staff by qualification, field of study, gender, and rank.

d) Assessing trends in research funding.

e) Assessing trends in publication outputs, citation counts, and research quality.

f) Investigating patterns of collaboration and co-authorship, both within the ARUA network and internationally.

Methodology

Data for the report was collected through standardised templates across three key areas: student and graduate data, academic staff and postdoctoral fellows, and research funding and patents. A trend analysis across the 2015–2023 period highlighted key insights. A key methodological improvement in Phase III was the disaggregation of academic staff data by field of study, allowing for a more granular analysis of staffing dynamics. The study also utilised data from the Web of Science Core Collection, which integrates publication records, citations, and funding information from a wide range of academic fields.

New developments: dynamic dashboards

One of the major innovations introduced in Phase III was the development of dynamic, real-time dashboards using Microsoft Power BI. These dashboards provide an interactive and flexible approach to data visualisation, centralising insights into a single, easy-to-access platform. The dashboards allow users to explore detailed data through interactive filters, enabling better decision-making and fostering improved collaboration among university stakeholders. Three dashboards were developed to track: 1) Student Data, 2) Postdoctoral Research Fellows and Staff, and 3) Research Funding,

Patents, and Bibliometric Analysis. A fourth dashboard, which will allow for Individual University analysis has been piloted.

Enrolments

Between 2015 and 2023, significant trends in student enrolments emerged across the ARUA universities. While master's enrolments displayed a mixed trend, with slight decreases observed in certain universities, doctoral enrolments showed consistent growth. Significant growth in master's enrolments was observed at universities like the University of Mauritius (Mauritius), Makerere University (Makerere), and Addis Ababa University (AAU). Doctoral enrolments showed a strong upward trend, particularly at institutions like AAU, Rhodes University (Rhodes), University of Cape Town (UCT), and Université Mohammed VI Polytechnique (UM6P). 2023 data shows that the University of Pretoria (UP) had the highest proportion of postgraduate students lower than master's, at 16.4%, followed by Université Cheikh Anta Diop (UCAD) (15.2%) and others. For master's enrolments, UM6P had the highest proportion at 35.1% and for doctoral enrolments, UM6P led with 23.3%, followed by UCT with 7.5%.

A clustering analysis of postgraduate (PG) enrolments categorised universities into three groups based on the percentage of PG students in 2023: Cluster 1 had universities with less than 10% PG enrolment [e.g., University of Rwanda (Rwanda), Universidade Eduardo Mondlane (UEM) and University of Lagos (UNILAG)], Cluster 2 had those with 10% to 20% PG enrolment [e.g., University of Ghana (UG), University of Ibadan (Ibadan) and University of Nairobi (Nairobi)], and Cluster 3 had universities with over 20% PG enrolment [e.g., UM6P, University of KwaZulu Natal (UKZN) and Makerere].

The analysis of student data by field of study shows distinct patterns in the distribution of PG enrolments across disciplines. Fields like Natural Sciences, Engineering, and Medical and Health Sciences have seen notable growth in PG enrolments, especially at institutions like Rhodes, Mauritius, UCAD, and the University of the Witwatersrand (Wits). In contrast, Agricultural Sciences has experienced a decline in its share of postgraduate enrolments. Social Sciences, Humanities, and other fields exhibited varied trends, with some universities showing strong growth in these areas, while others experienced stagnation.

Postgraduate enrolments by gender across the universities can be grouped into three clusters. In Cluster 1 (female majority), universities like Ibadan, Mauritius, Rhodes, Stellenbosch University (SU), UCT, UKZN, University of Pretoria (UP), and Wits have higher female representation, with Rhodes, Wits, and Mauritius showing the most improvement since 2015. In Cluster 2 (male majority), institutions such as AAU, UG, Kwame Nkrumah University of Science and Technology (KNUST), and Makerere have more male postgraduate students, with Makerere and UCAD experiencing declines in female representation. Cluster 3 (balanced male and female representation) features the University of Nigeria, Nsukka (UNN) and UM6P, where gender distribution is more equal. At the master's level, significant gains for women were recorded at Ibadan, AAU, Rhodes, UP, and SU, though Makerere and UCAD saw declines. At the doctoral level, universities like Mauritius, Rhodes, SU, UCT, UM6P, UP, and Wits showed notable increases in female participation, while male-dominated enrolments remained at AAU, UEM, UG, and others, with UKZN, Ibadan, and Makerere making substantial progress in improving female representation.

Trends in permanent academic staff and qualifications

Significant disparities persist across African universities in terms of staff ranks and qualifications. Some universities, such as Mauritius, UCAD, and Ibadan, have a higher proportion of senior academic staff (professors, associate professors, and senior lecturers), while many institutions show an increasing concentration of junior academic positions. This trend may be indicative of institutional growth but also points to challenges in promoting staff to higher academic ranks.

Between 2015 and 2023, gender parity among academic staff has generally improved, but challenges persist, particularly at higher academic ranks. Female representation has notably increased at lower academic levels, but women continue to be underrepresented at the professor and associate professor levels, especially in fields such as Engineering and Technology. However, universities such as UCT and Makerere are making strides in increasing female participation in senior academic ranks in fields like Engineering and Technology, which have traditionally been male-dominated. Similarly, universities like UP, UCT, and SU have stronger female representation in the Social Sciences, while UEM and Mauritius have stronger female representation in Business and Economics.

In terms of academic qualifications, the proportion of academic staff with doctoral degrees has increased across many institutions, particularly in the Medical and Health Sciences, Natural Sciences, and Social Sciences. Universities like UM6P, UCAD, and UCC have notably high proportions of staff with PhDs, especially in the fields of Medical and Health Sciences and Natural Sciences. However, significant disparities remain, with some universities still having a substantial proportion of academic staff without doctoral qualifications.

Fields like Natural Sciences, Social Sciences, and Medical and Health Sciences have the highest concentrations of PhD-qualified academic staff, placing these disciplines in a strong position to lead research efforts. Increasing the proportion of PhD-qualified staff is vital for enhancing research output, attracting funding, and elevating the global standing of African universities.

Overall, while significant progress has been made in improving gender parity and academic qualifications, much work remains to ensure that the universities are truly inclusive, research-focused institutions.

Postdoctoral Fellows

The number of postdoctoral research fellows (postdocs) across ARUA member universities has shown variability from 2015 to 2023, with no consistent trend. South African universities dominate the distribution, while UDSM, Mauritius, UNILAG, and UM6P reported the highest numbers among non-South African institutions in 2023. Case 1 universities (i.e. universities that submitted data fairly consistently from 2015 to 2023) saw an overall increase in postdocs from 2015 to 2021, followed by a decline in 2022 and partial recovery in 2023, with the highest number recorded in 2017. For example, at UP, the number of postdocs has generally increased, except for declines in 2018 and 2019, while at UKZN, the number has dropped from 314 in 2015 to 284 in 2023. Despite fluctuations, the overall trend highlights the dominance of South African institutions in hosting postdocs within ARUA member universities.

Patents

Patents serve as a key indicator of innovation, enabling universities to translate research into practical applications with societal and economic impact. They foster industry collaboration, attract funding, and enhance knowledge transfer, though patent registration trends can be inconsistent due to the complex patenting process and varying research outputs. Despite these challenges, encouraging patent registration is crucial for research productivity, institutional reputation, and global competitiveness. In 2023, SU (31), UCT (30), Nairobi (20), UNILAG (17), and UP (15) recorded the highest patent numbers. Case 1 universities saw a 128% increase in patents from 64 in 2015 to 146 in 2023. Furthermore, universities must balance patenting efforts with other research priorities, such as publishing and open-source innovation. Strengthening institutional support, streamlining the patenting process, and fostering industry partnerships can help increase the number of registered patents over time.

Research Funding

Research funding sources for ARUA universities vary, with government funding playing a significant role at institutions like Makerere, Ibadan, and UEM, where over 50% of research funding comes from national sources. However, this dependence exposes them to risks from policy changes. In contrast, universities like Nairobi, UDSM, and UNILAG receive strong international funding, reflecting global collaborations but also raising the risk of over-reliance on foreign resources. Some universities, such as UCAD and Rwanda, have tapped into regional funding, fostering local partnerships. Private sector funding is also growing, with institutions like SU, UP, and Ibadan engaging with industry partners to diversify their income streams.

To improve financial resilience, ARUA universities are adopting more balanced funding portfolios. For instance, SU combines international funding, government support, private sector contributions, and national research councils, while UP balances funding from government, international sources, and the private sector. Rwanda integrates regional support with private funding. These diversified approaches help mitigate risks and ensure long-term sustainability for research activities.

Research output

Between 2015 and 2023, a total of 224,557 articles and reviews were published by ARUA universities. Publication output increased annually, with a notable rise from 16,897 articles in 2015 to 28,349 in 2023, reflecting a consistent growth rate of about 7% per year. However, ARUA's share of the total academic publications in Africa declined from 28% in 2015 to 21% in 2023, mainly due to a significant increase in research output from non-ARUA institutions.

The analysis revealed a concentration of research output in a small number of South African universities, with UCT, Wits, UKZN, SU, and UP accounting for over 50% of all publications in 2023. While the inclusion of additional ARUA institutions across the years contributed to a broadening of the research landscape, the dominance of South African institutions remained evident.

Quality of research

Although ARUA universities did not feature prominently in the top 1% of most cited documents, between 8% and 15% of publications were ranked among the top 10% of highly cited papers. Furthermore, a significant portion of ARUA publications were published in high-impact journals, with between 22% and 50% appearing in Q1 journals, which are known for their high impact factors.

Research collaboration patterns

International collaboration was a significant contributor to the research output of ARUA universities, with some institutions, such as the Université de Kinshasa (Kinshasa) and Rwanda, showing high levels of international co-authorship. Domestic collaboration, though less prevalent, was also notable in institutions such as UNILAG and Ibadan. Collaboration within the ARUA network itself was particularly strong among South African universities, which often collaborated more with one another than with their non-South African counterparts.

Research areas

ARUA universities concentrated their research efforts in fields such as public health, environmental sciences, infectious diseases, and ecology. ARUA institutions were particularly influential in specialised areas such as astronomy and astrophysics, where they contributed a significant share of Africa's research output.

Conclusion

The findings suggest that ARUA universities are making significant strides in both academic staff and postgraduate student growth and research output. While there has been positive growth in the number of female academics, particularly at junior ranks, significant gaps remain at senior levels. Increasing the representation of women in senior academic positions will be crucial for promoting gender equity across ARUA institutions. At the same time, enhancing the academic rank distribution and improving doctoral qualifications will strengthen the academic foundation of ARUA universities.

ARUA universities are emerging as key contributors to Africa’s academic and research landscape, with notable growth in both publication volume and research quality. The study offers valuable insights into the state of research across ARUA member universities, shedding light on the major research areas, collaboration trends, and funding structures that underpin African academic output. By leveraging international collaborations, diversifying funding sources, and enhancing industry and domestic collaborations, ARUA universities have the potential to strengthen their research capacities and contribute even more significantly to global knowledge creation and socio-economic development in Africa.

1.0 INTRODUCTION

This report presents the findings of Phase III of the Data Gathering and Benchmarking project conducted by the African Research Universities Alliance (ARUA). While Phase III covered the period from 2022 to 2023, the report provides a comprehensive trend analysis across all three phases of the project. Phase I covered the period from 2015 to 2017 and Phase II spanned from 2018 to 2021.

The primary objective of this project is to assess the research performance of ARUA universities by utilising a variety of key indicators, including:

a) Postgraduate (PG) student enrolment;
b) Graduate outputs;
c) The composition of academic staff;
d) Main sources of research funding; and
e) Registered patents and research productivity, including publication output and co-authorship patterns.

Specifically, the study aimed to:

a) Identify and understand patterns and trends in postgraduate enrolments across different postgraduate levels, gender, and field of studies over the 2015–2023 period;
b) Track and analyse the number of postgraduate graduates by level, gender, and field of study;
c) Analyse the composition of academic staff by qualification level, field of study, gender, and rank over the 2015–2023 period;
d) Track trends in publication output across ARUA member universities, focusing on the quantity and quality of academic articles published; and
e) Investigate patterns of collaboration and co-authorship within and between the 23 universities, as well as with international researchers.

The project, funded by the Carnegie Corporation of New York, commenced in 2018 with Phase I.

ARUA is a network of 23 leading universities from 14 African countries. It was established in 2015 to strengthen research-intensive universities in Africa through collaboration. ARUA aims to improve research and graduate training in member universities by creating a robust knowledge ecosystem, based on local research led by African-trained scholars. In addition to its local socio-economic impact and contribution to solving Africa's development challenges, ARUA's goal is for the research output from its member universities to be globally competitive and internationally visible.

ARUA seeks to leverage the resources of its member universities to enhance training and support for doctoral and master's students, build capacity to enhance research management, and foster collaborative research across the network. While building this capacity will take time, it is important to track incremental improvements in research output resulting from ARUA activities. This will help ARUA's governing body, among others, to:

a) Monitor the progress and impact of research in member universities;

b) Decide on interventions or policy changes to guide universities towards ARUA's vision and mission; and
c) Establish criteria for admitting universities into ARUA (e.g., minimum standards for being recognised as research-intensive).

The report is divided into two parts. Part I presents data and analysis on the following features of the research profiles of ARUA universities:

a) PG enrolments (by level, gender, and field of study);
b) PG graduates (by level, gender, and field of study);
c) Number of postdoctoral research fellows;
d) Academic staff profile (by qualification level, field of study, gender, and rank);
e) Sources and scale of research funding, and;
f) Registered patents

Part II presents a bibliometric analysis of the following key metrics:

a) Publication output;
b) Citation analysis;
c) Leading research topics; and
d) Patterns of co-authorship.

The report for Phase I of the data-gathering and benchmarking project covered 13 of the 16 member universities at the time that provided data on the various dimensions investigated. These were:

1. Addis Ababa University (AAU)
2. Université Cheikh Anta Diop (UCAD)
3. Makerere University (Makerere)
4. Rhodes University (Rhodes)
5. Stellenbosch University (SU)
6. University of Cape Town (UCT)
7. University of Dar es Salaam (UDSM)
8. University of Ghana (UG)
9. University of Ibadan (Ibadan)
10. University of KwaZulu-Natal (UKZN)
11. University of Lagos (UNILAG)
12. University of Pretoria (UP)
13. University of the Witwatersrand (Wits)

Phase 2 of the project utilised data from 16 member universities which now included:

14. University of Nairobi (Nairobi)
15. University of Rwanda (Rwanda)
16. University of Mauritius (Mauritius) - Associate Member

In Phase 3 of the project, data was also provided by six of the seven new universities that had joined ARUA. The universities that joined ARUA during the period were:

17. Kwame Nkrumah University of Science and Technology (KNUST)
18. Obafemi Awolowo University (OAU)

19. University of Cape Coast (UCC)
20. Universidade Eduardo Mondlane (UEM) – Associate Member
21. Université Mohammed VI Polytechnic (UM6P)
22. University of Nigeria, Nsukka (UNN)
23. Université de Kinshasa (Kinshasa) – Associate Member

Université de Kinshasa (Kinshasa) did not provide institutional data and so are not included in Part I of the report. However, Kinshasa is included in Part II of the report where the bibliometric data used for the analysis was obtained from the Web of Science database.

A few data gaps were identified across the institutions. For example, for student data, OAU did not submit data for postgraduate enrolments, and UM6P did not provide data for 2022. Regarding graduate data, UCAD did not submit data for 2023 because the finalised figures were unavailable at the time of submission, and UNILAG did not submit data for 2022 due to the absence of an undergraduate graduation ceremony that year. UM6P also did not provide any graduate data for 2022. Although the University of Nairobi participated in Phases II, the student data from earlier periods have been excluded from the trend analysis in this report due to ongoing verification processes.

For academic staff data, OAU's disaggregated data by gender, highest qualification, and academic rank did not match the total number of permanent academic staff and was therefore excluded from the analysis. UCC did not provide permanent academic staff data by rank, and UNN faced the same issue as OAU. UM6P did not submit data for 2022 and also did not provide data on permanent academic staff by rank. In the case of postdoctoral fellows, UCT did not submit data for 2022 and 2023. And on research funding, UCT did not submit data for 2021, and UM6P did not submit funding data.

Resolving the identified gaps remains an ongoing exercise for the project as it will ensure a more accurate and comprehensive monitoring of the research performance of member universities, ultimately advancing ARUA's mission to foster globally competitive and impactful research across African universities.

Part 1

2.0 INSTITUTIONAL RESEARCH PROFILES

This part of the report provides an in-depth analysis of the research profiles of 22 ARUA universities (Université de Kinshasa is excluded) over the period from 2015 to 2023. As highlighted in the introduction, although Phase III data covers 2022–2023, the earlier period (2015–2021) is also incorporated to enable a trend analysis. The comprehensive dataset enables a robust evaluation of institutional growth and performance variations, comparisons across universities, and the identification of trends that could inform strategic decisions.

2.1 Advancements in Data Systems and Governance Among ARUA Universities

ARUA universities have made significant strides in advancing their data systems and processes, implementing a range of new developments. This progress has been largely driven by capacity-building initiatives facilitated by ARUA. A major area of progress by the universities has been the reform of data systems, particularly focusing on improving data structures. A number of universities have embraced more integrated data systems that foster greater collaboration between different stakeholders within their institutions while enabling them to generate comprehensive reports and conduct analytics that integrate data from multiple sources. Some universities are working towards systems similar to South Africa's Higher Education Management Information System (HEMIS), which streamlines the management of student and staff data. One of such institutions is Makerere University with the launch of MAKDATA which allowed for a comprehensive reporting and analytics. This integration has enabled more effective data validation processes, improving the accuracy and reliability of the data used for decision-making. However, this shift towards integration has been more advanced at some universities than others.

Another notable development during Phase III, which has been adopted by several universities, is the move towards online publication of basic university statistics. The University of Ghana is one of the institutions which has shown marked progress in this area with the launch of a Power BI dashboard. This has increased transparency and made key data more accessible to both internal stakeholders (such as staff and students) and external stakeholders (such as policymakers, researchers, and the public). The extent to which universities have moved towards online publication, however, varies, with some institutions further along in this process than others.

The design of databases for management and performance indicators has been a positive development at some institutions, improving monitoring and evaluation capabilities. However, not all universities have developed these systems yet, and the use of performance indicators is still in its early stages in a number of institutions. The introduction of data auditing has further enhanced data integrity at those universities where it has been implemented, while the development of in-house

dashboards has provided real-time tools for informed decision-making. These dashboards, available at a few institutions, enable users to access key metrics and trends in real-time, allowing for quicker responses to emerging challenges and opportunities.

To support efforts towards improvement data systems and governance, a few universities have established dedicated data management offices for the first time under the project. These include the University of Ibadan and the University of Lagos, both in Nigeria. These offices oversee data governance, ensuring data integrity and quality across their institutions. The creation of formal data management policies at these universities is helping to standardise data practices and ensure consistency in data collection. Following these developments, the project is witnessing marked improvements in data governance and quality assurance from these institutions.

In addition to system upgrades, staff training has been prioritised, with a focus on enhancing data fluency and empowering staff to better manage and use data. While many universities have implemented training programmes, the scope and effectiveness of these programmes differ, with some institutions investing more heavily in developing data skills across their staff. The University of Ghana is good example in this area, leveraging on the benefits from the study tours at the University of the Witwatersrand under Phase II of the project.

Overall, these developments have significantly strengthened the data infrastructure at several ARUA universities, particularly those that have actively engaged in the capacity-building efforts. However, progress has not been uniform across all institutions. While some universities have made notable advancements, others are still in the process of implementing these changes. The improvements that have been achieved highlight the positive impact of ARUA's efforts through the Carnegie Corporation grant, enabling the universities that have made the most progress to continue advancing their data management practices and systems while sharing best practices and "mentoring" those with relatively less developed systems. These developments were discussed and showcased at a two-day workshop held on June 24-25, 2024, in Nairobi, Kenya, where institutions shared their experiences, reviewed progress, and outlined the next steps for further strengthening collaboration, data management and communities of practice across the network.

2.1 Methodology

As already mentioned, some universities did not provide data on all the relevant metrics. As a result, these universities are not included in the analysis on the metrics for which they have missing data.

During Phase III, three templates for collecting data were distributed to member universities, building on the data-gathering efforts from Phases I and II (the same templates were used for Phase I and Phase II). The templates were designed to standardise and streamline the collection of crucial data across universities. The first template focused on student and graduate data, capturing enrolment, graduation rates, and academic progression across various fields of study. The second template was aimed at academic staff and postdoctoral fellows, gathering data on staff composition, qualifications, and ranks. The third template addressed research funding and patents, collecting information on external research funding, grants, and intellectual property developments, such as registered patents.

These templates were completed and submitted by the universities. The clear, structured format of the templates helped ensure that data was collected consistently, simplifying the process for universities and enabling them to submit more reliable information for analysis. The use of the standardised templates acted as a catalyst for improving data management practices across several of the universities. For some universities, particularly those without mature data systems in place, the use of these templates prompted significant efforts to refine and enhance their internal data collection processes. These institutions were able to better align their practices with ARUA's data requirements, thereby improving the overall quality and consistency of their data submissions.

To further support these efforts, four capacity building workshops[1] were held between Phases I and III, providing opportunities for ARUA member universities to collaborate, share best practices, and discuss areas for improvement. Three of these workshops were in-person: the first took place in Accra, Ghana in July 2022; the second was hosted by Stellenbosch University (SU) in South Africa in November 2022; and the most recent was hosted by the University of Nairobi in June 2024. An additional online workshop was held in March 2024. These workshops played a pivotal role in helping universities improve data completeness and quality, enabling participants to learn from each other's experiences and strengthen their data collection and integration practices.

In terms of the methodology applied for the trend analysis in this report, one of the key improvements has been a focus on data quality. Accurate data is essential for providing meaningful insights. Trend analysis helped identify outliers and deviations from expected patterns, offering clarity on whether universities are following the trends established in earlier phases. The importance of maintaining high-quality data throughout this process cannot be overstated, as it serves as the foundation for accurate comparisons, trends, and insights.

For the trend analysis, ARUA universities were grouped based on their data, which helped highlight similarities and differences between institutions. This clustering provided valuable insights, enabling universities to identify areas of strength and opportunities for growth. In most cases, the same interval was consistently used for clustering to maintain uniformity; however, in certain instances, variations in the data and the specific variable being analysed led to the application of different intervals. The analysis primarily focused on comparing data from 2015 to 2023, using the nine years of data available for universities that provided data for the period. However, for newer members that joined ARUA much later, key observations were noted, although these universities mostly had just two years of data available (2022 – 2023). As such, further data will be necessary to provide a more comprehensive analysis of their progress.

[1] Prior to these Capacity Building workshops, an inaugural workshop was held with the Deputy Vice Chancellors (DVCs) and their data point persons in Addis Ababa, Ethiopia, in January 2018. The focus of the engagement was to agree on essential indicators for the project. The SciSTIP (a Centre of Excellence in Scientometrics and Science, Technology and Innovation Policy at Stellenbosch University) was engaged to guide the leadership of ARUA institutions to obtain agreement on, and commitment to, a set of performance indicators for the project. The workshop also exposed participants to the data requirements for the project, and how best to compile and analyse the data at their institutions based on experiences from the Higher Education Research and Advocacy Network in Africa (HERANA) project. The template to be used for gathering performance data for this project was discussed and accepted, marking an important step for the project.

The ARUA universities which participated in Phase III of the project can be classified into two distinct groups: Case 1, which includes universities that submitted data fairly consistently from 2015 to 2023, and Case 2, comprising universities that joined during Phase III and provided data only for 2022 and 2023. As a result, trend analysis is primarily applicable to Case 1 universities due to the availability of a more extensive dataset. However, to incorporate the universities that joined later, a clustering approach was applied, focusing exclusively on 2023 data. This method allows all ARUA member universities to be included in the analysis, fostering a holistic understanding of their research profiles.

A notable addition to the trend analysis in Phase III was the disaggregation of permanent academic staff data by study field, complementing the analyses in Phase I and Phase II, which already included gender, highest qualification, and academic rank. This deeper level of analysis enabled a better understanding of the academic staff composition and provided a clearer picture of how staffing dynamics relate to student data and research outputs.

Overall, the use of standardised templates for data collection, alongside enhanced methodologies for trend analysis and correlation studies, has significantly improved the quality and depth of the data gathered in Phase III. By providing a clearer, more structured approach to data collection, ARUA has strengthened its ability to track the progress of its member universities and identify areas for improvement. The findings from the trend analysis will support universities in refining their strategies for enhancing research and overall institutional development.

2.2 New Development: Dynamic Power BI Dashboards for Data Analytics in Phase III

A key addition to the project in Phase III was the development of dynamic, near real-time dashboards using the Microsoft Power BI platform. The dashboards were developed by a team from Stellenbosch University (SU). The platform offers a more interactive, flexible, and real-time approach to data visualisation and analysis, supporting better data exploration, collaboration, and decision-making. The benefits of the dashboards include:

1. **Centralised data insights**: Dashboards centralise data from various sources into a single view, allowing users to see comprehensive insights and trends without navigating through multiple static reports or systems.
2. **Interactive visualisations**: The dashboards include interactive elements such as filters and drilldowns, enabling users to explore detailed data or view specific subsets. This makes it easier to analyse complex data.
3. **Customisable and flexible**: The dashboards can be tailored to meet the specific needs of different users. Different views can be created for various levels within the institution, from high-level executive summaries to detailed operational reports.
4. **Enhanced collaboration**: Dashboards are accessible to all stakeholders, promoting better communication and collaboration.
5. **Data-driven decision-making**: By visualising data effectively, these dashboards help users identify trends, patterns, and outliers that might not be obvious in raw data or static reports.
6. **Ease of Use**: The dashboards are easy to use, even by those without technical expertise.

The following four dashboards have been created: 1) Student Data, 2) Postdoctoral Research Fellows & Staff, 3) Research Funding, Patents & Bibliometric Analysis, and 4) Individual University Reports. This report draws extensively on the dashboard for its figures and tables.

2.3 Student Data by Qualification Type

This section analyses student data by qualification type, focusing on four key categories: undergraduate (UG), postgraduate lower than master's (PG lower than master's), master's, and doctoral degrees. The data is further disaggregated by gender where relevant, offering a more detailed insight into gender dynamics across the qualification levels. Additionally, the top five universities with the highest enrolments in both 2015 (baseline year) and 2023 (ending year) are highlighted, with trends showing both improvements and declines in enrolment numbers. To provide a clearer understanding of the landscape, universities are clustered based on the percentage of enrolments, categorising them into three distinct clusters.

The 2015 data serves as the baseline for comparison, while the 2023 data reflects the latest figures. As outlined in the introduction, the 22 universities that contributed data for Phase III can be categorised into two broad groups: the sixteen universities from Phases I and II, and the universities that joined the network during Phase III and provided data only for this phase (2022 and 2023). For methodological consistency, it would not be advisable to combine all the universities in the trend analysis. Therefore, two distinct groups have been created: Case I, which consists of the sixteen universities that provided data across all three phases (2015 to 2023), and Case II, which consists of the six universities that joined ARUA in Phase III and provided data for 2022 and 2023. These two cases are used throughout the remainder of this section and the report to allow for a nuanced analysis of trends.

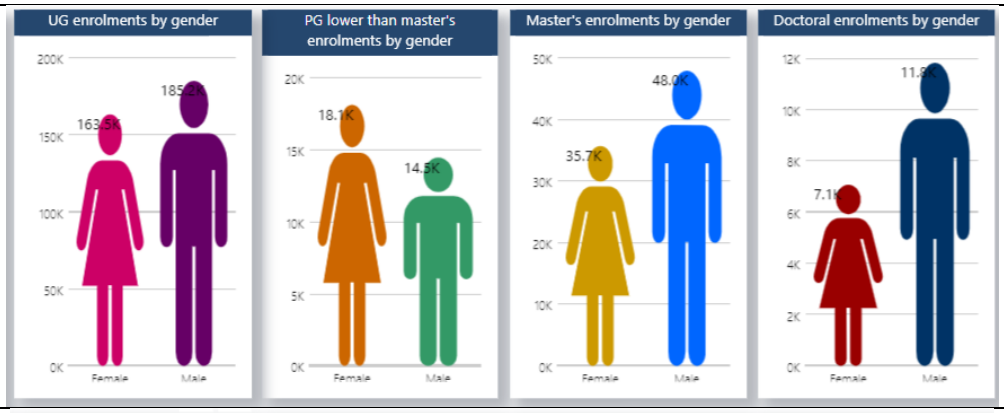
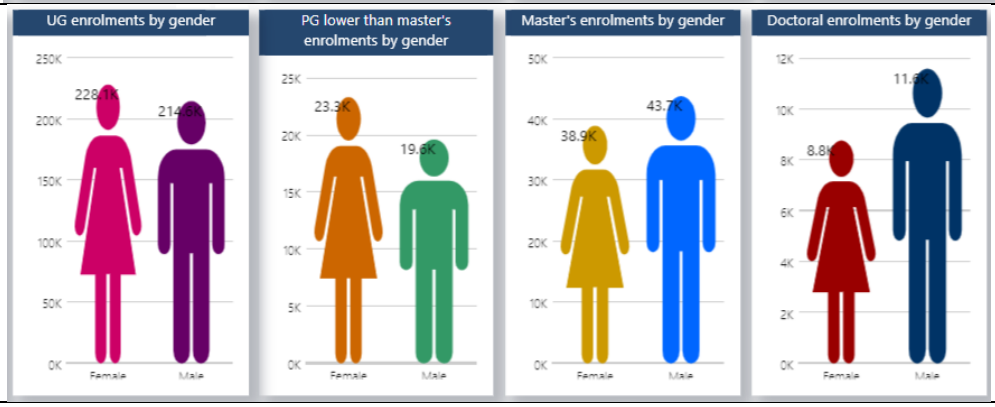
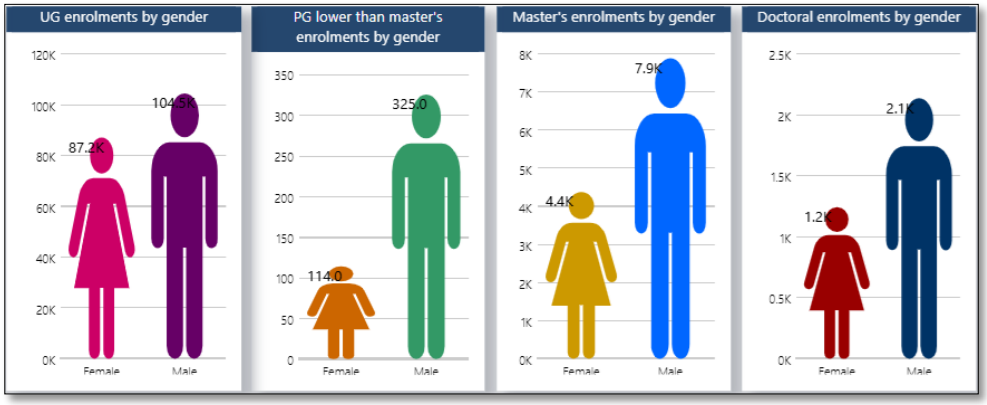
Enrolment trends by qualification type and gender

Figure 2.1 illustrates student enrolments by qualification type and gender for both Case 1 and Case 2 universities. For Case 1 universities, focusing on undergraduate (UG) enrolments, the number of female students increased significantly from 163,500 in 2015 to 228,100 in 2023 (a 39.5% increase). In the category of PG lower than master's, female enrolments rose from 18,100 in 2015 to 23,300 in 2023 (a 29% increase). For master's programmes, female enrolments grew from 35,700 in 2015 to 38,900 in 2023 (a 9% increase), while doctoral enrolments saw a rise from 7,100 to 8,800 (a 24% increase) over the same period. These figures highlight an encouraging trend of narrowing gender gaps, particularly at the undergraduate and PG lower than master's levels, where female enrolments have now surpassed those of male students. Furthermore, the gender gap for master's and doctoral programmes has also been significantly reduced. This suggests that Phase III has seen notable improvements in gender parity across the ARUA network, especially at the more advanced academic levels.

For Case 2 universities, which includes data for the new Phase III members, only the 2023 trends are highlighted. The number of female undergraduate students stood at 87,160 (45.5%) compared to 104,530 (54.5%) male students in 2023. In the PG lower than master's category, female enrolments

stood at 114 (26%) compared to 326 (74%) male. For master's programmes, female students stood at 4,380 (36%) compared to 7,890 (64%) male in 2023, and at the doctoral level, the number of female students stood at 1,240 (37%) compared to 2,140 (63%) male in 2023.

Figure 2.1. Student enrolments by qualification type and gender, 2015 vs. 2023

2015	
Case 1: 2023 (Phase I and II universities)	
Case 2: 2023 (Phase III universities)	

Overall Enrolment Changes: 2015 vs 2023

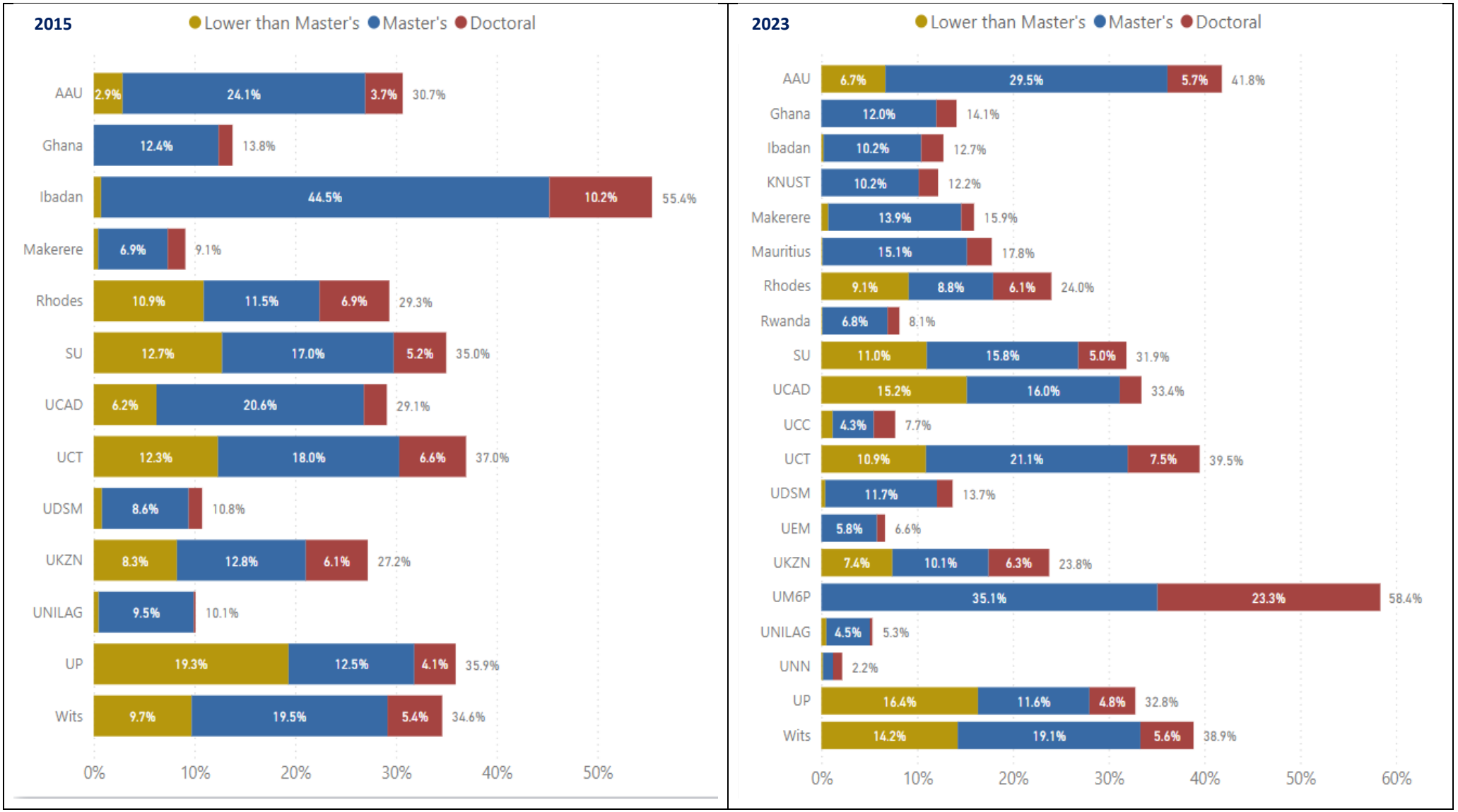
- **Undergraduate enrolments (UG):** The overall undergraduate enrolments across universities in Case 1 have increased from 348,717 in 2015 to 442,749 in 2023 (a 27% increase). For Case 2, the total undergraduate enrolments stood at 191,687 in 2023.
- **Master's enrolments:** For Case 1 universities, the total number of master's enrolments decreased slightly, from 83,692 in 2015 to 82,592 in 2023 (a 1.5% decline). For Case 2 universities, the number of master's enrolment stood at 12,269 in 2023.

- **Doctoral enrolments:** Doctoral enrolments recorded an increase. In Case 1 universities, doctoral enrolments rose from 18,970 in 2015 to 20,370 in 2023 (a 7.5% increase). For Case 2 universities, the total number of doctoral students stood at 3,382 in 2023.

Postgraduate enrolment by university and year

Figure 2.2 presents a comparison of postgraduate (PG) enrolments by university and year, contrasting data from 2015 and 2023. The analysis highlights significant shifts in the distribution of enrolments across different qualification types (PG lower than master's, master's, and doctoral) and universities over the nine-year period.

Figure 2.2. Postgraduate enrolments by qualification type and year as a percentage of total enrolments, 2015 vs. 2023



In 2023, UP had the highest proportion of PG lower than master's enrolments, accounting for 16.4% of its total enrolment, followed by UCAD with 15.2%, Wits at 14.2%, SU with 11%, and UCT at 10.9%. In 2015, UP had the highest proportion of PG lower than master's enrolments, at 19.3%, followed by SU (12.7%), UCT (12.3%), Rhodes (10.9%), and Wits (9.7%).

For master's enrolments in 2023, the top five universities were: UM6P (35.1%), AAU (29.5%), UCT (21.1%), Wits (19.1%), and UCAD (16%). The top five universities for master's enrolments in 2015 were: Ibadan (44.5%), AAU (24.1%), UCAD (20.6%), Wits (19.5%), and UCT (18%). It is clear that by 2023, Ibadan's dominance in master's enrolments had been surpassed by several universities.

When examining doctoral enrolments in 2023, the universities with the highest proportion of doctoral students were: UM6P (23.3%), UCT (7.5%), UKZN (6.3%), Rhodes (6.1%), and Wits (5.6%). The top five universities for doctoral enrolments in 2015 were: Ibadan (10.2%), Rhodes (6.9%), UCT (6.6%), UKZN (6.1%), and Wits (5.4%). Ibadan's relative share of doctoral students declined over the period. Other universities, such as UCT and Wits, have remained stable in doctoral enrolments, while institutions like UKZN, UP, Wits and UCT have seen consistent growth.

This analysis reveals a changing landscape in postgraduate enrolments across ARUA universities, with several universities, such as UM6P, AAU, and UCT, showing increased enrolments at both the master's and doctoral levels. In contrast, universities like Ibadan have experienced shifts in enrolment patterns, particularly in doctoral and master's programmes.

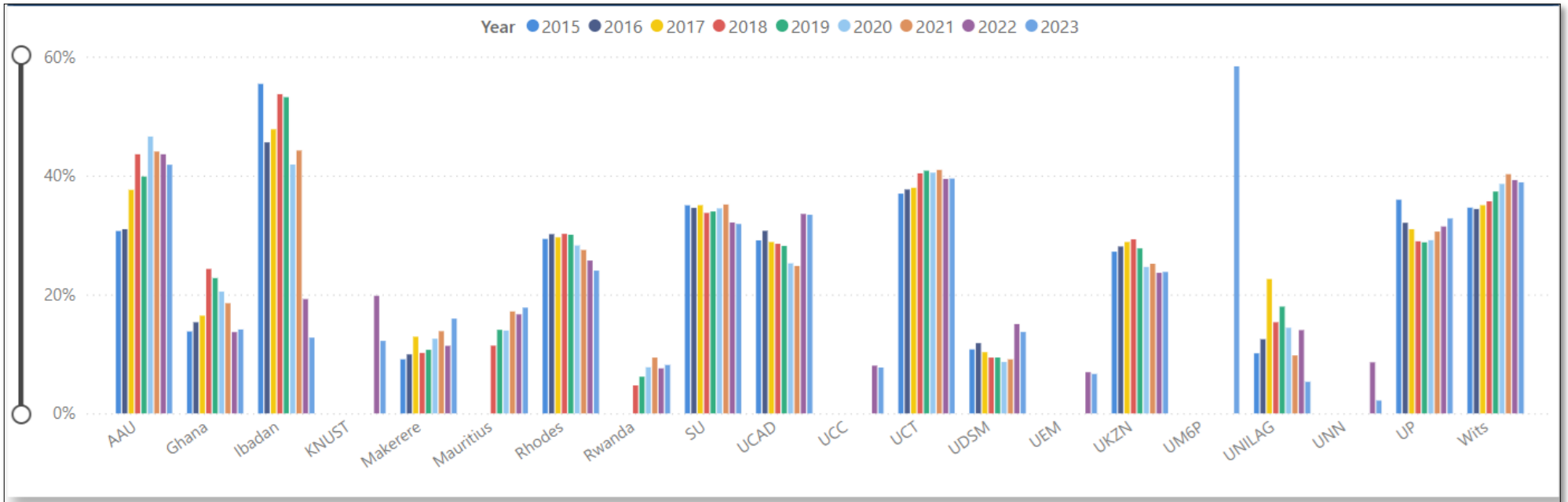
Postgraduate enrolments as a percentage of total enrolments

Figure 2.3 illustrates postgraduate (PG) enrolments as a percentage of total enrolments from 2015 to 2023. To better understand the distribution and trends across ARUA universities, a clustering method was applied, categorising the universities into three distinct groups based on their 2023 PG enrolment data:

- **Cluster 1:** Universities with less than 10% PG enrolment in 2023: Rwanda, UCC, UEM, UNILAG, and UNN.
- **Cluster 2:** Universities with PG enrolments between 10% and 20% in 2023: UG, Ibadan, KNUST, , , Nairobi, and UDSM.
- **Cluster 3:** Universities with PG enrolments greater than 20% in 2023: AAU, Rhodes, SU, UCT, UKZN, Makerere, Mauritius, UM6P, UP, and Wits.

The analysis also highlights changes in PG enrolment percentages compared to 2015. Notably, AAU saw a 36% increase, while UDSM and Wits increased their PG enrolments by 27% and 12.5%, respectively. However, some universities have experienced declines in their PG enrolment proportions since 2015. These include Ibadan, Rhodes, SU, UKZN, UNILAG, and UP, where the percentage of PG enrolments has decreased.

Figure 2.3. Postgraduate enrolments as a percentage of all enrolments, 2015 - 2023



Year	AAU	Ghana	Ibadan	KNUST	Makerere	Mauritius	Rhodes	Rwanda	SU	UCAD	UCC	UCT	UDSM	UEM	UKZN	UM6P	UNILAG	UNN	UP	Wits
2015	30.7%	13.8%	55.4%		9.1%		29.3%		35.0%	29.1%		37.0%	10.8%		27.2%		10.1%		35.9%	34.6%
2016	31.0%	15.3%	45.6%		9.9%		30.1%		34.6%	30.7%		37.7%	11.8%		28.1%		12.5%		32.1%	34.4%
2017	37.6%	16.4%	47.8%		12.9%		29.6%		35.0%	28.8%		38.0%	10.3%		28.8%		22.6%		31.0%	35.0%
2018	43.6%	24.3%	53.7%		10.2%	11.4%	30.2%	4.7%	33.7%	28.5%		40.4%	9.4%		29.3%		15.3%		28.9%	35.7%
2019	39.8%	22.8%	53.2%		10.7%	14.1%	30.0%	6.2%	34.0%	28.2%		40.8%	9.4%		27.8%		18.0%		28.8%	37.3%
2020	46.6%	20.5%	41.9%		12.6%	13.9%	28.2%	7.8%	34.5%	25.2%		40.5%	8.6%		24.6%		14.4%		29.1%	38.6%
2021	44.0%	18.5%	44.2%		13.8%	17.1%	27.5%	9.4%	35.1%	24.8%		40.9%	9.1%		25.2%		9.8%		30.6%	40.2%
2022	43.6%	13.7%	19.2%	19.8%	11.4%	16.7%	25.7%	7.6%	32.1%	33.5%	8.0%	39.4%	15.0%	6.9%	23.7%		14.0%	8.6%	31.4%	39.2%
2023	41.8%	14.1%	12.7%	12.2%	15.9%	17.8%	24.0%	8.1%	31.9%	33.4%	7.7%	39.5%	13.7%	6.6%	23.8%	58.4%	5.3%	2.2%	32.8%	38.9%

Master's and doctoral enrolments as a percentage of total enrolments

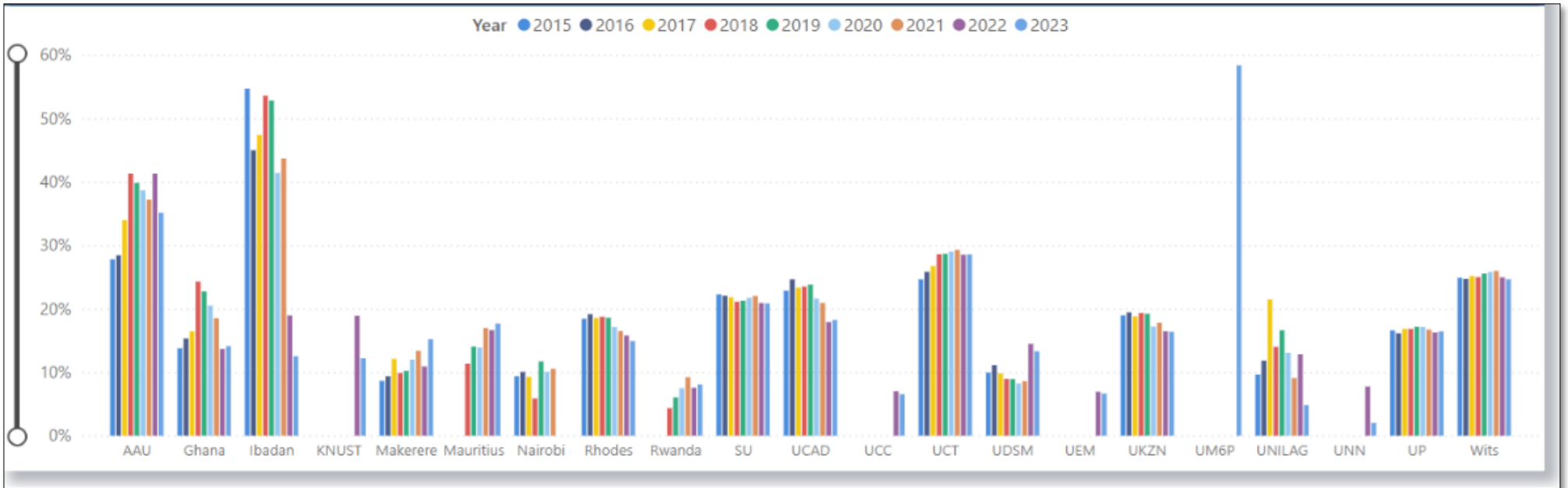
Figure 2.4 illustrates the trends in master's and doctoral enrolments as a percentage of total enrolments from 2015 to 2023. The universities are categorised into three clusters based on their 2023 enrolment data, as follows:

- **Cluster 1**: Universities with less than 10% of their total enrolments in master's and doctoral programmes in 2023: Rwanda, UCC, UEM, UNILAG, and UNN.
- **Cluster 2**: Universities with 10% to 15% of their total enrolments in master's and doctoral programmes in 2023: UG, Ibadan, KNUST, , Nairobi, Rhodes, , , UDSM, ,.
- **Cluster 3**: Universities with more than 20% of their total enrolments in master's and doctoral programmes in 2023: AAU, Makerere, Mauritius, SU, UCAD, UCT, UKZN, UM6P, UP, and Wits.

The data also highlights notable improvements and declines in the percentage of master's and doctoral enrolments since 2015. Several universities have made considerable progress in increasing their postgraduate enrolment proportions. For example, UDSM experienced a 30% increase, AAU a 27% increase, and UCT grew by 16%.

However, some universities have experienced declines in their postgraduate enrolment proportions since 2015. These include Ibadan, Rhodes, UCAD, UKZN, and UNILAG, where the percentage of students enrolled in postgraduate programmes decreased.

Figure 2.4. Master's and Doctoral as a % of total enrolments, 2015 – 2023



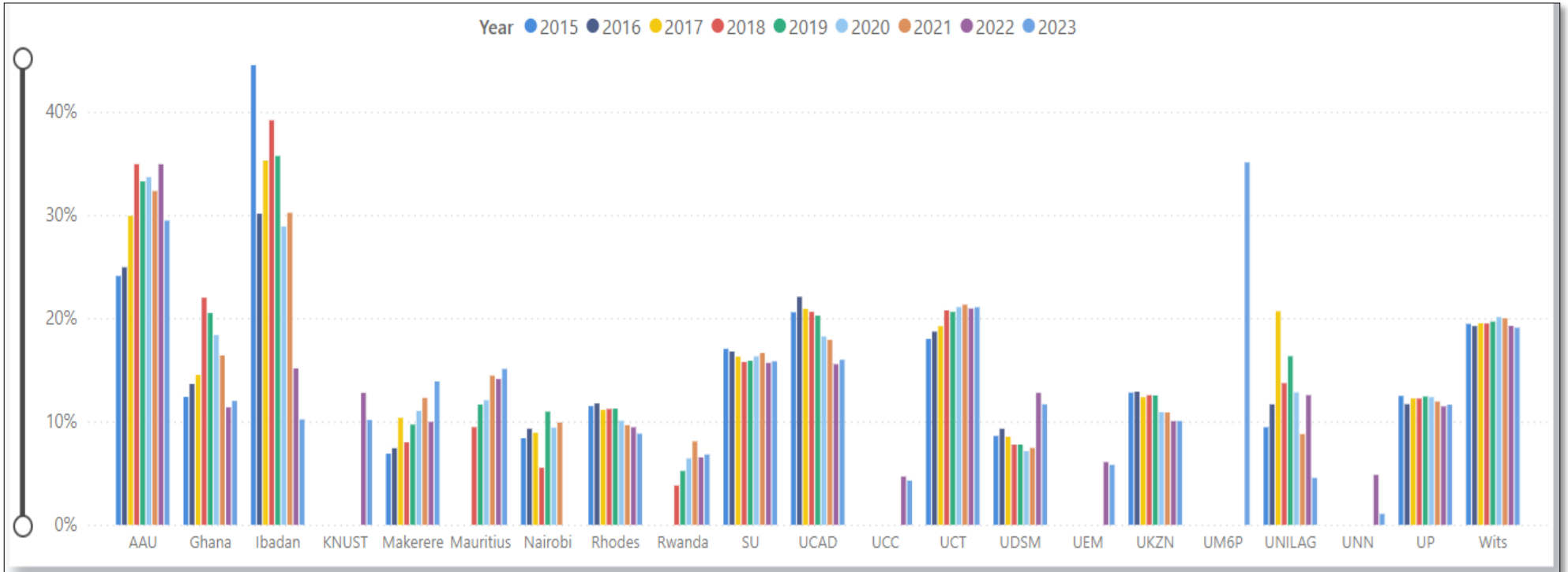
Year	AAU	Ghana	Ibadan	KNUST	Makerere	Mauritius	Nairobi	Rhodes	Rwanda	SU	UCAD	UCC	UCT	UDSM	UEM	UKZN	UM6P	UNILAG	UNN	UP	Wits
2015	27.8%	13.8%	54.7%		8.6%		9.4%	18.4%		22.3%	22.9%		24.6%	9.9%		19.0%		9.6%		16.6%	24.9%
2016	28.4%	15.3%	45.0%		9.4%		10.1%	19.2%		22.1%	24.6%		25.8%	11.1%		19.4%		11.8%		16.1%	24.7%
2017	34.0%	16.4%	47.4%		12.1%		9.3%	18.6%		21.8%	23.3%		26.7%	9.8%		18.8%		21.5%		16.8%	25.2%
2018	41.3%	24.3%	53.6%		9.9%	11.3%	5.9%	18.7%	4.4%	21.1%	23.5%		28.6%	8.9%		19.3%		14.0%		16.8%	25.0%
2019	39.8%	22.8%	52.8%		10.2%	14.0%	11.7%	18.6%	6.0%	21.3%	23.8%		28.7%	8.9%		19.2%		16.6%		17.2%	25.5%
2020	38.7%	20.5%	41.4%		12.0%	13.9%	10.1%	17.1%	7.5%	21.7%	21.6%		29.0%	8.2%		17.2%		13.0%		17.1%	25.8%
2021	37.2%	18.5%	43.7%		13.4%	17.0%	10.5%	16.5%	9.2%	22.0%	20.9%		29.3%	8.6%		17.8%		9.1%		16.7%	26.0%
2022	41.3%	13.7%	18.9%	18.9%	10.9%	16.6%		15.8%	7.6%	20.9%	17.9%	7.0%	28.5%	14.5%	6.9%	16.4%		12.8%	7.8%	16.3%	25.0%
2023	35.1%	14.1%	12.5%	12.2%	15.2%	17.7%		14.9%	8.0%	20.9%	18.2%	6.5%	28.6%	13.3%	6.6%	16.4%	58.4%	4.8%	2.0%	16.4%	24.6%

Master's enrolment as a percentage of total enrolments

Figure 2.5 illustrates master's enrolments as a percentage of total enrolments from 2015 to 2023. The universities are categorised into three clusters based on their 2023 enrolment data, as follows:

- **Cluster 1**: Universities with less than 10% of their total enrolments in master's programmes in 2023: Rhodes, Rwanda, UCC, UEM, UNILAG, and UNN.
- **Cluster 2**: Universities with 10% to 15% of their total enrolments in master's programmes in 2023: UG, Ibadan, KNUST, Makerere, Nairobi, UDSM, UKZN, and UP
- **Cluster 3**: Universities with more than 15% of their total enrolments in master's programmes in 2023: AAU, Mauritius, SU, UCAD, UCT, UM6P, and Wits.

Figure 2.5. Master's enrolments as a % of total enrolments, 2015 – 2023



Year	AAU	Ghana	Ibadan	KNUST	Makerere	Mauritius	Nairobi	Rhodes	Rwanda	SU	UCAD	UCC	UCT	UDSM	UEM	UKZN	UM6P	UNILAG	UNN	UP	Wits
2015	24.1%	12.4%	44.5%		6.9%		8.4%	11.5%		17.0%	20.6%		18.0%	8.6%		12.8%		9.5%		12.5%	19.5%
2016	24.9%	13.6%	30.1%		7.4%		9.3%	11.8%		16.8%	22.1%		18.7%	9.3%		12.9%		11.7%		11.7%	19.2%
2017	29.9%	14.5%	35.3%		10.4%		8.9%	11.1%		16.3%	20.9%		19.2%	8.5%		12.4%		20.7%		12.2%	19.5%
2018	34.9%	22.0%	39.2%		8.0%	9.5%	5.5%	11.2%	3.8%	15.8%	20.6%		20.8%	7.8%		12.6%		13.7%		12.2%	19.5%
2019	33.3%	20.5%	35.7%		9.7%	11.7%	11.0%	11.3%	5.2%	15.9%	20.3%		20.6%	7.8%		12.5%		16.3%		12.4%	19.7%
2020	33.7%	18.4%	28.9%		11.0%	12.1%	9.4%	10.1%	6.4%	16.3%	18.2%		21.1%	7.1%		10.9%		12.8%		12.4%	20.1%
2021	32.3%	16.4%	30.2%		12.3%	14.4%	9.9%	9.7%	8.1%	16.6%	17.9%		21.3%	7.4%		10.9%		8.8%		11.9%	20.0%
2022	34.9%	11.4%	15.1%	12.8%	10.0%	14.1%		9.4%	6.5%	15.7%	15.6%	4.7%	20.9%	12.8%	6.1%	10.0%		12.6%	4.8%	11.5%	19.3%
2023	29.5%	12.0%	10.2%	10.2%	13.9%	15.1%		8.8%	6.8%	15.8%	16.0%	4.3%	21.1%	11.7%	5.8%	10.1%	35.1%	4.5%	1.1%	11.6%	19.1%

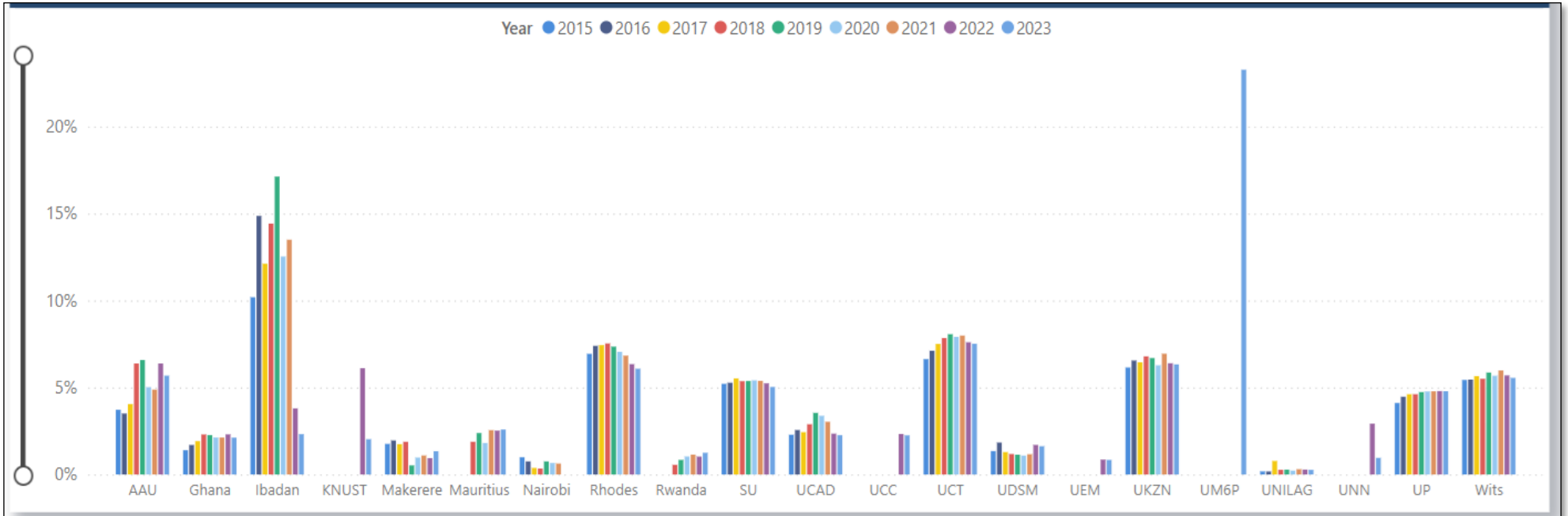
In terms of improvement since 2015, several universities in Cluster 3 have shown significant growth in their master's enrolment percentages. For example, Makerere experienced a 30% rise, AAU increased by 22.5%, and UCT saw an increase of 17%. However, some universities have experienced a decline in the percentage of master's enrolments. Notable institutions in this category include UG, Ibadan, Rhodes, SU, UCAD, UKZN, UNILAG, UP, and Wits.

Doctoral enrolments as a percentage of total enrolments

Figure 2.6 illustrates doctoral enrolments as a percentage of total enrolments from 2015 to 2023. The universities are categorised into three clusters based on their 2023 enrolment data, as follows:

- **Cluster 1**: Universities with less than 3% of total enrolments in doctoral programmes in 2023: UG, Ibadan, KNUST, Makerere, Nairobi, Rwanda, UCAD, UCC, UDSM, UEM, UNILAG, and UNN**.**
- **Cluster 2**: Universities with 3% to 5% of total enrolments in doctoral programmes in 2023: SU and UP
- **Cluster 3**: Universities with more than 5% of total enrolments in doctoral programmes in 2023: AAU, Rhodes, UCT, UKZN, UM6P, and Wits.

Figure 2.6. Doctoral enrolments as a % of total enrolments, 2015 – 2023



Year	AAU	Ghana	Ibadan	KNUST	Makerere	Mauritius	Nairobi	Rhodes	Rwanda	SU	UCAD	UCC	UCT	UDSM	UEM	UKZN	UM6P	UNILAG	UNN	UP	Wits
2015	3.7%	1.4%	10.2%		1.8%		1.0%	6.9%		5.2%	2.3%		6.6%	1.3%		6.1%		0.2%		4.1%	5.4%
2016	3.5%	1.7%	14.9%		2.0%		0.8%	7.4%		5.3%	2.6%		7.1%	1.8%		6.6%		0.2%		4.5%	5.5%
2017	4.0%	1.9%	12.1%		1.7%		0.4%	7.4%		5.5%	2.4%		7.5%	1.3%		6.4%		0.8%		4.6%	5.7%
2018	6.4%	2.3%	14.4%		1.9%	1.9%	0.3%	7.5%	0.6%	5.4%	2.9%		7.8%	1.2%		6.8%		0.3%		4.6%	5.5%
2019	6.6%	2.3%	17.1%		0.5%	2.4%	0.7%	7.3%	0.8%	5.4%	3.5%		8.1%	1.1%		6.7%		0.3%		4.7%	5.9%
2020	5.0%	2.1%	12.5%		1.0%	1.8%	0.7%	7.0%	1.0%	5.4%	3.4%		7.9%	1.1%		6.3%		0.2%		4.8%	5.7%
2021	4.9%	2.1%	13.5%		1.1%	2.5%	0.6%	6.8%	1.1%	5.4%	3.0%		8.0%	1.2%		6.9%		0.3%		4.8%	6.0%
2022	6.4%	2.3%	3.8%	6.1%	0.9%	2.5%		6.3%	1.0%	5.2%	2.3%	2.3%	7.6%	1.7%	0.9%	6.4%		0.3%	2.9%	4.8%	5.7%
2023	5.7%	2.1%	2.3%	2.0%	1.3%	2.6%		6.1%	1.2%	5.0%	2.3%	2.2%	7.5%	1.6%	0.8%	6.3%	23.3%	0.3%	1.0%	4.8%	5.6%

In terms of improvement since 2015, several universities have demonstrated notable growth in their doctoral enrolment percentages. AAU and UG both saw a remarkable 50% increase, indicating a strong push towards expanding doctoral education. UP improved by 17%, UCT by 14%, and Wits by 4%. However, some universities saw declines in their doctoral enrolments. Notably, Ibadan, Makerere, and Rhodes experienced reductions in their doctoral enrolment percentages.

2.3.1 Student Data by Field of Study

This section illustrates the distribution of master's and doctoral students across the following fields of study: Natural Sciences, Engineering and Technology, Medical and Health Sciences, Agricultural Sciences, Social Sciences, Humanities, and Business, Economics, and Management Studies.

Natural Sciences

Figure 2.7 illustrates the master's and doctoral enrolments in the Natural Sciences as a percentage of all master's and doctoral enrolments from 2015 to 2023. The universities are categorised into three clusters based on their 2023 enrolment data, as follows:

- **Cluster 1**: Universities with less than 10% of their master's and doctoral enrolments in Natural Sciences in 2023: UG, Nairobi, and UDSM.
- **Cluster 2**: Universities with 10% to 15% of their master's and doctoral enrolments in Natural Sciences in 2023: AAU, Ibadan, KNUST, Rwanda, SU, UCC, UCT, UEM, UKZN, UNILAG, and UNN.
- **Cluster 3**: Universities with more than 15% of their master's and doctoral enrolments in Natural Sciences in 2023: Makerere, Mauritius, Rhodes, UCAD, UM6P, UP, and Wits.

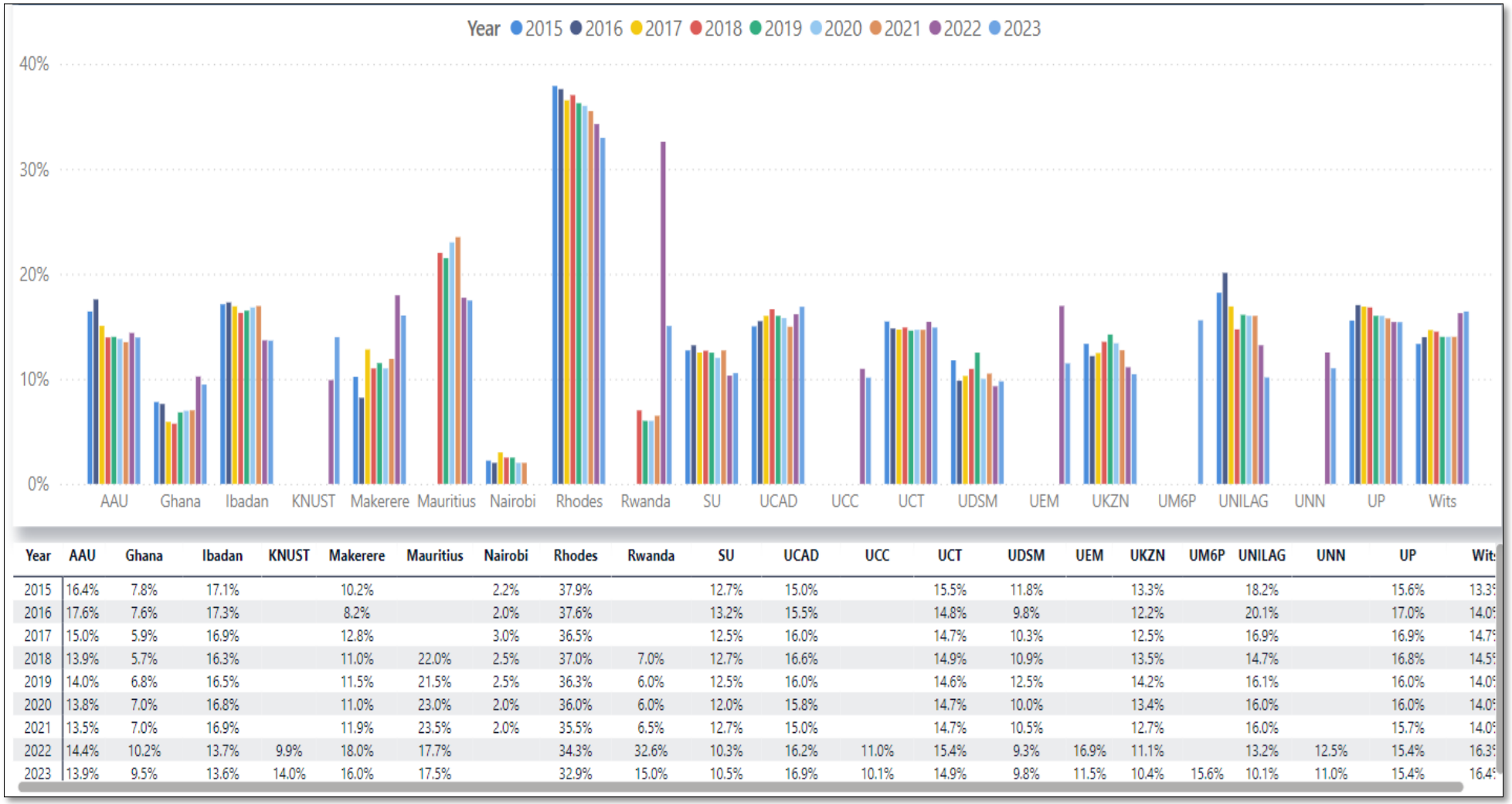
In terms of enrolment distribution for 2023, the top five universities with the highest proportions of enrolments in Natural Sciences were:

1. Rhodes: 32.9%
2. Mauritius: 17.5%
3. UCAD: 16.9%
4. Wits: 16.4%
5. Makerere: 16%

When looking at improvements compared to 2015, the following universities saw notable growth in their enrolments in Natural Sciences:

- Makerere: a 59% increase
- Wits: a 23.5% increase
- UG: a 22% increase
- UCAD: a 13% increase

Figure 2.7. Master's and doctoral enrolments in Natural Sciences as a percentage of all master's and doctoral enrolments, 2015 – 2023



Year	AAU	Ghana	Ibadan	KNUST	Makerere	Mauritius	Nairobi	Rhodes	Rwanda	SU	UCAD	UCC	UCT	UDSM	UEM	UKZN	UM6P	UNILAG	UNN	UP	Wit
2015	16.4%	7.8%	17.1%		10.2%		2.2%	37.9%		12.7%	15.0%		15.5%	11.8%		13.3%		18.2%		15.6%	13.3
2016	17.6%	7.6%	17.3%		8.2%		2.0%	37.6%		13.2%	15.5%		14.8%	9.8%		12.2%		20.1%		17.0%	14.0
2017	15.0%	5.9%	16.9%		12.8%		3.0%	36.5%		12.5%	16.0%		14.7%	10.3%		12.5%		16.9%		16.9%	14.7
2018	13.9%	5.7%	16.3%		11.0%	22.0%	2.5%	37.0%	7.0%	12.7%	16.6%		14.9%	10.9%		13.5%		14.7%		16.8%	14.5
2019	14.0%	6.8%	16.5%		11.5%	21.5%	2.5%	36.3%	6.0%	12.5%	16.0%		14.6%	12.5%		14.2%		16.1%		16.0%	14.0
2020	13.8%	7.0%	16.8%		11.0%	23.0%	2.0%	36.0%	6.0%	12.0%	15.8%		14.7%	10.0%		13.4%		16.0%		16.0%	14.0
2021	13.5%	7.0%	16.9%		11.9%	23.5%	2.0%	35.5%	6.5%	12.7%	15.0%		14.7%	10.5%		12.7%		16.0%		15.7%	14.0
2022	14.4%	10.2%	13.7%	9.9%	18.0%	17.7%		34.3%	32.6%	10.3%	16.2%	11.0%	15.4%	9.3%	16.9%	11.1%		13.2%	12.5%	15.4%	16.3
2023	13.9%	9.5%	13.6%	14.0%	16.0%	17.5%		32.9%	15.0%	10.5%	16.9%	10.1%	14.9%	9.8%	11.5%	10.4%	15.6%	10.1%	11.0%	15.4%	16.4

Engineering and Technology

Figure 2.8 illustrates the master's and doctoral enrolments in Engineering and Technology as a percentage of all master's and doctoral enrolments from 2015 to 2023. The universities are categorised into three clusters based on their 2023 enrolment data, as follows:

- **Cluster 1**: Universities with less than 10% of their master's and doctoral enrolments in Engineering and Technology in 2023: UG, Ibadan, Mauritius, Rwanda, UCAD, UCC, UEM, UKZN, UNILAG, and UNN.
- **Cluster 2**: Universities with 10% to 15% of their master's and doctoral enrolments in Engineering and Technology in 2023: AAU, Makerere, and UCT.
- **Cluster 3**: Universities with more than 15% of their master's and doctoral enrolments in Engineering and Technology in 2023: KNUST, Nairobi, SU, UDSM, UM6P, UP, and Wits.

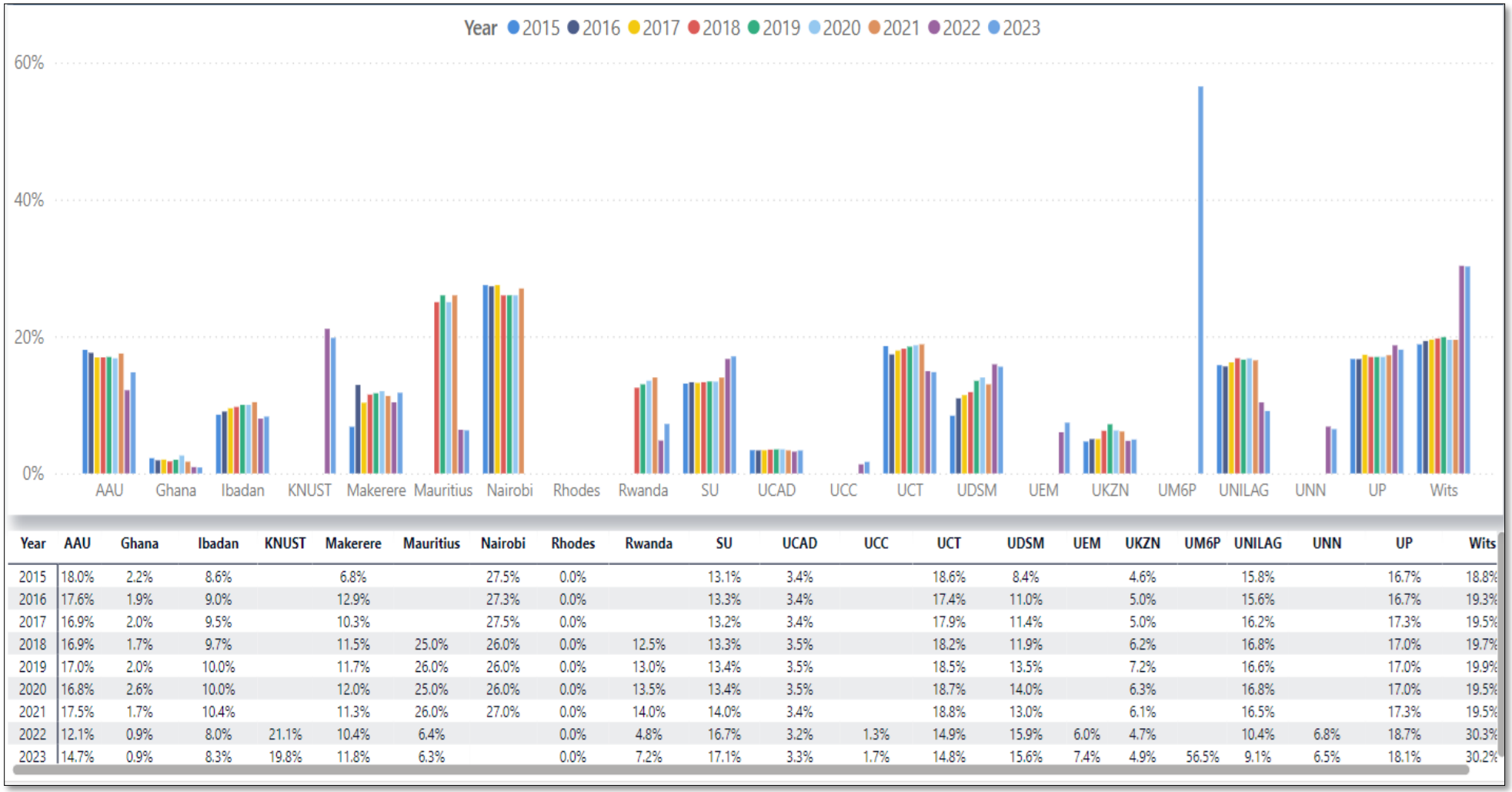
In terms of 2023 enrolment distribution, the top five universities with the highest proportions of enrolments in Engineering and Technology were:

1. UM6P: 56.5%
2. Wits: 30.2%
3. KNUST: 19.8%
4. UP**:** 18.1%
5. SU**:** 17.1%

In terms of improvements compared to 2015, the following universities saw significant growth in their enrolments in Engineering and Technology:

- UDSM: a 80% increase
- Makerere: a 73% increase
- Wits: a 50% increase
- SU: a 30.5% increase
- UP: a 10% increase

Figure 2.8. Master's and doctoral enrolments in Engineering and Technology as a percentage of all master's and doctoral enrolments, 2015 – 2023



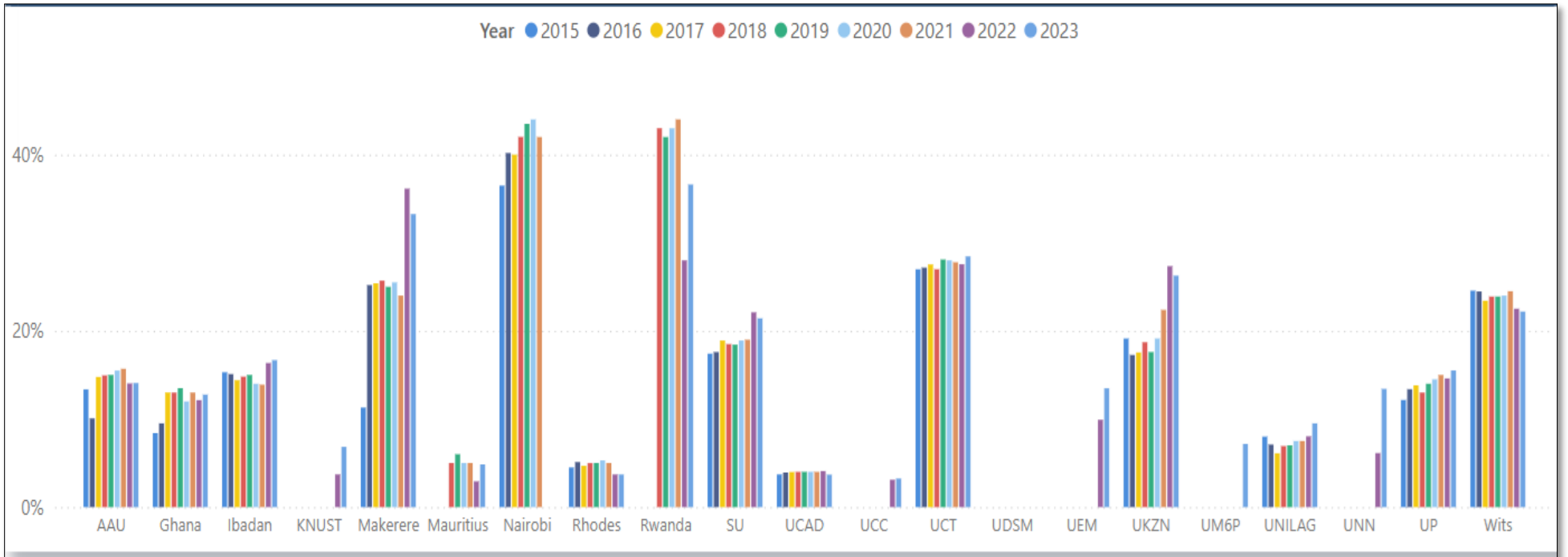
Year	AAU	Ghana	Ibadan	KNUST	Makerere	Mauritius	Nairobi	Rhodes	Rwanda	SU	UCAD	UCC	UCT	UDSM	UEM	UKZN	UM6P	UNILAG	UNN	UP	Wits
2015	18.0%	2.2%	8.6%		6.8%		27.5%	0.0%		13.1%	3.4%		18.6%	8.4%		4.6%		15.8%		16.7%	18.8%
2016	17.6%	1.9%	9.0%		12.9%		27.3%	0.0%		13.3%	3.4%		17.4%	11.0%		5.0%		15.6%		16.7%	19.3%
2017	16.9%	2.0%	9.5%		10.3%		27.5%	0.0%		13.2%	3.4%		17.9%	11.4%		5.0%		16.2%		17.3%	19.5%
2018	16.9%	1.7%	9.7%		11.5%	25.0%	26.0%	0.0%	12.5%	13.3%	3.5%		18.2%	11.9%		6.2%		16.8%		17.0%	19.7%
2019	17.0%	2.0%	10.0%		11.7%	26.0%	26.0%	0.0%	13.0%	13.4%	3.5%		18.5%	13.5%		7.2%		16.6%		17.0%	19.9%
2020	16.8%	2.6%	10.0%		12.0%	25.0%	26.0%	0.0%	13.5%	13.4%	3.5%		18.7%	14.0%		6.3%		16.8%		17.0%	19.5%
2021	17.5%	1.7%	10.4%		11.3%	26.0%	27.0%	0.0%	14.0%	14.0%	3.4%		18.8%	13.0%		6.1%		16.5%		17.3%	19.5%
2022	12.1%	0.9%	8.0%	21.1%	10.4%	6.4%		0.0%	4.8%	16.7%	3.2%	1.3%	14.9%	15.9%	6.0%	4.7%		10.4%	6.8%	18.7%	30.3%
2023	14.7%	0.9%	8.3%	19.8%	11.8%	6.3%		0.0%	7.2%	17.1%	3.3%	1.7%	14.8%	15.6%	7.4%	4.9%	56.5%	9.1%	6.5%	18.1%	30.2%

Medical and Health Sciences

Figure 2.9 illustrates the master's and doctoral enrolments in Medical and Health Sciences as a percentage of all master's and doctoral enrolments from 2015 to 2023. The universities are categorised into three clusters based on their 2023 enrolment data, as follows:

- **Cluster 1**: Universities with less than 10% of their master's and doctoral enrolments in Medical and Health Sciences in 2023: UG and UDSM.
- **Cluster 2**: Universities with 10% to 15% of their master's and doctoral enrolments in Medical and Health Sciences in 2023: SU, UCC, UEM, UKZN, UNILAG, and UNN.
- **Cluster 3**: Universities with more than 15% of their master's and doctoral enrolments in Medical and Health Sciences in 2023: AAU, Ibadan, KNUST, Makerere, Mauritius, Nairobi, Rhodes, Rwanda, UCAD, UCT, UM6P, UP, and Wits.

Figure 2.9. Master's and doctoral enrolments in Medical and Health Sciences, as a percentage of all master's and doctoral enrolments, 2015 – 2023



Year	AAU	Ghana	Ibadan	KNUST	Makerere	Mauritius	Nairobi	Rhodes	Rwanda	SU	UCAD	UCC	UCT	UDSM	UEM	UKZN	UM6P	UNILAG	UNN	UP	Wits
2015	13.4%	8.4%	15.3%		11.3%		36.5%	4.5%		17.4%	3.7%		27.0%	0.0%		19.1%		8.0%		12.2%	24.6%
2016	10.1%	9.5%	15.1%		25.2%		40.2%	5.1%		17.6%	3.9%		27.2%	0.0%		17.3%		7.1%		13.4%	24.5%
2017	14.8%	13.0%	14.4%		25.4%		40.0%	4.7%		18.9%	4.0%		27.5%	0.0%		17.6%		6.1%		13.8%	23.4%
2018	14.9%	13.0%	14.8%		25.7%	5.0%	42.0%	5.0%	43.0%	18.5%	4.0%		27.0%	0.0%		18.7%		6.9%		13.0%	23.9%
2019	15.0%	13.5%	15.0%		25.0%	6.0%	43.5%	5.0%	42.0%	18.4%	4.0%		28.1%	0.0%		17.6%		7.0%		14.0%	23.9%
2020	15.5%	12.0%	14.0%		25.5%	5.0%	44.0%	5.3%	43.0%	18.9%	4.0%		28.0%	0.0%		19.1%		7.5%		14.5%	24.0%
2021	15.7%	13.0%	13.9%		24.0%	5.0%	42.0%	5.0%	44.0%	19.0%	4.0%		27.8%	0.0%		22.4%		7.5%		15.0%	24.5%
2022	14.0%	12.1%	16.4%	3.7%	36.1%	2.9%		3.7%	28.0%	22.1%	4.1%	3.1%	27.6%	0.0%	9.9%	27.3%		8.0%	6.1%	14.6%	22.5%
2023	14.1%	12.8%	16.7%	6.8%	33.3%	4.8%		3.7%	36.6%	21.4%	3.7%	3.2%	28.5%	0.0%	13.5%	26.3%	7.2%	9.5%	13.4%	15.5%	22.2%

In 2023, the top five universities with the highest proportions of enrolments in Medical and Health Sciences were:

1. Rwanda: 36.6%
2. Makerere: 33.3%
3. UCT: 28.5%
4. UKZN: 26.3%
5. Wits: 22.2%

In terms of improvements since 2015, the following universities have shown notable increases in their enrolments in the Medical and Health Sciences:

- UG: a 53% increase
- UKZN: a 38% increase
- Makerere: a 32% increase
- UP: a 27% increase
- SU: a 23% increase

Agricultural Sciences

Figure 2.10 illustrates master's and doctoral enrolments in Agricultural Sciences as a percentage of all master's and doctoral enrolments from 2015 to 2023. The universities are categorised into three clusters based on their 2023 enrolment data, as follows:

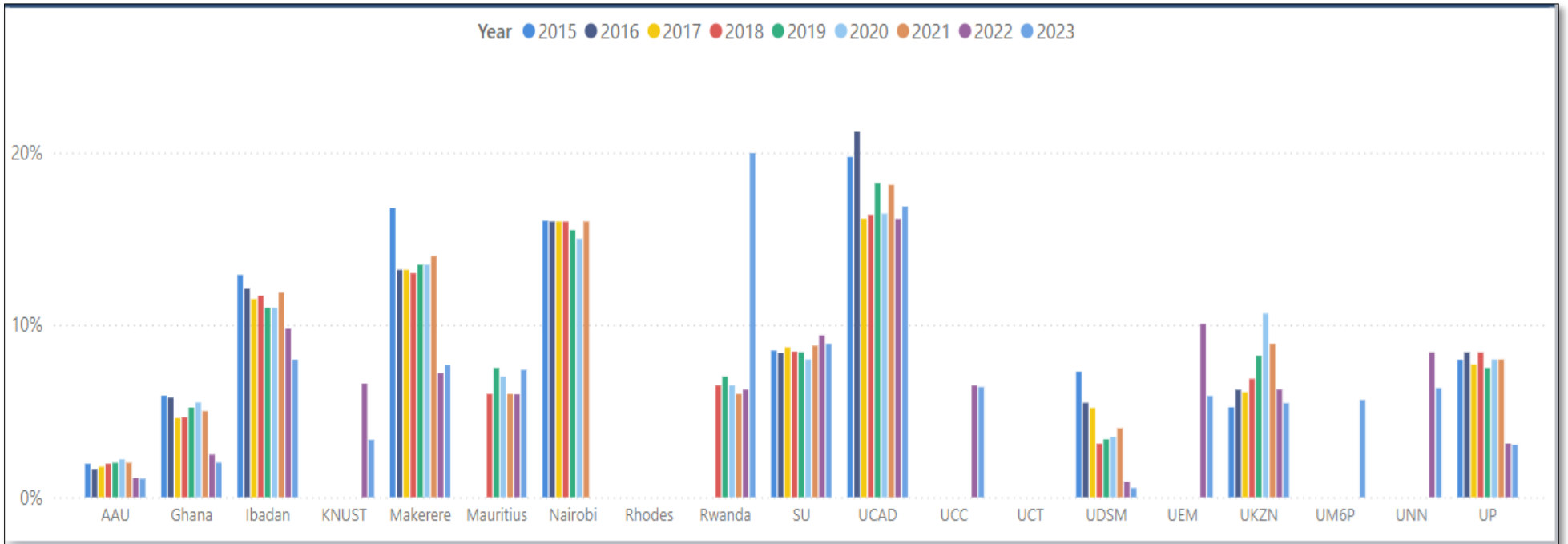
- **Cluster 1**: Universities with less than 5% of master's and doctoral enrolments in Agricultural Sciences in 2023: AAU, Ghana, KNUST, UDSM, and UP.
- **Cluster 2**: Universities with 5% to 10% of their master's and doctoral enrolments in Agricultural Sciences in 2023: Ibadan, Makerere, Mauritius, SU, UCC, UEM, UKZN, UM6P, and UNN.
- **Cluster 3**: Universities with more than 10% of total enrolments in Agricultural Sciences in 2023: Nairobi, Rwanda and UCAD.

In 2023, the top five universities with the highest proportions of enrolments in Agricultural Sciences were:

1. Rwanda: 20%
2. UCAD: 16.9%
3. SU: 8.9%
4. Ibadan: 8%
5. Makerere: 7.7%

A significant trend observed across many universities is the decline in the proportion of postgraduate enrolments in Agricultural Sciences compared to 2015.

Figure 2. 10. Master's and doctoral enrolments in Agricultural Sciences as a percentage of all master's and doctoral enrolments, 2015 – 2023



Year	AAU	Ghana	Ibadan	KNUST	Makerere	Mauritius	Nairobi	Rhodes	Rwanda	SU	UCAD	UCC	UCT	UDSM	UEM	UKZN	UM6P	UNN	UP
2015	1.9%	5.9%	12.9%		16.8%		16.1%	0.0%		8.5%	19.8%		0.0%	7.3%		5.2%			8.0%
2016	1.6%	5.8%	12.1%		13.2%		16.0%	0.0%		8.4%	21.2%		0.0%	5.5%		6.2%			8.4%
2017	1.8%	4.6%	11.5%		13.2%		16.0%	0.0%		8.7%	16.2%		0.0%	5.2%		6.1%			7.7%
2018	1.9%	4.6%	11.7%		13.0%	6.0%	16.0%	0.0%	6.5%	8.4%	16.4%		0.0%	3.1%		6.9%			8.4%
2019	2.0%	5.2%	11.0%		13.5%	7.5%	15.5%	0.0%	7.0%	8.4%	18.2%		0.0%	3.4%		8.2%			7.5%
2020	2.2%	5.5%	11.0%		13.5%	7.0%	15.0%	0.0%	6.5%	8.0%	16.5%		0.0%	3.5%		10.7%			8.0%
2021	2.0%	5.0%	11.9%		14.0%	6.0%	16.0%	0.0%	6.0%	8.8%	18.1%		0.0%	4.0%		8.9%			8.0%
2022	1.1%	2.5%	9.8%	6.6%	7.2%	6.0%		0.0%	6.3%	9.4%	16.2%	6.5%	0.0%	0.9%	10.1%	6.3%		8.4%	3.1%
2023	1.1%	2.0%	8.0%	3.3%	7.7%	7.4%		0.0%	20.0%	8.9%	16.9%	6.4%	0.0%	0.5%	5.9%	5.5%	5.6%	6.3%	3.0%

Social Sciences

Figure 2.11 illustrates the master's and doctoral enrolments in Social Sciences as a percentage of all master's and doctoral enrolments from 2015 to 2023. The universities are categorised into three clusters based on their 2023 enrolment data, as follows:

- **Cluster 1**: Universities with less than 10% of master's and doctoral enrolments in Social Sciences in 2023: Rwanda.
- **Cluster 2**: Universities with 10% to 15% of total enrolments in Social Sciences in 2023: AAU, Mauritius, KNUST, Makerere, Nairobi, Rhodes, UCT, UP, and Wits.
- **Cluster 3**: Universities with more than 15% of total enrolments in Social Sciences in 2023: UG, Ibadan, UCAD, UCC, UDSM, UEM, UNILAG, and UNN.

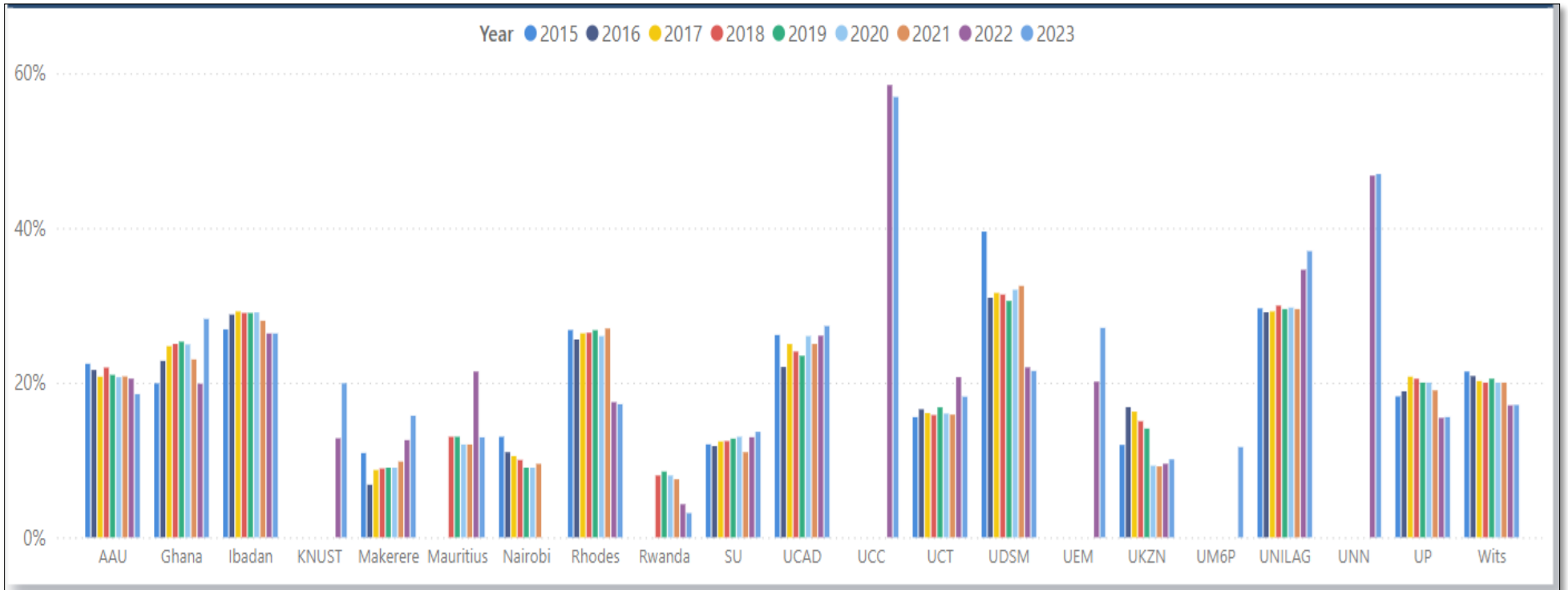
In 2023, the top five universities with the highest proportions of enrolments in Social Sciences were:

1. UCC: 56.9%
2. UNN: 47%
3. UNILAG: 37%
4. UG: 28.2%
5. UCAD: 27.3%

In terms of improvements compared to 2015, several universities have shown notable growth in their Social Sciences enrolments:

- UG: a 41% increase.
- Makerere: a 44% increase.
- SU: a 13% increase.
- UCAD: a 4.5% increase.
- UCT: a 17.5% increase.
- UNILAG: a 25% increase.

Figure 2.11. Master's and doctoral enrolments in Social Sciences as a percentage of all master's and doctoral enrolments, 2015 – 2023



Year	AAU	Ghana	Ibadan	KNUST	Makerere	Mauritius	Nairobi	Rhodes	Rwanda	SU	UCAD	UCC	UCT	UDSM	UEM	UKZN	UM6P	UNILAG	UNN	UP	Wits
2015	22.4%	19.9%	26.9%		10.9%		13.0%	26.8%		12.0%	26.2%		15.5%	39.5%		11.9%		29.6%		18.2%	21.4%
2016	21.6%	22.8%	28.8%		6.8%		11.0%	25.6%		11.8%	22.0%		16.6%	31.0%		16.8%		29.1%		18.9%	20.9%
2017	20.8%	24.7%	29.2%		8.7%		10.5%	26.4%		12.4%	25.0%		16.1%	31.6%		16.2%		29.2%		20.8%	20.2%
2018	21.9%	25.0%	29.0%		8.9%	13.0%	10.0%	26.4%	8.0%	12.4%	24.0%		15.8%	31.4%		15.0%		30.0%		20.5%	20.0%
2019	21.0%	25.3%	29.0%		9.0%	13.0%	9.0%	26.8%	8.5%	12.8%	23.5%		16.8%	30.6%		14.1%		29.5%		20.0%	20.5%
2020	20.7%	24.9%	29.1%		9.0%	12.0%	9.0%	26.0%	8.0%	13.0%	26.0%		16.0%	32.0%		9.3%		29.7%		20.0%	20.0%
2021	20.8%	23.0%	28.0%		9.8%	12.0%	9.5%	27.0%	7.5%	11.0%	25.0%		15.9%	32.5%		9.2%		29.5%		19.0%	20.0%
2022	20.5%	19.9%	26.4%	12.8%	12.6%	21.4%		17.5%	4.3%	12.9%	26.1%	58.5%	20.7%	22.0%	20.1%	9.5%		34.6%	46.8%	15.4%	17.1%
2023	18.5%	28.2%	26.4%	19.9%	15.7%	12.9%		17.2%	3.1%	13.6%	27.3%	56.9%	18.2%	21.5%	27.1%	10.1%	11.7%	37.0%	47.0%	15.5%	17.1%

Humanities

Figure 2.12 illustrates the master's and doctoral enrolments in Humanities as a percentage of all master's and doctoral enrolments from 2015 to 2023. The universities are categorised into three clusters based on their 2023 enrolment data, as follows:

- **Cluster 1**: Universities with less than 10% of their total enrolments in Humanities in 2023: UG, KNUST, Makerere, Mauritius, Nairobi, UCC, UCT, UNILAG, UNN, and Wits.
- **Cluster 2**: Universities with 10% to 15% of total enrolments in Humanities in 2023: AAU, Ibadan, Rwanda, SU, UEM, and UP.
- **Cluster 3**: Universities with more than 15% of total enrolments in Humanities in 2023: Rhodes, UCAD, UDSM, and UKZN.

In 2023, the top five universities with the highest proportions of enrolments in Humanities were:

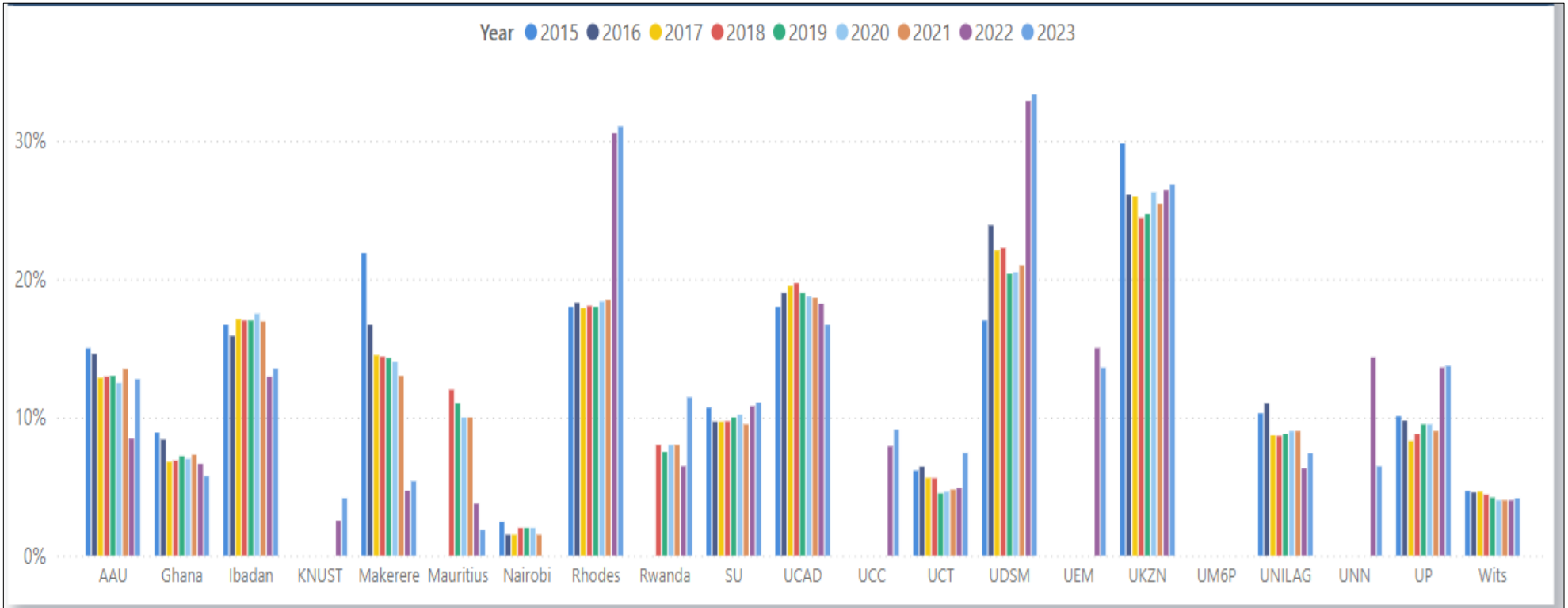
1. UDSM: 33.4%
2. Rhodes: 31.1%
3. UKZN: 26.8%
4. UCAD: 16.7%
5. UP: 13.7%

In terms of improvements compared to 2015, several universities have made notable gains in their Humanities enrolments:

- Rhodes: a 70% increase.
- Rwanda: a 37.5% increase.
- UP: a 36% increase.
- UCT: a 19.5% increase.
- SU: a 4% increase.

However, AAU, UG, Ibadan, Makerere, UKZN, and Wits experienced a decline in their Humanities enrolments when compared to 2015.

Figure 2.12. Master's and doctoral enrolments in Humanities as a percentage of all master's and doctoral enrolments, 2015 – 2023



Year	AAU	Ghana	Ibadan	KNUST	Makerere	Mauritius	Nairobi	Rhodes	Rwanda	SU	UCAD	UCC	UCT	UDSM	UEM	UKZN	UM6P	UNILAG	UNN	UP	Wits
2015	15.0%	8.9%	16.7%		21.9%		2.4%	18.0%		10.7%	18.0%		6.2%	17.0%		29.8%		10.3%		10.1%	4.7%
2016	14.6%	8.4%	15.9%		16.7%		1.5%	18.3%		9.7%	19.0%		6.4%	23.9%		26.1%		11.0%		9.8%	4.6%
2017	12.9%	6.8%	17.1%		14.5%		1.5%	17.9%		9.7%	19.5%		5.6%	22.1%		26.0%		8.7%		8.3%	4.6%
2018	12.9%	6.9%	17.0%		14.4%	12.0%	2.0%	18.1%	8.0%	9.7%	19.7%		5.6%	22.3%		24.4%		8.7%		8.8%	4.4%
2019	13.0%	7.2%	17.0%		14.3%	11.0%	2.0%	18.0%	7.5%	10.0%	19.0%		4.5%	20.4%		24.7%		8.8%		9.5%	4.2%
2020	12.5%	7.0%	17.5%		14.0%	10.0%	2.0%	18.4%	8.0%	10.2%	18.7%		4.6%	20.5%		26.3%		9.0%		9.5%	4.0%
2021	13.5%	7.3%	16.9%		13.0%	10.0%	1.5%	18.5%	8.0%	9.5%	18.6%		4.8%	21.0%		25.5%		9.0%		9.0%	4.0%
2022	8.5%	6.6%	12.9%	2.5%	4.7%	3.8%		30.6%	6.5%	10.8%	18.2%	7.9%	4.9%	32.9%	15.0%	26.4%		6.3%	14.3%	13.6%	4.0%
2023	12.8%	5.7%	13.5%	4.2%	5.4%	1.9%		31.1%	11.4%	11.1%	16.7%	9.1%	7.4%	33.4%	13.6%	26.8%	0.0%	7.4%	6.5%	13.7%	4.2%

Business, Economics, and Management

Figure 2.13 illustrates the master's and doctoral enrolments in Business, Economics, and Management Studies as a percentage of all master's and doctoral enrolments from 2015 to 2023. The universities are categorised into three clusters based on their 2023 enrolment data, as follows:

- **Cluster 1**: Universities with less than 10% of their total enrolments in Business, Economics, and Management Studies in 2023: Nairobi, Rwanda, UM6P, UNN, and Wits.
- **Cluster 2**: Universities with 10% to 15% of master's and doctoral enrolments in Business, Economics, and Management Studies in 2023: Ibadan, Makerere, SU, UCC, and UP.
- **Cluster 3**: Universities with more than 15% of total enrolments in Business, Economics, and Management Studies in 2023: AAU, UG, KNUST, Mauritius, Rhodes, UCAD, UCT, UDSM, UKZN, UEM, UP, and UNILAG.

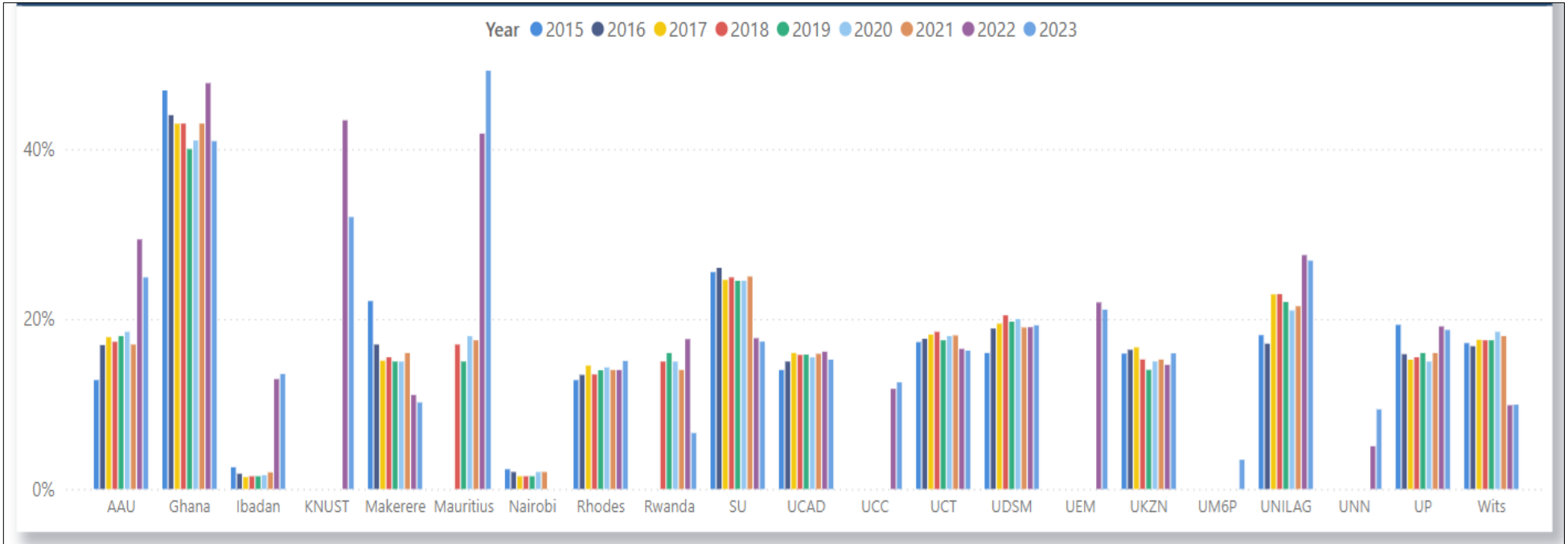
In 2023, the top five universities with the highest proportion of enrolments in Business, Economics, and Management Studies were:

1. Mauritius: 49.2%
2. UNILAG: 26.9%
3. UG: 40.9%
4. KNUST: 32%
5. AAU: 24.9%

In terms of improvements since 2015, the following universities saw notable growth:

- UNILAG: a 49% increase.
- UDSM: a 21% increase.
- Rhodes: a 18% increase.
- UCAD: a 10% increase.

Figure 2.13. Master's and doctoral enrolments in Business, Economics and Management Studies as a percentage of all master's and doctoral enrolments, 2015 – 2023



Year	AAU	Ghana	Ibadan	KNUST	Makerere	Mauritius	Nairobi	Rhodes	Rwanda	SU	UCAD	UCC	UCT	UDSM	UEM	UKZN	UM6P	UNILAG	UNN	UP	Wits
2015	12.8%	46.9%	2.6%		22.1%		2.3%	12.8%		25.5%	14.0%		17.3%	16.0%		15.9%		18.1%		19.3%	17.2%
2016	16.9%	44.0%	1.8%		17.0%		2.0%	13.4%		26.0%	15.0%		17.7%	18.9%		16.4%		17.1%		15.9%	16.8%
2017	17.9%	43.0%	1.4%		15.1%		1.5%	14.5%		24.6%	16.0%		18.2%	19.5%		16.7%		22.9%		15.2%	17.6%
2018	17.3%	43.0%	1.5%		15.5%	17.0%	1.5%	13.5%	15.0%	24.9%	15.8%		18.5%	20.4%		15.2%		22.9%		15.5%	17.5%
2019	18.0%	40.0%	1.5%		15.0%	15.0%	1.5%	14.0%	16.0%	24.5%	15.8%		17.5%	19.7%		14.0%		22.0%		16.0%	17.5%
2020	18.5%	41.0%	1.6%		15.0%	18.0%	2.0%	14.3%	15.0%	24.5%	15.5%		18.0%	20.0%		15.0%		21.0%		15.0%	18.5%
2021	17.0%	43.0%	2.0%		16.0%	17.5%	2.0%	14.0%	14.0%	25.0%	15.9%		18.1%	19.0%		15.2%		21.5%		16.0%	18.0%
2022	29.4%	47.8%	12.9%	43.4%	11.1%	41.8%		14.0%	17.6%	17.7%	16.2%	11.8%	16.5%	19.0%	22.0%	14.6%		27.5%	5.0%	19.1%	9.9%
2023	24.9%	40.9%	13.5%	32.0%	10.2%	49.2%		15.1%	6.6%	17.3%	15.2%	12.5%	16.3%	19.3%	21.1%	16.0%	3.4%	26.9%	9.4%	18.7%	9.9%

2.3.2 Student Data by Gender

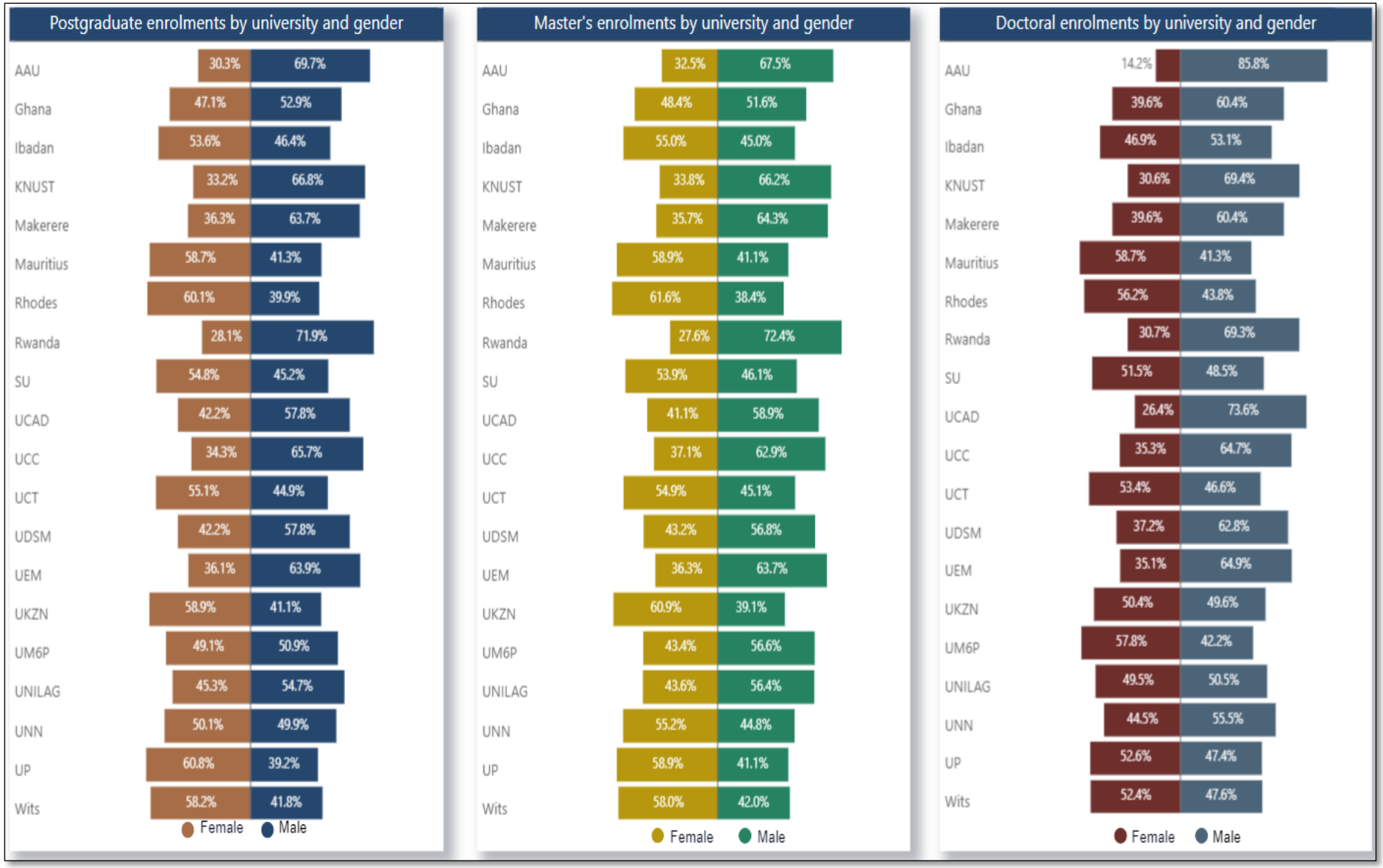
Figure 2.14 provides an overview of postgraduate (PG), master's, and doctoral enrolments by university and gender, with the top figure (Panel A) representing data from 2015 and the bottom figure Panel B) representing data from 2023. The universities are grouped into three clusters based on their gender distribution in 2023, providing a clear view of trends in gender representation in postgraduate education. The clusters are as follows:

- **Cluster 1** (female majority in 2023)
- **Cluster 2** (male majority in 2023)
- **Cluster 3** (balanced in 2023)

Figure 2.14. Postgraduate, Master's and Doctoral enrolments by gender, 2015 – 2023

Panel A (2015)

Panel B (2023)


Postgraduate enrolments by university and gender
AAU 30.3% 69.7%
Ghana 47.1% 52.9%
Ibadan 53.6% 46.4%
KNUST 33.2% 66.8%
Makerere 36.3% 63.7%
Mauritius 58.7% 41.3%
Rhodes 60.1% 39.9%
Rwanda 28.1% 71.9%
SU 54.8% 45.2%
UCAD 42.2% 57.8%
UCC 34.3% 65.7%
UCT 55.1% 44.9%
UDSM 42.2% 57.8%
UEM 36.1% 63.9%
UKZN 58.9% 41.1%
UM6P 49.1% 50.9%
UNILAG 45.3% 54.7%
UNN 50.1% 49.9%
UP 60.8% 39.2%
Wits 58.2% 41.8%
Female Male
Master's enrolments by university and gender
AAU 32.5% 67.5%
Ghana 48.4% 51.6%
Ibadan 55.0% 45.0%
KNUST 33.8% 66.2%
Makerere 35.7% 64.3%
Mauritius 58.9% 41.1%
Rhodes 61.6% 38.4%
Rwanda 27.6% 72.4%
SU 53.9% 46.1%
UCAD 41.1% 58.9%
UCC 37.1% 62.9%
UCT 54.9% 45.1%
UDSM 43.2% 56.8%
UEM 36.3% 63.7%
UKZN 60.9% 39.1%
UM6P 43.4% 56.6%
UNILAG 43.6% 56.4%
UNN 55.2% 44.8%
UP 58.9% 41.1%
Wits 58.0% 42.0%
Female Male
Doctoral enrolments by university and gender
AAU 14.2% 85.8%
Ghana 39.6% 60.4%
Ibadan 46.9% 53.1%
KNUST 30.6% 69.4%
Makerere 39.6% 60.4%
Mauritius 58.7% 41.3%
Rhodes 56.2% 43.8%
Rwanda 30.7% 69.3%
SU 51.5% 48.5%
UCAD 26.4% 73.6%
UCC 35.3% 64.7%
UCT 53.4% 46.6%
UDSM 37.2% 62.8%
UEM 35.1% 64.9%
UKZN 50.4% 49.6%
UM6P 57.8% 42.2%
UNILAG 49.5% 50.5%
UNN 44.5% 55.5%
UP 52.6% 47.4%
Wits 52.4% 47.6%
Female Male

Postgraduate enrolments by gender

For overall postgraduate enrolments, Cluster 1 (female majority) includes universities such as Ibadan, Mauritius, Rhodes, SU, UCT, UKZN, UP, and Wits. These institutions have a greater proportion of female students enrolled in postgraduate programmes. Cluster 2 (male majority) includes AAU, UG, KNUST, Nairobi, UEM, Makerere, Rwanda, UCAD, UCC, UDSM, and UNILAG, where the male enrolment figures outnumber the female enrolments. Cluster 3 (balanced) is represented by UNN and UM6P, with a relatively equal gender distribution in their postgraduate student populations.

In terms of improvements in female representation since 2015, Rhodes saw a notable increase of 7.1%, Wits by 6.2%, UNILAG by 5%, UKZN by 4.4%, SU by 4.3%, UP by 3.7%, and UDSM by 2.7%. Conversely, Makerere and UCAD experienced a decline in female representation during this period, indicating a potential challenge in ensuring gender parity in these institutions.

Master's enrolments by gender

For master's enrolments, Cluster 1 (female majority) includes universities like Ibadan, Mauritius, Rhodes, SU, UCT, UKZN, UNN, UP, and Wits, which show higher female representation at the master's level. Cluster 2 consists of AAU, UG, UEM, Ibadan, KNUST, UNILAG, Makerere, Rwanda, UCAD, UCC, UDSM, UEM, Nairobi, and UM6P, where male enrolments tend to dominate.

In terms of improvements in female representation since 2015, Ibadan recorded a notable increase of 13%, followed by AAU with a 12.5% improvement, Rhodes with 9.6%, and UP and SU both with an 8% increase. Other universities that made progress include UCT (7.5%), Wits (7%), UKZN (6%), UDSM (5%), and UNILAG (3.6%). UG saw a smaller increase of 1%. However, Makerere and UCAD again experienced a decline in female representation over the same period, which is a point of concern for these institutions in terms of gender inclusivity at the master's level.

Doctoral enrolments by gender

For doctoral enrolments, Cluster 1 (female majority) includes universities such as Mauritius, Rhodes, SU, UCT, UM6P, UP, and Wits. These universities have successfully increased female participation at the doctoral level, which is often seen as an indicator of both research strength and gender equity in advanced academic programmes. Cluster 2 consists of AAU, UEM, UG, Ibadan, KNUST, Makerere, Rwanda, Nairobi, UCAD, UCC, UDSM, UEM, and UNN, where male doctoral students outnumber their female counterparts. Finally, Cluster 3 comprises UNILAG and UKZN where there is near 1:1 gender parity.

In terms of improvements in female representation since 2015, UKZN showed the most substantial increase of 11.4%, followed by Ibadan with a 9.9% improvement and Makerere with 8.6%. Rhodes and UP saw increase of 7.7% and 7.6%, respectively, while SU showed a 7% increase. Other universities that made notable progress include UCAD (6.9%), UDSM (2%), UCT (4.4%), and AAU (4.2%).

2.4 Graduates by Qualification Type

Figure 2.15 illustrates the distribution of student graduates by qualification type and gender. For Case 1 universities for whom historical data exists, the following trends are observed:

- **Undergraduate graduates**: The number of female graduates has increased from 22,000 in 2015 to 24,900 in 2023 (representing a 13.5% increase).
- **PG lower than master's graduates**: Female graduates in this category have decreased slightly, from 9,700 in 2015 to 9,200 in 2023 (representing a 5.5% decline).
- **Master's graduates**: There has been a significant increase in female graduates, from 11,300 in 2015 to 14,400 in 2023 (representing a 27.5% increase).
- **Doctoral graduates**: Female doctoral graduates have increased from 1,100 in 2015 to 1,400 in 2023 (representing a 28% increase).

These trends show that the gender gap in the number of female graduates has narrowed in Phase III, with improvements across all qualification levels, except for the PG lower than master's category, where female graduate numbers have slightly decreased.

For Case 2, which includes the six universities with data only for Phase III, the distribution of female graduates is as follows:

1. **Undergraduate graduates**: The number of female graduates stood at 4,640 (49%) compared to 4,800 male graduates (51%) in 2023.
2. **PG lower than master's graduates**: Female graduates in this category stand at 1,690 (53%) compared to 1,510 male graduates (47%) in 2023.
3. **Master's graduates**: Female master's graduates stood at 2,280 (70%) compared to 1,000 male graduates (30%) in 2023.
4. **Doctoral graduates**: Female doctoral graduates stood at 671 (23%) compared to 2,270 male graduates (77%) in 2023.

In 2023, the top five universities with the highest number of female graduates were:

1. KNUST: 19,200 graduates
2. UP: 14,300 graduates
3. UG: 13,900 graduates
4. UNILAG: 13,600 graduates
5. Makerere: 13,200 graduates

Overall trends in graduation numbers show significant increases:

- Undergraduate graduates - The total number of undergraduate graduates increased from 44,400 in 2015 to 47,080 in 2023 (6% increase) for Case 1 universities. The total number undergraduate graduate stood at 28,984 in 2023 for Case 2 universities.
- Master's graduates - The total number of master's graduates increased from 25,520 in 2015 to 29,000 in 2023 (14% increase) for Case 1 universities. The total number of master's graduates stood at 3,295 in 2023 for Case 2 universities.

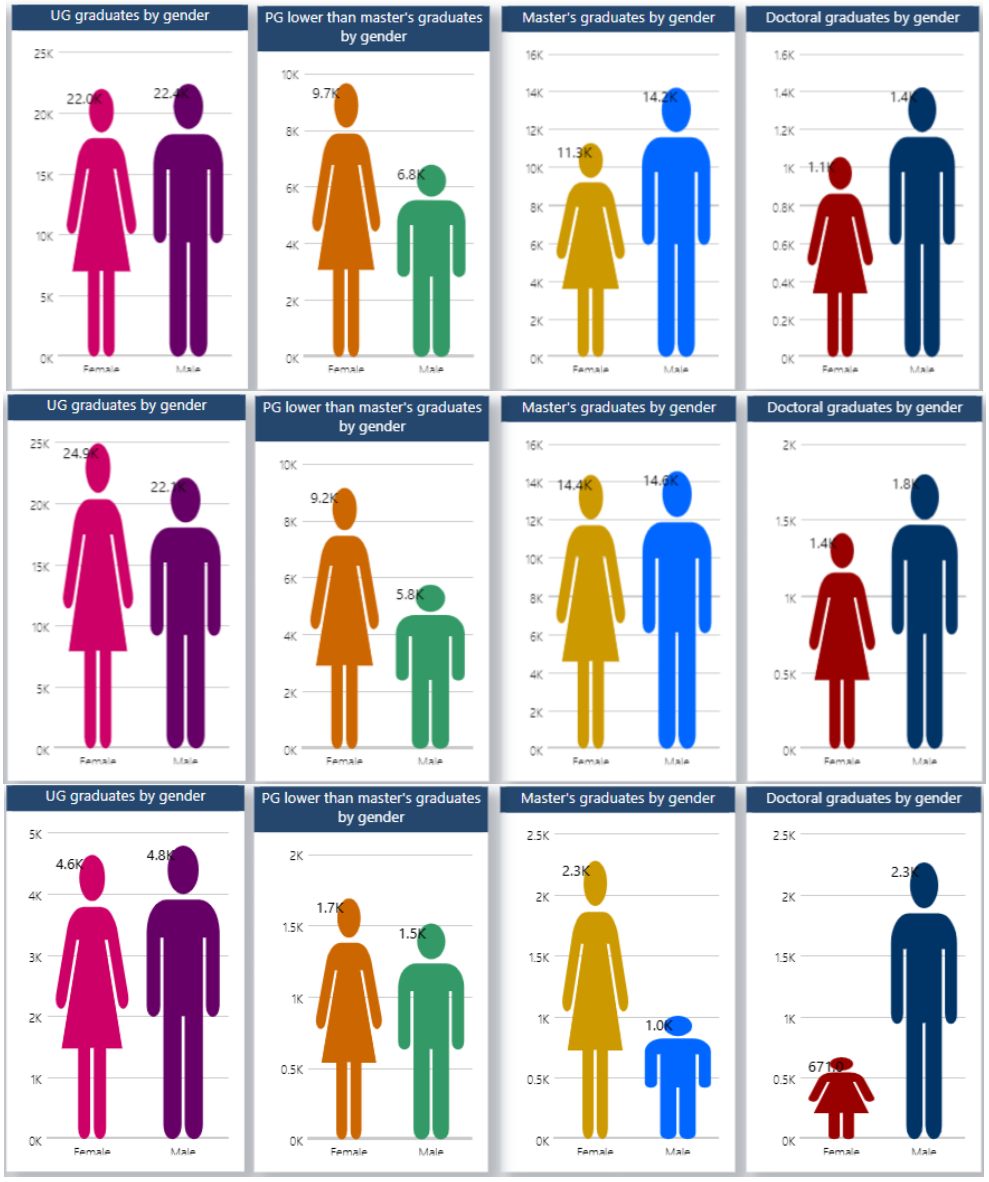
- Doctoral graduates: The total number of doctoral graduates increased from 2,520 in 2015 to 3,220 in 2023 (28% increase) for Case 1. The total number of doctoral graduates stood at 2,940 in 2023 for Case 2.

Figure 2.15. Student graduates by qualification type and gender, 2015 vs. 2023

2015

Case 1 universities: 2023

Case 2 universities: 2023



Postgraduate graduates by university and year

Figure 2.16 illustrates postgraduate (PG) graduates as a percentage of total graduates by university and year (2015 vs. 2023). In 2023, the distribution of PG graduates by qualification type shows the following trends:

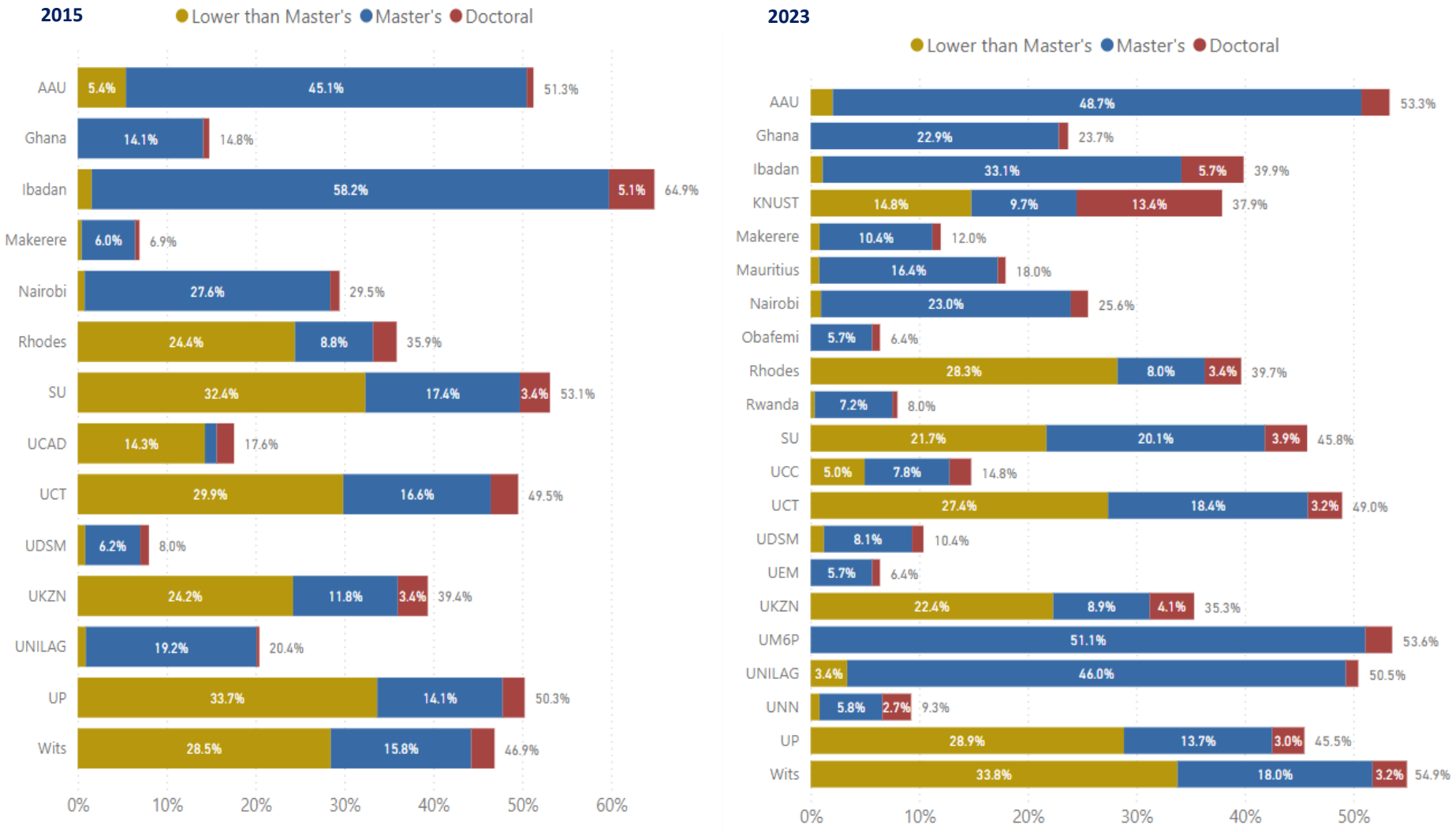
- **PG lower than master's**: The top five universities with the highest number of PG lower than master's graduates in 2023 were: Wits (33.8%), UP (28.9%), Rhodes (28.3%), UCT (27.4%), and UKZN (22.4%).

- **Master's graduates**: The top five universities with the highest number of master's graduates in 2023 were: UM6P (51.1%), AAU (48.7%), UNILAG (46%), Ibadan (33.1%), and Nairobi (23%).
- **Doctoral graduates**: The top universities in 2023 were: KNUST (13.4%), Ibadan (5.7%), UKZN (4.1%), SU (3.9%), and Rhodes (3.4%).

When comparing these figures to 2015, the rankings for PG graduates at various qualification levels shift as follows:

- **PG lower than master's**: In 2015, the top five universities with the highest number of PG lower than master's graduates were: UP (33.7%), SU (32.4%), UCT (29.9%), Wits (28.5%), and Rhodes (24.4%).
- **Master's graduates**: In 2015, the top five universities with the highest proportion of master's graduates in 2015 were: Ibadan (58.2%), AAU (45.1%), Nairobi (27.6%), UNILAG (19.2%), and SU (17.4%).
- **Doctoral graduates**: The top five universities for doctoral graduates in 2015 were: Ibadan (5.1%), SU (3.4%), UKZN (3.4%), UCT (3.1%), and Rhodes and Wits (both at 2.6%).

Figure 2.16. Postgraduate graduates by qualification type and year as percentage of total number of graduates, 2015 vs. 2023



Postgraduate graduates as a percentage of total graduates

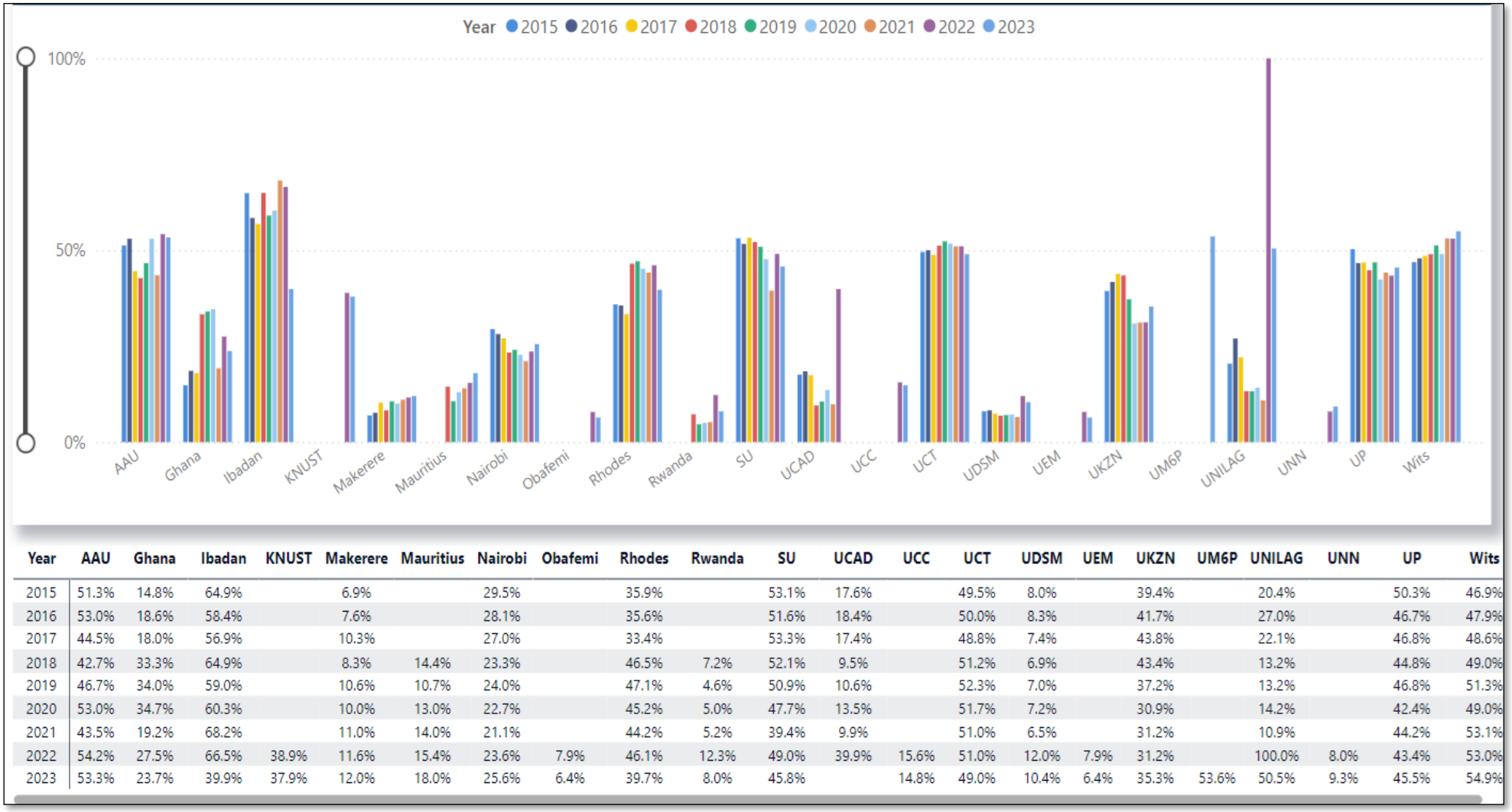
Figure 2.17 illustrates postgraduate (PG) graduates as a percentage of total graduates from 2015 to 2023. To better understand the distribution of postgraduate graduates, we cluster the institutions into three groups based on their 2023 enrolment data:

- **Cluster 1**: Universities with less than 10% of total graduates in postgraduate programmes in 2023. This group includes OAU, Rwanda, UEM, and UNN.
- **Cluster 2**: Universities with 10% to 15% of total graduates in postgraduate programmes in 2023. This group includes UG, Makerere, UCC, and UDSM.
- **Cluster 3**: Universities with more than 30% of total graduates in postgraduate programmes in 2023. This group includes AAU, Ibadan, KNUST, Mauritius, Nairobi, Rhodes, SU, UCAD, UCT, UKZN, UM6P, UNILAG, UP, and Wits.

In terms of improvements in the percentage of postgraduate graduates since 2015, the following universities have seen notable increases: UG (8.9%), Makerere (5.1%), Rhodes (3.7%), UDSM (2.5%), AAU (2%), and Wits (1%).

On the other hand, the following universities experienced a decline in the percentage of postgraduate graduates compared to 2015: Ibadan, Nairobi, SU, UKZN, and UP.

Figure 2.17. Postgraduate graduates as a percentage of all enrolments, 2015 - 2023



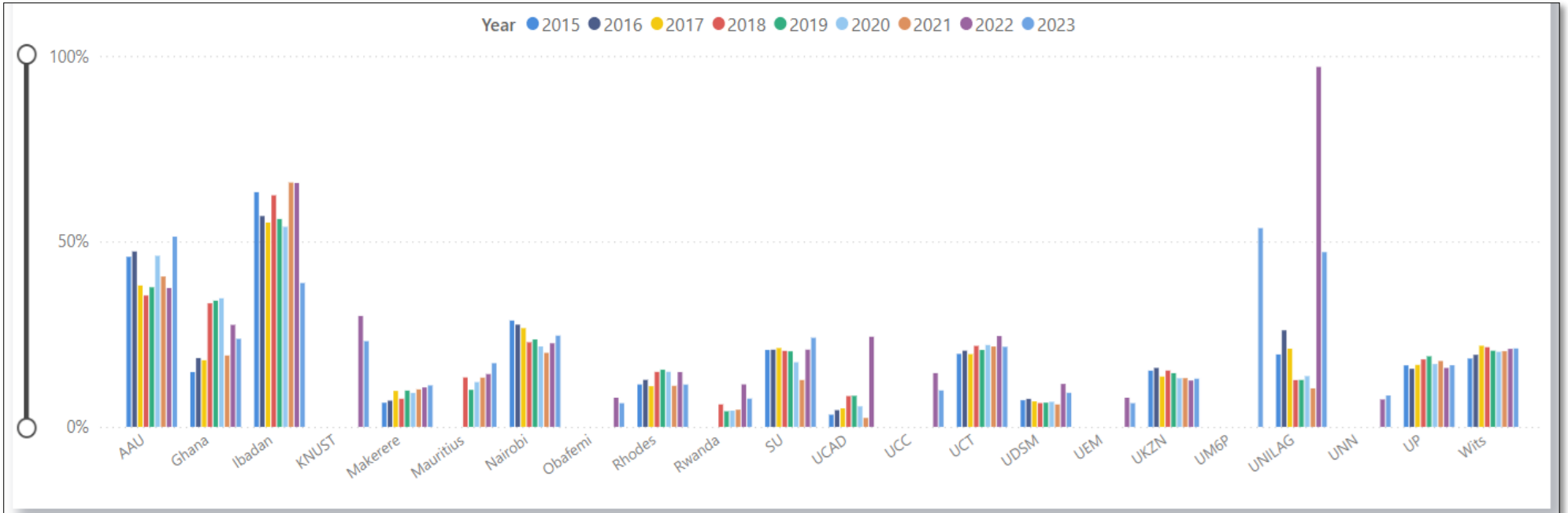
Year	AAU	Ghana	Ibadan	KNUST	Makerere	Mauritius	Nairobi	Obafemi	Rhodes	Rwanda	SU	UCAD	UCC	UCT	UDSM	UEM	UKZN	UM6P	UNILAG	UNN	UP	Wits
2015	51.3%	14.8%	64.9%		6.9%		29.5%		35.9%		53.1%	17.6%		49.5%	8.0%		39.4%		20.4%		50.3%	46.9%
2016	53.0%	18.6%	58.4%		7.6%		28.1%		35.6%		51.6%	18.4%		50.0%	8.3%		41.7%		27.0%		46.7%	47.9%
2017	44.5%	18.0%	56.9%		10.3%		27.0%		33.4%		53.3%	17.4%		48.8%	7.4%		43.8%		22.1%		46.8%	48.6%
2018	42.7%	33.3%	64.9%		8.3%	14.4%	23.3%		46.5%	7.2%	52.1%	9.5%		51.2%	6.9%		43.4%		13.2%		44.8%	49.0%
2019	46.7%	34.0%	59.0%		10.6%	10.7%	24.0%		47.1%	4.6%	50.9%	10.6%		52.3%	7.0%		37.2%		13.2%		46.8%	51.3%
2020	53.0%	34.7%	60.3%		10.0%	13.0%	22.7%		45.2%	5.0%	47.7%	13.5%		51.7%	7.2%		30.9%		14.2%		42.4%	49.0%
2021	43.5%	19.2%	68.2%		11.0%	14.0%	21.1%		44.2%	5.2%	39.4%	9.9%		51.0%	6.5%		31.2%		10.9%		44.2%	53.1%
2022	54.2%	27.5%	66.5%	38.9%	11.6%	15.4%	23.6%	7.9%	46.1%	12.3%	49.0%	39.9%	15.6%	51.0%	12.0%	7.9%	31.2%		100.0%	8.0%	43.4%	53.0%
2023	53.3%	23.7%	39.9%	37.9%	12.0%	18.0%	25.6%	6.4%	39.7%	8.0%	45.8%		14.8%	49.0%	10.4%	6.4%	35.3%	53.6%	50.5%	9.3%	45.5%	54.9%

Masters and Doctoral graduates as a percentage of total graduates

Figure 2.18 illustrates master's and doctoral graduates as a percentage of total graduates from 2015 to 2023. The universities are categorised into three clusters based on their 2023 enrolment data, as follows:

- **Cluster 1**: Universities with less than 10% of total graduates in master's and doctoral programmes in 2023: OAU, Rwanda, UCC, UDSM, UEM, and UNN.
- **Cluster 2**: Universities with 10% to 20% of total graduates in master's and doctoral programmes in 2023: Makerere, Mauritius, Rhodes, UKZN, and UP.
- **Cluster 3**: Universities with more than 20% of total graduates in master's and doctoral programmes in 2023: AAU, UG, Ibadan, KNUST, Nairobi, SU, UCT, UM6P, UNILAG, and Wits.

Figure 2.18. Master's and Doctoral graduates as a percentage of all graduates, 2015 – 2023



Year	AAU	Ghana	Ibadan	KNUST	Makerere	Mauritius	Nairobi	Obafemi	Rhodes	Rwanda	SU	UCAD	UCC	UCT	UDSM	UEM	UKZN	UM6P	UNILAG	UNN	UP	Wits
2015	45.8%	14.8%	63.3%		6.5%		28.7%		11.4%		20.7%	3.3%		19.7%	7.2%		15.2%		19.5%		16.6%	18.4%
2016	47.3%	18.6%	56.8%		7.1%		27.6%		12.7%		20.8%	4.5%		20.5%	7.6%		15.9%		26.0%		15.7%	19.4%
2017	38.1%	18.0%	55.1%		9.7%		26.6%		11.0%		21.3%	5.0%		19.6%	6.9%		13.6%		21.1%		16.7%	21.9%
2018	35.4%	33.3%	62.4%		7.6%	13.3%	22.8%		14.8%	6.1%	20.5%	8.3%		21.8%	6.4%		15.2%		12.6%		18.2%	21.5%
2019	37.6%	34.0%	56.0%		9.8%	10.0%	23.6%		15.4%	4.2%	20.4%	8.4%		20.7%	6.5%		14.5%		12.6%		19.0%	20.5%
2020	46.1%	34.7%	53.9%		9.1%	12.1%	21.7%		14.9%	4.4%	17.4%	5.5%		22.1%	6.8%		13.1%		13.7%		16.9%	20.2%
2021	40.5%	19.2%	65.9%		10.1%	13.3%	20.0%		11.1%	4.6%	12.6%	2.4%		21.7%	6.0%		13.1%		10.4%		17.8%	20.4%
2022	37.4%	27.5%	65.8%	29.9%	10.6%	14.2%	22.5%	7.9%	14.8%	11.5%	20.8%	24.3%	14.5%	24.5%	11.6%	7.9%	12.5%		97.1%	7.4%	15.9%	21.0%
2023	51.3%	23.7%	38.8%	23.1%	11.2%	17.2%	24.6%	6.4%	11.4%	7.6%	24.0%		9.8%	21.6%	9.2%	6.4%	13.0%	53.6%	47.1%	8.4%	16.6%	21.1%

In terms of improvements in the percentage of master's and doctoral graduates since 2015, the following universities have seen the most notable increases: UG (19%), AAU (5.5%), Makerere (4.7%), SU (3.3%), Wits (2.7%), UDSM (2%), and UCT (2%).

Meanwhile, the following universities experienced a decline in the percentage of master's and doctoral graduates compared to 2015: Ibadan, Nairobi, and UKZN.

Master's graduates as a percentage of total graduates

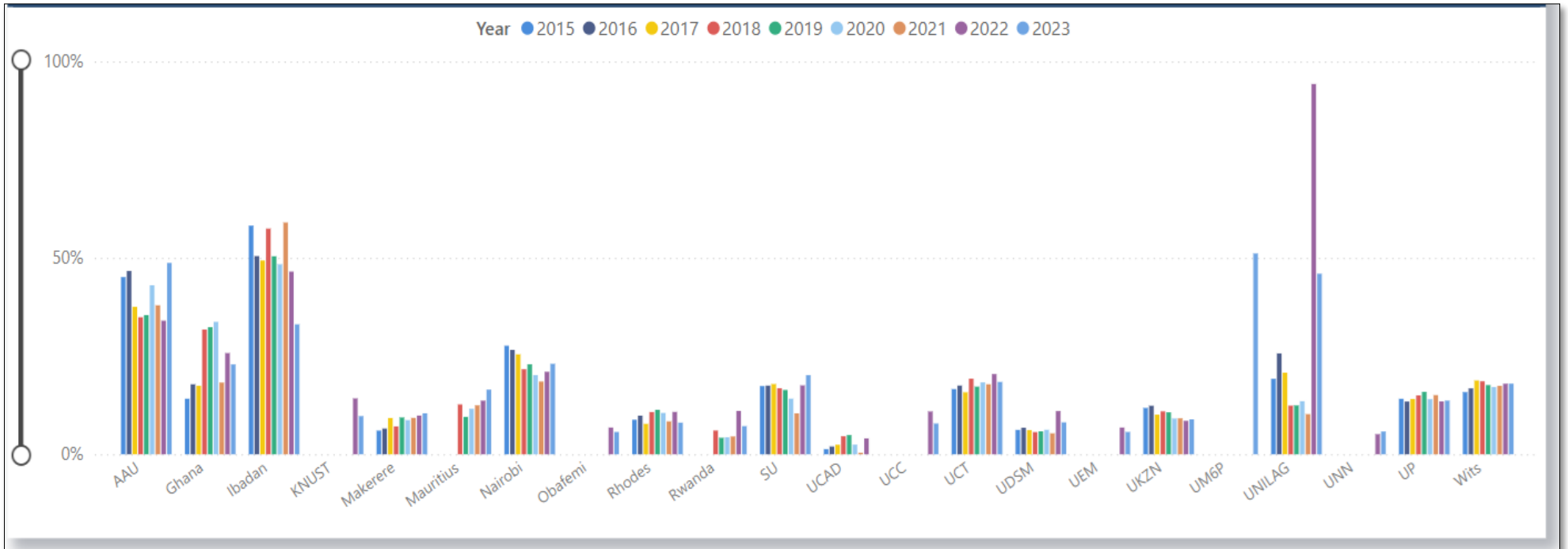
Figure 2.19 illustrates master's graduates as a percentage of total graduates from 2015 to 2023. The universities are categorised into three clusters based on their 2023 enrolment data, as follows:

- **Cluster 1**: Universities with less than 10% of total graduates in master's programmes in 2023. This group includes KNUST, OAU, Rhodes, Rwanda, UCC, UDSM, UEM, UKZN, and UNN.
- **Cluster 2**: Universities with 10% to 15% of total graduates in master's programmes in 2023. This group includes Makerere, and UP.
- **Cluster 3**: Universities with more than 20% of total graduates in master's programmes in 2023. This group includes AAU, UG, Ibadan, Mauritius, Nairobi, SU, UCT, UM6P, UNILAG, and Wits.

In terms of improvements since 2015, the following universities saw the largest increases in the percentage of master's graduates: UDSM (31%), SU (15.5%), Wits (14%), UCT (11%), and AAU (8%).

However, the following universities experienced a decline in the percentage of master's graduates compared to 2015: Ibadan, Nairobi, Rhodes, UKZN, and UP.

Figure 2.19. Master's graduates as a percentage of all graduates, 2015 – 2023



Year	AAU	Ghana	Ibadan	KNUST	Makerere	Mauritius	Nairobi	Obafemi	Rhodes	Rwanda	SU	UCAD	UCC	UCT	UDSM	UEM	UKZN	UM6P	UNILAG	UNN	UP	Wits
2015	45.1%	14.1%	58.2%		6.0%		27.6%		8.8%		17.4%	1.3%		16.6%	6.2%		11.8%		19.2%		14.1%	15.8%
2016	46.7%	17.8%	50.4%		6.6%		26.6%		9.8%		17.5%	2.0%		17.5%	6.8%		12.3%		25.7%		13.4%	16.8%
2017	37.6%	17.4%	49.3%		9.2%		25.4%		7.8%		17.9%	2.4%		15.8%	6.1%		10.1%		20.8%		14.1%	18.8%
2018	34.9%	31.8%	57.4%		7.1%	12.7%	21.6%		10.8%	6.0%	16.8%	4.6%		19.2%	5.6%		10.9%		12.4%		15.0%	18.6%
2019	35.4%	32.4%	50.4%		9.4%	9.5%	22.9%		11.3%	4.2%	16.4%	4.9%		17.2%	5.8%		10.7%		12.4%		15.9%	17.6%
2020	43.0%	33.7%	48.4%		8.7%	11.6%	20.2%		10.5%	4.3%	14.1%	2.4%		18.3%	6.2%		9.1%		13.5%		14.0%	17.1%
2021	37.9%	18.3%	59.0%		9.3%	12.5%	18.5%		8.4%	4.5%	10.4%	0.4%		17.8%	5.3%		9.1%		10.2%		15.1%	17.4%
2022	34.0%	25.8%	46.5%	14.2%	9.8%	13.6%	21.0%	6.8%	10.8%	11.0%	17.5%	4.0%	10.9%	20.4%	11.0%	6.8%	8.5%		94.3%	5.1%	13.4%	18.0%
2023	48.7%	22.9%	33.1%	9.7%	10.4%	16.4%	23.0%	5.7%	8.0%	7.2%	20.1%		7.8%	18.4%	8.1%	5.7%	8.9%	51.1%	46.0%	5.8%	13.7%	18.0%

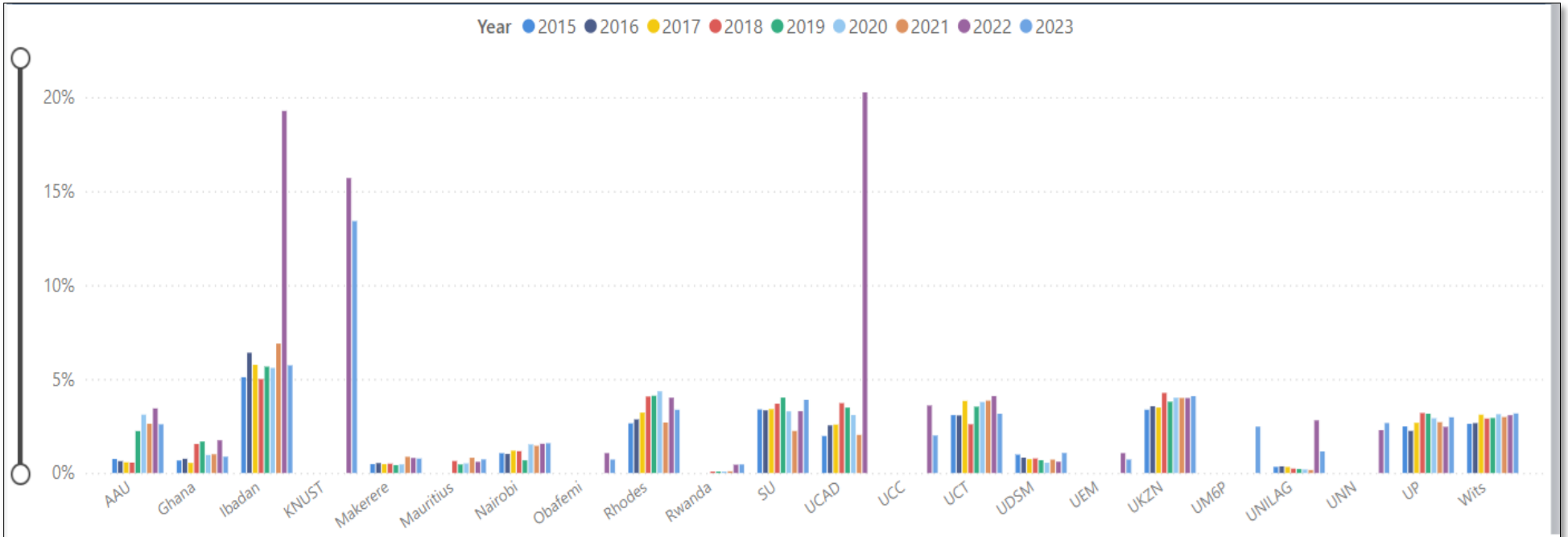
Doctoral graduates as a percentage of total graduates

Figure 2.20 illustrates doctoral graduates as a percentage of total graduates from 2015 to 2023. The universities are categorised into three clusters based on their 2023 enrolment data, as follows:

- **Cluster 1**: Universities with less than 1% of total graduates in doctoral programmes in 2023. This group includes UG, Makerere, Mauritius, OAU, Rwanda, and UEM.
- **Cluster 2**: Universities with 1% to 3% of total graduates in doctoral programmes in 2023. This group includes AAU, UCC, UDSM, UM6P, UNN, and UP.
- **Cluster 3**: Universities with more than 3% of total graduates in doctoral programmes in 2023. This group includes Ibadan, KNUST, Rhodes, SU, UCT, UKZN, and Wits.

In terms of improvement since 2015, the following universities showed the most significant increases in the percentage of doctoral graduates: Makerere (60%), UG (28%), Rhodes (30%), UP (32%), Wits (23%), UKZN (21%), Ibadan (12%), and SU (15%).

Figure 2.20. Doctoral graduates as a percentage of all graduates, 2015 – 2023



Year	AAU	Ghana	Ibadan	KNUST	Makerere	Mauritius	Nairobi	Obafemi	Rhodes	Rwanda	SU	UCAD	UCC	UCT	UDSM	UEM	UKZN	UM6P	UNILAG	UNN	UP	Wits
2015	0.7%	0.7%	5.1%		0.5%		1.0%		2.6%		3.4%	2.0%		3.1%	1.0%		3.4%		0.3%		2.5%	2.6%
2016	0.6%	0.8%	6.4%		0.5%		1.0%		2.8%		3.3%	2.5%		3.1%	0.8%		3.6%		0.4%		2.2%	2.7%
2017	0.6%	0.5%	5.8%		0.5%		1.2%		3.2%		3.4%	2.6%		3.8%	0.7%		3.5%		0.3%		2.7%	3.1%
2018	0.6%	1.5%	5.0%		0.5%	0.6%	1.2%		4.1%	0.0%	3.7%	3.7%		2.6%	0.8%		4.3%		0.2%		3.2%	2.9%
2019	2.2%	1.7%	5.7%		0.4%	0.5%	0.7%		4.1%	0.0%	4.0%	3.5%		3.5%	0.7%		3.8%		0.2%		3.2%	2.9%
2020	3.1%	1.0%	5.6%		0.5%	0.5%	1.5%		4.3%	0.1%	3.3%	3.1%		3.8%	0.5%		4.0%		0.2%		2.9%	3.1%
2021	2.6%	1.0%	6.9%		0.9%	0.8%	1.4%		2.7%	0.1%	2.2%	2.0%		3.9%	0.7%		4.0%		0.2%		2.7%	3.0%
2022	3.4%	1.7%	19.3%	15.7%	0.8%	0.6%	1.6%	1.1%	4.0%	0.4%	3.3%	20.3%	3.6%	4.1%	0.6%	1.1%	4.0%		2.8%	2.3%	2.5%	3.1%
2023	2.6%	0.9%	5.7%	13.4%	0.8%	0.7%	1.6%	0.7%	3.4%	0.5%	3.9%		2.0%	3.2%	1.1%	0.7%	4.1%	2.5%	1.1%	2.7%	3.0%	3.2%

2.4.1 Graduates by Gender

Figure 2.21 illustrates postgraduate (PG), master's, and doctoral graduates by university and gender, with the top figure (Panel A) representing 2015 and the bottom figure (Panel B) representing 2023. PG graduates, including master's and doctoral levels, are grouped into two clusters based on their gender distribution in 2023:

- **Cluster 1** (female majority in 2023): This includes Ibadan, KNUST, Rhodes, SU, UCT, UKZN, UM6P, UNILAG, UP, and Wits.
- **Cluster 2** (male majority in 2023): This includes AAU, UEM, Makerere, Mauritius, Nairobi, OAU, Rwanda, UCC, UDSM, and UNN.

In terms of improvements in female representation since 2015, the following universities showed the most notable increases in female PG graduates: Rhodes (18.8%), Ibadan (15.2%), UNILAG (11%), UG (7.5%), Makerere (6%), Wits (4.3%), UKZN (2.8%), UCT (3%), and UP (2.1%). Conversely, some universities experienced a decline in female representation, including UDSM, Nairobi, and AAU.

For master's graduates, Cluster 1 (female majority in 2023), includes UG, Ibadan, KNUST, Rhodes, SU, UCT, UKZN, UM6P, UP, and Wits. Cluster 2 (male majority in 2023) includes AAU, UEM, Makerere, Mauritius, OAU, Rwanda, UCC, UDSM, UNILAG, and UNN.

In terms of improvement in female representation since 2015, the following universities showed the highest increases: Rhodes (20.5%), Ibadan (16%), UNILAG (10%), UDSM (8.5%), UG (8%), UCT (7.5%), UP (7%), Wits (6%), UKZN (5.5%), SU (5%), and Makerere (4.5%).

However, Nairobi and AAU experienced a decline in female representation over the same period.

For doctoral graduates, Cluster 1 (female majority in 2023) includes: Rhodes, UP, and Wits. Cluster 2 (male majority in 2023) includes: AAU, UG, Ibadan, KNUST, Makerere, Nairobi, OAU, Rwanda, SU, UCC, UCT, UDSM, UEM, UKZN, UM6P, UNILAG, and UNN.

In terms of improvements in female representation since 2015, the following universities showed the most significant gains: Makerere (10.5%), UNILAG (9%), Ibadan (8.6%), and UKZN (4%). However, AAU, Rhodes, and UDSM experienced a decline in female representation in doctoral programmes over the same period.

Figure 2.21. Postgraduate, Master's and Doctoral graduates by gender, 2015 – 2023

Panel A (2015)

Panel B (2023)

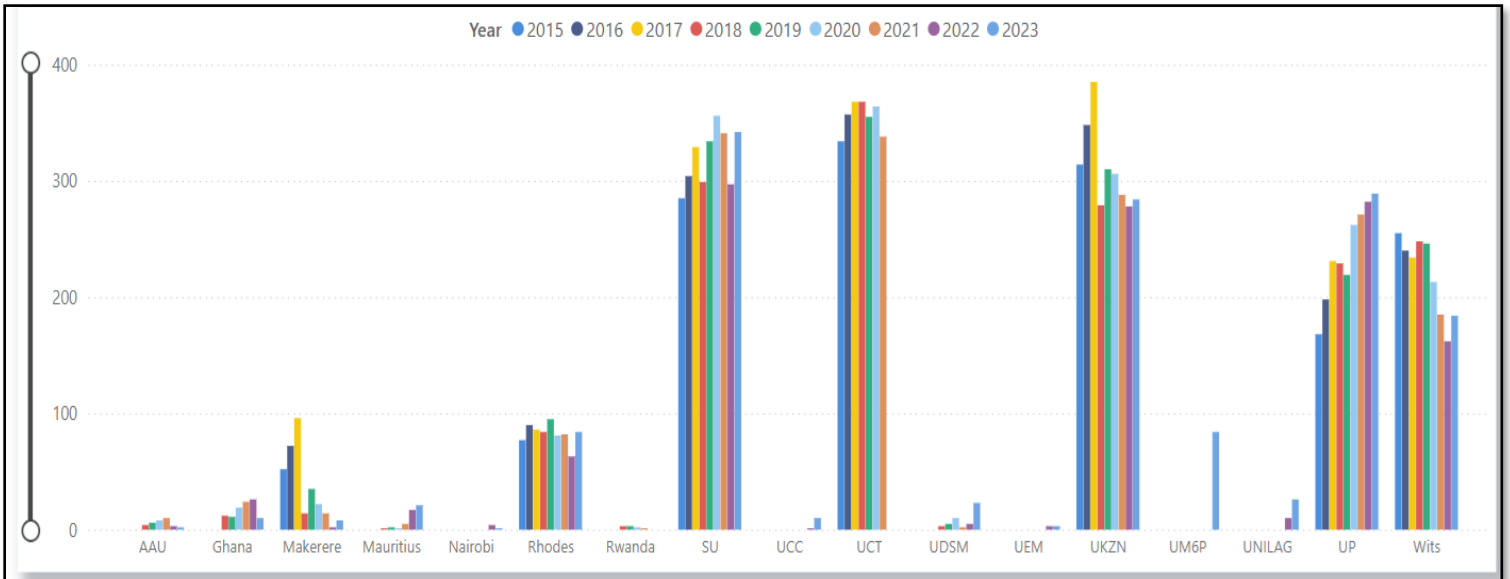

Postgraduate graduates by university and gender
AAU 28.9% 71.1%
Ghana 51.0% 49.0%
Ibadan 51.7% 48.3%
KNUST 52.4% 47.6%
Makerere 41.0% 59.0%
Mauritius 47.7% 52.3%
Nairobi 48.1% 51.9%
Obafemi 41.2% 58.8%
Rhodes 62.3% 37.7%
Rwanda 30.2% 69.8%
SU 55.8% 44.2%
UCC 31.7% 68.3%
UCT 56.1% 43.9%
UDSM 44.3% 55.7%
UEM 41.2% 58.8%
UKZN 62.8% 37.2%
UM6P 50.6% 49.4%
UNILAG 50.5% 49.5%
UNN 41.9% 58.1%
UP 61.1% 38.9%
Wits 60.3% 39.7%
Female Male
Master's graduates by university and gender
AAU 28.6% 71.4%
Ghana 51.9% 48.1%
Ibadan 53.0% 47.0%
KNUST 90.3% 9.7%
Makerere 41.5% 58.5%
Mauritius 48.7% 51.3%
Nairobi 49.7% 50.3%
Obafemi 41.7% 58.3%
Rhodes 68.6% 31.4%
Rwanda 30.0% 70.0%
SU 52.4% 47.6%
UCC 35.6% 64.4%
UCT 53.3% 46.7%
UDSM 46.8% 53.2%
UEM 41.7% 58.3%
UKZN 60.5% 39.5%
UM6P 51.8% 48.2%
UNILAG 49.9% 50.1%
UNN 43.8% 56.2%
UP 59.1% 40.9%
Wits 59.0% 41.0%
Female Male
Doctoral graduates by university and gender
AAU 11.5% 88.5%
Ghana 29.2% 70.8%
Ibadan 41.6% 58.4%
KNUST 21.0% 79.0%
Makerere 40.6% 59.4%
Mauritius 50.0% 50.0%
Nairobi 35.8% 64.2%
Obafemi 36.8% 63.2%
Rhodes 58.3% 41.7%
Rwanda 34.2% 65.8%
SU 46.8% 53.2%
UCC 28.1% 71.9%
UCT 48.9% 51.1%
UDSM 30.3% 69.7%
UEM 36.8% 63.2%
UKZN 49.0% 51.0%
UM6P 27.3% 72.7%
UNILAG 44.9% 55.1%
UNN 40.3% 59.7%
UP 53.5% 46.5%
Wits 50.6% 49.4%
Female Male

2.5 Postdoctoral Research Fellows

Figure 2.22 shows the number of postdoctoral research fellows (postdocs) from 2015 to 2023. It is important to highlight that not all ARUA member universities have postdocs. As shown in the figure, the year-on-year number of postdocs across the universities is characterised by variability, with no consistent trend. However, at UP, the number of postdocs has generally increased, with the exception of 2018 and 2019, when a decline was recorded. At UKZN, the number of postdocs has decreased from 314 in 2015 to 284 in 2023.

The distribution of postdocs is dominated by South African universities. Among non-South African institutions, UDSM, Mauritius, UNILAG, and UM6P reported the highest numbers of postdocs in 2023. For Case 1 universities, the number of postdocs increased from 1,485 in 2015 to 1,561 in 2021 (a 5% increase), followed by a decline to 1,149 in 2022, and a subsequent recovery to 1,274 in 2023. Over the years, this metric has fluctuated, with the highest recorded number of postdocs being 1,729 in 2017. This variability highlights the need for ARUA member universities to prioritise postdocs and stabilise recruitment in this area. For Case 2 universities—comprising UCC, UEM, and UM6P, which submitted data—the total number of postdocs stood at 97 in 2023.

Figure 2.22. Postdoctoral Fellows, 2015 – 2023



Year	AAU	Ghana	Makerere	Mauritius	Nairobi	Rhodes	Rwanda	SU	UCC	UCT	UDSM	UEM	UKZN	UM6P	UNILAG	UP	Wits
2015			52			77		285		334			314			168	255
2016			72			90		304		357			348			198	240
2017			96			86		329		368			385			231	234
2018	4	12	14	1		84	3	299		368	3		279			229	248
2019	6	11	35	2		95	3	334		355	5		310			219	246
2020	8	19	22	1		81	2	356		364	10		306			262	213
2021	10	24	14	5		82	1	341		338	2		288			271	185
2022	3	26	2	17	4	63		297	1		5	3	278		10	282	162
2023	2	10	8	21	1	84		342	10		23	3	284	84	26	289	184

2.6 Academic Staff Data

Similar to the student data (see Section 2.3), in this section, the universities are categorized into two broad groups based on academic staff data: Case 1 and Case 2. Case 1 universities includes universities from Phases I and II for the period 2015 to 2023, while Case 2 universities includes the six universities that provided data in Phase III. These categories are used throughout the remainder of this section and the report.

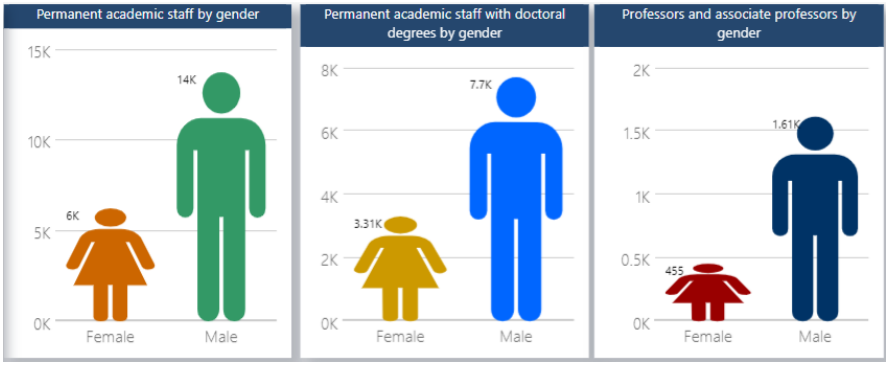
Figure 2.25 illustrates permanent academic staff by gender and doctoral degrees, as well as the number of associate professors and professors by gender. For Case 1 universities, the number of permanent female academic staff has increased from 6,220 in 2015 to 7,530 in 2023 (represent a 21% increase). The number of permanent female academic staff with doctoral degrees has increased from 3,310 in 2015 to 4,480 in 2023 (representing a 35% increase). The number of permanent female associate professors and professors has increased from 455 in 2015 to 739 in 2023 (representing a 62% increase). This is a positive indicator of the narrowing gender gap at higher ranks.

For Case 2 universities (the six = universities in Phase III), the number of permanent female academic staff stood at 881 (23%) compared to 2,600 permanent male academic staff (77%) in 2023. The number of permanent female academic staff with doctoral degrees stood at 479 (21%) compared to 1,790 male (79%) in 2023. The number of permanent female associate professors and professors stood at 19 (16%) compared to 102 (84%) in 2023. The limited growth in female representation at senior levels highlights the persistence of gender disparities among some ARUA universities, particularly in higher academic ranks (associate professor and professor).

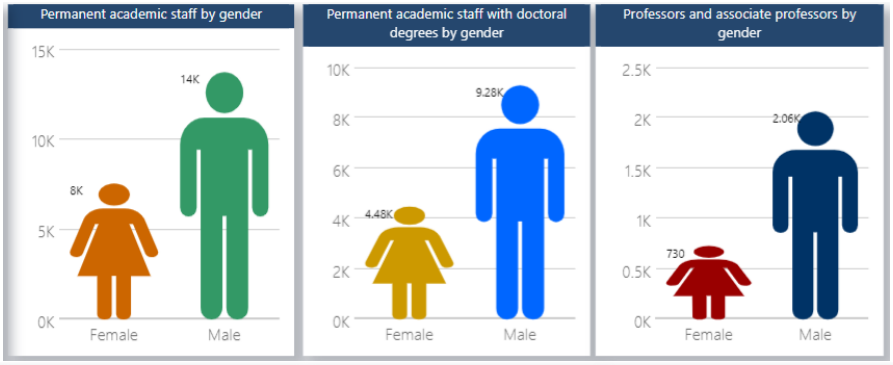
In 2023, the top ten universities with the highest number of permanent academic staff were: UNN (2,890), AAU (2,790), UDSM (1,860), Ibadan (1,600), UNILAG (1,530), UCAD (1,470), UG (1,470), Makerere (1,440), Wits (1,290), and UP (1,270). In Case 1, the total number of permanent academic staff increased from 19,943 in 2015 to 21,239 in 2023 (6.5% increase). In 2023, the total number of permanent academic staff stood at 24,715.

Figure 2.23. Permanent academic staff as a percentage of all academic staff, 2015 – 2023

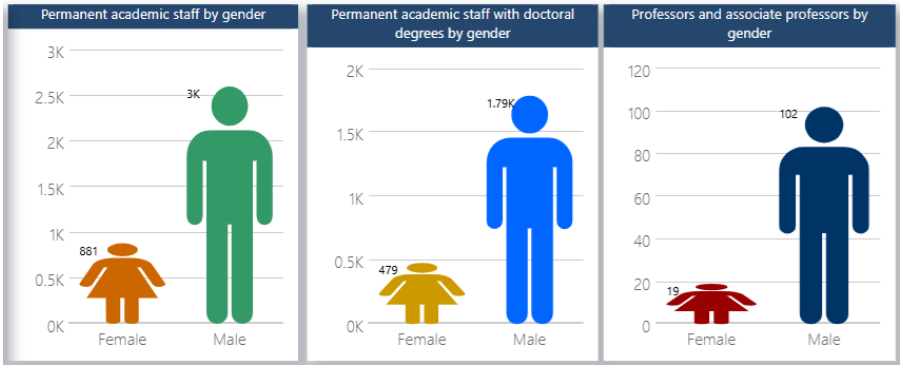
2015



Case 1 universities: 2023



Case 2 universities: 2023 (Phase III only)

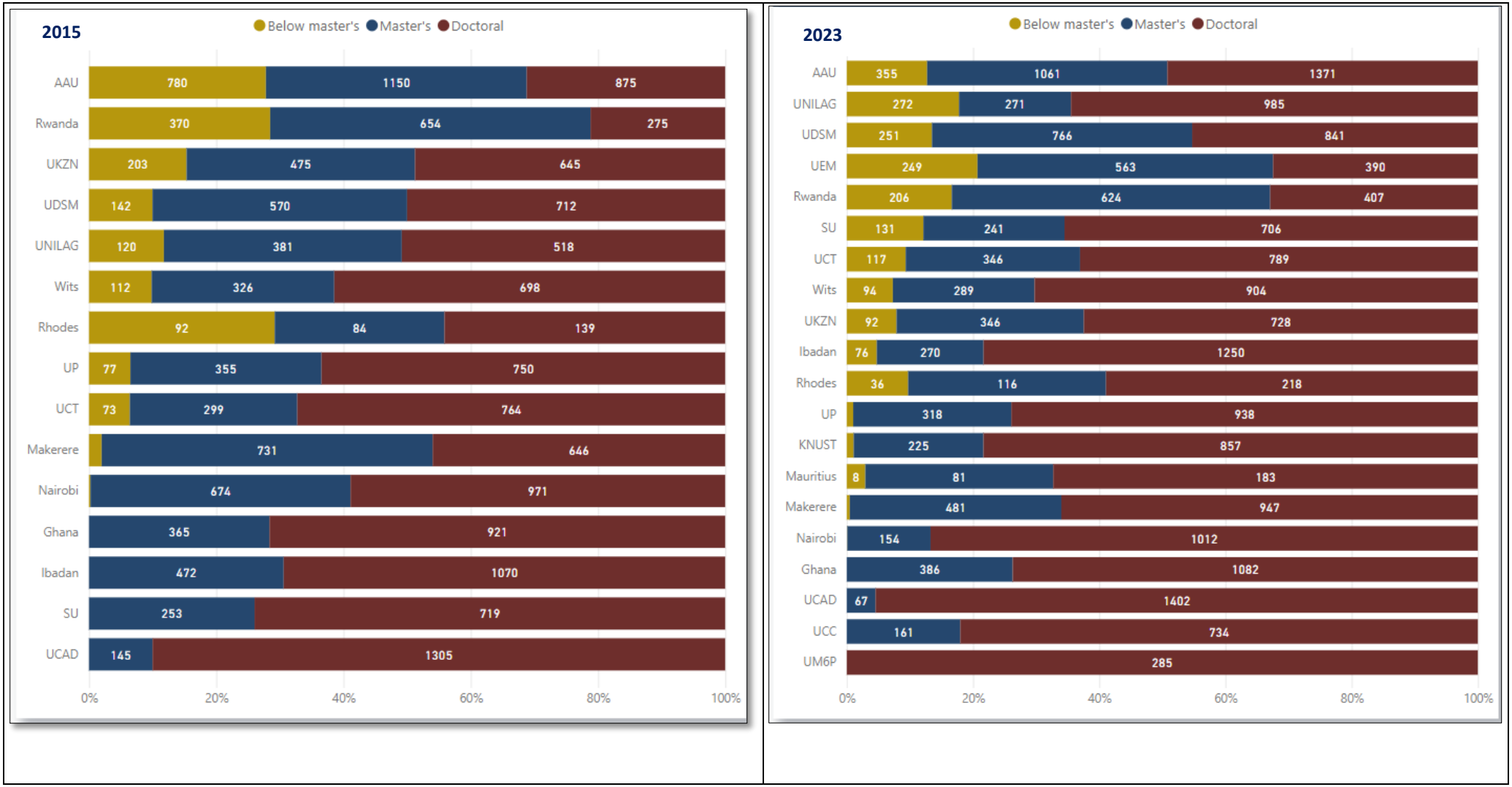


Permanent academic staff by university and qualification

Figure 2.26 illustrates the number of permanent academic staff by university and qualification in 2015 and 2023. In 2015, the top five universities with the highest number of permanent academic staff with below a master's degree were: 1) AAU (780), 2) Rwanda (370), 3) UKZN (203), 4) UDSM (142), and 5) UNILAG (120). The top five universities with the highest number of permanent academic staff with a master's degree were: AAU (1,150), Makerere (731), Nairobi (674), Rwanda (654), and UDSM (570). The top five universities with the highest number of permanent academic staff with a doctoral degree were: UCAD (1,305), Ibadan (1,070), Nairobi (971), UG (921), and AAU (875).

In 2023, the top five universities with the highest number of permanent academic staff with below a master's degree were: AAU (355), UNILAG (272), UDSM (251), UEM (249), and Rwanda (206). The top five universities with the highest number of permanent academic staff with a master's degree were: AAU (1,061), UDSM (766), Rwanda (624), UEM (563), and Makerere (481). The top five universities with the highest number of permanent academic staff with a doctoral degree were: UCAD (1,401), AAU (1,371), Ibadan (1,250), UG (1,082), and Nairobi (1,012). The top five universities with the highest proportion of permanent academic staff with a doctoral degree were: UM6P (100%), UCAD (95.4%), Nairobi (86.7%), Ibadan (78.3%), and UP (73.9%).

Figure 2.24. Permanent academic staff by university, qualification type, and year 2015 – 2023



Permanent academic staff by university and academic rank

Figure 2.27 illustrates the number of permanent academic staff by university and academic rank in 2015 and 2023. In 2015, the top five universities with the highest number of lecturers and other ranks were: AAU (1,649), Rwanda (1,141), UDSM (1,014), Nairobi (975), and Makerere (964). In 2023, the top five universities for the same academic rank were: UDSM (1,559), AAU (1,189), Rwanda (1,055), Makerere (936), and UEM (842).

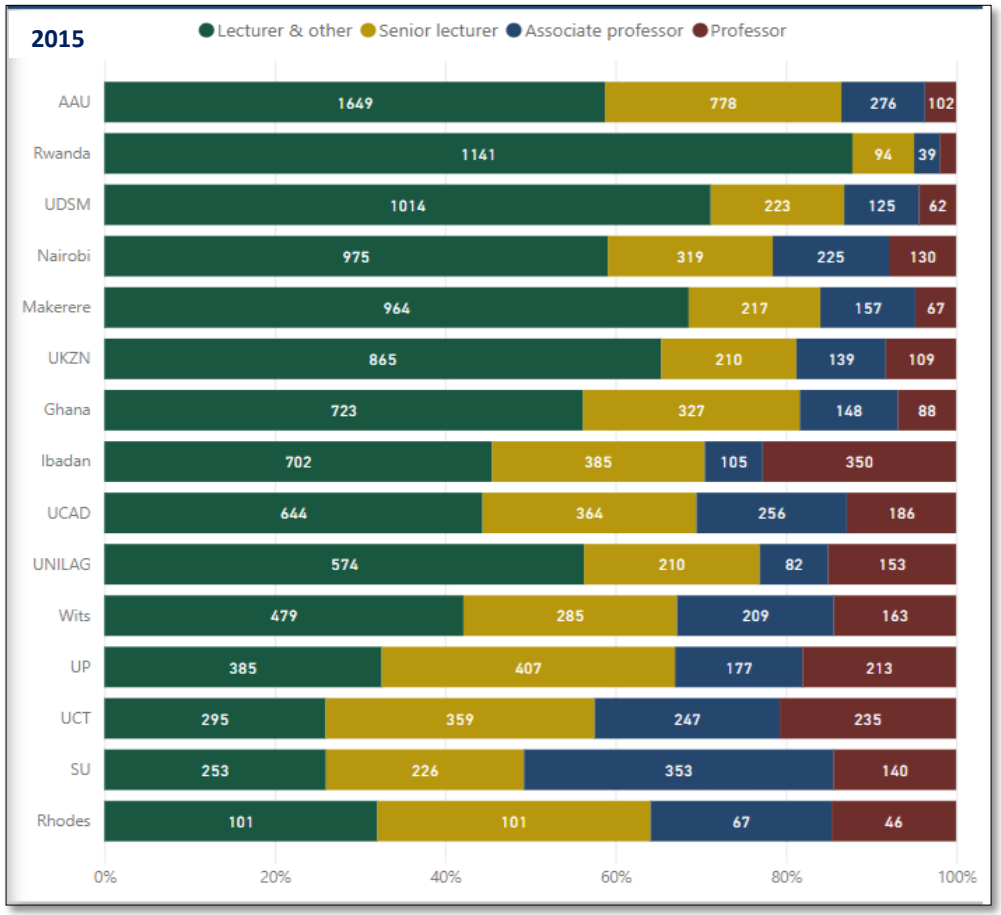
For the senior lecturer rank, in 2015, the top five universities with the highest numbers were: AAU (778), UP (407), Ibadan (385), UCAD (364), and UCT (359). In 2023, the top five universities were: AAU (1,040), UG (598), UCAD (448), Ibadan (443), and UNILAG (384).

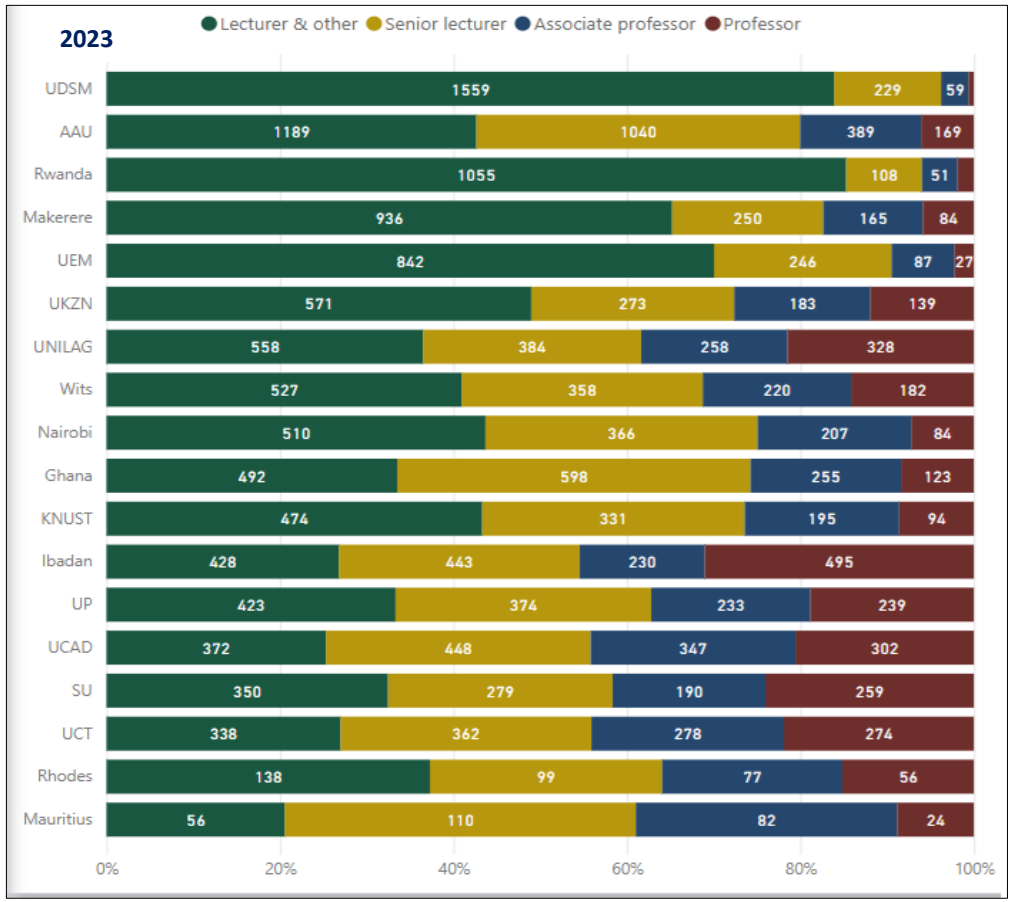
For the associate professor rank, in 2015, the top five universities were: SU (353), AAU (276), UCAD (256), UCT (247), and Nairobi (225). In 2023, the top five universities were: AAU (389), UCAD (347), UCT (278), UNILAG (258), and UG (255).

For the professor rank, in 2015, the top five universities were: Ibadan (350), UCT (235), UP (213), UCAD (186), and Wits (163). In 2023, the top five universities were: Ibadan (495), UNILAG (328), UCAD (302), UCT (274), and SU (259).

In 2023, the top five universities with the highest proportion of senior academics (senior lecturers, associate professors, and professors) were: Mauritius (79.4%), UCAD (74.7%), Ibadan (73.2%), UCT (73%), and UP (66.7%). The following universities experienced an improvement compared to 2015: AAU (39%), UG (51%), Ibadan (34.5%), Mauritius (20.5%), Nairobi (38%), UCAD (34.5%), UKZN (47.5%), and UNILAG (44.5%). Rhodes, SU, and UDSM experienced a decline compared to 2015.

Figure 2.25. Permanent academic staff by university, rank, and year 2015 – 2023



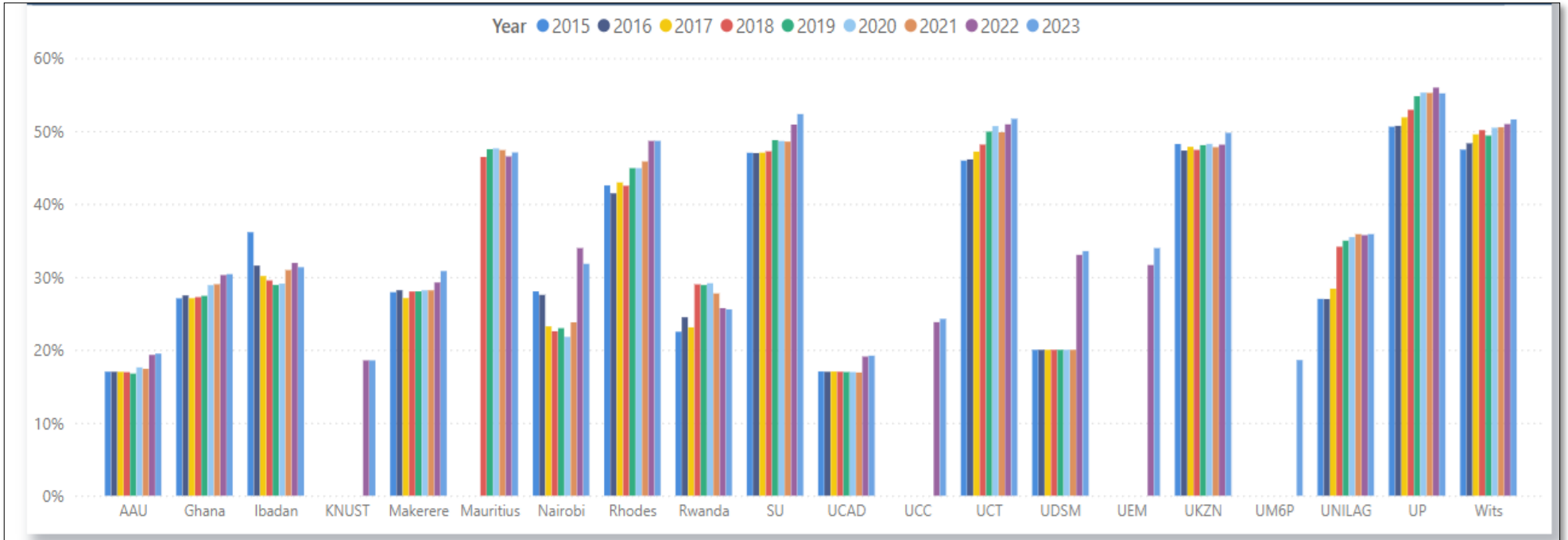


Proportion of permanent female academic staff

Figure 2.28 shows the proportion of permanent female academic staff between 2015 and 2023. The universities are grouped into three clusters based on the proportion of female academic staff as follows: 1) Cluster 1 (less than 15% in 2023), 2) Cluster 2 (20% to 40% in 2023), and 3) Cluster 3 (more than 40% in 2023). Cluster 1 includes AAU, UCAD, and UM6P. Cluster 2 consists of UG, Ibadan, Makerere, Nairobi, Rwanda, UCC, UDSM, UEM, and UNILAG. Cluster 3 comprises Mauritius, Rhodes, SU, UCT, UKZN, UP, and Wits.

In terms of improvements compared to 2015, UDSM has improved by 11.5%, UNILAG by 8%, UCT and Rhodes by 6%, UP and SU by 5%, Wits by 4%, UG and Makerere by 3%, AAU by 2.5%, and UCAD by 2%. Ibadan experienced a decline in 2023 compared to its 2015 performance. Closing the gap between female and male permanent academic staff among ARUA member universities is essential for addressing historical gender disparities and ensuring women have equal access to academic leadership roles.

Figure 2.26. Proportion of permanent female academic staff as a percentage of total academic staff, 2015 – 2023



Year	AAU	Ghana	Ibadan	KNUST	Makerere	Mauritius	Nairobi	Rhodes	Rwanda	SU	UCAD	UCC	UCT	UDSM	UEM	UKZN	UM6P	UNILAG	UP
2015	17.0%	27.1%	36.1%		27.9%		28.0%	42.5%	22.5%	47.0%	17.0%		46.0%	20.0%		48.2%		27.0%	50.6%
2016	17.0%	27.5%	31.5%		28.2%		27.5%	41.5%	24.5%	47.0%	17.0%		46.1%	20.0%		47.3%		27.0%	50.7%
2017	17.0%	27.1%	30.1%		27.1%		23.2%	42.9%	23.1%	47.0%	17.0%		47.2%	20.0%		47.8%		28.4%	51.9%
2018	16.9%	27.2%	29.5%		28.0%	46.5%	22.5%	42.5%	29.0%	47.2%	17.0%		48.1%	20.0%		47.4%		34.1%	52.9%
2019	16.7%	27.4%	28.9%		28.0%	47.5%	23.0%	44.9%	28.9%	48.8%	17.0%		49.9%	20.0%		48.1%		35.0%	54.8%
2020	17.6%	28.9%	29.1%		28.2%	47.6%	21.8%	44.9%	29.1%	48.6%	17.0%		50.7%	20.0%		48.2%		35.5%	55.3%
2021	17.4%	29.0%	30.9%		28.2%	47.4%	23.8%	45.8%	27.7%	48.5%	16.9%		49.8%	20.0%		47.8%		35.9%	55.2%
2022	19.3%	30.3%	31.9%	18.6%	29.2%	46.5%	33.9%	48.6%	25.7%	50.9%	19.1%	23.8%	50.9%	33.0%	31.6%	48.1%		35.7%	56.0%
2023	19.5%	30.4%	31.3%	18.6%	30.8%	47.1%	31.8%	48.6%	25.5%	52.3%	19.2%	24.2%	51.7%	33.5%	33.9%	49.7%	18.6%	35.9%	55.2%

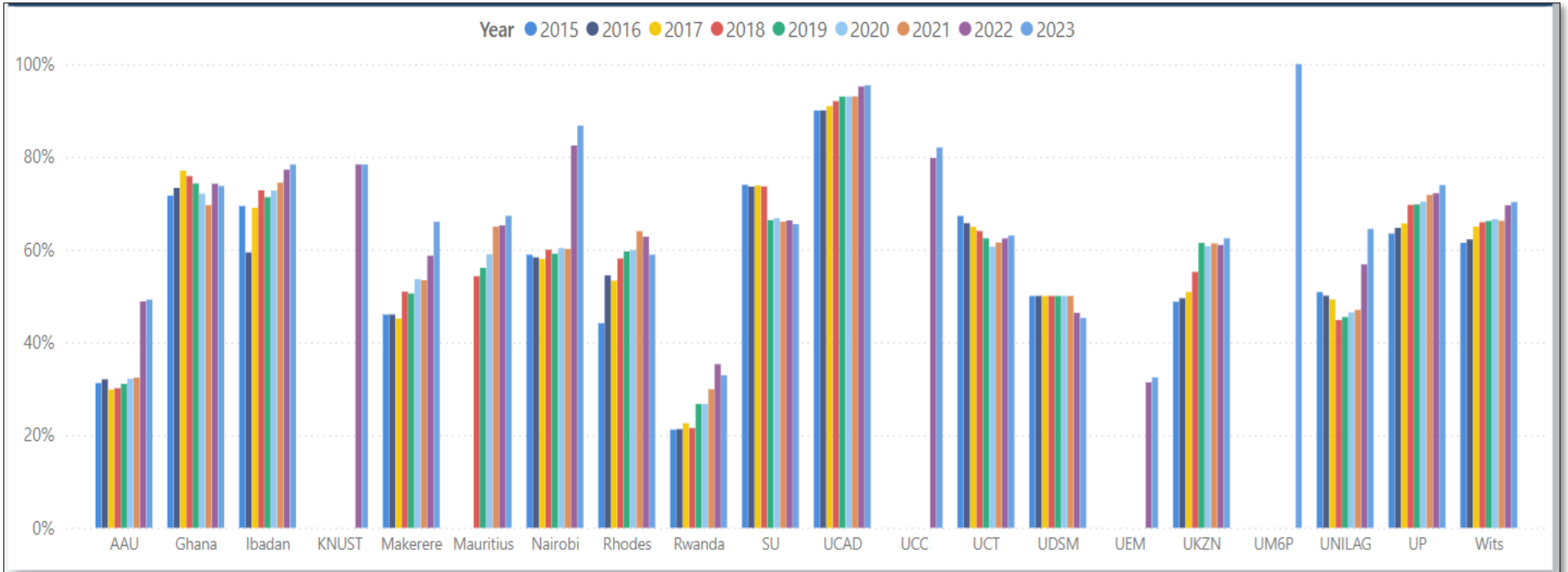
2.6.1 Permanent academic staff with PhD degrees

Figure 2.29 shows the proportion of permanent academic staff with doctorates from 2015 to 2023. The universities are clustered into three groups: 1) Cluster 1 (less than 40% in 2023), 2) Cluster 2 (40% - 60% in 2023), and 3) Cluster 3 (more than 60% in 2023) . Cluster 1 includes Rwanda and UEM. Cluster 2 consists of AAU, Rhodes, UNILAG, Nairobi, and UDSM. Cluster 3 comprises UG, Ibadan, Makerere, UM, SU, UCAD, UCC, UCT, UKZN, UNILAG, UP, and Wits.

In terms of improvements compared to 2015, AAU has improved by 9%, UG by 2%, Ibadan by 9%, Makerere by 15%, Nairobi by 5%, Rhodes by 14%, UCAD by 5%, UKZN by 14%, UNILAG by 14%, UP by 11%, and Wits by 9%. SU, UCT, and UDSM experienced a decline compared to 2015.

In 2023, the top five universities with the highest proportion of permanent academic staff with PhDs were: 1) UM6P (100%), 2) UCAD (95.4%), 3) UCC (82%), 4) KNUST (78.3%), and 5) Ibadan (78.3%). Permanent academic staff with PhDs are important as they bring a high level of expertise and research skills to universities, contributing to the institution's academic credibility, helping secure research funding, and playing a key role in supervising postgraduate students, which is crucial for knowledge creation and capacity building.

Figure 2.27. Proportion of permanent academic staff with doctorates, 2015 – 2023



Year	AAU	Ghana	Ibadan	KNUST	Makerere	Mauritius	Nairobi	Rhodes	Rwanda	SU	UCAD	UCC	UCT	UDSM	UEM	UKZN	UM6P	UNILAG	UP	Wits
2015	31.2%	71.6%	69.4%		46.0%		58.9%	44.1%	21.2%	74.0%	90.0%		67.3%	50.0%		48.8%		50.8%	63.5%	61.4%
2016	32.0%	73.3%	59.4%		46.0%		58.3%	54.4%	21.3%	73.6%	90.0%		65.7%	50.0%		49.5%		50.0%	64.7%	62.2%
2017	29.8%	77.0%	69.0%		45.1%		58.0%	53.3%	22.6%	73.8%	91.0%		64.9%	50.0%		50.9%		49.3%	65.6%	65.0%
2018	30.1%	75.8%	72.8%		50.9%	54.3%	60.0%	58.1%	21.5%	73.6%	92.0%		64.0%	50.0%		55.2%		44.8%	69.6%	65.9%
2019	31.0%	74.2%	71.3%		50.5%	56.1%	59.1%	59.6%	26.7%	66.3%	93.0%		62.4%	50.0%		61.4%		45.5%	69.7%	66.2%
2020	32.1%	72.1%	72.7%		53.6%	59.0%	60.3%	59.9%	26.7%	66.8%	93.0%		60.6%	50.0%		60.7%		46.5%	70.3%	66.6%
2021	32.4%	69.6%	74.4%		53.4%	64.9%	60.1%	64.0%	29.9%	66.0%	93.0%		61.5%	50.0%		61.3%		47.0%	71.8%	66.2%
2022	48.8%	74.2%	77.2%	78.3%	58.7%	65.2%	82.4%	62.8%	35.3%	66.3%	95.2%	79.7%	62.4%	46.4%	31.4%	61.0%		56.8%	72.1%	69.6%
2023	49.2%	73.7%	78.3%	78.3%	66.0%	67.3%	86.7%	58.9%	32.9%	65.5%	95.4%	82.0%	63.0%	45.3%	32.4%	62.4%	100.0%	64.5%	73.9%	70.2%

2.6.2 Permanent academic staff by rank

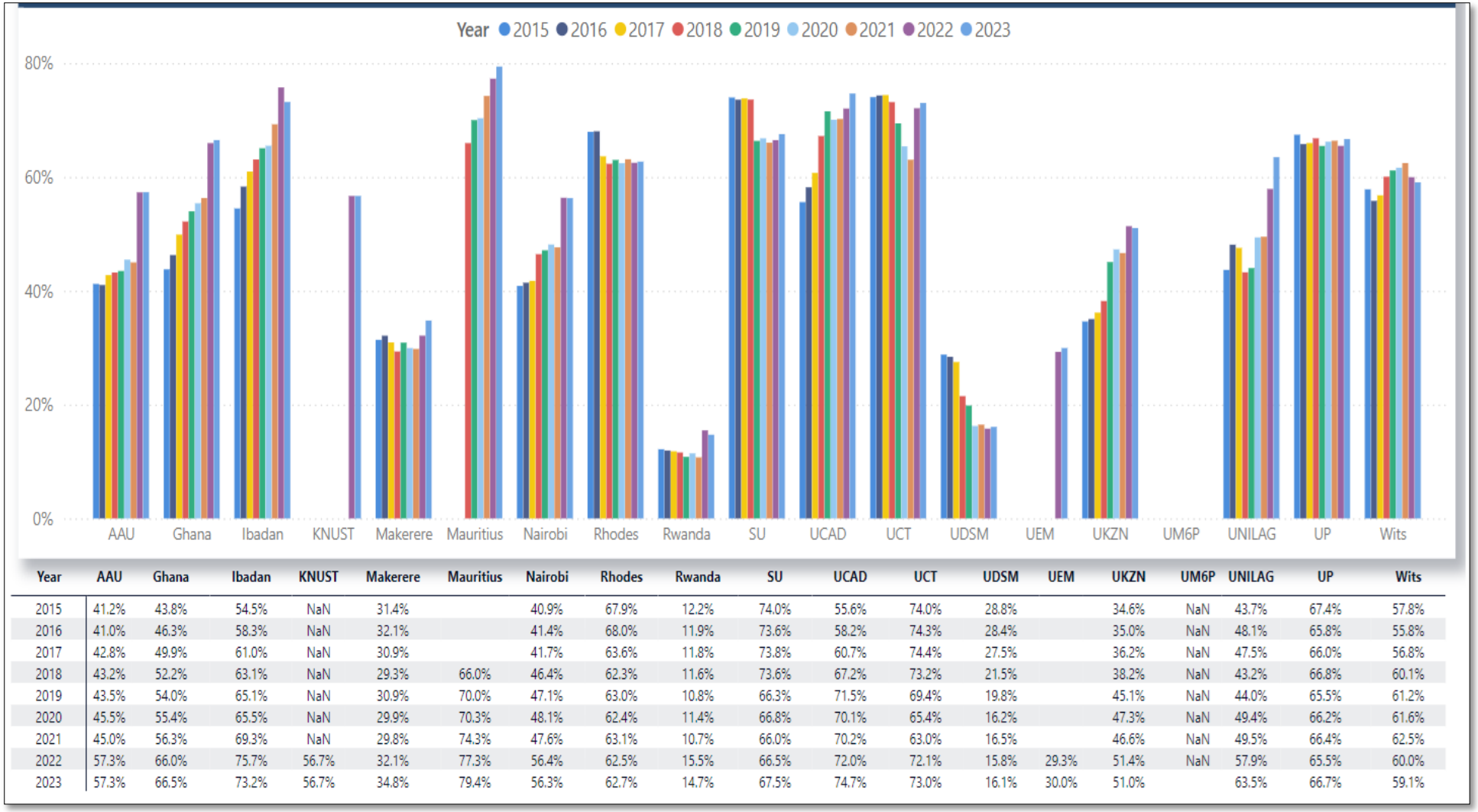
Figure 2.30 shows professors, associate professors, and senior lecturers as a percentage of permanent academic staff from 2015 to 2023. The universities are clustered into three groups: 1) Cluster 1 (less than 40% in 2023), 2) Cluster 2 (40% - 60% in 2023), and 3) Cluster 3 (more than 60% in 2023). Cluster 1 includes Makerere, Rwanda, UEM, and UDSM. Cluster 2 consists of AAU, Nairobi, UKZN, and UNILAG. Cluster 3 includes UG, Ibadan, Mauritius, Rhodes, SU, UCAD, UCT, UP, and Wits.

In terms of improvements compared to 2015, AAU has improved by 16%, UG by 20%, Ibadan by 6%, Makerere by 3%, Nairobi by 10%, Rwanda by 2%, UCAD by 20%, UKZN by 16%, UNILAG by 20%, and Wits by 2%. Rhodes, SU, and UDSM experienced a decline compared to 2015.

The combination of these ranks (professors, associate professors, and senior lecturers) is important because it reflects the academic strength and leadership within a university. This mix ensures a balance of experience, mentorship, and research capacity, with senior staff members guiding the development of younger academics and contributing to the institution's research output and global reputation. In the African context, having a strong proportion of senior academics is essential for advancing local knowledge production, addressing key regional challenges, and improving the overall quality of higher education.

In 2023, the top five universities with the highest percentage of professors, associate professors, and senior lecturers were: 1) Mauritius (79.4%), 2) UCAD (74.7%), 3) Ibadan (73.2%), 4) UCT (73%), and 5) UP (66.7%).

Figure 2.28. Professors, associate professors, and senior lecturers as a percentage of permanent academic staff, 2015 – 2023



Year	AAU	Ghana	Ibadan	KNUST	Makerere	Mauritius	Nairobi	Rhodes	Rwanda	SU	UCAD	UCT	UDSM	UEM	UKZN	UM6P	UNILAG	UP	Wits
2015	41.2%	43.8%	54.5%	NaN	31.4%		40.9%	67.9%	12.2%	74.0%	55.6%	74.0%	28.8%		34.6%	NaN	43.7%	67.4%	57.8%
2016	41.0%	46.3%	58.3%	NaN	32.1%		41.4%	68.0%	11.9%	73.6%	58.2%	74.3%	28.4%		35.0%	NaN	48.1%	65.8%	55.8%
2017	42.8%	49.9%	61.0%	NaN	30.9%		41.7%	63.6%	11.8%	73.8%	60.7%	74.4%	27.5%		36.2%	NaN	47.5%	66.0%	56.8%
2018	43.2%	52.2%	63.1%	NaN	29.3%	66.0%	46.4%	62.3%	11.6%	73.6%	67.2%	73.2%	21.5%		38.2%	NaN	43.2%	66.8%	60.1%
2019	43.5%	54.0%	65.1%	NaN	30.9%	70.0%	47.1%	63.0%	10.8%	66.3%	71.5%	69.4%	19.8%		45.1%	NaN	44.0%	65.5%	61.2%
2020	45.5%	55.4%	65.5%	NaN	29.9%	70.3%	48.1%	62.4%	11.4%	66.8%	70.1%	65.4%	16.2%		47.3%	NaN	49.4%	66.2%	61.6%
2021	45.0%	56.3%	69.3%	NaN	29.8%	74.3%	47.6%	63.1%	10.7%	66.0%	70.2%	63.0%	16.5%		46.6%	NaN	49.5%	66.4%	62.5%
2022	57.3%	66.0%	75.7%	56.7%	32.1%	77.3%	56.4%	62.5%	15.5%	66.5%	72.0%	72.1%	15.8%	29.3%	51.4%	NaN	57.9%	65.5%	60.0%
2023	57.3%	66.5%	73.2%	56.7%	34.8%	79.4%	56.3%	62.7%	14.7%	67.5%	74.7%	73.0%	16.1%	30.0%	51.0%		63.5%	66.7%	59.1%

2.6.3 Permanent academic staff by rank and gender

Figure 2.31 illustrates the proportion of professors, associate professors, and senior lecturers by gender.

For professors, in 2015, the top five universities with the highest percentage of male permanent academic staff were: AAU (97%), Rwanda (92%), UCAD (88%), UNILAG (87%), and Rhodes (85%). The top five universities with the highest percentage of female permanent academic staff were: SU (37%), Nairobi (31%), UKZN (29%), UP (26%), and Wits (26%). In 2023, the top five male-dominant universities were: AAU (97%), KNUST (94%), Rwanda (91%), UDSM (91%), and UG (89%). The top five female-dominant universities were: UEM (48%), UP (41%), Rhodes (38%), SU (35%), and Wits (34%).

For associate professors, in 2015 the top five male-dominant universities were: AAU (96%), Rwanda (92%), UCAD (84%), UDSM (82%), and Makerere (80%). The top five female-dominant universities were: SU (61%), Ibadan (50%), UCT (44%), UP (40%), and Wits (40%). In 2023, the top five male-dominant universities were: AAU (95%), KNUST (87%), UCAD (81%), Rwanda (78%), and Nairobi (76%). The top five female-dominant universities were: Rhodes (49%), UCT (49%), UP (49%), Wits (45%), and Mauritius (44%).

For senior lecturers, in 2015, the top five male-dominant universities were: AAU (87%), Rwanda (86%), UCAD (81%), UG (80%), and UDSM (77%). The top five female-dominant universities were: UP (54%), Ibadan (51%), Wits (49%), Rhodes (49%), and UCT (48%). In 2023, the top five male-dominant universities were: Rwanda (85%), KNUST (81%), UCAD (80%), AAU (80%), and UDSM (77%). The top five female-dominant universities were: UP (58%), UCT (57%), SU (57%), Wits (52%), and UKZN (50%).

Figure 2.29. Professors, Associate Professors, and Senior lecturers by gender, 2015 vs. 2023

Panel A (2015)

Panel B (2023)


Professors by university and gender
AAU 3% 97%
Ghana 11% 89%
Ibadan 21% 79%
KNUST 6% 94%
Makerere 15% 85%
Mauritius 33% 67%
Nairobi 13% 87%
Rhodes 38% 63%
Rwanda 9% 91%
SU 35% 65%
UCAD 16% 84%
UCT 39% 61%
UDSM 9% 91%
UEM 48% 52%
UKZN 29% 71%
UNILAG 31% 69%
UP 41% 59%
Wits 34% 66%
Female Male
Associate professors by university and gender
AAU 5% 95%
Ghana 28% 72%
Ibadan 35% 65%
KNUST 13% 87%
Makerere 25% 75%
Mauritius 44% 56%
Nairobi 24% 76%
Rhodes 49% 51%
Rwanda 22% 78%
SU 43% 57%
UCAD 19% 81%
UCT 49% 51%
UDSM 25% 75%
UEM 29% 71%
UKZN 39% 61%
UNILAG 34% 66%
UP 49% 51%
Wits 45% 55%
Female Male
Senior lecturers by university and gender
AAU 20% 80%
Ghana 30% 70%
Ibadan 36% 64%
KNUST 19% 81%
Makerere 34% 66%
Mauritius 48% 52%
Nairobi 34% 66%
Rhodes 43% 57%
Rwanda 15% 85%
SU 57% 43%
UCAD 20% 80%
UCT 57% 43%
UDSM 23% 77%
UEM 31% 69%
UKZN 50% 50%
UNILAG 37% 63%
UP 58% 42%
Wits 52% 48%
Female Male

2.6.4 Permanent academic staff by field of study, qualification type, rank, and gender

Figure 2.32 shows the number of permanent academic staff by field of study, qualification type, rank, and gender in 2023. The first visual (Panel A) illustrates the number of permanent academic staff by field of study and qualification type. At below master's level, the ranking of fields of study with the highest number of permanent academic staff is as follows: 1) Medical and Health Sciences (414), 2) Engineering and Technology (384), 3) Natural Sciences (248), 4) Social Sciences (227), 5) Humanities (211), 6) Business, Economics, and Management Studies (199), and 7) Agricultural Sciences (58).

At master's level, the ranking of fields of study with the highest number of permanent academic staff is: 1) Medical and Health Sciences (1419), 2) Social Sciences (971), 3) Humanities (902), 4) Engineering and Technology (898), 5) Natural Sciences (768), 6) Business, Economics, and Management Studies (703), and 7) Agricultural Sciences (253).

At doctoral level, the ranking of fields of study with the highest number of permanent academic staff is: 1) Natural Sciences (3422), 2) Social Sciences (3148), 3) Medical and Health Sciences (2882), 4) Humanities (2216), 5) Engineering and Technology (1739), 6) Business, Economics, and Management Studies (1500), and 7) Agricultural Sciences (1135).

The second visual (Panel B) shows the number of permanent academic staff by field of study and rank. For lecturer and other ranks, the ranking of fields of study with the highest number of permanent academic staff is: 1) Natural Sciences (2045), 2) Medical and Health Sciences (1989), 3) Social Sciences (1845), 4) Humanities (1665), 5) Engineering and Technology (1627), 6) Business, Economics, and Management Studies (971), and 7) Agricultural Sciences (614).

For senior lecturer rank, the ranking of fields of study with the highest number of permanent academic staff is: 1) Medical and Health Sciences (1550), 2) Social Sciences (1114), 3) Natural Sciences (1005), 4) Humanities (812), 5) Business, Economics, and Management Studies (751), 6) Engineering and Technology (688), and 7) Agricultural Sciences (354).

For associate professor rank, the ranking of fields of study with the highest number of permanent academic staff is: 1) Medical and Health Sciences (852), 2) Natural Sciences (628), 3) Social Sciences (615), 4) Humanities (405), 5) Engineering and Technology (372), 6) Business, Economics, and Management Studies (355), and 7) Agricultural Sciences (247).

For professor rank, the ranking of fields of study with the highest number of permanent academic staff is: 1) Medical and Health Sciences (756), 2) Natural Sciences (583), 3) Social Sciences (471), 4) Engineering and Technology (322), 5) Humanities (316), 6) Business, Economics, and Management Studies (237), and 7) Agricultural Sciences (232).

The third visual (Panel C) shows the number of permanent academic staff by field of study and gender. For female, the ranking of fields of study is: 1) Medical and Health Sciences (2018), 2) Social Sciences (1661), 3) Natural Sciences (1318), 4) Humanities (1294), 5) Business, Economics, and Management Studies (862), 6) Engineering and Technology (739), and 7) Agricultural Sciences (546). For male, the ranking of fields of study is: 1) Natural Sciences (3120), 2) Medical and Health Sciences (2697), 3) Social Sciences (2685), 4) Engineering and Technology (2282), 5) Humanities (2035), 6) Business, Economics, and Management Studies (1540), and 7) Agricultural Sciences (900).

In Engineering and Technology:

- The top five universities with the highest proportion of female senior lecturers were: UCT (48.3%), Makerere (40.9%), UP (36.1%), Ibadan (27.6%), and UNILAG (24.1%).
- The top five universities with the highest proportion of female associate professors were: Mauritius (61.8%), UP (38.5%), UCT (37.5%), UNILAG (26.7%), and SU (25%).
- The top five universities with the highest proportion of female professors were: UP (23.7%), Mauritius (23.1%), SU (15.8%), UCT (14.7%), and Makerere (12.5%).

In Agricultural Sciences:

- The top five universities with the highest proportion of female senior lecturers were: UP (63.9%), Makerere (42.5%), UKZN (38.1%), Ibadan (37.3%), and SU (36.4%).
- The top five universities with the highest proportion of female associate professors were: SU (40.9%), UEM (38.9%), UP (36.4%), UKZN (33.3%), and Mauritius (33.3%).
- The top five universities with the highest proportion of female professors were: UEM (50%), UP (45.5%), SU (29.4%), AAU (25%), and Ibadan (14.5%).

In Business, Economics, and Management Studies:

- The top five universities with the highest proportion of female senior lecturers were: UP (64.9%), SU (64%), Mauritius (63.2%), Wits (52.7%), and Rhodes (44%).
- The top five universities with the highest proportion of female associate professors were: UEM (83.3%), UP (51.4%), UKZN (50%), and SU (41.4%).
- The top five universities with the highest proportion of female professors were: UEM (100%), Rhodes (50%), UKZN (50%), Wits (41.4%), and UP (38.5%).

In Humanities:

- The top five universities with the highest proportion of female senior lecturers were: SU (67.9%), Rhodes (60.9%), UKZN (60.3%), Wits (48.7%), and UCT (41%).
- The top five universities with the highest proportion of female associate professors were: UKZN (60%), UP (59%), Rhodes (53.3%), SU (50%), and Makerere (46.2%).
- The top five universities with the highest proportion of female professors were: UP (54.1%), UDSM (50%), Makerere (42.9%), SU (40%), and UCT (39.1%).

In Medical and Health Sciences:

- The top five universities with the highest proportion of female senior lecturers were: UCT (84.1%), SU (77.3%), Wits (66%), UKZN (62.5%), and UP (62.2%).
- The top five universities with the highest proportion of female associate professors were: UP (75%), Wits (70%), UCT (67.3%), SU (55.6%), and UKZN (53.5%).
- The top five universities with the highest proportion of female professors were: UP (79.2%), UKZN (60%), Wits (57.1%), SU (52.3%), and UCT (50.6%).

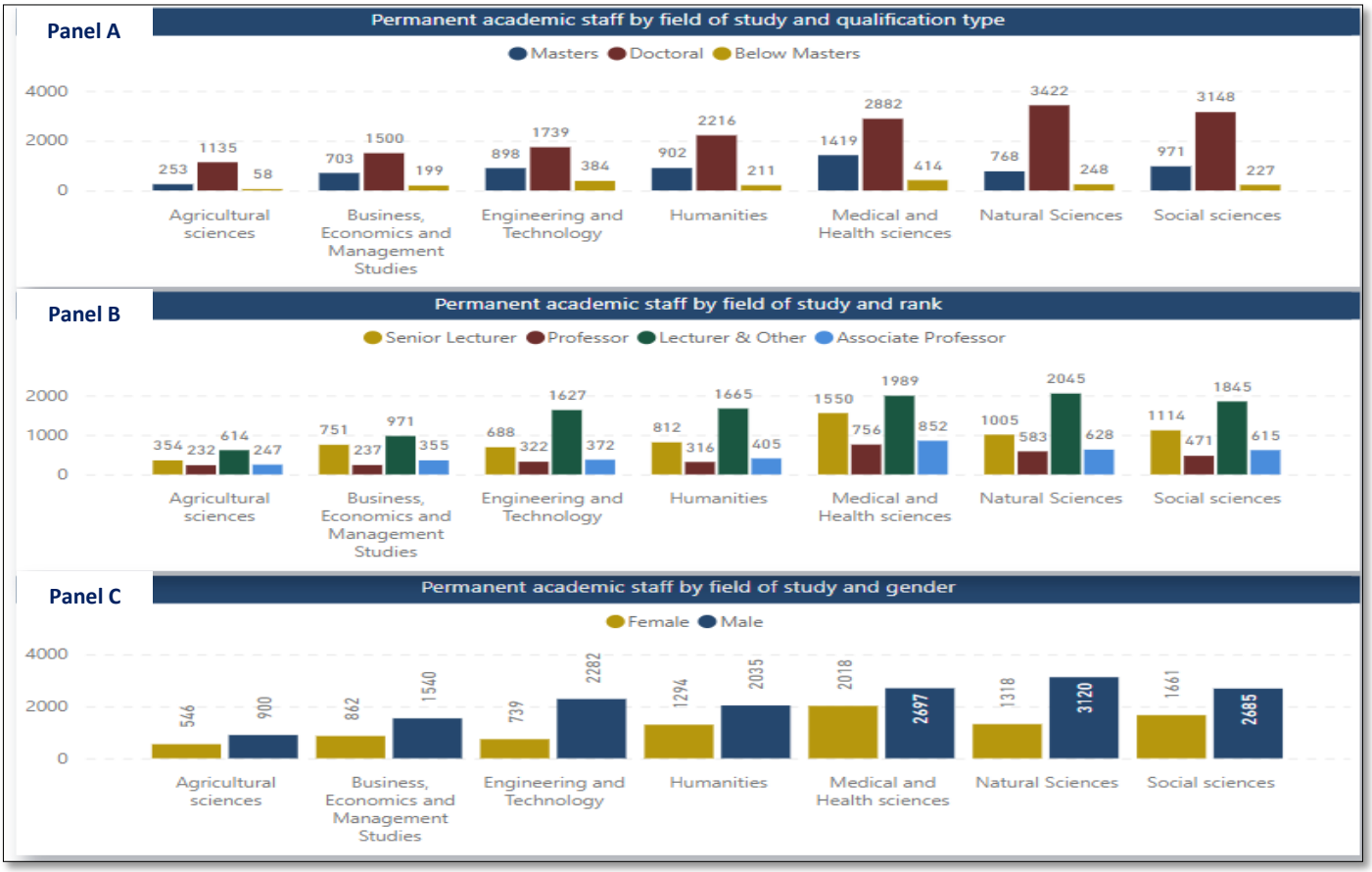
In Natural Sciences:

- The top five universities with the highest proportion of female senior lecturers were: Wits (51.3%), UP (48.4%), UCT (43.4%), UNILAG (40%), and Ibadan (37.2%).
- The top five universities with the highest proportion of female associate professors were: Mauritius (71.4%), Ibadan (45.7%), UNILAG (43.9%), UDSM (41.7%), and Rhodes (41.4%).
- The top five universities with the highest proportion of female professors were: Mauritius (60%), UP (31.7%), UCT (31.3%), UNILAG (30%), and Rhodes (28%).

In Social Sciences:

- The top five universities with the highest proportion of female senior lecturers were: UP (73.5%), SU (66.7%), UKZN (65.7%), UCT (63.5%), and UNILAG (50.7%).
- The top five universities with the highest proportion of female associate professors were: UCT (70%), Rhodes (68.4%), Rwanda (66.7%), UP (52.4%), and Wits (46.7%).
- The top five universities with the highest proportion of female professors were: Rhodes (60%), UKZN (50%), SU (47.8%), UP (37.9%), and UNILAG (35.6%).

Figure 2.30. Permanent academic staff by field of study, qualification type, rank, and gender



2.7 Research Funding

Research funding has undergone a dynamic evolution from 2015 to 2023, characterised by both an increase in total funding and a shift toward greater diversification across institutions (see tables 2.1 and 2.2). The overall scale of funding has expanded. However, disparities remain, especially among universities that participated in Phase I. A trend analysis reveals a complex trajectory—while some universities have capitalised on increased allocations, others have faced stagnation or volatility, exposing vulnerabilities in their funding resilience. Notably, institutions from Phase I show varied growth patterns: some leveraged early investments to scale up, while others plateaued. Beyond the raw figures, the composition of funding sources reveals a deeper insight. Universities with a diversified funding portfolio—combining governmental grants, industry partnerships, philanthropic contributions, and international collaborations—have demonstrated greater financial agility, shielding themselves from risks associated with over-reliance on any single revenue stream. In contrast, institutions heavily dependent on one source of funding have become more vulnerable to economic fluctuations, policy changes, and shifting donor priorities, underscoring the need for strategic adjustments in their research funding approaches.

Six sources of research income were included in the data template: 1) Government Sources (e.g., national and subnational ministries, agencies, and parastatals), 2) National Research Councils/Funding Agencies or Equivalent (e.g., Science Councils), 3) Private Sector/Industry, 4) International Funding from Agencies and Initiatives in Africa, 5) International Funding from Agencies and Foundations

Outside of Africa, and 6) Other Sources. Research income from diverse sources plays a crucial role in driving innovation, fostering collaboration, and addressing global challenges through academic inquiry. Government sources, including national and subnational entities, provide essential support for research aligned with policy priorities and public needs. National research councils and funding agencies enable scientific advancement by nurturing scientific talent and supporting research infrastructure. Contributions from the private sector stimulate applied research and industry-relevant solutions, while international funding within Africa promotes regional collaboration and capacity-building, as seen in initiatives from the African Union and RUFORUM. Beyond the continent, organisations such as DFID, SIDA, and JICA, along with global institutions like the World Bank and United Nations, inject vital resources into cross-border knowledge exchange and transdisciplinary research aimed at sustainable development. Together, these diverse funding streams create a synergistic ecosystem that empowers universities to tackle complex societal issues and generate transformative impact.

For Case 1 universities (those included in Phase I and II), total estimated research funding increased from $483,787,000 in 2015 to $817,734,000 in 2023, reflecting a 69% increase. For Case 2 universities (universities that only participated in Phase III), total estimated research funding stood at $27,640,000 in 2023, with the main contributor being KNUST (56%), followed by UEM (30%) and UCC (9%). It is important to note that the reporting mechanisms of Case 1 universities have significantly improved since Phase I, likely contributing to more accurate reporting of research funding. The year 2023 serves as a baseline for analysing the proportion of various research funding sources for each university, providing a clear, standardised snapshot of funding dynamics across institutions. This approach ensures consistency in comparisons and interpretations, helping to identify funding trends.

Table 2.1. Research funding ($000) by university and sources in 2023

University	Government	National	Private	International (in Africa)	International (Outside Africa)	Other	Total
AAU	2086			5216	16342	11126	34770
Wits	54775	16433		2739	53406	9586	136938
UP	14802	2277	7970	3795	9109		37953
UKZN	31914	9308	1662			23271	66488
UCT	8009	22525		5005	62068	2002	100109
SU	14734	12540	13794		18810	2508	62699
Rwanda				8372	6169	14688	29375
Rhodes	11137	6053	3995		3026		24211
UCAD	708			1063	1449		3220
UDSM			2501	1000	77527	19007	100035
Nairobi				1434	34418		35852
Mauritius	869			193	869		1932
Makerere	93958				50593		144550
UNILAG	2656			1328	9296		13280
Ibadan	724		241	157	84		1207
UEM	4564		815	1141	1630		8150
OAU	845		169		676		1690
UCC	490			613	1348		2450
UNN	2355		1570	393	3533		7850
UG	5023	2512	1256	1256	12558	2512	25115
KNUST	4605		3070		6140		15350

Table 2.2. Diversification of research funding ($000) per university in 2023

University	Government	National	Private	International (in Africa)	International Funding (Outside Africa)	Other
AAU	6%			15%	47%	32%
Wits	40%	12%		2%	39%	7%
UP	39%	6%	21%	10%	24%	
UKZN	48%	14%	3%			35%
UCT	8%	23%		5%	62%	2%
SU	24%	20%	22%		30%	4%
Rwanda				29%	21%	50%
Rhodes	46%	25%	17%		13%	
UCAD	22%			33%	45%	
UDSM			3%	1%	78%	19%
Nairobi				4%	96%	
Mauritius	45%			10%	45%	
Makerere	65%				35%	
UNILAG	20%			10%	70%	
Ibadan	60%		20%	13%	7%	
UEM	56%		10%	14%	20%	
OAU	50%		10%		40%	
UCC	20%			25%	55%	
UNN	30%		20%	5%	45%	
Ghana	20%	10%	5%	5%	50%	10%
KNUST	30%		20%	10%	40%	

Key Observations:

- ✓ **Government funding**: The top five universities with the highest proportion of government funding are: 1) Makerere (65%), 2) Ibadan (60%), 3) UEM (56%), 4) OAU (50%), and 5) UKZN (48%). These universities rely heavily on Government Funding. This reliance may suggest limited diversification in funding sources, making these institutions potentially vulnerable to shifts in government budgets or policy priorities.
- ✓ **National funding**: The top five universities with the highest proportion of national funding are: 1) Rhodes (25%), 2) UCT (23%), 3) SU (20%), 4) UKZN (14%), and 5) Wits (12%).
- ✓ **International funding outside Africa**: The top five universities with the highest proportion of international funding from outside Africa are: 1) Nairobi (96%), 2) UDSM (78%), 3) UNILAG (70%), 4) UCT (62%), and 5) UCC (55%). The strong reliance on international funding suggests strong ties to international donors and research collaborations, particularly from outside Africa. While this reflects their global networks, it also indicates a dependence on foreign funding, which carries the risk of over-reliance on non-African sources.
- ✓ **International funding from Africa**: The top five universities with the highest proportion of international funding from within Africa are: 1) UCAD (33%), 2) Rwanda (29%), 3) UCC (25%), 4) AAU (15%), and 5) UEM (14%). These universities have tapped into regional funding opportunities, demonstrating a focus on strengthening partnerships within Africa.

- ✓ **Private funding**: The top five universities with the highest proportion of private funding are: 1) SU (22%), 2) UP (21%), 3) Ibadan (20%), 4) UNN (20%), and 5) KNUST (20%). These universities have diversified their income by engaging with private sector stakeholders.

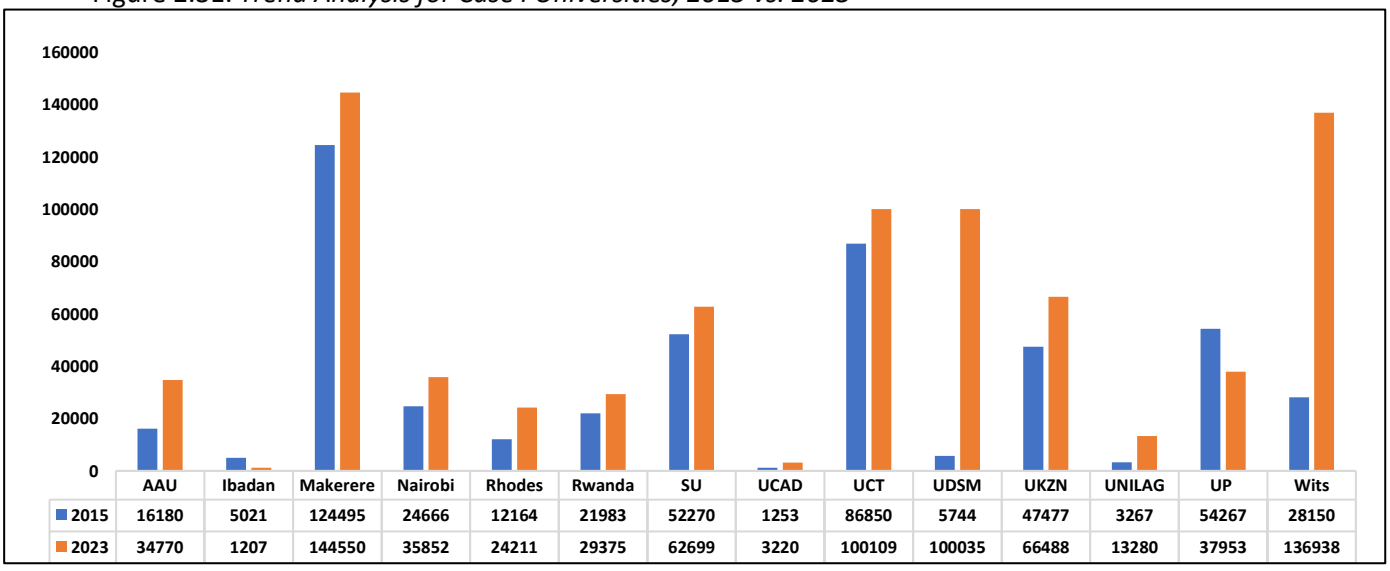
ARUA universities must strike a balance between government support, international funding, regional partnerships, and private sector engagement. Over-reliance on any single source of funding can expose institutions to significant risks, as demonstrated by the withdrawal of USAID funding under the new American administration. For example, universities that rely heavily on international funding from sources like USAID could face financial instability if such funding is reduced or redirected, as happened with the shift in U.S. foreign policy. This highlights the importance of diversification in funding portfolios. A balanced mix of funding sources reduces dependency on any one stream and enhances financial resilience. The top three universities with relatively balanced funding portfolios are:

- ✓ SU: 30% from international funding outside Africa, 23.5% from government, 22% from the private sector/industry, and 20% from national research councils. This diverse mix reflects a strong mix of domestic, international, and private partnerships.
- ✓ UP: 39% from government, 35% from international funding, 20.5% from the private sector/industry, and 6% from national research councils. UP demonstrates a notable balance across funding streams.
- ✓ Rwanda: 28.5% from Africa-based funding, 21% from international sources outside Africa, and 50.5% from the private sector and other resources. This mix reflects a strong integration of local and regional support.

By diversifying funding sources, ARUA universities can better navigate fluctuations in external financial support and build a more sustainable model for future growth and development.

Figure 2.33 below compares the total research funding received by Case I universities in 2015 (base year) and 2023

Figure 2.31. *Trend Analysis for Case I Universities, 2015 vs. 2023*



	AAU	Ibadan	Makerere	Nairobi	Rhodes	Rwanda	SU	UCAD	UCT	UDSM	UKZN	UNILAG	UP	Wits
2015	16180	5021	124495	24666	12164	21983	52270	1253	86850	5744	47477	3267	54267	28150
2023	34770	1207	144550	35852	24211	29375	62699	3220	100109	100035	66488	13280	37953	136938

Key Observations:

- ✓ Most universities have experienced an increase in funding between 2015 and 2023, reflecting a positive trend in research investment. Makerere, UCT, UDSM, and Wits lead in terms of absolute funding values.
- ✓ Wits, Makerere, and UDSM have shown significant increases in funding, with Makerere maintaining its dominant funding position. Some universities, like Ibadan and UCAD, have experienced relatively small increases or only marginal growth.
- ✓ UDSM and Wits have seen remarkable increases in research funding. The top five universities with the highest research funding in 2023 are: 1) UDSM, 2) Wits, 3) UNILAG, 4) UCAD, and 5) AAU.

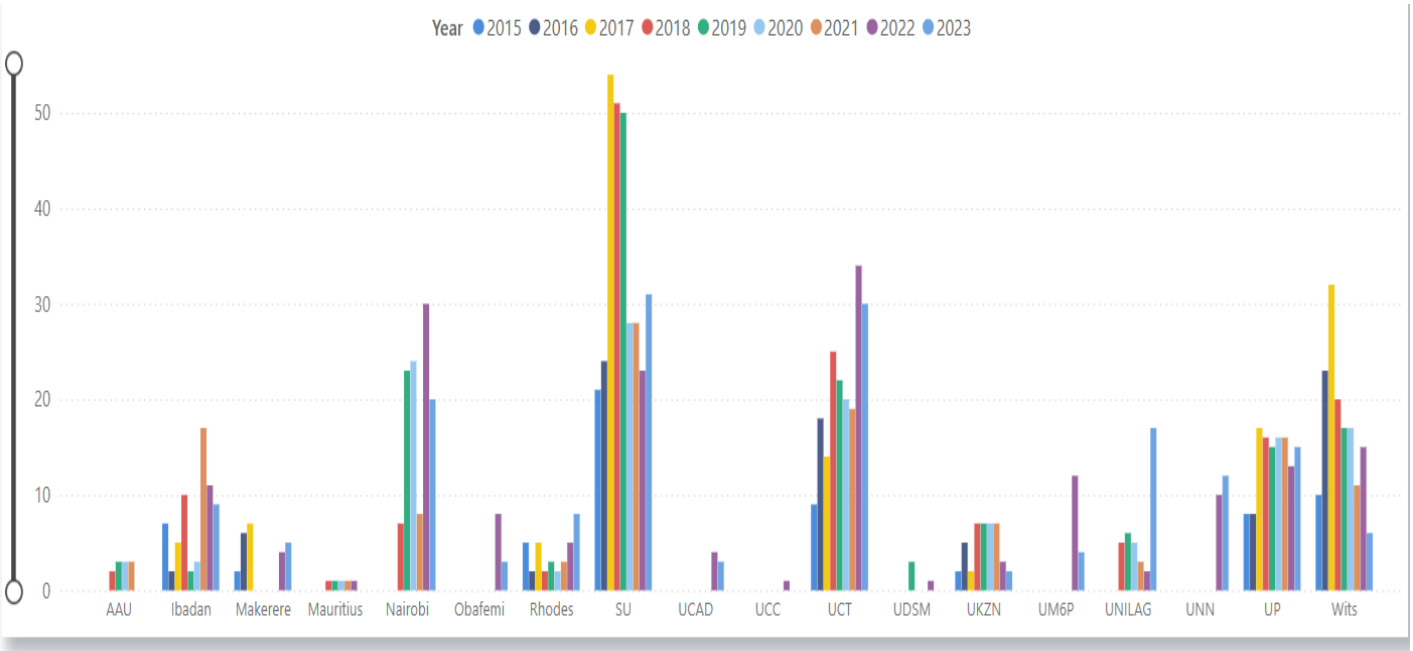
2.8 Patents

Registered patents are a key indicator of innovation and research productivity, reflecting universities' ability to translate research into practical applications with societal and economic impact. Patents not only protect intellectual property but also foster industry collaboration, attract funding, and enhance the university's role in knowledge transfer and commercialisation, driving technological advancement and economic growth.

However, when analysing patent registration as a metric, clear trends are often elusive due to the complex nature of the patenting process, varying funding cycles, and differences in research outputs across disciplines. Additionally, the time required to secure patents, alongside a focus on non-patentable outputs such as academic publications, contributes to fluctuations in patent numbers. Despite these challenges, creating an environment that encourages patent registration remains essential for boosting research productivity, enhancing institutional reputation, and improving global competitiveness.

Figure 2.24 illustrates the number of registered patents from 2015 to 2023. In 2023, the top five universities with the highest number of patents were: SU (31), UCT (30), Nairobi (20), UNILAG (17), and UP (15). For Case 1 universities, the number of patents increased from 64 in 2015 to 146 in 2023, marking a 128% rise. For Case 2 universities, the total number of patents stood at 19 in 2023.

Figure 2.34. Number of Patents, 2015 – 2023



Year	AAU	Ibadan	Makerere	Mauritius	Nairobi	Obafemi	Rhodes	SU	UCAD	UCC	UCT	UDSM	UKZN	UM6P	UNILAG	UNN	UP	Wits
2015		7	2				5	21			9		2				8	10
2016		2	6				2	24			18		5				8	23
2017		5	7				5	54			14		2				17	32
2018	2	10		1	7		2	51			25		7		5		16	20
2019	3	2		1	23		3	50			22	3	7		6		15	17
2020	3	3		1	24		2	28			20		7		5		16	17
2021	3	17		1	8		3	28			19		7		3		16	11
2022		11	4	1	30	8	5	23	4	1	34	1	3	12	2	10	13	15
2023		9	5		20	3	8	31	3		30		2	4	17	12	15	6

2.9 Summary

This part of the report highlights the progress of the ARUA universities between 2015 and 2023, including improvements in data management. Key advancements include the adoption of advanced academic management platforms, integrated data systems, and dedicated data management offices. These developments have streamlined administrative processes, enhanced data validation, and improved transparency. While some institutions have made significant strides, progress has been uneven across the network.

The overall distribution of postgraduate enrolments has shifted since 2015. While some universities, like UDSM, and Wits, have seen significant growth in postgraduate enrolments, others, such as Ibadan and Rhodes, have experienced declines. The distribution of master's and doctoral students across various fields of study reveals diverse trends in enrolment across African universities. In general, universities in the region show distinct patterns in their focus on different academic disciplines, with some institutions emphasising specific fields such as Natural Sciences, Engineering, Medical and Health Sciences, and Agricultural Sciences, while others exhibit a stronger presence in Social Sciences, Humanities, and Business, Economics, and Management. The proportion of students in each field varies significantly between universities, with some institutions showing marked growth in particular areas, such as Medical and Health Sciences or Engineering, while others have experienced a decline

or plateau in enrolment numbers in certain fields like Agricultural Sciences and Humanities. Across the years, improvements in enrolments have been particularly noticeable in fields like Social Sciences, Engineering, and Business, Economics, and Management, where several universities have made substantial strides.

Gender distribution in postgraduate enrolments also reflects varying trends, with certain universities displaying a female majority, while others show a male-dominated enrolment profile. A significant number of institutions have made improvements in female representation, particularly at the master's and doctoral levels, which signals progress towards gender equity in higher education. This shift is seen across a range of fields, with some universities showing strong gains in female enrolments in traditionally male-dominated areas like Engineering and Medical Sciences. However, despite these improvements, challenges persist at some institutions where female enrolment figures have either stagnated or declined.

Between 2015 and 2023, female graduates in African universities showed significant growth. Case 1 universities (institutions which provided historical data) also saw increases in female graduates, the growth was less pronounced. Overall, these trends reflect progress towards narrowing the gender gap in higher education, though disparities remain, particularly at the postgraduate level.

In 2023, universities such as Rhodes, Ibadan, UNILAG, UG, and KNUST, reported a higher proportion of female postgraduate graduates, with Rhodes and Ibadan showing the most notable increases in female representation, particularly at the master's and doctoral levels. However, disparities persist, as some universities like Nairobi and AAU have experienced declines in female doctoral graduates. While progress in gender equality is evident in many institutions, challenges remain in achieving consistent improvements across all qualification types and disciplines.

From 2015 to 2023, there has been a steady increase in female academic staff across the ARUA universities, with marked growth in those holding doctoral degrees. Universities in Case 1 saw a 21% overall increase in female staff, with a 35% rise in those with doctorates. Despite these improvements, gender disparities persist at senior academic ranks, particularly in fields like Engineering and Technology, where male dominance is more pronounced. There has also been a general increase in staff holding doctoral degrees, though some fields, particularly Medical and Health Sciences, still have a significant portion of staff with lower qualifications. Gender imbalances are most evident at the professor and associate professor levels, where female representation remains low, especially in male-dominated disciplines.

The trends from 2015 to 2023 illustrate progress in increasing the qualifications and ranks of academic staff, with particular improvements in female representation and PhD holders. However, challenges remain, particularly in achieving greater gender equality at senior academic ranks and in addressing the uneven distribution of academic staff across disciplines. There is also a clear need for universities to focus on maintaining and improving the quality of academic staff to ensure a robust, sustainable academic environment that fosters leadership, research, and knowledge creation across all fields of study.

The number of postdoctoral research fellows across ARUA member universities has shown variability from 2015 to 2023, with no consistent trend. South African universities dominate the distribution, while UDSM, Mauritius, UNILAG, and UM6P reported the highest numbers among non-South African institutions in 2023. Case 1 universities saw an overall increase in postdocs from 2015 to 2021,

followed by a decline in 2022 and partial recovery in 2023, with the highest number recorded in 2017. Despite fluctuations, the overall trend highlights the dominance of South African institutions in hosting postdocs within ARUA member universities.

Patents are a key indicator of innovation, allowing universities to turn research into practical applications with societal and economic impact. They promote industry collaboration, attract funding, and enhance knowledge transfer, though patent trends can be inconsistent due to the complex process and varying research outputs. Nonetheless, encouraging patent registration is essential for research productivity, institutional reputation, and global competitiveness. In 2023, the universities with the highest patent numbers were SU (31), UCT (30), Nairobi (20), UNILAG (17), and UP (15). Case 1 universities saw a 128% increase in patents, rising from 64 in 2015 to 146 in 2023. While universities focus on patents, they must also balance this with other priorities like publishing and open-source innovation. Strengthening institutional support, streamlining the patenting process, and fostering industry partnerships will help boost patent registrations over time.

Funding sources for universities vary, with government funding being especially significant for institutions like Makerere, Ibadan, and UEM, where more than 50% comes from national sources. However, this reliance exposes them to risks from policy changes. In contrast, universities like Nairobi, UDSM, and UNILAG rely heavily on international funding, which signals global partnerships but also risks over-dependence on foreign resources. Some universities, such as UCAD and Rwanda, have tapped into regional funding, strengthening local partnerships. Private sector funding is also growing, with institutions like SU, UP, and Ibadan diversifying income streams. Universities are increasingly adopting balanced funding portfolios, like SU, which blends international, government, private, and national sources. This strategy helps mitigate risks and ensures financial sustainability for their research activities.

Part 2

3.0 BIBLIOMETRIC ANALYSIS

In this part of the report, a bibliometric analysis of the research produced by ARUA universities is presented. The analysis aims to provide a comprehensive overview of the research output, quality[2], and research impact of the universities within the ARUA network over the period from 2015 to 2023. By leveraging bibliometric data from the Web of Science Core Collection, the analysis examines the number of publications produced by ARUA member institutions, the trends in academic output, and how these institutions contribute to the broader African research landscape. A particular focus is placed on the role of ARUA universities in advancing knowledge in key scientific domains, with a special emphasis on areas such as public health, environmental sciences, and infectious diseases. Additionally, the analysis tracks changes in publication volume, examines the geographical and institutional distribution of research outputs, and identifies the journals and academic outlets where ARUA universities publish their work. The analysis also highlights the research collaboration patterns among member universities, both within Africa and internationally, and the associated funding sources that support these endeavours.

Furthermore, the analysis provides insights into the global knowledge influence of ARUA universities, particularly in high-impact research areas, and compares their performance with that of other African institutions. By examining these various dimensions, the analysis aims to offer a detailed understanding of the contributions ARUA universities make to both regional and global academic and research communities, providing key insights into their strategic positioning for future research directions and partnerships.

All the 23 ARUA universities are included in the bibliometric analysis. The bibliometric analysis complements the analysis presented in Part I of the report. It allows a holistic understanding of the research profiles of ARUA universities.

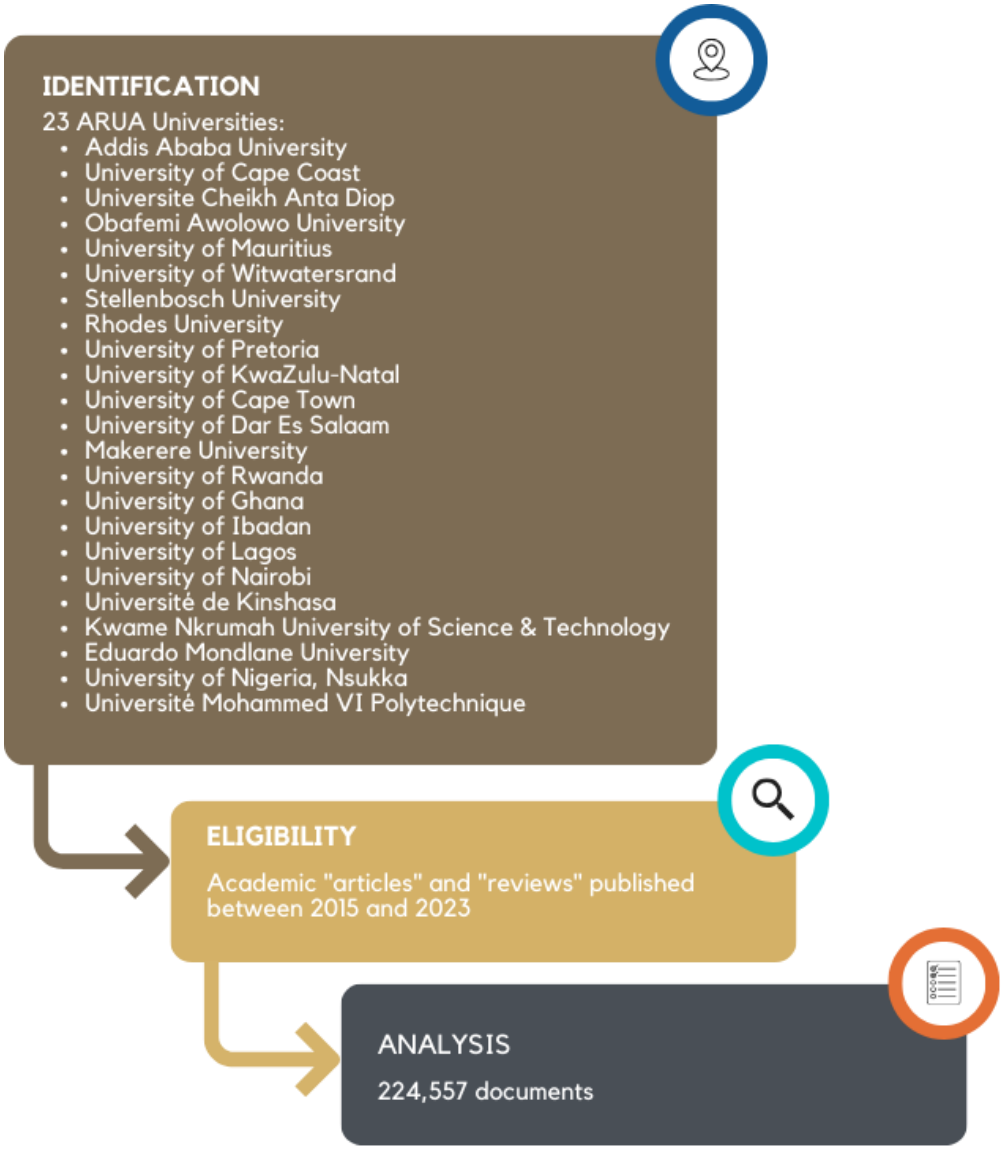
3.1 Data Source for Bibliometric Analysis and Selection Criteria

This report is based solely on data from the Web of Science Core Collection, a comprehensive database offering one of the best-in-class publication and citation data. The platform integrates regional, subject-specific data and patent indexes into the Core Collection, drawing from an extensive array of sources. These include nearly 90 million publication records, 2.1 billion citations, 22 million records containing funding information, and 1.5 million patent-related records. Widely used by leading academic, corporate, and government institutions, as well as researchers globally, the Web of Science Core Collection serves as a vital tool for generating reports, gaining valuable insights, and making informed decisions that help shape future research strategies.

[2] The study did not originally aim to specifically evaluate the quality of research produced by ARUA universities. However, by analysing key indicators such as citation counts and journal impact factors, it is possible to gain some insight into the quality of research from these institutions. While these indicators provide useful information, they are inherently limited and do not offer a comprehensive assessment of research quality.

For this report, the analysis was confined to two main types of documents within the database: 'articles' and 'reviews' (see Figure 3.1). The analysis period was limited to the years covered by the Data-Gathering and Benchmarking project, spanning from 2015 to 2023. This time frame also corresponds with the period during which ARUA has existed as a network. Additionally, the analysis was restricted to publications originating from academic institutions. Although the Web of Science database also includes content from other types of organisations, such as research institutes, the analysis focused exclusively on academic institutions. These parameters—document type, timeframe, and organisation type—constituted the primary filters applied to select the publications tracked in this report.

Figure 3.1. Inclusion criteria



3.2 Research output in ARUA Member Universities

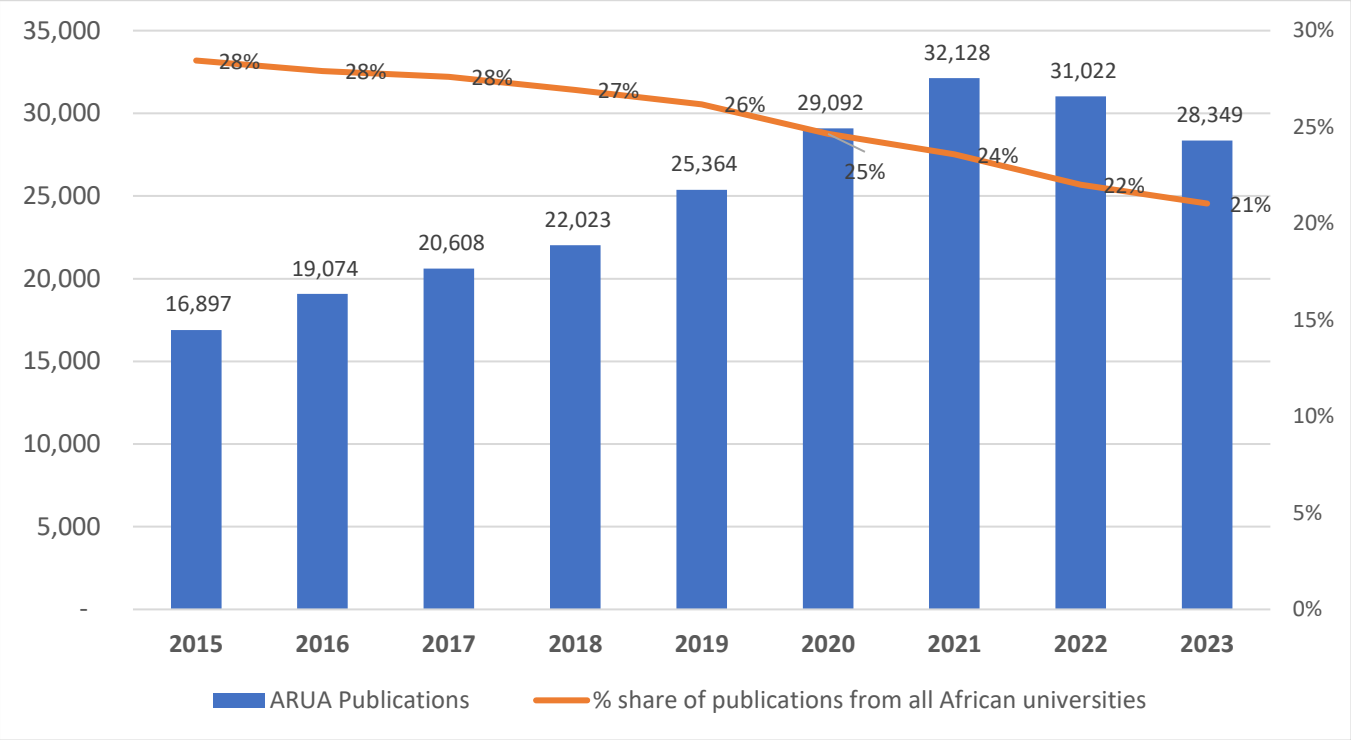
Using the filters described in the previous section, the analysis found that a total of 224,557 articles and reviews from ARUA member universities were captured in the Web of Science database over the eight years of the network's existence. A total of 16,897 articles and reviews were captured in 2015

from member universities. By 2023, the number of articles and reviews had increased to 28,349, with an average annual growth rate of about 7% (Figure 3.2). The data was retrieved from the Web of Science database on 12 June 2024.

When comparing the research output of ARUA universities to the total number of articles and reviews published by academic institutions across the rest of Africa, ARUA's share of the total number of publications in Africa over the period declined from 28% in 2015 to 21% in 2023. The main reason for this declining trend is the steady increase in the research output from a number of non-ARUA

institutions, especially in North Africa such as Cairo University, Ain Shams University, Mansoura University and Alexandria University.

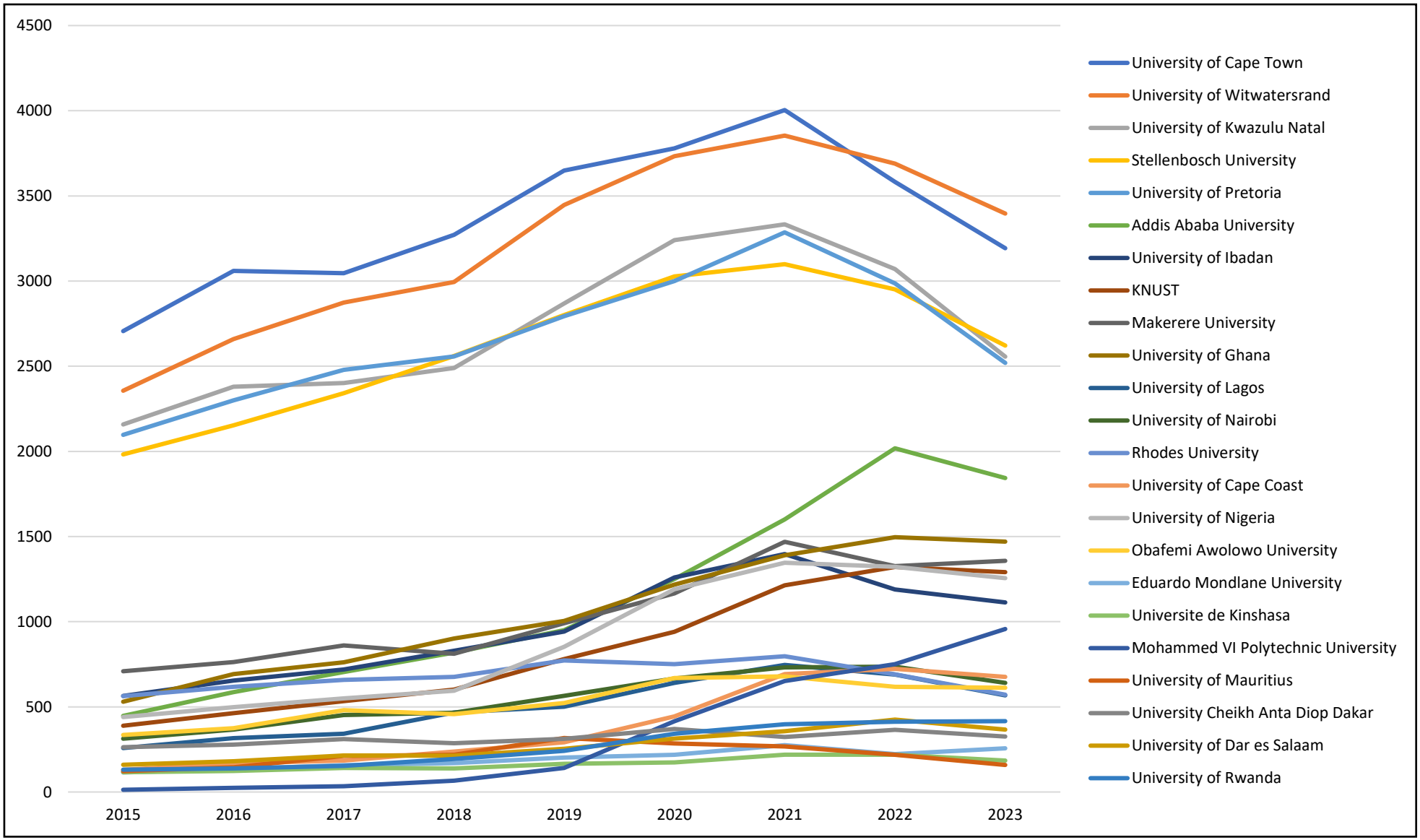
Figure 3.2. Publications by ARUA universities



When disaggregating the publications across individual universities, three key observations were made. First, despite a slight decline in 2023 at most institutions, with the exception of five universities, there was a general increase in the number of articles and reviews from ARUA universities between 2015 and 2023 (Figure 3.3). Second, five South African universities — UCT, Wits, UKZN, SU, and UP — accounted for the largest share of the articles and reviews produced over the period. While these universities accounted for approximately 67% of the publications in 2015, their share decreased to 50% by 2023. This decline is primarily the result of an increase in the number of ARUA universities across the three phases of the study – from 15 in 2015 to 23 in 2023. Third, universities appear to be clustering into three groups based on research output: those with more than 2,500 papers, those with between 1,000 and 2,000 papers, and those with fewer than 1,000 papers in 2023. These patterns are consistent with those observed in the report by Van Schalkwyk et al. (2021)[3] for the same institutions.

[3] Van Schalkwyk, F, Blanckenberg, J, Cloete, Maassen, P & Mouton, J. Science output up, but data driven investment needed. *University World News*, 14 January 2021.

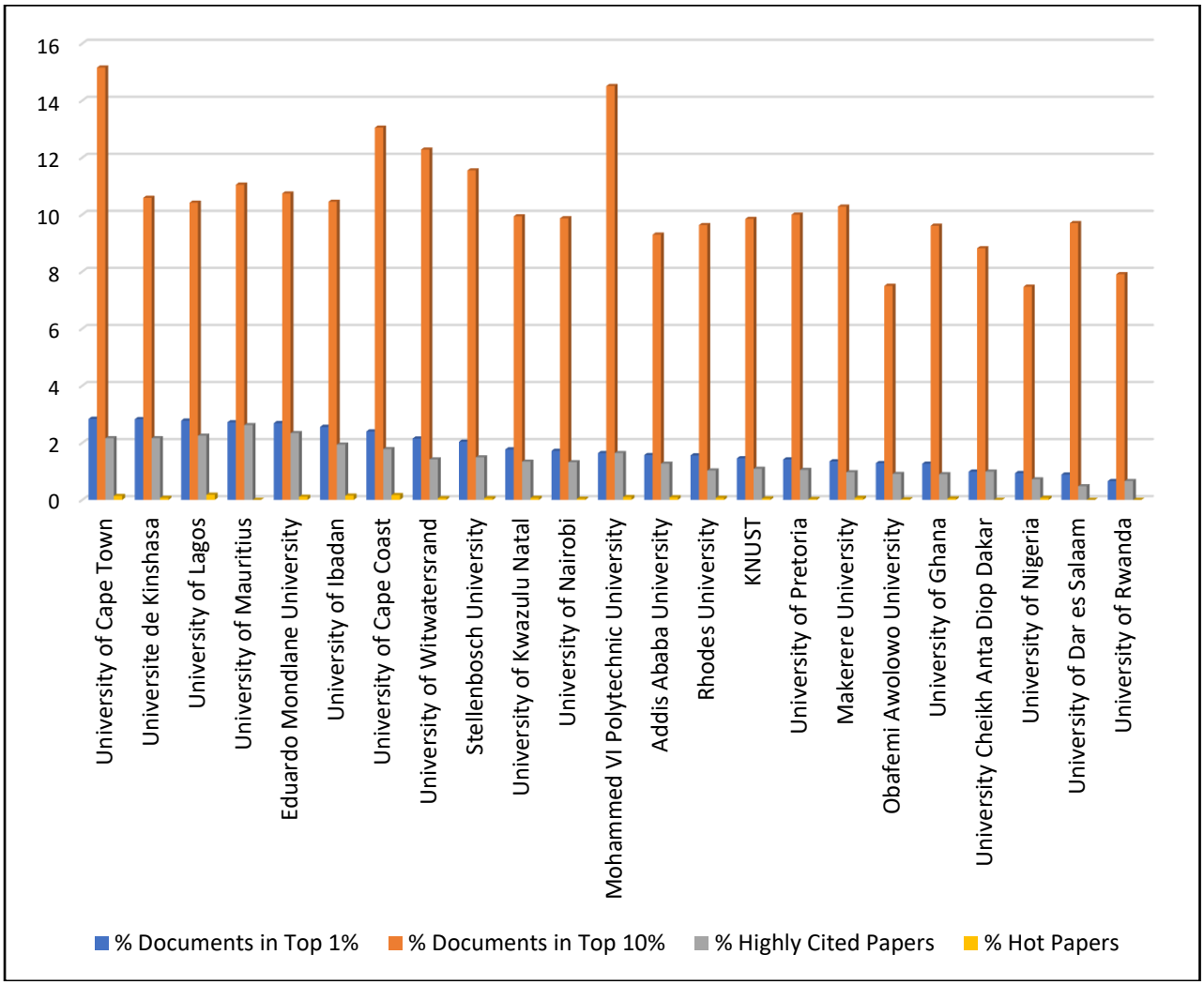
Figure 3.3. Number of publications by member universities



3.3 Quality of Research Outputs

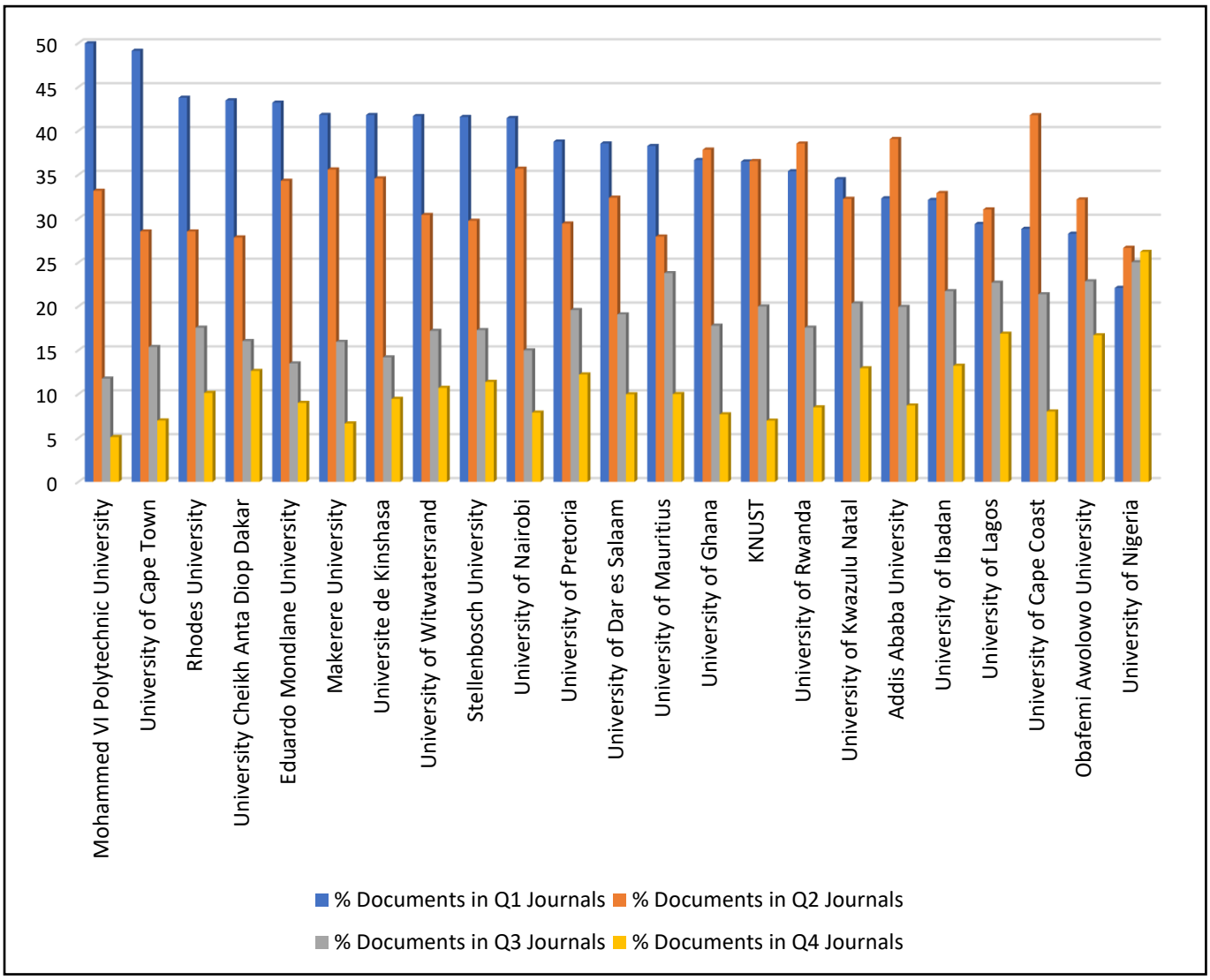
To further explore the quality of research, we examined the proportion of publications in top-ranking and high-impact factor journals (Figures 3.4 and 3.5). ARUA universities do not feature prominently in the top 1% of the most cited documents categorised by subject, year, and publication type. Instead, they rank within the top 10%. Between 8% and 15% of the publications were ranked among the top 10% of highly cited papers (Figure 3.4).

Figure 3.4. Proportion of Publications in Top-Ranking Journals



Using the Journal Impact Factor Quartile, Figure 3.5 shows that a significant proportion of publications by ARUA academics were in Q1 journals (the highest quartile for journal impact factor), ranging from 22% to 50%. Between 27% and 42% were in Q2 journals, 12% to 25% were in Q3 journals, and 5% to 26% were in Q4 journals. These trends indicate that a notable number of publications from ARUA institutions are of good quality.

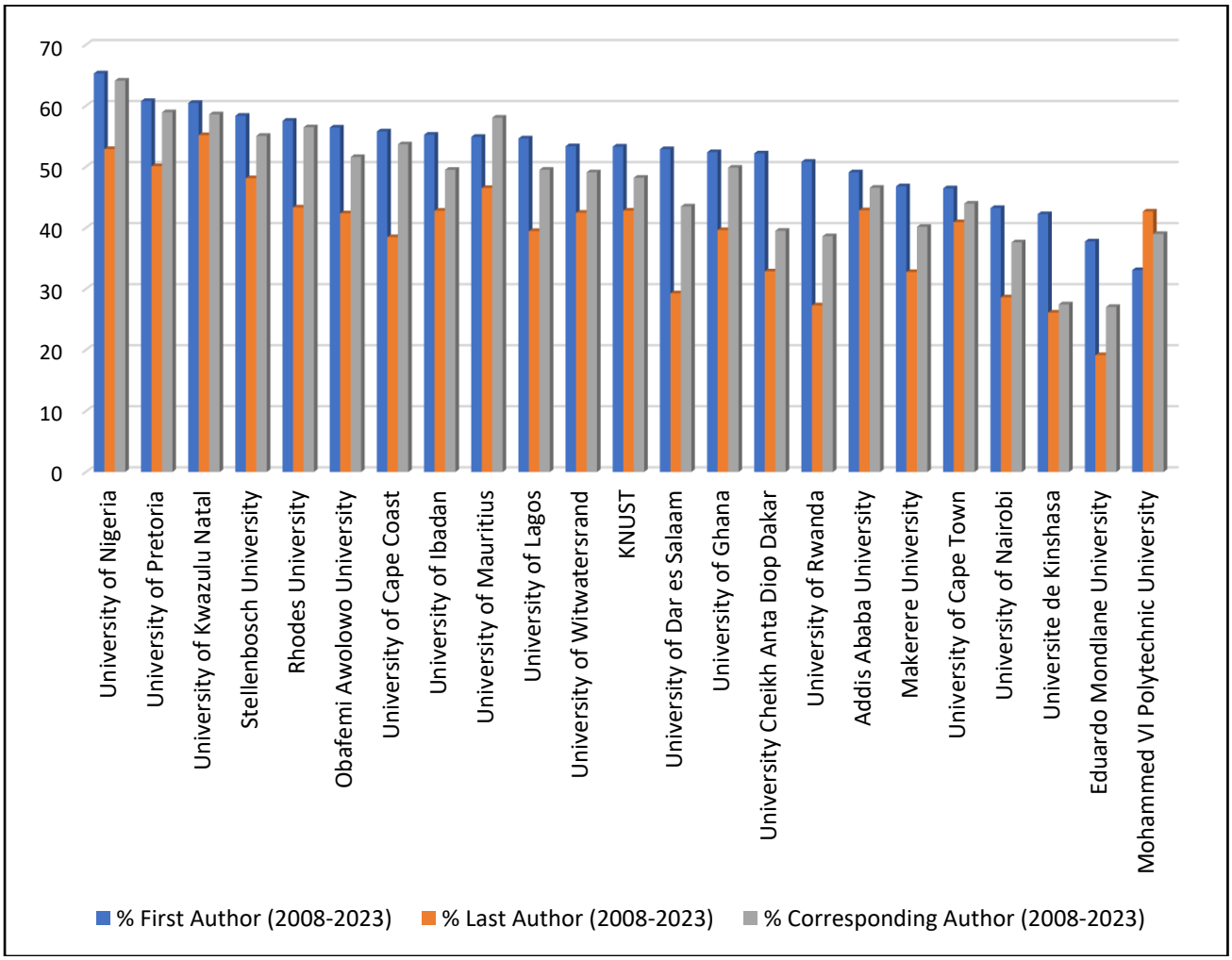
Figure 3.5. Proportion of publications in high-impact factor journals



3.4 Position of Authors on Publications

Figure 3.6 provides insights into the position of authors on the publications. Between 33% and 65% of academics in ARUA member universities were first authors on the publications between 2015 and 2023. Between 19% and 55% were last authors, and between 27% and 65% were corresponding authors.

Figure 3.6. Position of authors on publications



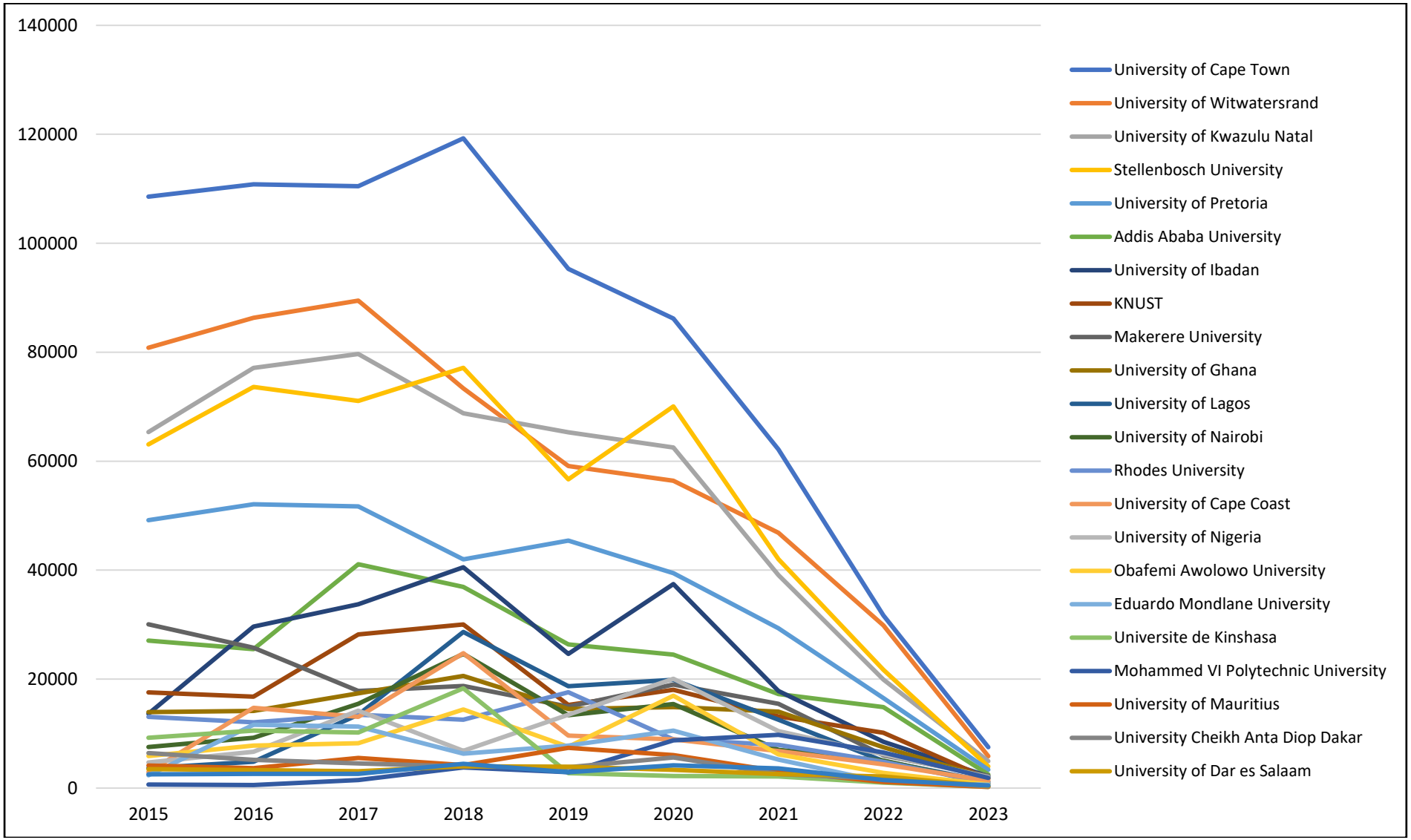
3.5 Knowledge Impact by ARUA Universities

Beyond research output and quality, the relevance of research to the global knowledge society is crucial. We assess the global influence of knowledge produced by ARUA universities by first looking at the number of citations (Figure 3.7) and then the Category Normalised Citation Impact (CNCI) (Figure 3.8). Although citations provide a sense of the impact of research, they are not entirely reliable, as various factors such as research area and publication year can influence citation counts. Therefore, we complement citation data with the CNCI, which normalises citations based on document type, publication year, and subject area.

In Figure 3.7, a pattern similar to that in Figure 3.3 is observed, with the top five universities in terms of citations being South African institutions: UCT, Wits, UKZN, SU, and UP. The universities with the lowest number of citations in 2015 were Rwanda and the UDSM[4].

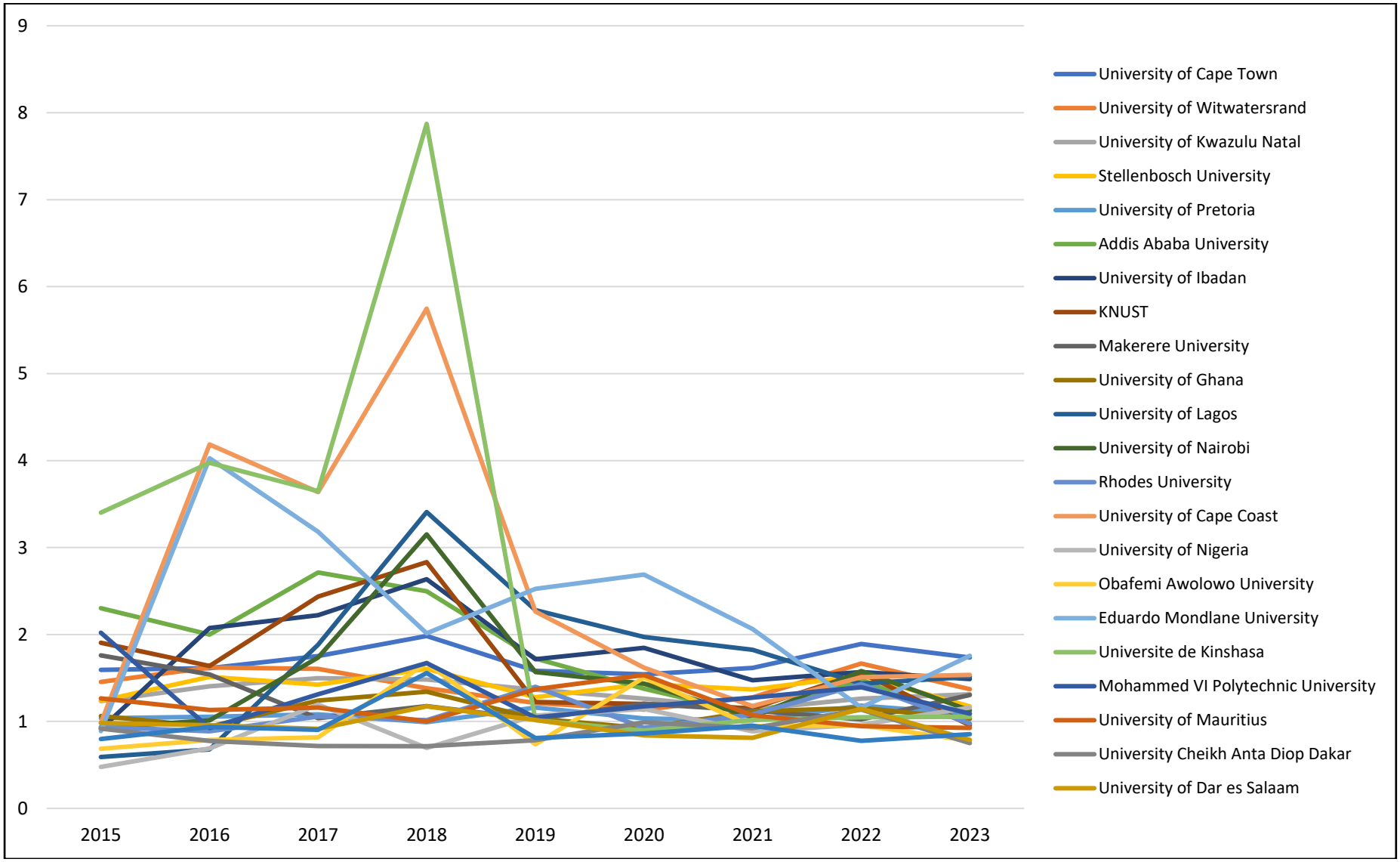
[4] The downward trend in citations for all the universities is expected given that older publications tend to have higher citations on average compared to more recently published works.

Figure 3.7. Number of citations by member universities



The Category Normalised Citation Impact (CNCI) is calculated by dividing the actual count of citing items by the expected citation rate for documents of the same type, year, and subject area. A CNCI value of 1 indicates performance at the world average; values above 1 are considered above the world average, while values below 1 are below the world average. A value of 2, for example, indicates performance twice as high as the world average. Figure 3.8 reveals that, although most ARUA universities perform at or near the global average, there are at least seven universities that exceeded a CNCI value of 2 for at least one year during the period under review. These universities include Kinshasa, UCC, KNUST, UEM, UNILAG, Nairobi, AAU, and Ibadan. Notably, in 2018, the CNCI for Kinshasa and UCC was 7.9 and 5.7, respectively, suggesting high global knowledge impact.

Figure 3.8. Category normalized citation impact by ARUA universities



3.6 Publication (Journal) Outlets

The primary journal outlets for articles and reviews from ARUA member universities are highlighted below (Table 3.1) and sorted based on the number of documents per journal as well as citations. In Table 3.1, the top 20 journal outlets of ARUA universities are presented, ranked by the number of publications.

A large proportion of the articles and reviews from 2015 to 2023 were published in science, medicine, and public health journals. The journal *Plos One* (a science and medicine journal) had the highest number of publications from ARUA universities, followed by *Scientific Reports*, *SAMJ South African Medical Journal*, *BMC Public Health*, and *Heliyon*.

Table 3.1. Top 20 journals with the most documents

	Journal Name	Web of Science Documents	Times Cited	Rank	% Docs Cited
1	Plos One	4453	61527	1	89.31
2	Scientific Reports	1410	23252	2	89.79
3	SAMJ South African Medical Journal	1195	7702	3	82.68
4	BMC Public Health	1154	15658	4	89.51
5	Heliyon	1121	8425	5	81.45
6	BMJ Open	1085	7768	6	81.01
7	Pan African Medical Journal	921	4780	7	76.44
8	Monthly Notices of the Royal Astronomical Society	909	18435	8	92.63
9	HTS Teologiese Studies - Theological Studies	893	1530	9	55.32
10	Malaria Journal	783	10544	10	91.95
11	Sustainability	772	7429	11	86.53
12	South African Journal of Botany	745	6611	12	87.25
13	International Journal of Environmental Research and Public Health	726	8628	13	91.87
14	BMC Health Services Research	699	7763	14	87.27
15	Scientific African	648	3580	15	76.7
16	BMC Infectious Diseases	628	8832	16	92.83
17	African Health Sciences	623	3470	17	95.83
18	Clinical Infectious Diseases	542	13691	18	96.31
19	Plos Neglected Tropical Diseases	489	8831	19	92.64
20	Journal Of High Energy Physics	477	11707	20	92.24

In Table 3.2, the journals most frequently cited by ARUA universities are presented. The pattern once again favours science, medicine, and public health-based journals, with *The Lancet* having the highest number of citations, followed by *Plos One*, *New England Journal of Medicine*, *Astronomy & Astrophysics*, and *Nature*. It is notable that six of the journals with the highest citations also appear in Table 3.1, such as *Plos One*, *Astronomy & Astrophysics*, *Scientific Reports*, *BMC Public Health*, *Clinical Infectious Diseases*, and *Journal of High Energy Physics*.

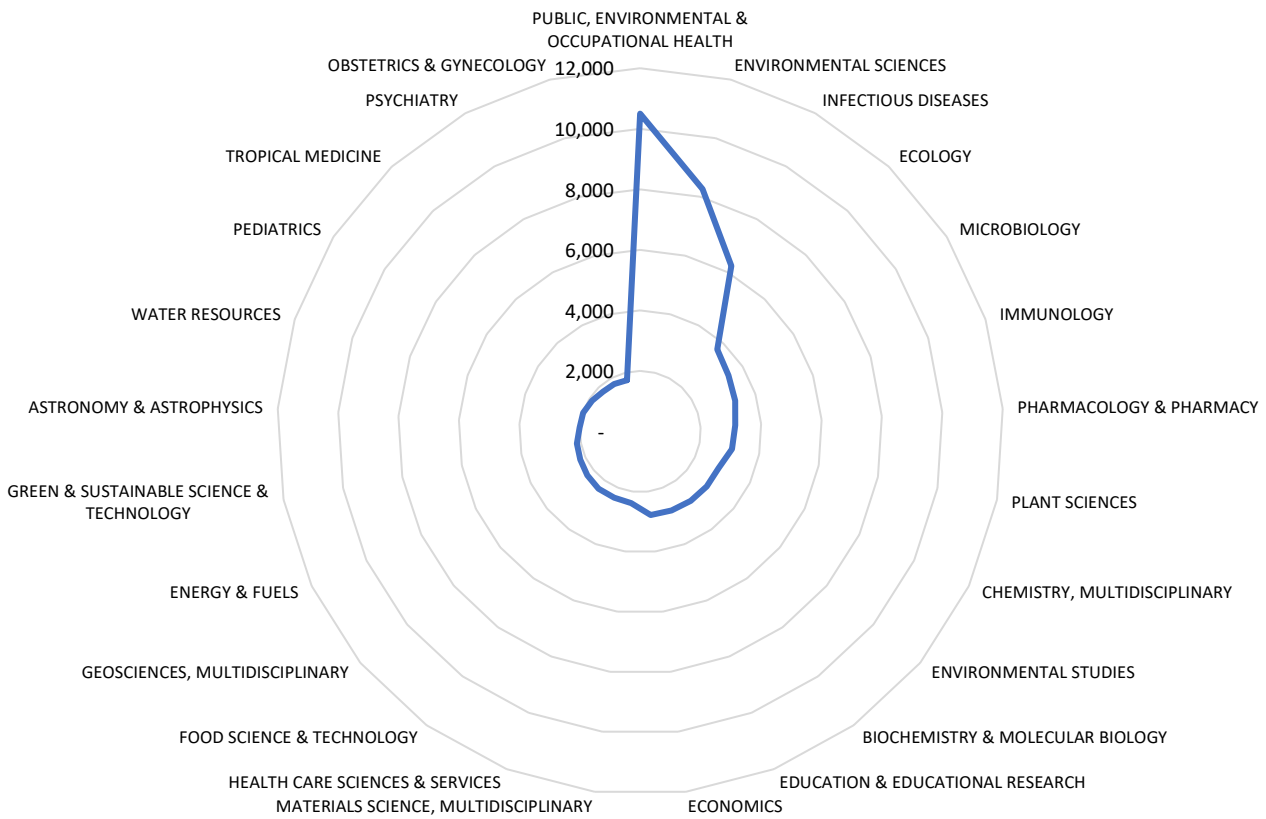
Table 3.2. Top 20 journals with the most citations

Journal Name	Web of Science Documents	Times Cited	Rank	% Docs Cited
Lancet	271	145558	1	100
Plos One	4453	61527	2	89.31
New England Journal of Medicine	115	38909	3	100
Astronomy & Astrophysics	435	35369	4	95.86
Nature	154	34482	5	99.35
Science	110	24965	6	99.09
Scientific Reports	1410	23252	7	89.79
Lancet Neurology	29	22351	8	100
Lancet Infectious Diseases	162	19626	9	98.77
Lancet Global Health	234	19188	10	97.86
Nature Communications	323	18891	11	93.5
Monthly Notices of The Royal Astronomical Society	909	18435	12	92.63
European Physical Journal C	404	15798	13	95.05
BMC Public Health	1154	15658	14	89.51
Clinical Infectious Diseases	542	13691	15	96.31
Jama Oncology	13	12756	16	100
Physical Review D	413	12119	17	93.46
Journal of High Energy Physics	477	11707	18	92.24
Science of the Total Environment	410	11526	19	94.88
Proceedings of the National Academy of Sciences of The United States of America	181	11264	20	98.9

3.7 Research Areas

Figure 3. 9 shows the specific research areas that dominated the output of ARUA universities between 2015 and 2023. The top research areas include Public, Environmental, and Occupational Health (10,499 publications), Environmental Sciences (8,269 publications), Infectious Diseases (6,244 publications), Ecology (3,710 publications), Microbiology (3,445 publications), and Immunology (3,296 publications). Other prominent research areas had between 1,000 and 2,000 publications. This aligns with the trends observed in Section 3.3, with a clear focus on science, medicine, public health, and religion.

Figure 3.9. Research areas of ARUA universities (top twenty-five areas)



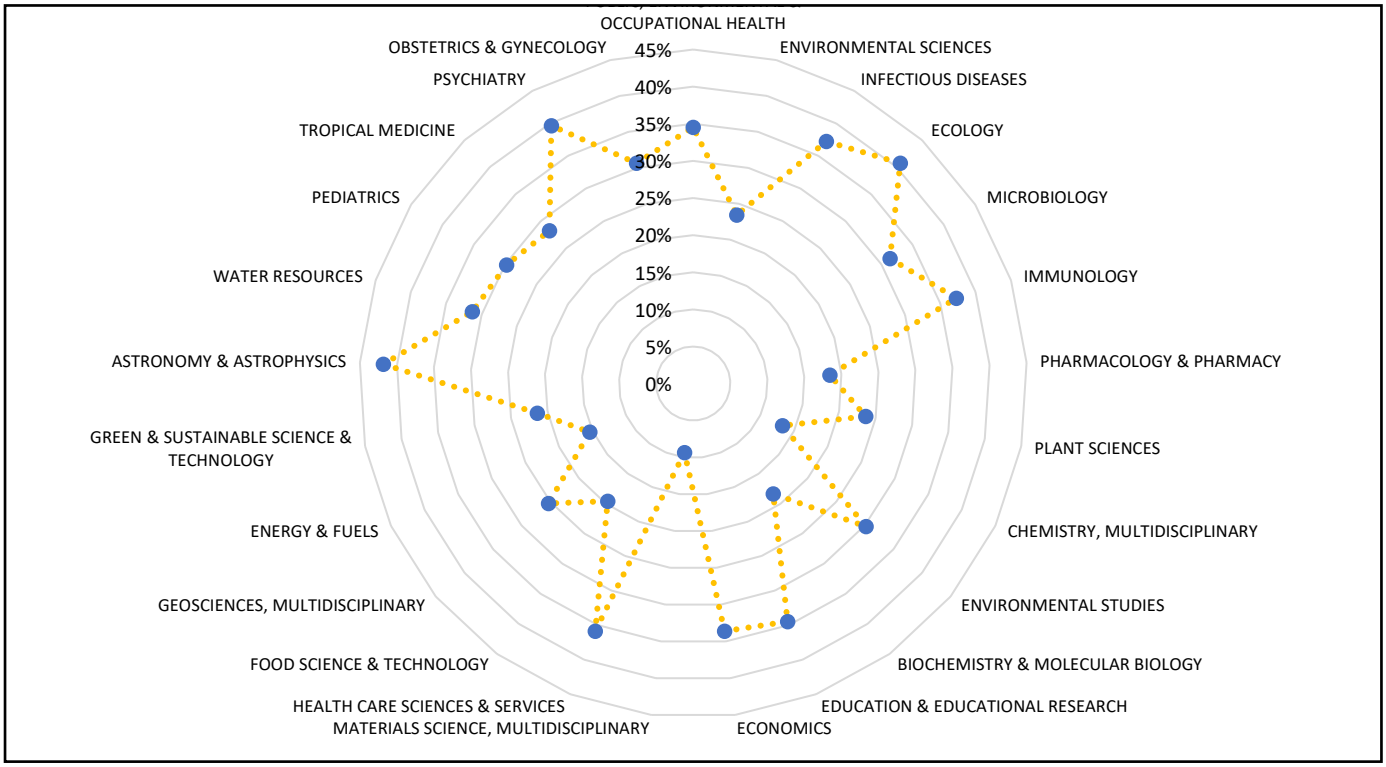
In comparing the research areas of ARUA member universities to those of other non-ARUA African universities, two key insights emerge:

1. **Similarity of research focus**: The research areas of ARUA member universities are closely aligned with the broader academic research trends across Africa, with a dominant focus on science, medicine, and public health. This is consistent with the broader trend in Africa, where the leading research areas for academic institutions across the continent also fall within these domains.
2. **Proportion of research output**: ARUA universities contribute a significant portion of Africa's total research output in specific key areas. Specifically:
    - In Material Science (multidisciplinary), ARUA universities published about 9% of the total research output from all African institutions.
    - In Astronomy & Astrophysics, Religion, and Psychiatry, ARUA universities produced a much larger share, accounting for almost 42% of Africa's total research in these fields.

The University of Cape Town is a major contributor to the research in Astronomy & Astrophysics and Psychiatry, indicating its strength in these disciplines. For research in Religion, a significant portion of ARUA's contribution came from UP and SU, suggesting that these institutions are central to the study and publication in this area within the ARUA network.

These findings highlight both the specialisation of certain ARUA universities in specific fields and their significant role in shaping the broader academic research landscape across Africa, particularly in specialised domains like Astronomy & Astrophysics, Psychiatry, and Religion. The high proportion of Africa's research output in these areas underscores the importance of ARUA universities in advancing knowledge within these disciplines.

Figure 3. 10. Research areas of ARUA universities relative to Africa (top twenty-five areas)



3.8 Research Collaborations

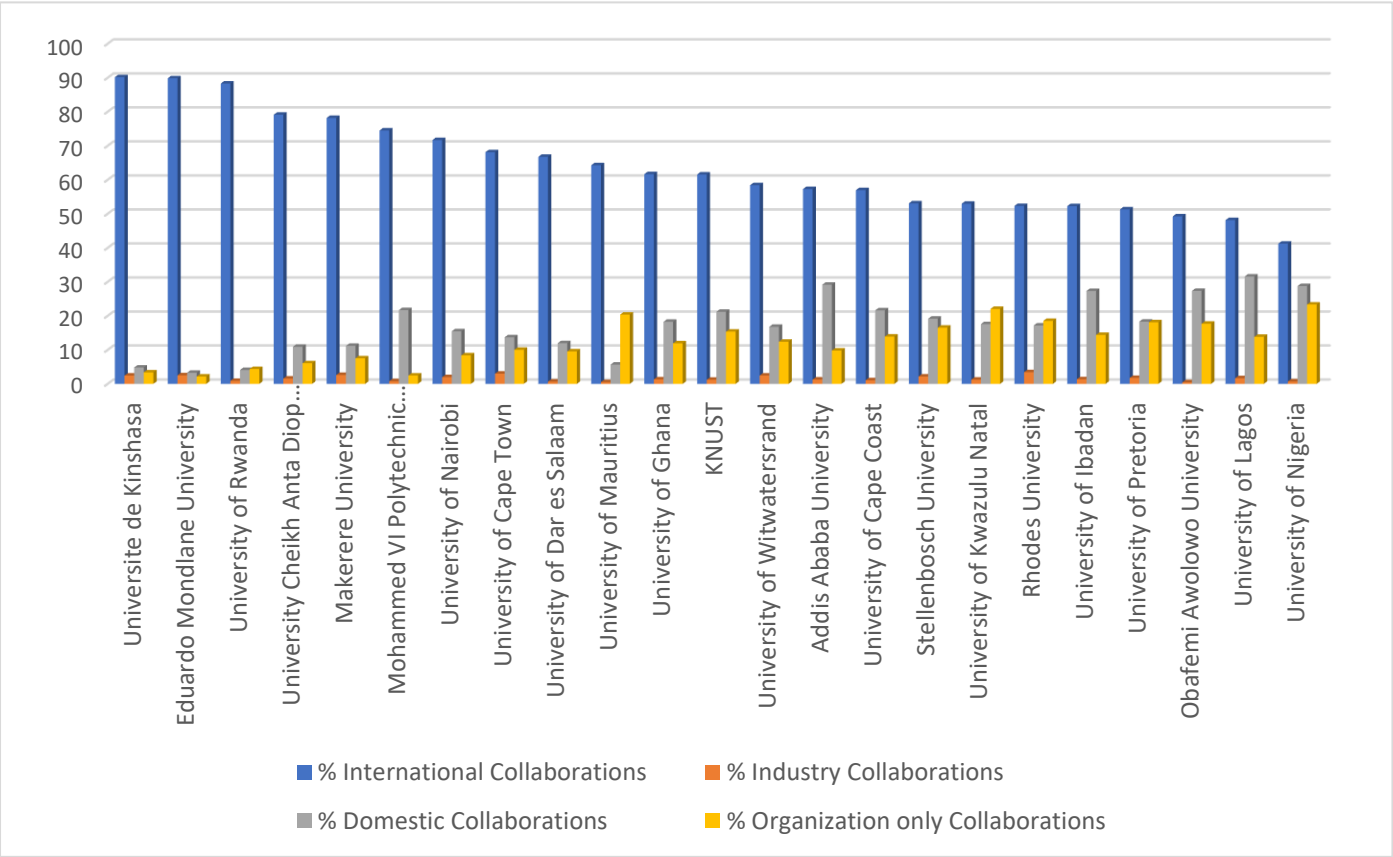
This section explores the different forms of collaborations that have contributed to the research output during the period under review. International Collaborations (papers with one or more international co-authors) represent the largest form of collaboration between 2015 and 2023 among ARUA universities (see Figure 3.11). International collaboration is highest at the Kinshasa (90%), Rwanda (89%), UCAD (79%), Makerere (78%), and Nairobi (72%). The University of Lagos (46%) has the lowest international collaboration for research output during this period.

Domestic collaborations (publications with authors from the same country) constituted the second-largest form of collaboration and were highest at UNILAG (32%), Ibadan (28%), AAU (28%), and UCC (21%). The university with the least domestic collaboration was Rwanda (4%).

Collaborations within organisations (organisation-only) were almost comparable to domestic collaborations in many universities. The University of KwaZulu-Natal had the highest organisation-only collaboration (23%), followed by Mauritius (20%). The university with the least organisation-only collaboration was Rwanda (4%). In some cases, the share of internal collaborations was higher than domestic collaborations, such as at UKZN, Rhodes, and Mauritius.

Finally, industry collaborations were low across all ARUA member universities, with the highest share of industry collaborations coming from Rhodes (3.5%) and UCT (2.5%).

Figure 3.11. Forms of collaboration in ARUA universities (cumulative 2015-2023)



In terms of collaborations within the ARUA network, most South African universities collaborate more among themselves than with their non-South African counterparts (see Appendix). For instance, the most prominent collaborators for UCT were Wits and SU. In the case of SU, its main collaborators were also UCT and Wits. For UKZN, collaboration was largely with Wits and UCT. UP collaborates most with Wits and UCT.

3.9 Funding Agencies

This section reports on the main funding agencies for research in ARUA member universities between 2015 and 2023. We focus on the top 25 funding sources for the articles and reviews captured in the analysis. It should be noted that not all publications acknowledge the source of research funding. However, the information provided in this section, while not exhaustive, offers a valuable indication of the main funders of research in ARUA universities.

In Table 3.3, the National Research Foundation – South Africa is the most prominent funding agency, supporting about 23% of the publications, followed by UK Research and Innovation (UKRI), accounting for 19% of the publications. Other key stakeholders include the United States Department of Health & Human Services (17%), the National Institutes of Health (NIH) – USA (15%), and the Medical Research Council UK (MRC) (11%). The remaining funding agencies each account for less than 10% of the publications.

In terms of the influence of funded research within the global knowledge system, we observed that publications funded by UK Research and Innovation (UKRI) attracted the highest number of citations, followed by the United States Department of Health & Human Services and the Medical Research Council UK (MRC).

Table 3.3. Top 25 funding sources with the most documents

Name of Funder	Web of Science Documents	Times Cited	Category Normalized Citation Impact
National Research Foundation - South Africa	13,423	221,752	1.00
UK Research & Innovation (UKRI)	12,238	532,328	2.72
United States Department of Health & Human Services	10,354	298,498	1.85
National Institutes of Health (NIH) – USA	9,503	280,121	1.88
Medical Research Council UK (MRC)	6,712	312,345	3.03
European Union (EU)	4,356	183,272	2.51
Welcome Trust	4,274	146,833	2.44
National Science Foundation (NSF)	3,928	178,599	2.62
South African Medical Research Council	3,872	84,147	1.52
National Natural Science Foundation of China (NSFC)	3,462	116,589	2.29
Bill & Melinda Gates Foundation	3,300	136,161	2.98
CGIAR	3,294	203,748	4.27
Spanish Government	3,216	169,967	3.20
South Africa Medical Research Council (SAMRC)	3,075	73,677	1.73
European Research Council (ERC)	2,912	155,710	3.26
German Research Foundation (DFG)	2,695	111,683	2.43
Science & Technology Facilities Council (STFC)	2,242	114,667	2.80
NIH National Institute of Allergy & Infectious Diseases (NIAID)	2,235	56,667	1.49
Federal Ministry of Education & Research (BMBF)	2,175	81,268	2.35
Ministry of Education, Culture, Sports, Science and Technology, Japan (MEXT)	2,161	148,442	4.02
United States Agency for International Development (USAID)	2,128	55,101	1.62
Japan Society for the Promotion of Science	2,049	144,886	4.12
Conselho Nacional de Desenvolvimento Cientifico e Tecnologico (CNPQ)	2,030	96,275	2.90
Department of Science & Technology (India)	1,944	47,080	1.40
Australian Research Council	1,936	82,134	2.56

3.10 Summary

This second part of the report provides a comprehensive analysis of research output, quality and knowledge impact, research areas and collaboration patterns among ARUA member universities between 2015 and 2023, providing critical insights into the state of higher education research across the ARUA network, and Africa at large.

The report shows that the scientific output of ARUA universities has increased steadily, growing at an average of about 8 per cent per annum. A breakdown of the research output for individual member universities reveals that a large share of the research output and growth came from five South African universities.

While most ARUA universities have knowledge impacts that are in line with the global average, the most influential research, based on the category-normalised citation index, was produced by the UCC, UNILAG, Nairobi, AAU, and Ibadan. The research output of ARUA universities over this period was most productive in the areas of Public, Environmental, and Occupational Health, Infectious Diseases, Environmental Sciences, Ecology, Immunology, and Microbiology. In three research areas (Astronomy & Astrophysics, Religion, and Psychiatry), ARUA universities published almost 42 per cent of the African total.

In terms of collaborations, ARUA universities were observed to be actively engaged in international collaborations, with an average of over 60 per cent of research output having at least one international co-author over the period of analysis. Leading universities in international collaboration include Kinshasa, Rwanda, and UCAD, with collaboration rates exceeding 70-90%. This underlines the global connectedness and international standing of ARUA member institutions. While strong international collaborations across ARUA member universities is a positive indicator of the global relevance of African research, they also suggest that there is potential for further strengthening cross-border collaborations within the African continent. While South African universities collaborate intensively among themselves, greater inter-regional collaborations could enhance the overall research profile of Africa.

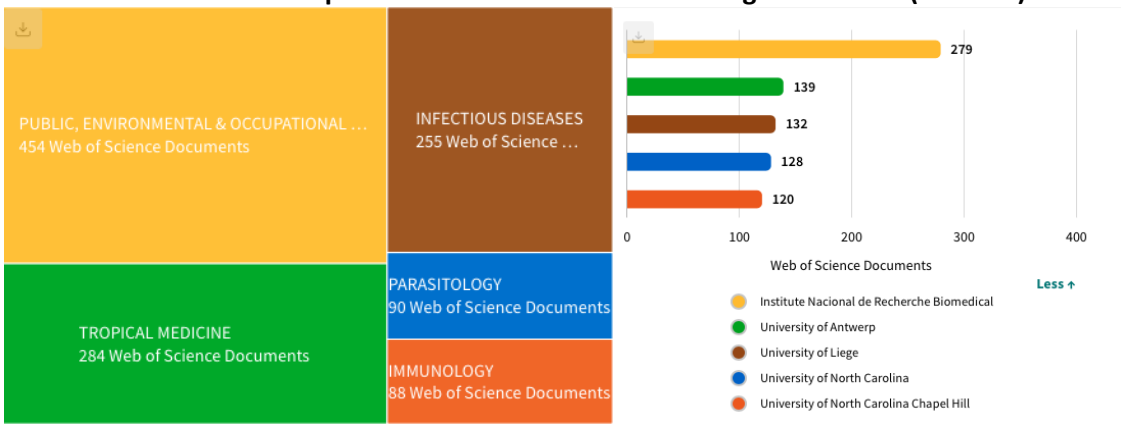
Industry collaborations were generally low across ARUA member universities, with Rhodes and UCT leading in this regard. The low industry collaboration suggests a missed opportunity for knowledge transfer and practical applications of research to real-world challenges, especially given the economic and developmental needs of the African continent.

Within the ARUA network, there is a notable trend where South African universities collaborate more intensively with each other than with universities from other countries. For example, UCT, SU, and Wits frequently collaborate with one another, indicating strong intra-national networks. The trend of localised collaboration within the ARUA network could be reflective of shared institutional contexts and resources, but also suggests an opportunity for increased cross-border collaboration within the continent. The relatively low levels of domestic and industry collaborations point to areas that need development. Strengthening domestic collaborations within countries can foster national research ecosystems and facilitate the sharing of resources and knowledge. Additionally, increasing industry collaborations could help translate academic research into tangible economic, social, and technological outcomes.

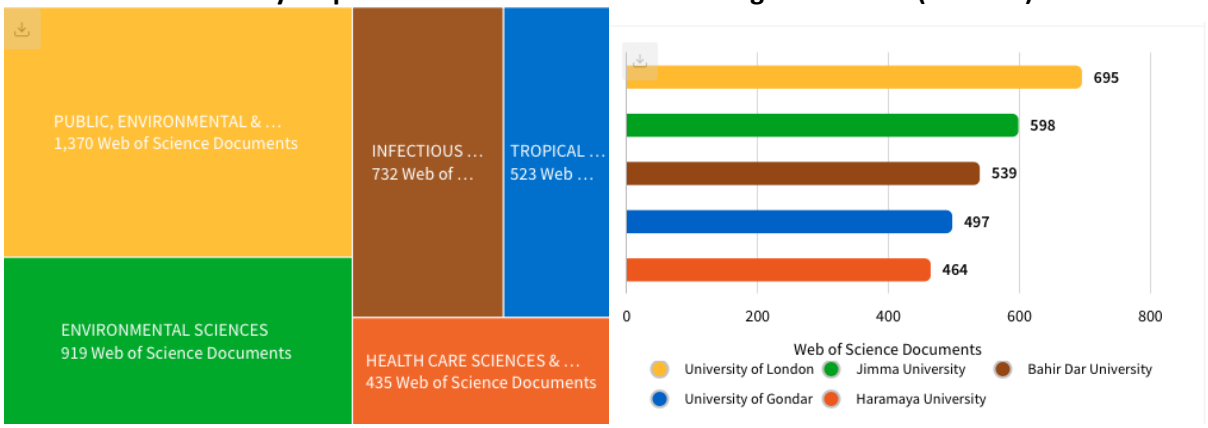
The study highlights key funding sources that supported ARUA research, with the National Research Foundation – South Africa emerging as the most significant sponsor, accounting for 23% of the publications. Other notable funding agencies include UK Research and Innovation (UKRI), the United States Department of Health & Human Services, the National Institutes of Health (NIH), and the Medical Research Council UK (MRC). These agencies have played a crucial role in facilitating research, particularly in high-impact areas like health, medicine, and science. The diversity of funding agencies indicates a varied and global support structure for research at ARUA institutions, with European, American, and African sources contributing significantly to the financial underpinnings of African academic research.

Appendix: Top Research Areas and Collaborating Institutions

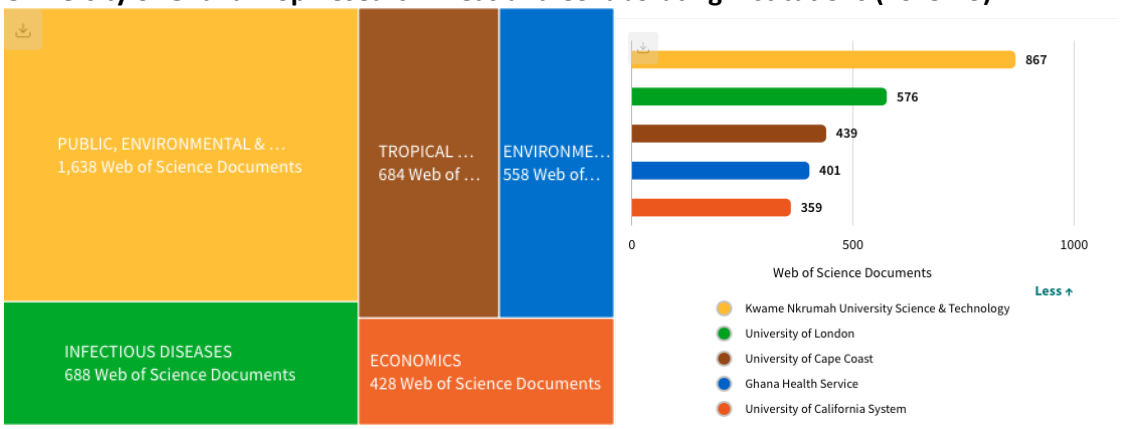
Université de Kinshasa: Top Research Areas and Collaborating Institutions (2015-23)



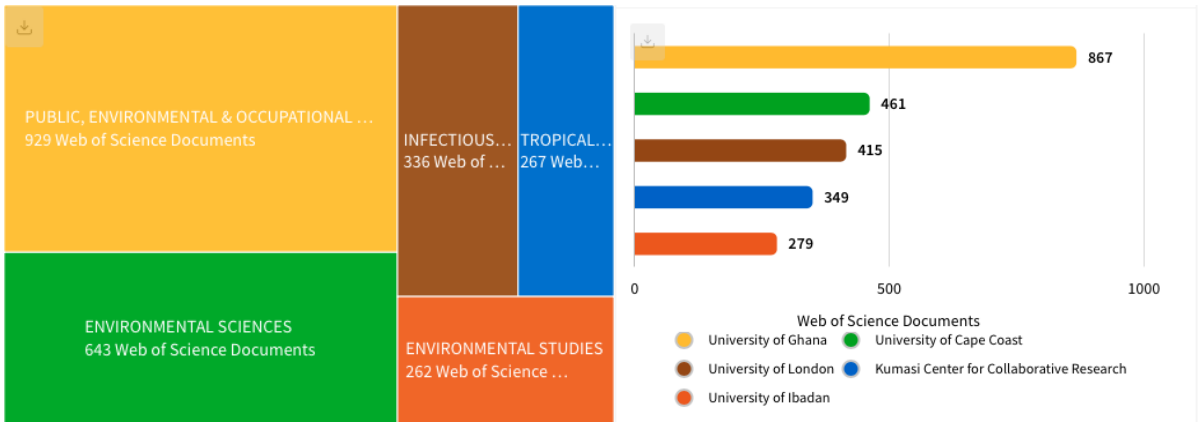
Addis Ababa University: Top Research Areas and Collaborating Institutions (2015-23)



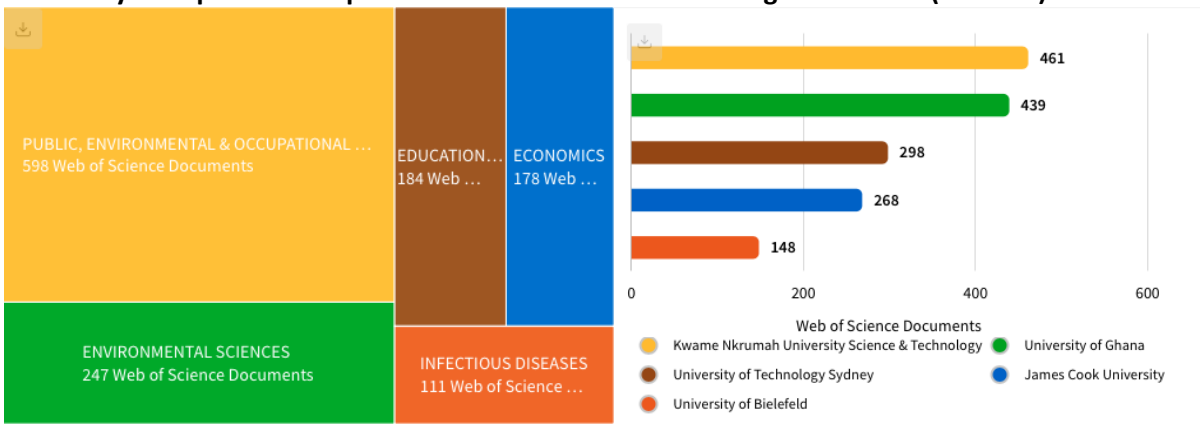
University of Ghana: Top Research Areas and Collaborating Institutions (2015-23)



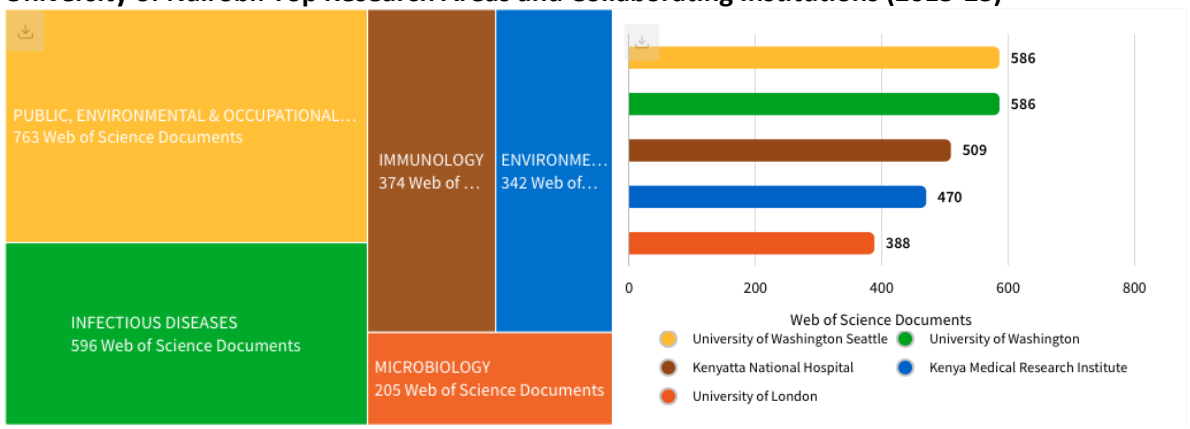
Kwame Nkrumah University of Science and Technology: Top Research Areas and Collaborating Institutions (2015-23)



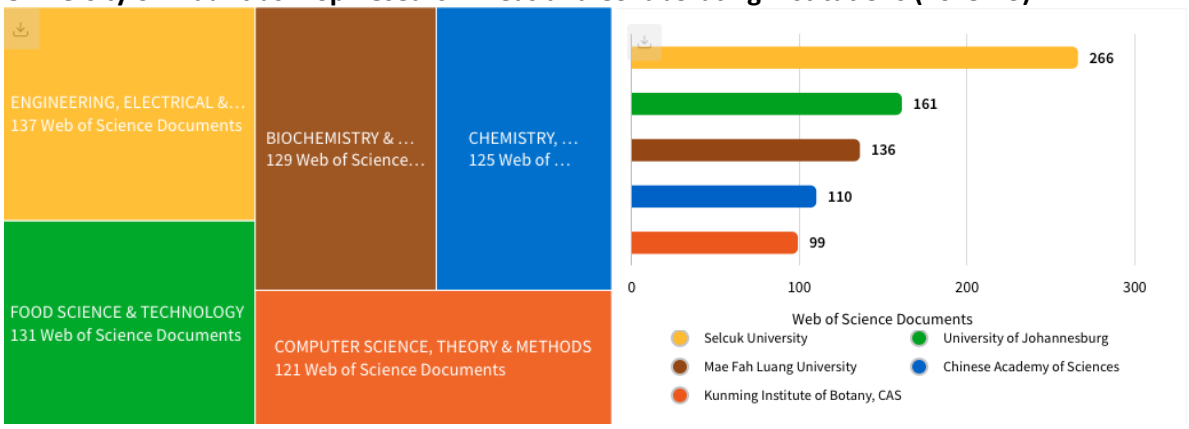
University of Cape Coast: Top Research Areas and Collaborating Institutions (2015-23)



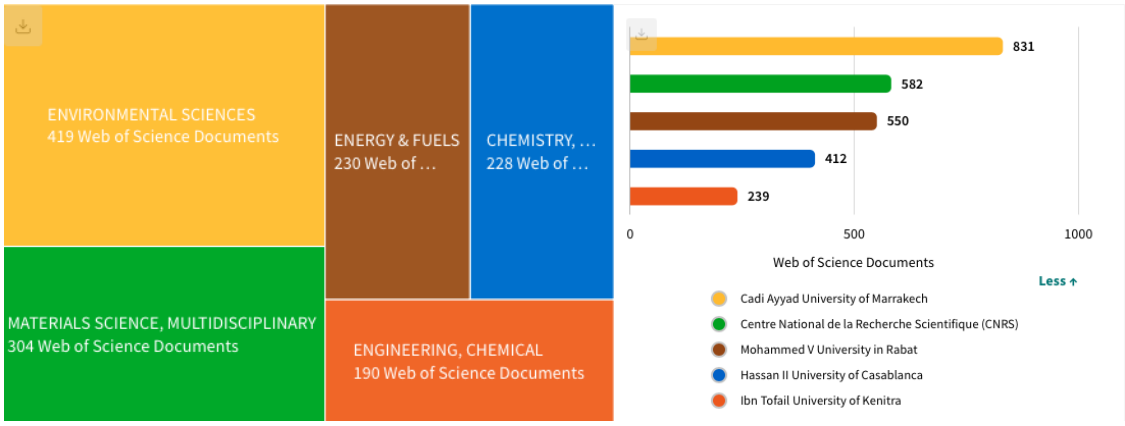
University of Nairobi: Top Research Areas and Collaborating Institutions (2015-23)



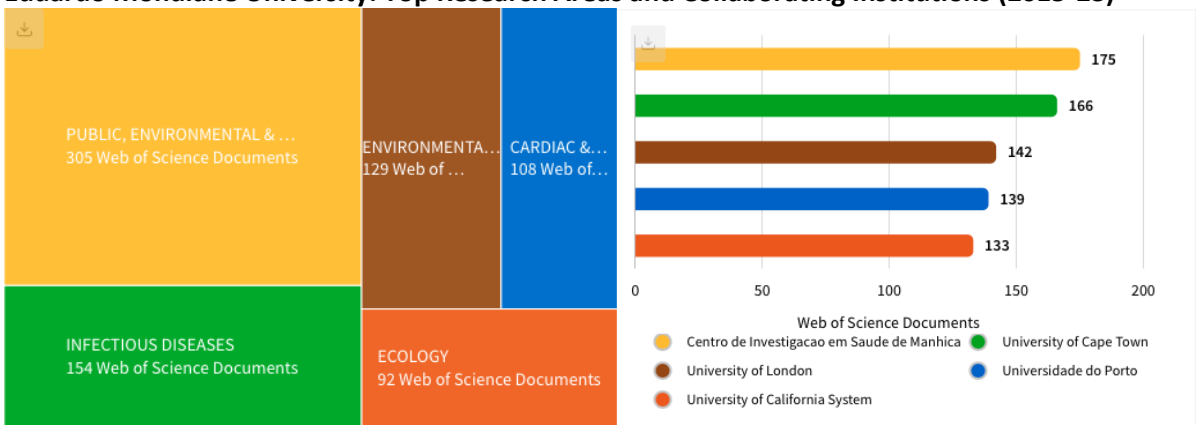
University of Mauritius: Top Research Areas and Collaborating Institutions (2015-23)



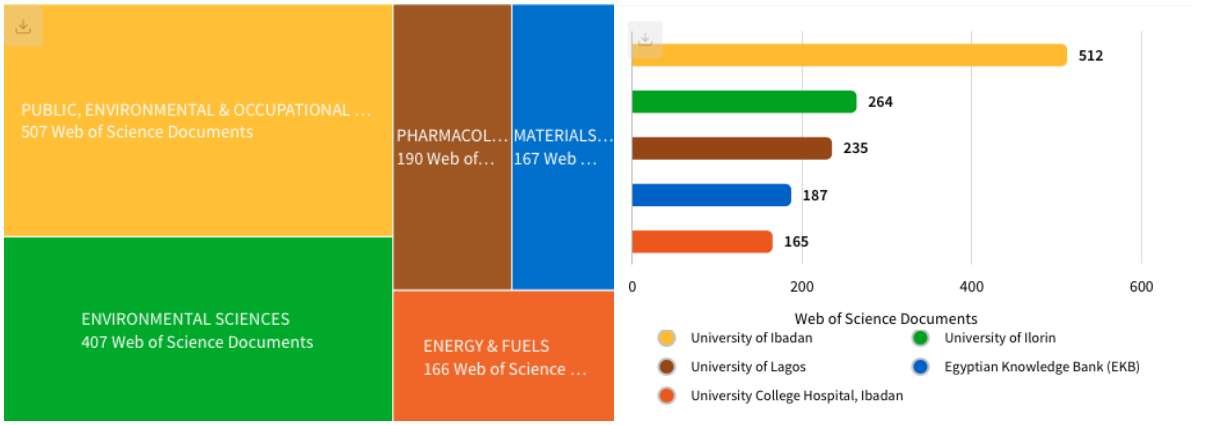
Université Mohammed VI Polytechnique: Top Research Areas and Collaborating Institutions (2015-23)



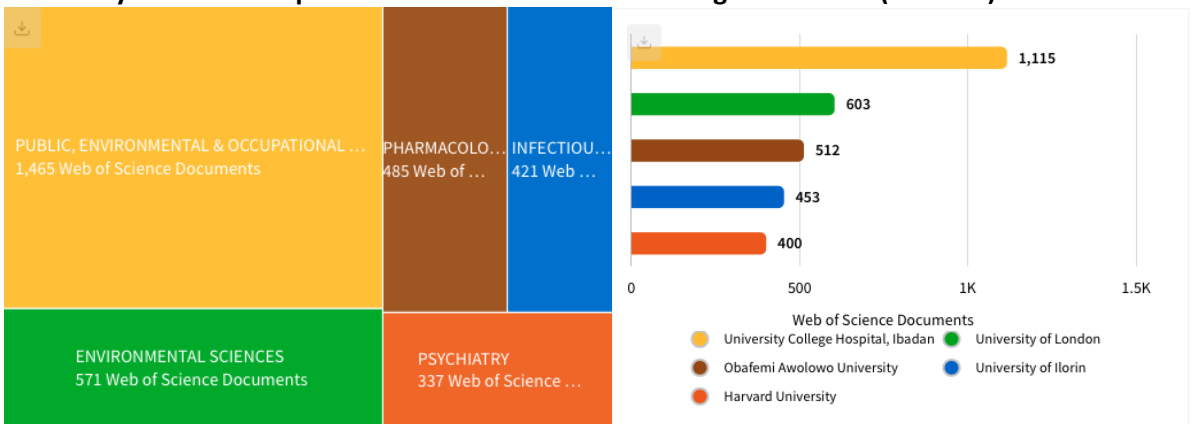
Eduardo Mondlane University: Top Research Areas and Collaborating Institutions (2015-23)



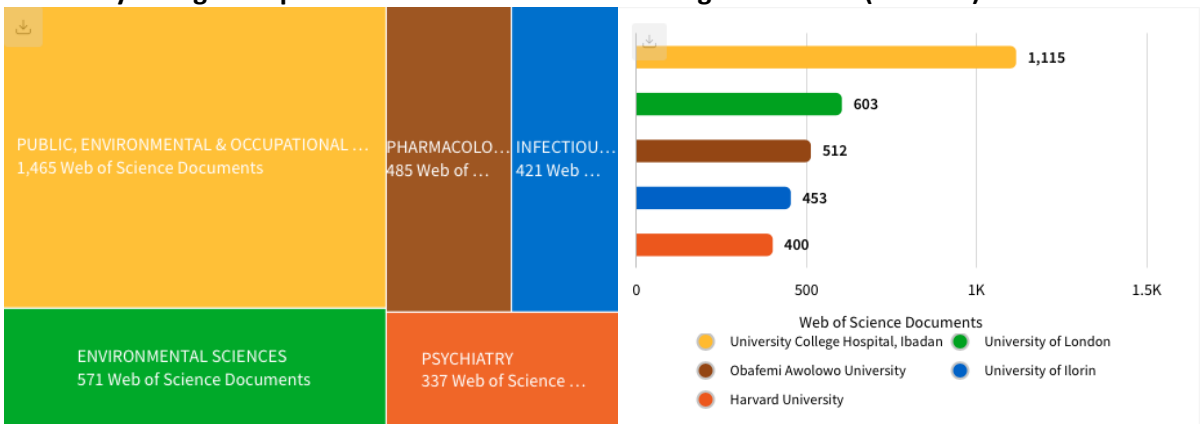
Obafemi Awolowo University (IIe-Ife): Top Research Areas and Collaborating Institutions (2015-23)



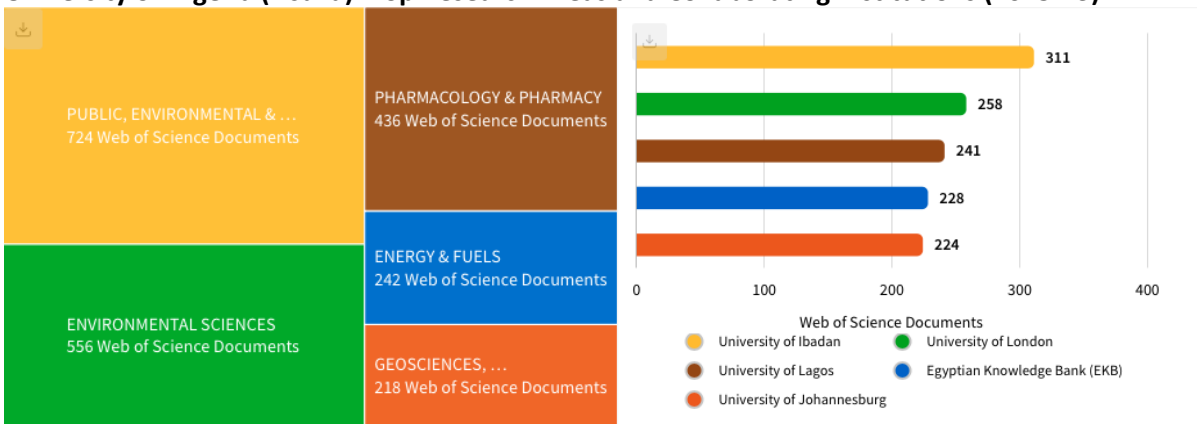
University of Ibadan: Top Research Areas and Collaborating Institutions (2015-23)



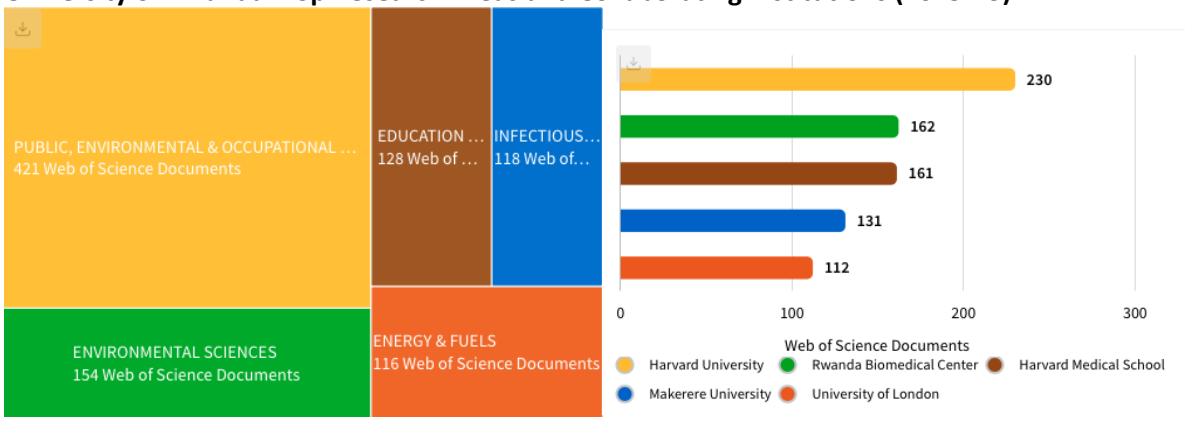
University of Lagos: Top Research Areas and Collaborating Institutions (2015-23)



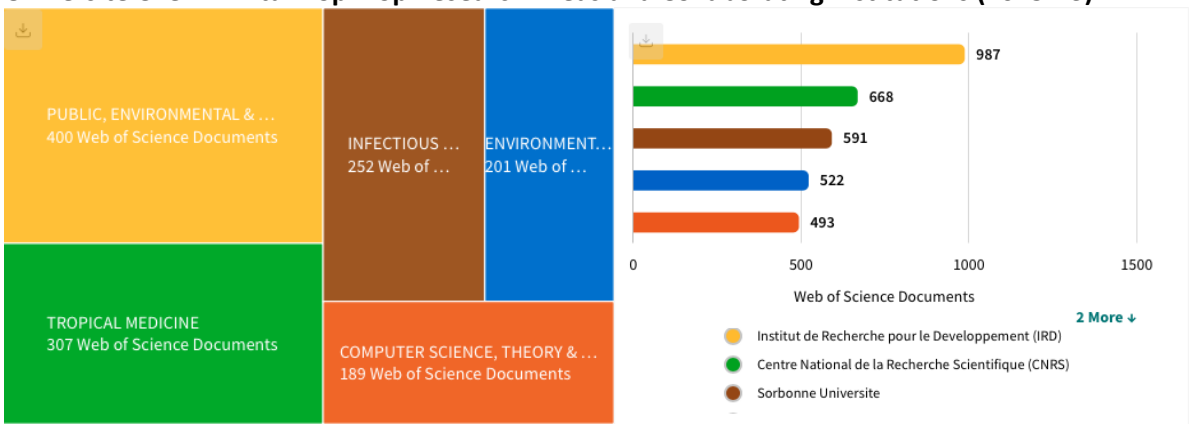
University of Nigeria (Nsuka): Top Research Areas and Collaborating Institutions (2015-23)



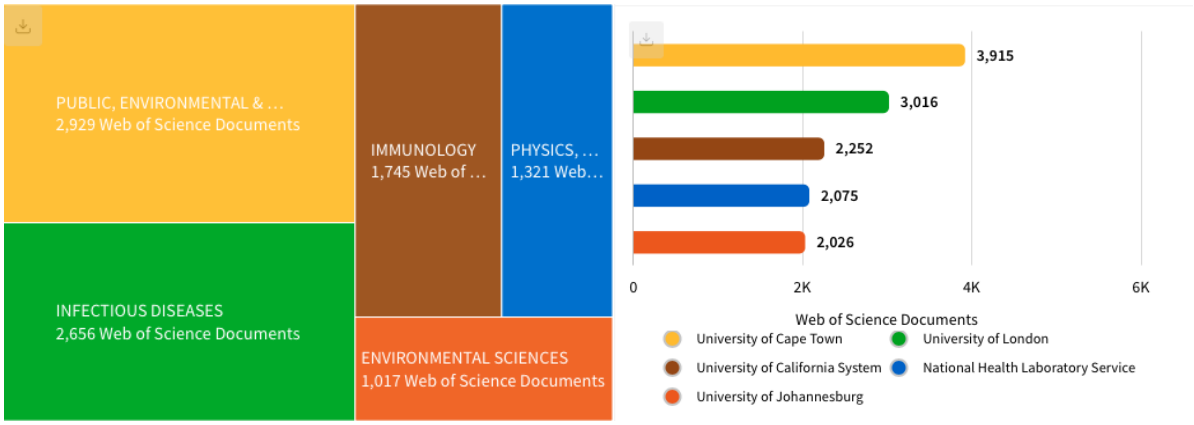
University of Rwanda: Top Research Areas and Collaborating Institutions (2015-23)



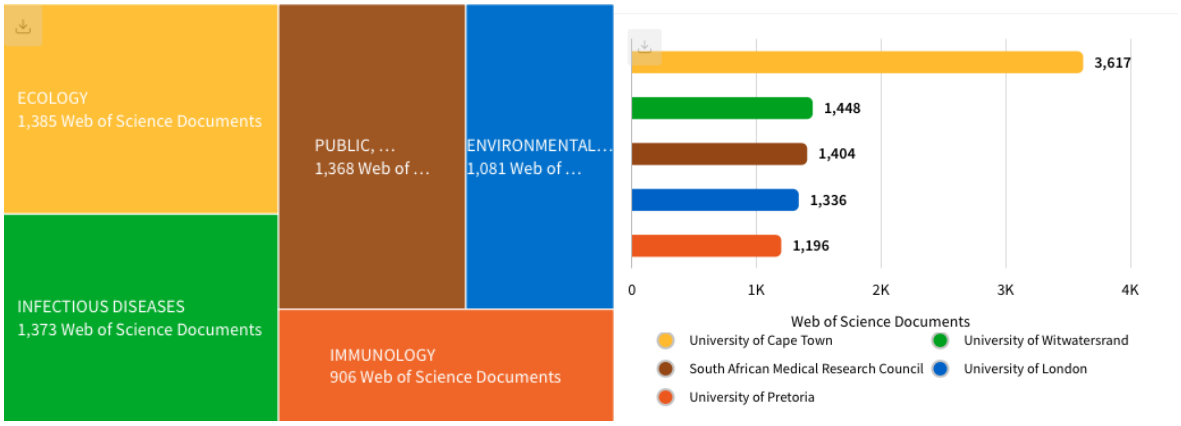
Université Cheikh Anta Diop: Top Research Areas and Collaborating Institutions (2015-23)



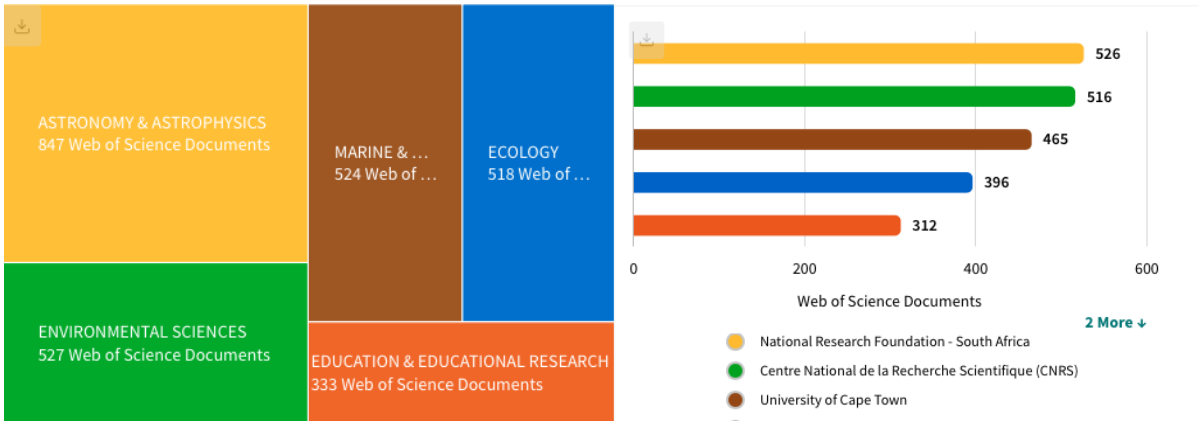
University of the Witwatersrand: Top Research Areas and Collaborating Institutions (2015-23)



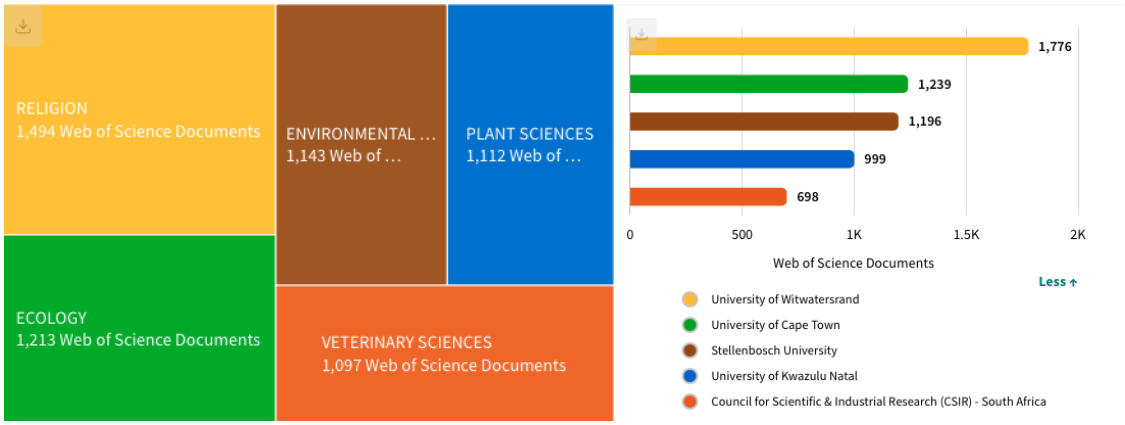
Stellenbosch University: Top Research Areas and Collaborating Institutions (2015-23)



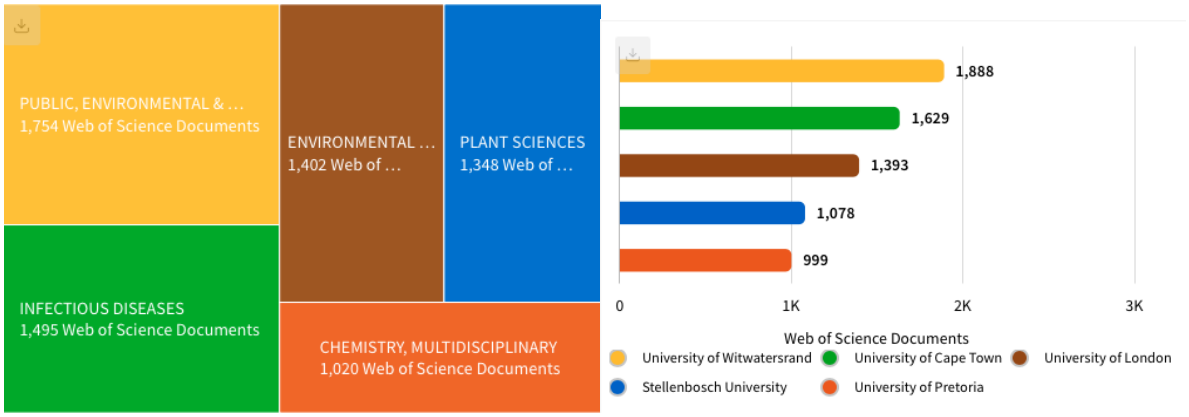
Rhodes University: Top Research Areas and Collaborating Institutions (2015-23)



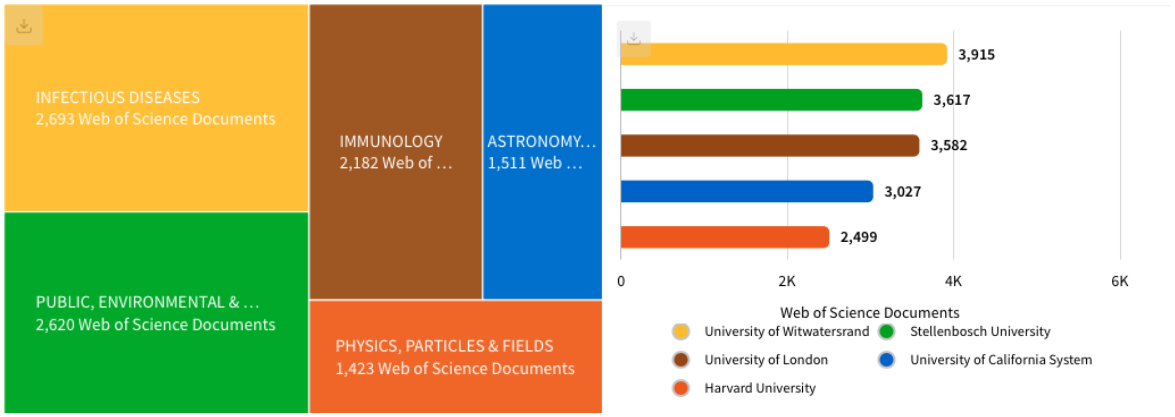
University of Pretoria: Top Research Areas and Collaborating Institutions (2015-23)



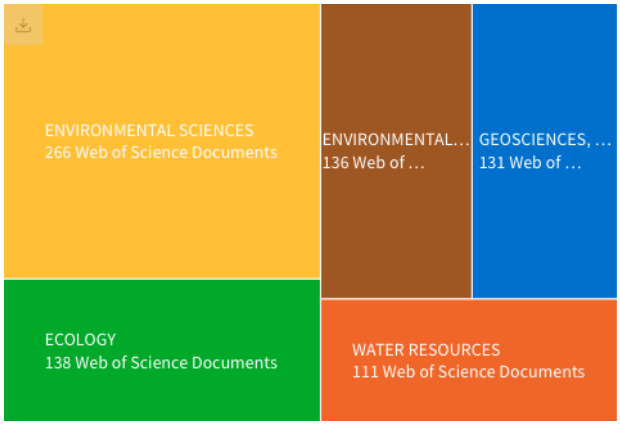
University of KwaZulu-Natal: Top Research Areas and Collaborating Institutions (2015-23)

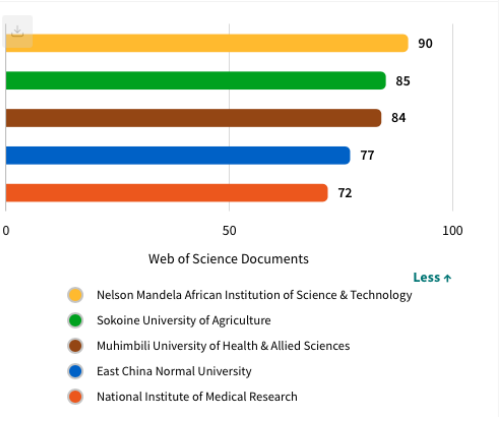


University of Cape Town: Top Research Areas and Collaborating Institutions (2015-23)

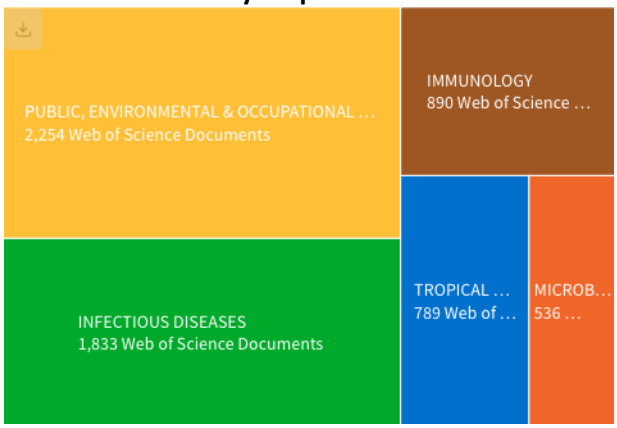


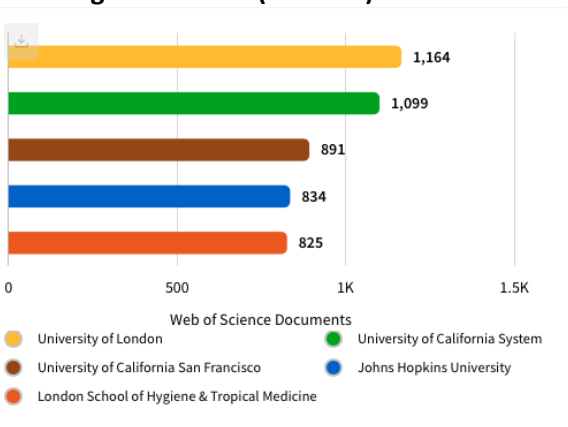
University of Dar Es Salaam: Top Research Areas and Collaborating Institutions (2015-23)





Makerere University: Top Research Areas and Collaborating Institutions (2015-23)





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Kwame Nkrumah University of Science and Technology

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UNIVERSITY
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MAKERERE UNIVERSITY

University of Nairobi

UNIVERSITY OF MAURITIUS

UNIVERSIDADE EDUARDO MONDLANE

UNIVERSITY OF IBADAN

OBAFEMI AWOLOWO UNIVERSITY

ADDIS ABABA UNIVERSITY

UNIVERSITY OF DAR ES SALAAM

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University of Rwanda
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