ARUA
African Research Universities Alliance

RESEARCH PROFILES OF ARUA UNIVERSITIES:

2015 - 2021

RESEARCH PROFILES OF ARUA UNIVERSITIES: PHASE II

December 2022

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Preface

In November 2022, ARUA launched its second Profiles Report (2018-2021) at a ceremony in Cape Town. The launch event followed a meeting of ARUA Vice Chancellors hosted by the University of Cape Town. The Vice Chancellors who gathered for the meeting and the launch were generally positive about the report, and this was not surprising since the report showed a positive trend in the performance of their universities. The second Profiles Report can be described as showing some progress with several of the performance indicators considered.

The Profiles Report is not intended to present a ranking of ARUA universities. It is simply designed to be an instrument for university leaders to benchmark their performance in selected areas against that of their peers. It also provides other stakeholders, such as governments and funders, some indication of how responsive various universities have been or can be over time, and how their performance against their peers has been over that period. It is certainly not comprehensive in terms of the number and type of performance indicators it covers.

I am glad that this second report took much less time to put together than was the case with the first (2015-2017). In this regard, it is important to emphasize that a major component of the Carnegie-sponsored project that yielded the report tackles capacity-building at the ARUA universities in the gathering and analysis of the data that is shared here. Quite a bit of time and resources were devoted in both Phase 1 and Phase 2 of the project to strengthening capacity, with consultants working closely with the data teams to identify gaps in their data and how these can be plugged. We also worked on how to analyse the data as accurately as possible, including holding two training workshops with data teams from all the universities. These workshops provided an opportunity for the teams to learn from one another. Indeed, the peer-learning workshops were very effective in transferring data-gathering and analysis skills to teams that were deficient. As a result, the time for gathering the data, analysing it and putting the report together was shortened considerably, as the data teams experienced significant improvements in capacity. We appreciate the work that all the data teams put in.

The data suggests that universities need to pay a lot more attention to the growth of graduate programmes, especially PhD, as they strive to become research-intensive universities. The situation varies considerably among them, but it is obvious that there is significant room

for improvement for all. It is also interesting that the significant gender gaps that are found at the non-South African universities especially It is not surprising that several universities are beginning to reconsider their gender policies with an eye on greater diversity and gender balance.

One of the objectives of ARUA is to grow significantly research collaboration among the member universities. A key finding of this report is that such collaboration remains low, but is beginning to grow. There is very little collaboration between South African and non-South African universities in this respect. We expect the data in this report to compel university leadership at all the ARUA universities to reappraise their policies on collaboration with a view to accelerating the process. Universities need to have clear strategies for the growth of collaborations at various levels. The need for more robust south-south collaboration cannot be over-emphasized in view of the ARUA strategic plan that seeks to develop the *African University* characterized by the sharing of resources and people.

remain wide even if we are beginning to observe improvements at some of them.

We thank the Carnegie Corporation of New York for the generous financial assistance that makes it possible to produce these reports. The Corporation shows considerable interest in how the task gets accomplished, and this is very encouraging for those who work on the project.

We are happy that Professor Gerald Ouma of the University of Pretoria was able to devote considerable time to this project. This is highly appreciated. He was supported in this effort by Dr Emmanuel Adu-Danso and Dr Emmanuel Abbey of the University of Ghana working as ARUA Consultants. They provided significant support to the data teams directly. The backroom support from the University of the Witwatersrand and the University of Pretoria is highly appreciated.

Ernest Aryeetey

ARUA Secretary-General.

Executive Summary

This report presents an analysis of Phase II of the data benchmarking study of ARUA universities. Phase II covered the period 2018 – 2021 while Phase I covered the period 2015 – 2017. The report includes a bibliometric analysis of the research productivity of ARUA universities.

The study collected the following data: (a) Student data (enrolments, field of study, gender, study level, and graduates); (b) Staff data (number of academics, rank, qualification, field of study, postdoctoral fellows, and technical support staff; (c) Research funding and patents, and (d) data on research productivity.

The analysis shows a general increase in the proportion of postgraduate (PG) enrolments, which was also recorded in actual enrolments. The rate of increase varied, with some institutions such as UCT, Lagos and Addis Ababa, recording stronger growth compared to the other universities. PG enrolments as a percentage of total student enrolments ranged from 9.5% (Rwanda) to 53% (UCT) in 2021. Notwithstanding the positive strides in PG enrolments, the majority of ARUA universities remain predominantly undergraduate (UG) universities.

All the universities, except for Rhodes, UCT and Lagos, offer PG programmes in all the major fields of study. The distribution of students in the various study fields, within and across the universities, is varied. For example, while Business, Economics and Management Sciences (BEMS) attracted the highest proportion of PG enrolments at UG (43%), most PG enrolments at Rhodes are concentrated in Natural Sciences (35.5%). On the other hand, Medical and Health Sciences (MHS) attracted the highest PG enrolments at Rwanda, Nairobi, Makerere, UCT and Wits.

The enrolment of female students has generally improved. In 2021, they constituted a majority in all the PG categories at Rhodes, UCT, UDSM, UKZN, UP, Wits and UM. A similar improvement was recorded regarding the proportion of female academic staff and the proportion of academics with doctorates.

The internal efficiency of PG programmes has generally improved. Most of the universities improved the proportion of doctoral students who completed their doctoral studies within four years, with Makerere recording the highest improvement – from 21.2% in 2015 to 47% in 2021.

Most academics at the ARUA universities occupy senior ranks. Except for Makerere, UDSM, UKZN, Addis Ababa and Nairobi, more than 60% of the academics at the other universities were either professors, associate professors, or senior lecturers. UCAD has the highest proportion of academics with doctorates (93% in 2021).

The bibliometric analysis shows that the scientific output of ARUA universities has increased steadily over the 2015 – 2021 period, growing at a yearly average rate of about 9%. Notwithstanding this trend, the share of the scientific research output of ARUA universities in the total research output from Africa declined over the period. An analysis of the research output of the 16 ARUA universities shows that a large share of the research output was produced by the six South African universities. These universities also performed better than the other universities with regard to publications output per permanent academic staff.

While the citation impact of most ARUA universities is at par with the global average, based on CNCI analysis, the highest normalised citation impact was achieved by publications produced by Lagos, Nairobi, Addis Ababa, and Ibadan. The research produced by ARUA universities was most prolific in the following areas: public, environmental, and occupational health, infectious diseases, environmental sciences, ecology, immunology, and plant science. ARUA's share of total knowledge produced in Africa in these areas is also high.

The analysis of co-authorships revealed that ARUA universities collaborate the most with international peers. On average, publications co-authored with international peers accounted for over 60 percent of research output by ARUA universities. Co-authorships among ARUA universities averaged about 21% of the total research output of each university.

1.0 INTRODUCTION

The African Research Universities Alliance (ARUA), a network of 16 leading universities from ten (10) African countries, was established in 2015 to develop strong and viable African research-intensive universities through a collaborative network of universities working together. ARUA aims to enhance research/graduate training in member universities through the development of a robust knowledge ecosystem based on local research carried out by African-trained scholars and researchers. Apart from having a local socio-economic impact and contributing to finding solutions to Africa's development challenges, ARUA's goal is that research output from member universities should be globally competitive and internationally visible.

ARUA seeks to harness member universities' collective resources to improve training and support for PhD and master's students, build capacity to enhance research management, and foster collaborative research across the network. While it will take time to develop such capacity, incremental improvements in research output arising from ARUA activities need to be tracked. This will help the Alliance's governing body to (a) monitor the progress and impact of research in member universities (b) decide on interventions or policy changes required to steer member universities towards ARUA's vision and mission and (c) determine the criteria for admitting universities into ARUA (for example, the minimum criteria for designating university as research-intensive). It is in line with these objectives that the Data-Gathering and Benchmarking project was launched.

Funded through a facility from the Carnegie Corporation of New York, the project seeks to measure member university's research performance by focusing on indicators such as enrolment of postgraduate (PG) students, graduate outputs, the composition of academic staff, main sources of funding for research, registered patents and research productivity, including publication output and patterns of co-authorship. Phase I of the project, which was completed in 2021, covered the period 2015 – 2017. This report is for Phase II of the project, which covered the period 2018 – 2021.

The report consists of 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 study fields).

(b) PG graduates (by level, gender, study fields and completion times).

(c) Number of post-doctoral research fellows.

(d) Academic staff profile (by qualification level, gender, and rank).

(e) Total estimated research funding (US $); and

(f) Number of registered patents.

Part II, a bibliometric analysis, reports on the following key metrics:

(a) Publication output.
(b) Citations analysis.
(c) Leading research topics; and
(d) Patterns of co-authorships.

All 16 ARUA universities provided data for Phase II of the project. The universities are listed below:

1) Addis Ababa University (Addis Ababa)
2) Cheikh Anta Diop University (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 (Lagos)
12) University of Mauritius (UM)
13) University of Nairobi (Nairobi)
14) University of Pretoria (UP)
15) University of Rwanda (Rwanda)
16) University of the Witwatersrand (Wits)

Whilst the universities of Nairobi and Rwanda did not participate in Phase I of the study, they provided data for this phase (2015 – 2017), together with data for Phase II.

Part 1

INSTITUTIONAL RESEARCH PROFILES

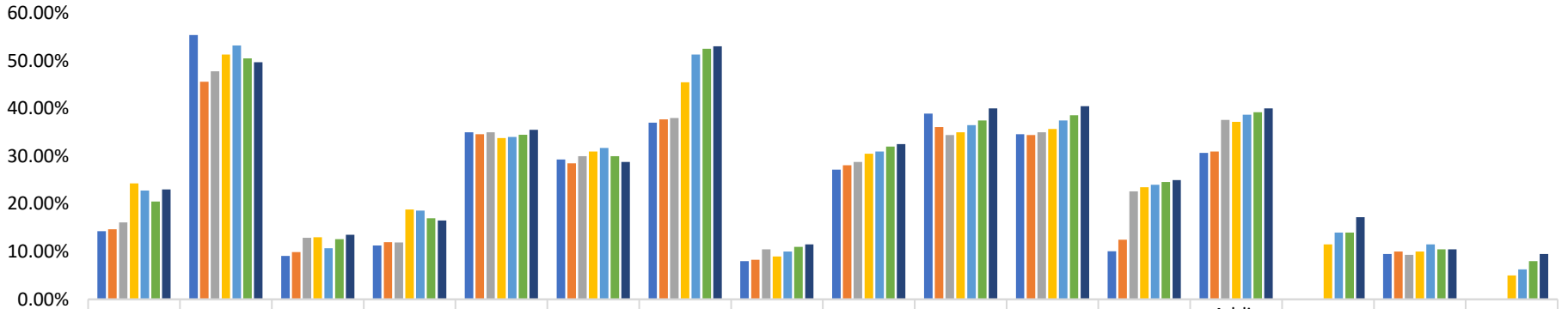
In this part of the report, an aggregated analysis of the research profiles of the 16 ARUA universities over the period 2015 – 2021 is presented. Whilst data for Phase II of the project covered the period 2018 – 2021, the earlier period (2015 – 2017) is included in the analysis to provide a trend analysis. UM's data covers the 2018 – 2021 period only because the university joined ARUA as an associate member in March 2021. Thus, UM did not participate in Phase I of the study. The indicators used during Phase I of the project have been retained.

All 16 ARUA universities submitted data for Phase II of the project. These data were verified by the universities. Several universities did not provide data for all the variables, meaning these universities are not included in the analysis of the variables where their data is missing.

2.0 Student enrolments

Figures 2.1 – 2.3 capture various PG student enrolment trends. PG enrolments include master's, PhD, and PGs lower than master's, for example, PG diplomas, and honours in South Africa.

Figure 2.1. Postgraduate enrolments as a percentage of all enrolments (undergraduates and postgraduates), 2015 – 2021



	Ghana	Ibadan	Makerere	Rhodes	SU	UCAD	UCT	UDSM	UKZN	UP	Wits	Lagos	Addis Ababa	Mauritius	Nairobi	Rwanda
2015	14.30%	55.40%	9.10%	11.30%	35.00%	29.30%	37.00%	8.00%	27.20%	38.90%	34.60%	10.10%	30.70%		9.50%	
2016	14.70%	45.60%	9.90%	12.00%	34.60%	28.50%	37.70%	8.30%	28.10%	36.10%	34.40%	12.50%	31.00%		10.00%	
2017	16.10%	47.80%	12.90%	11.90%	35.00%	30.00%	38.00%	10.50%	28.80%	34.40%	35.00%	22.60%	37.60%		9.30%	
2018	24.30%	51.30%	13.00%	18.80%	33.80%	31.00%	45.50%	9.00%	30.50%	35.00%	35.70%	23.50%	37.20%	11.50%	10.00%	5.00%
2019	22.80%	53.20%	10.70%	18.60%	34.00%	31.70%	51.30%	10.00%	31.00%	36.50%	37.50%	24.00%	38.70%	14.00%	11.50%	6.30%
2020	20.50%	50.50%	12.60%	17.00%	34.50%	30.00%	52.50%	11.00%	32.00%	37.50%	38.60%	24.60%	39.20%	14.00%	10.50%	8.00%
2021	23.00%	49.70%	13.50%	16.50%	35.50%	28.80%	53.00%	11.50%	32.50%	40.00%	40.50%	25.00%	40.00%	17.20%	10.50%	9.50%

The following observations can be drawn from Figure 2.1:

- → All the universities, except Ibadan and UCAD, increased the proportion of their postgraduate enrolment across the seven years.
- → UCT recorded the highest increase (16 percentage points) in the proportion of PG students, from 37% in 2015 to 53% in 2021, overtaking Ibadan as the university with the highest proportion of PG students. Lagos and Addis Ababa also recorded significant increases in their proportion of PG students – 14.9 percentage points and 9.3 percentage points, respectively.
- → Ibadan's proportion of PG enrolments between 2015 and 2021 declined by 5.7 percentage points while that of UCAD declined marginally by 0.5 percentage points.
- → Rwanda had the lowest proportion of PG student enrolment throughout the 2018 – 2021 period.

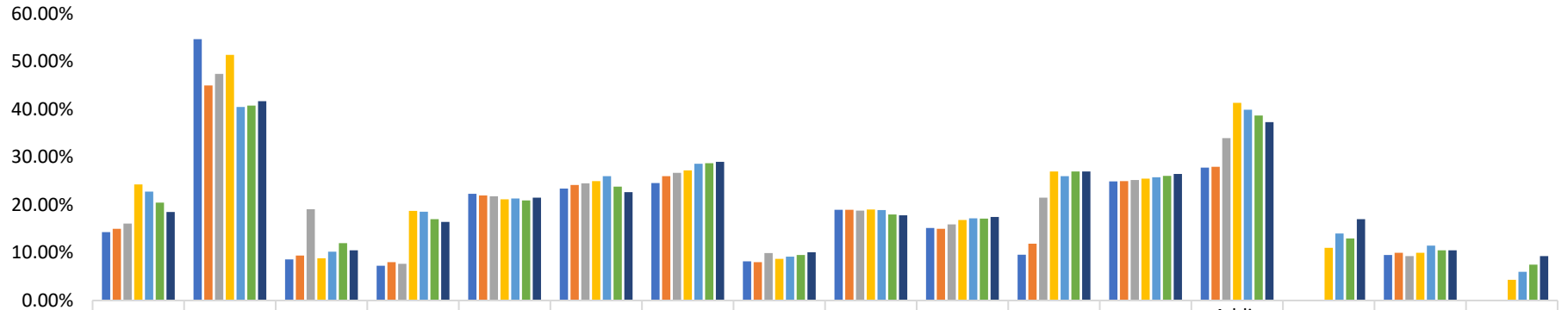
→ Compared to 2017 (the last year of Phase I) when only Ibadan had a PG enrolment above 40% of the total student enrolment, by 2021, UCT, UP, Wits and Addis Ababa had reached or exceeded the 40% threshold.

→ Notwithstanding the positive strides in PG enrolments, the majority of ARUA universities remain predominantly undergraduate universities.

The shape of postgraduate student enrolments

Figure 2.2 below shows the 'shape' of PG enrolments at the 16 universities. It excludes honours and postgraduate diplomas, which are included in Figure 2.1. The data in Figure 2.2, compared to Figure 2.1, shows that South African universities (Rhodes, SU, UCT, UKZN, UP and Wits) have a considerable number of PG students enrolled in PG programmes below master's. For example, while the share of PG enrolments at UKZN was 31% in 2019, its share for master's and doctoral enrolments was 19%.

Figure 2.2. Master's and doctoral enrolments as a % of total enrolments, 2015 – 2021

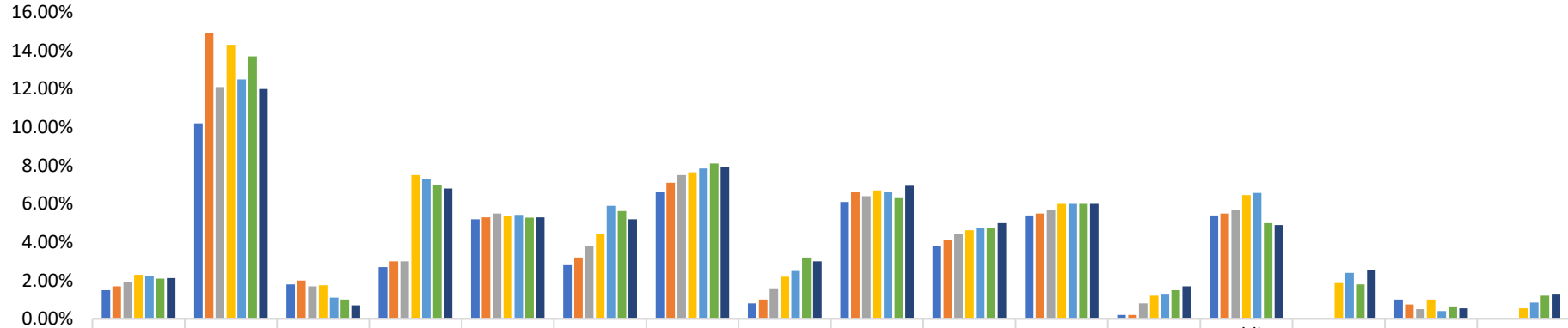


	Ghana	Ibadan	Makerere	Rhodes	SU	UCAD	UCT	UDSM	UKZN	UP	Wits	Lagos	Addis Ababa	Mauritius	Nairobi	Rwanda
2015	14.30%	54.70%	8.60%	7.30%	22.30%	23.40%	24.60%	8.20%	19.00%	15.20%	9.60%	24.90%	27.80%		9.50%	
2016	15.00%	45.00%	9.40%	8.00%	22.00%	24.20%	26.00%	8.00%	19.00%	15.00%	11.90%	25.00%	28.00%		10.00%	
2017	16.10%	47.40%	19.10%	7.70%	21.80%	24.50%	26.70%	9.90%	18.80%	15.90%	21.50%	25.20%	34.00%		9.30%	
2018	24.30%	51.40%	8.82%	18.75%	21.20%	25.00%	27.20%	8.70%	19.05%	16.85%	27.00%	25.50%	41.35%	11.00%	10.00%	4.35%
2019	22.80%	40.50%	10.20%	18.60%	21.35%	26.00%	28.62%	9.20%	18.92%	17.20%	26.00%	25.80%	39.90%	14.00%	11.50%	6.00%
2020	20.50%	40.80%	12.00%	17.00%	20.94%	23.80%	28.70%	9.50%	18.00%	17.13%	27.00%	26.10%	38.70%	13.00%	10.50%	7.50%
2021	18.50%	41.70%	10.50%	16.45%	21.50%	22.65%	29.00%	10.10%	17.80%	17.50%	27.00%	26.50%	37.30%	17.00%	10.50%	9.30%

Doctoral enrolments

Doctoral enrolments have remained largely stable across most of the universities (Figure 2.3). With 12% (2021), Ibadan maintained the highest proportion of doctoral enrolments, followed by UCT with 7.9% and UKZN with 7%. UCAD recorded the highest increase in the proportion of doctoral enrolments from 2015 – 2021, with 2.4 percentage points, followed by Ibadan and Lagos with 1.8 and 1.5 percentage points, respectively. Makerere, Addis Ababa and Nairobi recorded a decline in their proportion of doctoral enrolments. Nairobi had the lowest proportion of doctoral enrolments (0.55% in 2021).

Figure 2.3. Doctoral enrolments as a % of total enrolments, 2015 – 2021



	Ghana	Ibadan	Makerere	Rhodes	SU	UCAD	UCT	UDSM	UKZN	UP	Wits	Lagos	Addis Ababa	Mauritius	Nairobi	Rwanda
2015	1.50%	10.20%	1.80%	2.70%	5.20%	2.80%	6.60%	0.80%	6.10%	3.80%	5.40%	0.20%	5.40%		1.00%	
2016	1.70%	14.90%	2.00%	3.00%	5.30%	3.20%	7.10%	1.00%	6.60%	4.10%	5.50%	0.20%	5.50%		0.75%	
2017	1.90%	12.10%	1.70%	3.00%	5.50%	3.80%	7.50%	1.60%	6.40%	4.40%	5.70%	0.80%	5.70%		0.50%	
2018	2.30%	14.30%	1.75%	7.50%	5.35%	4.45%	7.65%	2.20%	6.70%	4.62%	6.00%	1.20%	6.46%	1.87%	1.00%	0.55%
2019	2.25%	12.50%	1.10%	7.30%	5.42%	5.90%	7.85%	2.50%	6.60%	4.75%	6.00%	1.30%	6.57%	2.40%	0.40%	0.85%
2020	2.10%	13.70%	1.00%	7.00%	5.28%	5.62%	8.10%	3.20%	6.30%	4.77%	6.00%	1.50%	5.00%	1.80%	0.65%	1.20%
2021	2.12%	12.00%	0.70%	6.80%	5.29%	5.20%	7.90%	3.00%	6.95%	5.00%	6.00%	1.70%	4.90%	2.55%	0.55%	1.30%

Master's and doctoral enrolments by field of study

Figures 2.4 to 2.10 show master's and doctoral enrolment patterns across the following broad fields of study: Natural Sciences (NS), Engineering and Technology (ET), Medical and Health Sciences (MHS), Agricultural Sciences (AS), Social Sciences (SS), Humanities, and Business, Economics and Management Studies (BEMS) (see Figures 2.4 – 2.10). The following key trends can be drawn from the graphs:

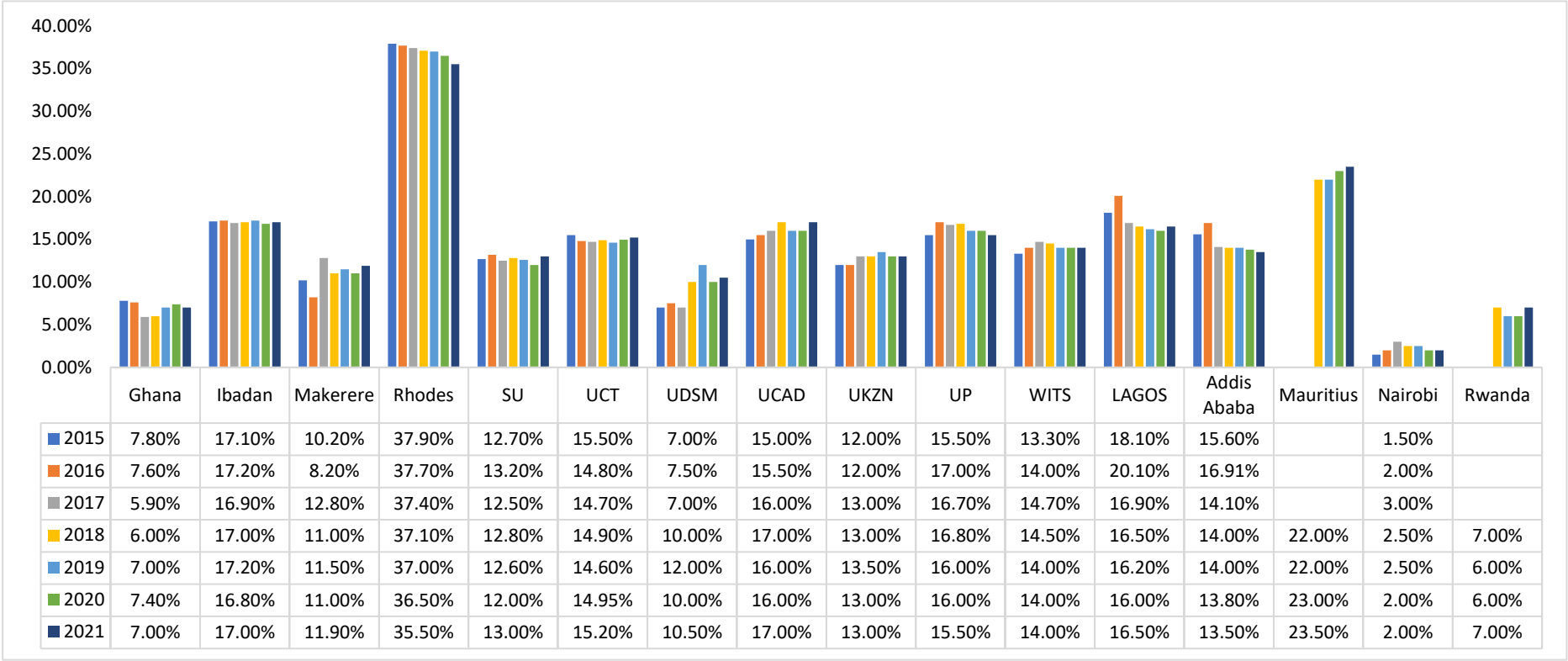
(a) Rhodes, UCT and Lagos remain the only universities that do not offer programmes in all the broad fields of study. These three universities do not offer master's and doctoral programmes in AS. Rhodes also does not offer programmes in ET.

(b) The proportion of master's and doctoral enrolments across the various fields of study remains diverse. At UG and SU, the largest share of master's and doctoral enrolments in 2021 was in BEMS. At Ibadan, UP, Lagos and Addis Ababa, the largest proportion of enrolments were in SS (28%, 19%, 29.5%, and 20.8%, respectively). Rhodes had the highest enrolments in NS (35.5% - a marginal decline compared to 2017), and Nairobi (42%), Rwanda (44%), Makerere (24%), UCT (28.7%) and Wits (25%) had their highest enrolments in MHS.

(c) Rwanda's 44% and Nairobi's 42% in MHS, UG's 43% in BEMS and Rhodes' 35.5% in NS, could be described as outliers considering the general enrolment trends across the other study fields. These three broad study fields have significantly higher enrolments at the respective universities compared to the rest.

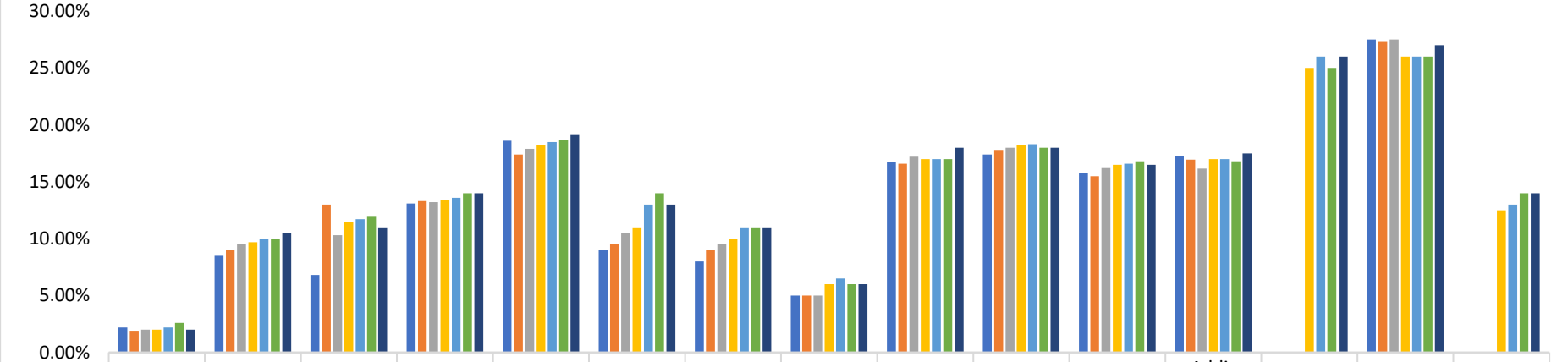
(d) The following fields of study attracted less than 5% of master's and doctoral enrolments in 2021 in various universities: ET at UG (2%); BEMS at Ibadan and Nairobi (2%); AS at Addis Ababa, Wits, and UCAD (2%, 1.5% and 2%, respectively); Humanities at Nairobi (1.5%) and NS at Nairobi (2%).

Figure 2.4. Master's and doctoral enrolments in Natural Sciences as a percentage of all master's and doctoral enrolments, 2015 – 2021



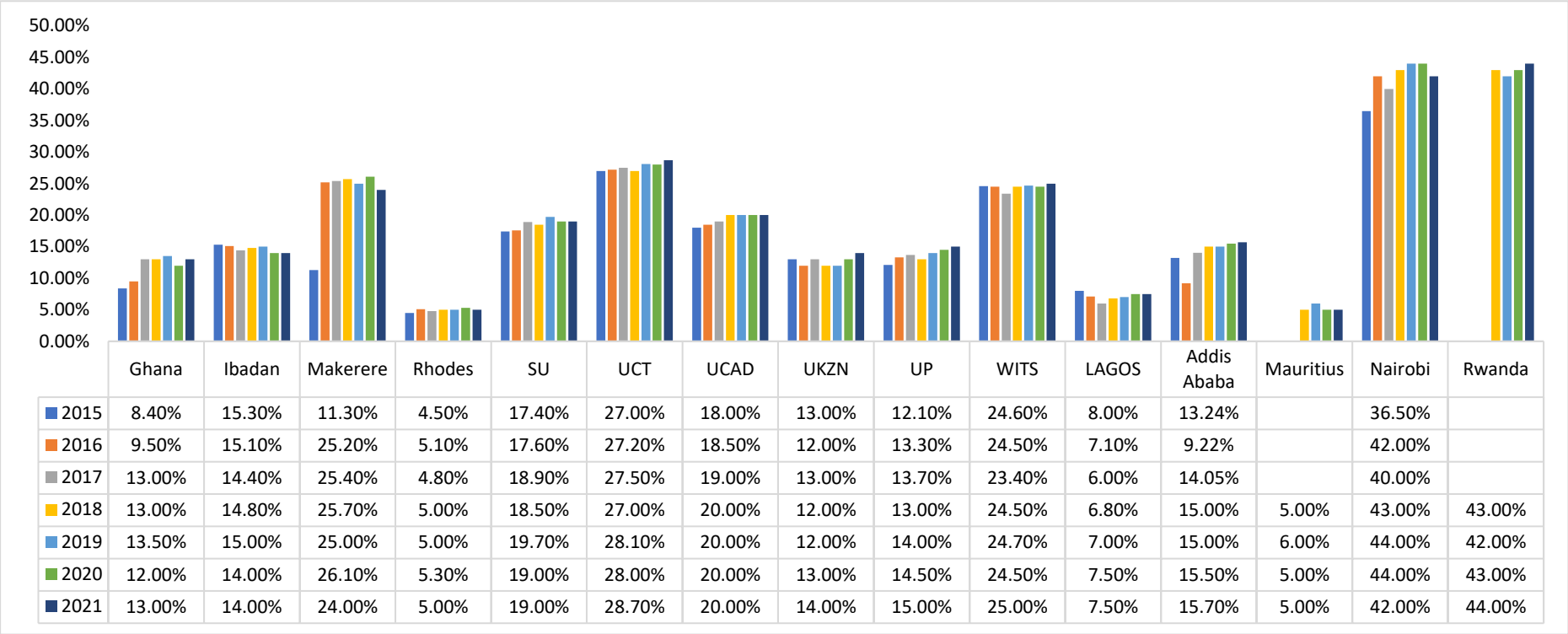
	Ghana	Ibadan	Makerere	Rhodes	SU	UCT	UDSM	UCAD	UKZN	UP	WITS	LAGOS	Addis Ababa	Mauritius	Nairobi	Rwanda
2015	7.80%	17.10%	10.20%	37.90%	12.70%	15.50%	7.00%	15.00%	12.00%	15.50%	13.30%	18.10%	15.60%		1.50%	
2016	7.60%	17.20%	8.20%	37.70%	13.20%	14.80%	7.50%	15.50%	12.00%	17.00%	14.00%	20.10%	16.91%		2.00%	
2017	5.90%	16.90%	12.80%	37.40%	12.50%	14.70%	7.00%	16.00%	13.00%	16.70%	14.70%	16.90%	14.10%		3.00%	
2018	6.00%	17.00%	11.00%	37.10%	12.80%	14.90%	10.00%	17.00%	13.00%	16.80%	14.50%	16.50%	14.00%	22.00%	2.50%	7.00%
2019	7.00%	17.20%	11.50%	37.00%	12.60%	14.60%	12.00%	16.00%	13.50%	16.00%	14.00%	16.20%	14.00%	22.00%	2.50%	6.00%
2020	7.40%	16.80%	11.00%	36.50%	12.00%	14.95%	10.00%	16.00%	13.00%	16.00%	14.00%	16.00%	13.80%	23.00%	2.00%	6.00%
2021	7.00%	17.00%	11.90%	35.50%	13.00%	15.20%	10.50%	17.00%	13.00%	15.50%	14.00%	16.50%	13.50%	23.50%	2.00%	7.00%

Figure 2.5. Master's and doctoral enrolments in Engineering and Technology as a percentage of all master's and doctoral enrolments, 2015 – 2021



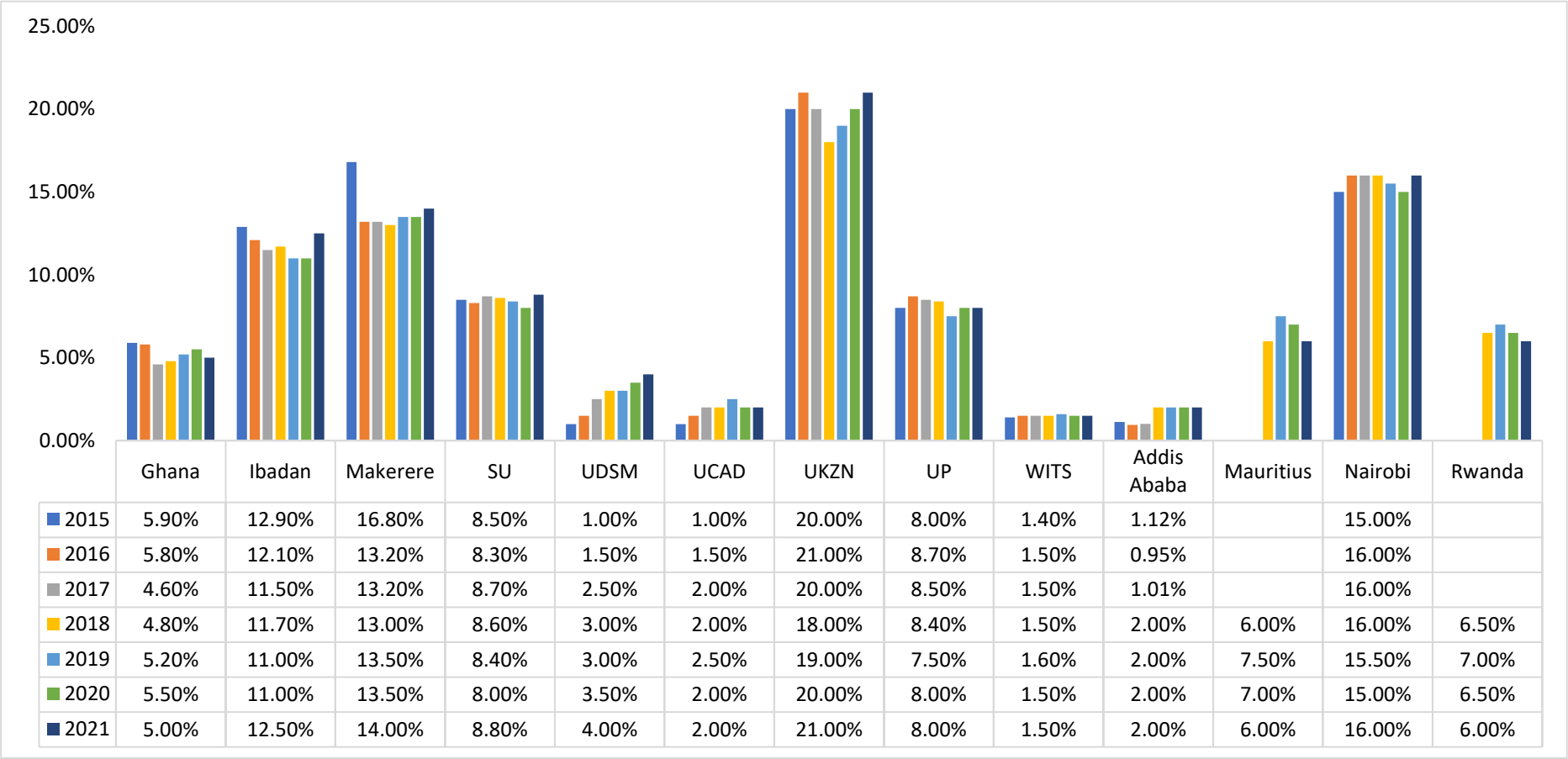
	Ghana	Ibadan	Makerere	SU	UCT	UDSM	UCAD	UKZN	UP	WITS	LAGOS	Addis Ababa	Mauritius	Nairobi	Rwanda
2015	2.20%	8.50%	6.80%	13.10%	18.60%	9.00%	8.00%	5.00%	16.70%	17.40%	15.80%	17.22%		27.50%	
2016	1.90%	9.00%	13.00%	13.30%	17.40%	9.50%	9.00%	5.00%	16.60%	17.80%	15.50%	16.94%		27.30%	
2017	2.00%	9.50%	10.30%	13.20%	17.90%	10.50%	9.50%	5.00%	17.20%	18.00%	16.20%	16.16%		27.50%	
2018	2.00%	9.70%	11.50%	13.40%	18.20%	11.00%	10.00%	6.00%	17.00%	18.20%	16.50%	17.00%	25.00%	26.00%	12.50%
2019	2.20%	10.00%	11.70%	13.60%	18.50%	13.00%	11.00%	6.50%	17.00%	18.30%	16.60%	17.00%	26.00%	26.00%	13.00%
2020	2.60%	10.00%	12.00%	14.00%	18.70%	14.00%	11.00%	6.00%	17.00%	18.00%	16.80%	16.80%	25.00%	26.00%	14.00%
2021	2.00%	10.50%	11.00%	14.00%	19.10%	13.00%	11.00%	6.00%	18.00%	18.00%	16.50%	17.50%	26.00%	27.00%	14.00%

Figure 2.6. Master's and doctoral enrolments in Medical and Health Sciences, as a percentage of all master's and doctoral enrolments, 2015 – 2021



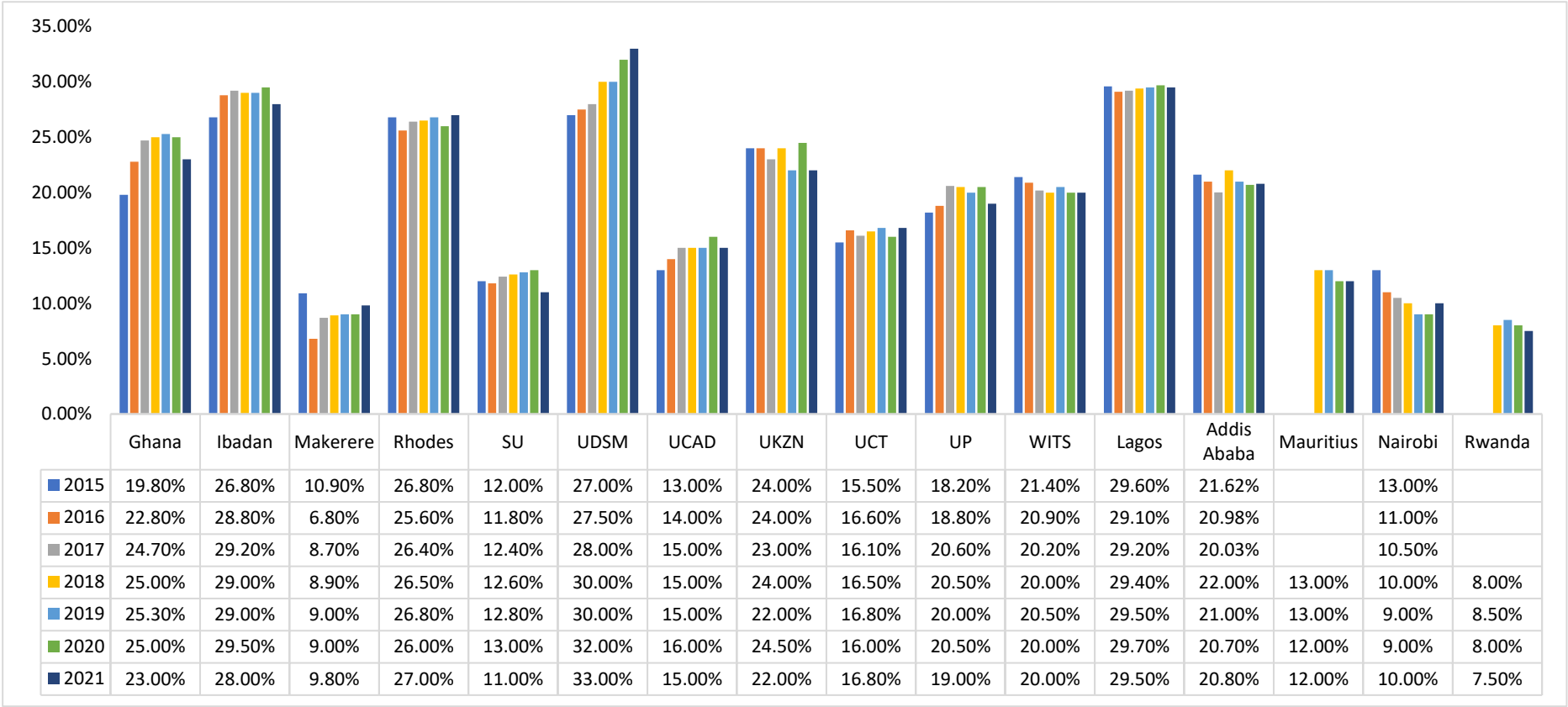
	Ghana	Ibadan	Makerere	Rhodes	SU	UCT	UCAD	UKZN	UP	WITS	LAGOS	Addis Ababa	Mauritius	Nairobi	Rwanda
2015	8.40%	15.30%	11.30%	4.50%	17.40%	27.00%	18.00%	13.00%	12.10%	24.60%	8.00%	13.24%		36.50%	
2016	9.50%	15.10%	25.20%	5.10%	17.60%	27.20%	18.50%	12.00%	13.30%	24.50%	7.10%	9.22%		42.00%	
2017	13.00%	14.40%	25.40%	4.80%	18.90%	27.50%	19.00%	13.00%	13.70%	23.40%	6.00%	14.05%		40.00%	
2018	13.00%	14.80%	25.70%	5.00%	18.50%	27.00%	20.00%	12.00%	13.00%	24.50%	6.80%	15.00%	5.00%	43.00%	43.00%
2019	13.50%	15.00%	25.00%	5.00%	19.70%	28.10%	20.00%	12.00%	14.00%	24.70%	7.00%	15.00%	6.00%	44.00%	42.00%
2020	12.00%	14.00%	26.10%	5.30%	19.00%	28.00%	20.00%	13.00%	14.50%	24.50%	7.50%	15.50%	5.00%	44.00%	43.00%
2021	13.00%	14.00%	24.00%	5.00%	19.00%	28.70%	20.00%	14.00%	15.00%	25.00%	7.50%	15.70%	5.00%	42.00%	44.00%

Figure 2.7. Master's and doctoral enrolments in Agricultural Sciences as a percentage of all master's and doctoral enrolments, 2015 – 2021



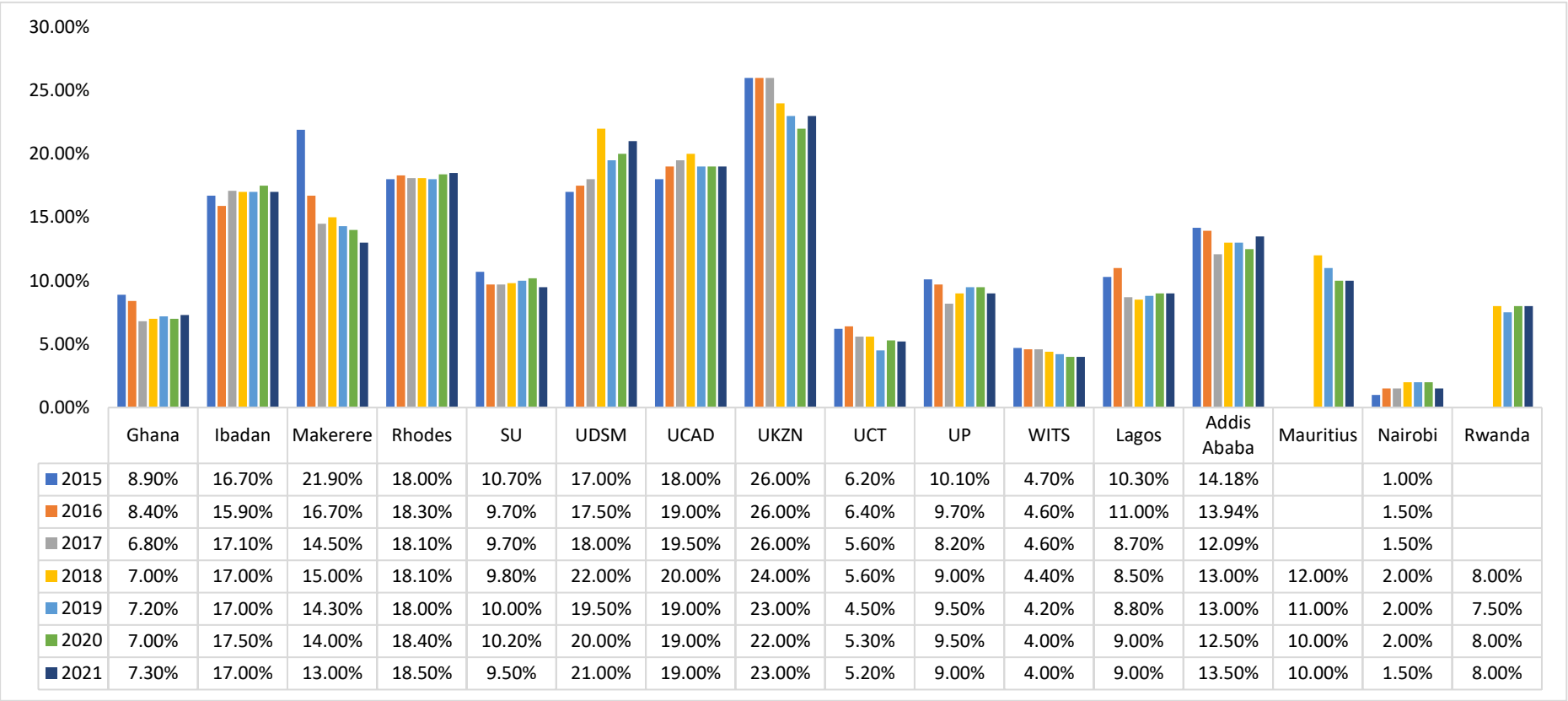
	Ghana	Ibadan	Makerere	SU	UDSM	UCAD	UKZN	UP	WITS	Addis Ababa	Mauritius	Nairobi	Rwanda
2015	5.90%	12.90%	16.80%	8.50%	1.00%	1.00%	20.00%	8.00%	1.40%	1.12%		15.00%	
2016	5.80%	12.10%	13.20%	8.30%	1.50%	1.50%	21.00%	8.70%	1.50%	0.95%		16.00%	
2017	4.60%	11.50%	13.20%	8.70%	2.50%	2.00%	20.00%	8.50%	1.50%	1.01%		16.00%	
2018	4.80%	11.70%	13.00%	8.60%	3.00%	2.00%	18.00%	8.40%	1.50%	2.00%	6.00%	16.00%	6.50%
2019	5.20%	11.00%	13.50%	8.40%	3.00%	2.50%	19.00%	7.50%	1.60%	2.00%	7.50%	15.50%	7.00%
2020	5.50%	11.00%	13.50%	8.00%	3.50%	2.00%	20.00%	8.00%	1.50%	2.00%	7.00%	15.00%	6.50%
2021	5.00%	12.50%	14.00%	8.80%	4.00%	2.00%	21.00%	8.00%	1.50%	2.00%	6.00%	16.00%	6.00%

Figure 2.8. Master's and doctoral enrolments in Social Sciences as a percentage of all master's and doctoral enrolments, 2015 – 2021



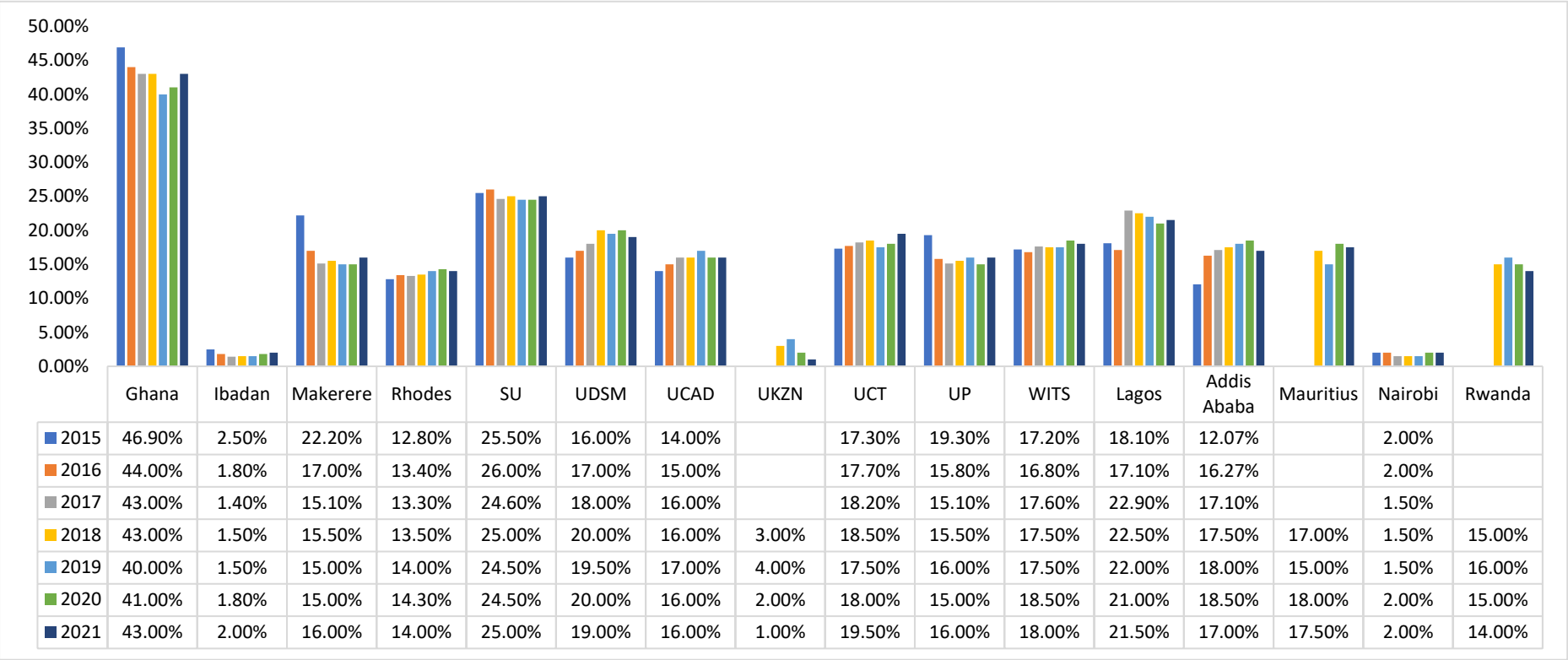
	Ghana	Ibadan	Makerere	Rhodes	SU	UDSM	UCAD	UKZN	UCT	UP	WITS	Lagos	Addis Ababa	Mauritius	Nairobi	Rwanda
2015	19.80%	26.80%	10.90%	26.80%	12.00%	27.00%	13.00%	24.00%	15.50%	18.20%	21.40%	29.60%	21.62%		13.00%	
2016	22.80%	28.80%	6.80%	25.60%	11.80%	27.50%	14.00%	24.00%	16.60%	18.80%	20.90%	29.10%	20.98%		11.00%	
2017	24.70%	29.20%	8.70%	26.40%	12.40%	28.00%	15.00%	23.00%	16.10%	20.60%	20.20%	29.20%	20.03%		10.50%	
2018	25.00%	29.00%	8.90%	26.50%	12.60%	30.00%	15.00%	24.00%	16.50%	20.50%	20.00%	29.40%	22.00%	13.00%	10.00%	8.00%
2019	25.30%	29.00%	9.00%	26.80%	12.80%	30.00%	15.00%	22.00%	16.80%	20.00%	20.50%	29.50%	21.00%	13.00%	9.00%	8.50%
2020	25.00%	29.50%	9.00%	26.00%	13.00%	32.00%	16.00%	24.50%	16.00%	20.50%	20.00%	29.70%	20.70%	12.00%	9.00%	8.00%
2021	23.00%	28.00%	9.80%	27.00%	11.00%	33.00%	15.00%	22.00%	16.80%	19.00%	20.00%	29.50%	20.80%	12.00%	10.00%	7.50%

Figure 2.9. Master's and doctoral enrolments in Humanities as a percentage of all master's and doctoral enrolments, 2015 – 2021



	Ghana	Ibadan	Makerere	Rhodes	SU	UDSM	UCAD	UKZN	UCT	UP	WITS	Lagos	Addis Ababa	Mauritius	Nairobi	Rwanda
2015	8.90%	16.70%	21.90%	18.00%	10.70%	17.00%	18.00%	26.00%	6.20%	10.10%	4.70%	10.30%	14.18%		1.00%	
2016	8.40%	15.90%	16.70%	18.30%	9.70%	17.50%	19.00%	26.00%	6.40%	9.70%	4.60%	11.00%	13.94%		1.50%	
2017	6.80%	17.10%	14.50%	18.10%	9.70%	18.00%	19.50%	26.00%	5.60%	8.20%	4.60%	8.70%	12.09%		1.50%	
2018	7.00%	17.00%	15.00%	18.10%	9.80%	22.00%	20.00%	24.00%	5.60%	9.00%	4.40%	8.50%	13.00%	12.00%	2.00%	8.00%
2019	7.20%	17.00%	14.30%	18.00%	10.00%	19.50%	19.00%	23.00%	4.50%	9.50%	4.20%	8.80%	13.00%	11.00%	2.00%	7.50%
2020	7.00%	17.50%	14.00%	18.40%	10.20%	20.00%	19.00%	22.00%	5.30%	9.50%	4.00%	9.00%	12.50%	10.00%	2.00%	8.00%
2021	7.30%	17.00%	13.00%	18.50%	9.50%	21.00%	19.00%	23.00%	5.20%	9.00%	4.00%	9.00%	13.50%	10.00%	1.50%	8.00%

Figure 2.10. Master's and doctoral enrolments in Business, Economics and Management Studies as a percentage of all master's and doctoral enrolments, 2015 – 2021

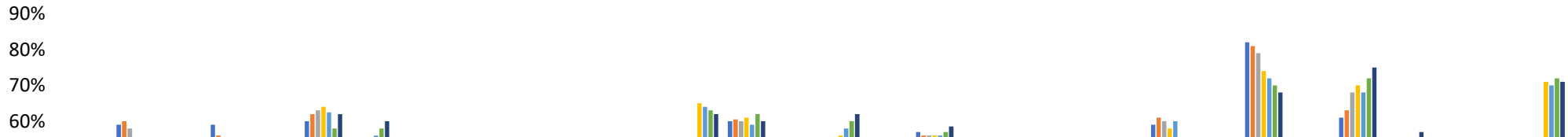


	Ghana	Ibadan	Makerere	Rhodes	SU	UDSM	UCAD	UKZN	UCT	UP	WITS	Lagos	Addis Ababa	Mauritius	Nairobi	Rwanda
2015	46.90%	2.50%	22.20%	12.80%	25.50%	16.00%	14.00%		17.30%	19.30%	17.20%	18.10%	12.07%		2.00%	
2016	44.00%	1.80%	17.00%	13.40%	26.00%	17.00%	15.00%		17.70%	15.80%	16.80%	17.10%	16.27%		2.00%	
2017	43.00%	1.40%	15.10%	13.30%	24.60%	18.00%	16.00%		18.20%	15.10%	17.60%	22.90%	17.10%		1.50%	
2018	43.00%	1.50%	15.50%	13.50%	25.00%	20.00%	16.00%	3.00%	18.50%	15.50%	17.50%	22.50%	17.50%	17.00%	1.50%	15.00%
2019	40.00%	1.50%	15.00%	14.00%	24.50%	19.50%	17.00%	4.00%	17.50%	16.00%	17.50%	22.00%	18.00%	15.00%	1.50%	16.00%
2020	41.00%	1.80%	15.00%	14.30%	24.50%	20.00%	16.00%	2.00%	18.00%	15.00%	18.50%	21.00%	18.50%	18.00%	2.00%	15.00%
2021	43.00%	2.00%	16.00%	14.00%	25.00%	19.00%	16.00%	1.00%	19.50%	16.00%	18.00%	21.50%	17.00%	17.50%	2.00%	14.00%

2.1 Enrolments by gender

Figures 2.11 – 2.13 provide summaries of enrolments by gender across various PG categories, namely, PG enrolments (including postgraduate enrolments below master's), master's and doctoral enrolments.

Figure 2.11. Postgraduate enrolments by gender, 2015 – 2021

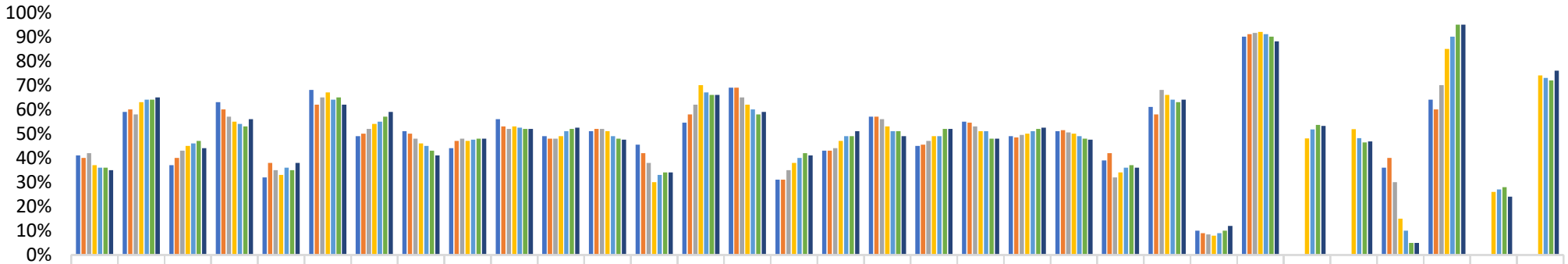


	Ghana		Ibadan		Makerere		Rhodes		SU		UCT		UCAD		UDSM		UKZN		UP		Wits		Lagos		Addis Ababa		Nairobi		Mauritius		Rwanda	
	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
2015	41%	59%	41%	59%	40%	60%	53%	47%	51%	50%	51%	49%	47%	53%	60%	40%	55%	46%	57%	43%	52%	48%	41%	59%	18%	82%	39%	61%				
2016	40%	60%	44%	56%	38%	62%	53%	47%	51%	50%	51%	49%	48%	52%	61%	40%	54%	46%	56%	44%	53%	48%	39%	61%	19%	81%	37%	63%				
2017	42%	58%	45%	55%	37%	63%	55%	45%	51%	49%	52%	48%	49%	51%	60%	40%	55%	45%	56%	44%	53%	47%	40%	60%	21%	79%	32%	68%				
2018	45%	55%	47%	53%	36%	64%	55%	45%	53%	47%	52%	48%	35%	65%	61%	49%	56%	44%	56%	44%	52%	48%	42%	58%	26%	74%	30%	70%	53%	47%	29%	71%
2019	47%	53%	51%	49%	38%	63%	56%	44%	54%	46%	55%	45%	36%	64%	59%	41%	58%	42%	56%	44%	53%	48%	40%	60%	28%	72%	32%	68%	54%	46%	30%	70%
2020	49%	51%	52%	48%	42%	58%	58%	42%	55%	46%	54%	46%	37%	63%	62%	38%	60%	40%	57%	43%	53%	47%	45%	55%	30%	70%	28%	72%	55%	45%	28%	72%
2021	49%	51%	51%	49%	38%	62%	60%	40%	55%	45%	54%	46%	38%	62%	60%	40%	62%	38%	59%	42%	54%	46%	46%	54%	32%	68%	25%	75%	57%	43%	29%	71%

Figure 2.12. Master's enrolments by gender, 2015 – 2021

	Ghana		Ibadan		Makerere		Rhodes		SU		UCT		UCAD		UDSM		UKZN		UP		Wits		Lagos		Addis Ababa		Nairobi		Mauritius		Rwanda	
	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
2015	41%	59%	42%	58%	42%	58%	48%	52%	46%	54%	48%	52%	46%	54%	60%	40%	55%	45%	51%	49%	51%	49%	41%	59%	20%	80%	39%	61%				
2016	40%	60%	45%	55%	39%	61%	48%	52%	47%	53%	49%	51%	44%	56%	62%	39%	51%	49%	41%	52%	52%	48%	40%	61%	22%	78%	39%	61%				
2017	42%	58%	46%	54%	38%	63%	48%	52%	48%	52%	51%	50%	40%	60%	60%	40%	58%	42%	54%	46%	53%	47%	41%	59%	22%	78%	30%	70%				
2018	42%	59%	48%	53%	39%	61%	53%	47%	50%	50%	51%	49%	36%	64%	61%	39%	59%	41%	56%	44%	54%	47%	42%	59%	25%	75%	20%	80%	55%	46%	28%	72%
2019	44%	57%	52%	48%	38%	62%	55%	45%	52%	49%	52%	48%	37%	63%	62%	38%	60%	41%	56%	44%	54%	46%	41%	59%	28%	73%	7%	93%	56%	44%	30%	70%
2020	45%	55%	52%	48%	38%	63%	56%	45%	53%	47%	53%	48%	39%	62%	61%	39%	61%	39%	57%	44%	54%	46%	43%	57%	30%	71%	8%	92%	56%	44%	28%	72%
2021	46%	55%	53%	47%	37%	64%	60%	40%	53%	47%	53%	47%	39%	62%	60%	40%	61%	39%	57%	43%	55%	45%	44%	56%	33%	68%	8%	92%	57%	44%	26%	74%

Figure 2.13. Doctoral enrolments by gender, 2015 – 2021



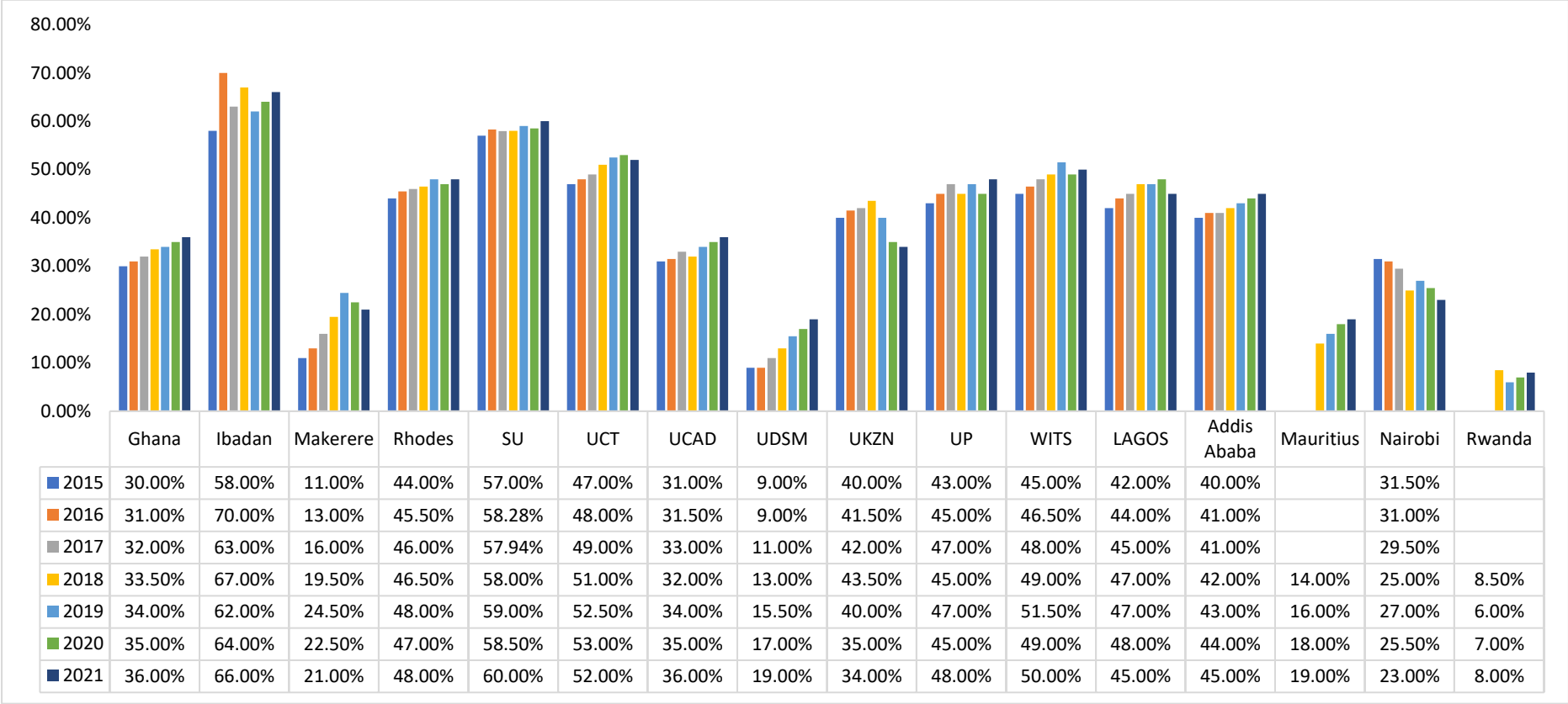
	Ghana		Ibadan		Makerere		Rhodes		SU		UCT		UCAD		UDSM		UKZN		UP		Wits		Lagos		Addis Ababa		Mauritius		Nairobi		Rwanda	
	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
2015	41%	59%	37%	63%	32%	68%	49%	51%	44%	56%	49%	51%	46%	55%	69%	31%	43%	57%	45%	55%	49%	51%	39%	61%	10%	90%			36%	64%		
2016	40%	60%	40%	60%	38%	62%	50%	50%	47%	53%	48%	52%	42%	58%	69%	31%	43%	57%	46%	55%	49%	52%	42%	58%	9%	91%			40%	60%		
2017	42%	58%	43%	57%	35%	65%	52%	48%	48%	52%	48%	52%	38%	62%	65%	35%	44%	56%	47%	53%	50%	51%	32%	68%	9%	92%			30%	70%		
2018	37%	63%	45%	55%	33%	67%	54%	46%	47%	53%	49%	51%	30%	70%	62%	38%	47%	53%	49%	51%	50%	50%	34%	66%	8%	92%	48%	52%	15%	85%	26%	74%
2019	36%	64%	46%	54%	36%	64%	55%	45%	48%	53%	51%	49%	33%	67%	60%	40%	49%	51%	49%	51%	51%	49%	36%	64%	9%	91%	52%	48%	10%	90%	27%	73%
2020	36%	64%	47%	53%	35%	65%	57%	43%	48%	52%	52%	48%	34%	66%	58%	42%	49%	51%	52%	48%	52%	48%	37%	63%	10%	90%	54%	46%	5%	95%	28%	72%
2021	35%	65%	44%	56%	38%	62%	59%	41%	48%	52%	53%	48%	34%	66%	59%	41%	51%	49%	52%	48%	53%	48%	36%	64%	12%	88%	53%	47%	5%	95%	24%	76%

The enrolment of female students has recorded positive growth across most of the universities. At five of the six South African universities, female students constitute a majority across the three PG categories except for doctoral enrolments at SU. Female students are also a majority at UDSM except for doctoral enrolments. In a few universities, the proportion of female students declined over the 2015 – 2021 period. The declines were recorded at UCAD and Nairobi across all the three categories, Makerere for overall PG enrolments and master's enrolments, Rwanda for master's and doctoral enrolments (2018 – 2021) and UG, UDSM and Lagos for doctoral enrolments. The declines in master's and doctoral enrolments at Nairobi were the highest; from 39% to 8%, and 36% to 5% for master's and doctoral enrolments, respectively. Overall, women remain underrepresented at most of the universities.

3.0 Graduates

Figures 3.1 – 3.4 provide a summary of the proportion of PG graduates produced by the universities. Figure 3.1 shows that the proportion of PG graduates increased across most of the universities except at UKZN, Nairobi and Rwanda. Ibadan had the highest percentage of PG graduates among all its graduates (66% in 2021), followed by SU (60%)) and UCT (52%). Rwanda recorded the lowest percentage of PG graduates (8%), followed by UDSM and UM (19%).

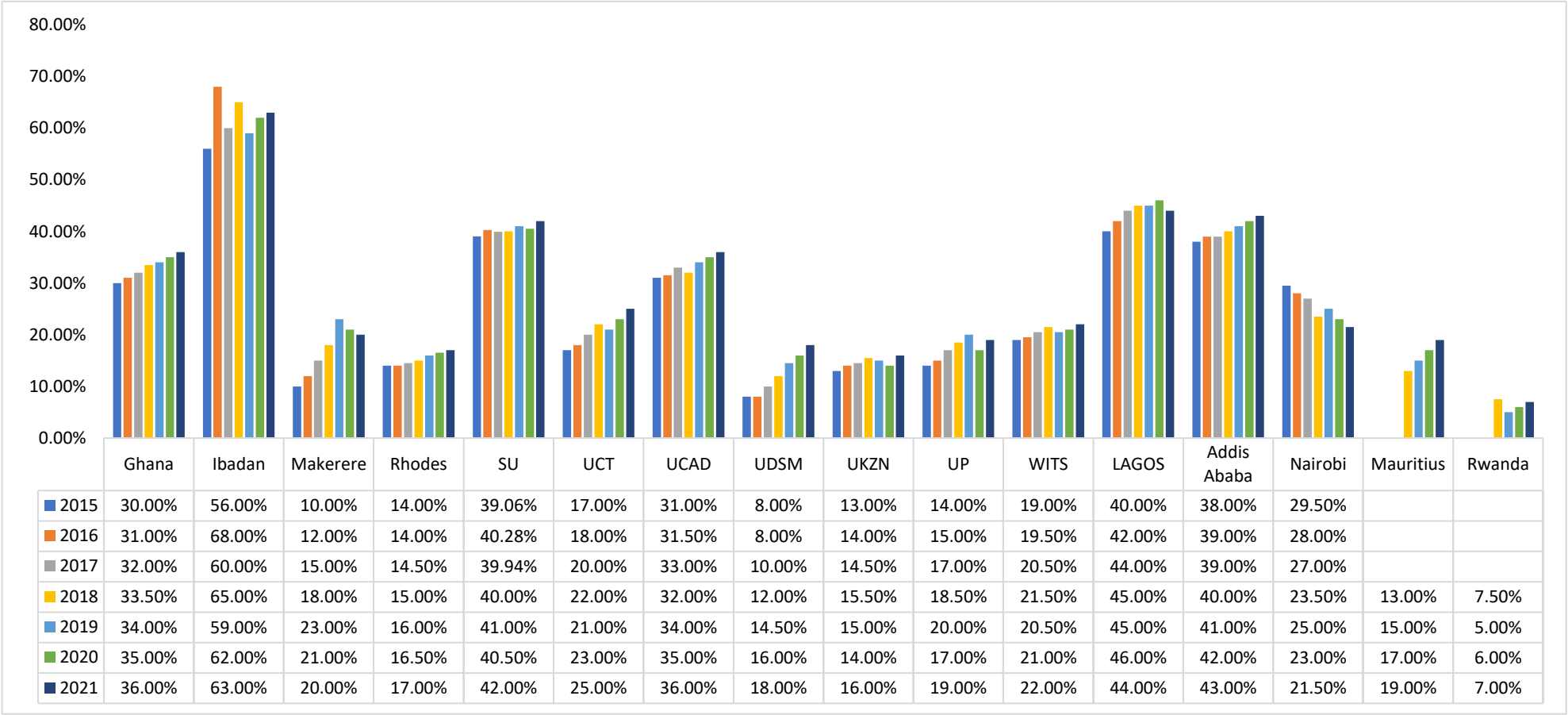
Figure 3.1. Proportion of PG graduates, 2015 – 2021



	Ghana	Ibadan	Makerere	Rhodes	SU	UCT	UCAD	UDSM	UKZN	UP	WITS	LAGOS	Addis Ababa	Mauritius	Nairobi	Rwanda
2015	30.00%	58.00%	11.00%	44.00%	57.00%	47.00%	31.00%	9.00%	40.00%	43.00%	45.00%	42.00%	40.00%		31.50%	
2016	31.00%	70.00%	13.00%	45.50%	58.28%	48.00%	31.50%	9.00%	41.50%	45.00%	46.50%	44.00%	41.00%		31.00%	
2017	32.00%	63.00%	16.00%	46.00%	57.94%	49.00%	33.00%	11.00%	42.00%	47.00%	48.00%	45.00%	41.00%		29.50%	
2018	33.50%	67.00%	19.50%	46.50%	58.00%	51.00%	32.00%	13.00%	43.50%	45.00%	49.00%	47.00%	42.00%	14.00%	25.00%	8.50%
2019	34.00%	62.00%	24.50%	48.00%	59.00%	52.50%	34.00%	15.50%	40.00%	47.00%	51.50%	47.00%	43.00%	16.00%	27.00%	6.00%
2020	35.00%	64.00%	22.50%	47.00%	58.50%	53.00%	35.00%	17.00%	35.00%	45.00%	49.00%	48.00%	44.00%	18.00%	25.50%	7.00%
2021	36.00%	66.00%	21.00%	48.00%	60.00%	52.00%	36.00%	19.00%	34.00%	48.00%	50.00%	45.00%	45.00%	19.00%	23.00%	8.00%

Figure 3.2, which only shows master's and doctoral graduates (as a percentage of all graduates), that is, excluding PG graduates below master's, shows a significantly lower proportion compared to that of all PG graduates (Figure 3.1) for South African universities. This reinforces the observation in Section 2 regarding the sizeable number of PG enrolments below master's in South African universities. This point is reinforced further by Figure 3.3, which shows that master's and doctoral graduates account for less than 50% of postgraduate graduates in South African universities. In the other universities, most postgraduate graduates are masters and doctoral graduates.

Figure 3.2 Master's and doctoral graduates as a percentage of all graduates, 2015 - 2021

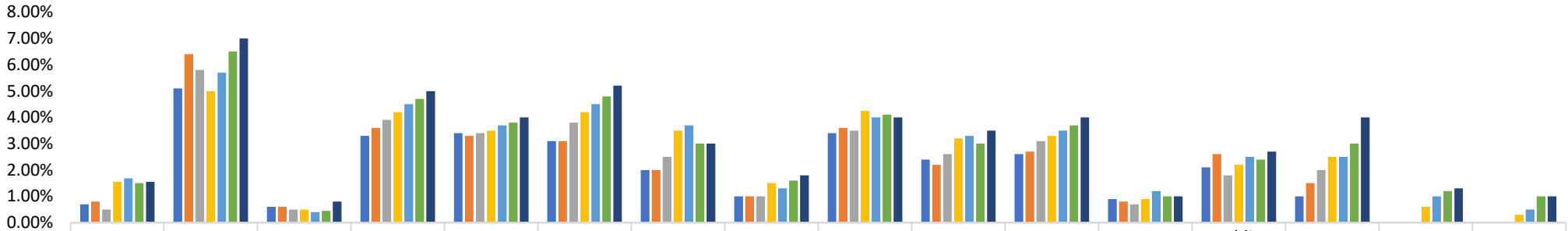


	Ghana	Ibadan	Makerere	Rhodes	SU	UCT	UCAD	UDSM	UKZN	UP	WITS	LAGOS	Addis Ababa	Nairobi	Mauritius	Rwanda
2015	30.00%	56.00%	10.00%	14.00%	39.06%	17.00%	31.00%	8.00%	13.00%	14.00%	19.00%	40.00%	38.00%	29.50%		
2016	31.00%	68.00%	12.00%	14.00%	40.28%	18.00%	31.50%	8.00%	14.00%	15.00%	19.50%	42.00%	39.00%	28.00%		
2017	32.00%	60.00%	15.00%	14.50%	39.94%	20.00%	33.00%	10.00%	14.50%	17.00%	20.50%	44.00%	39.00%	27.00%		
2018	33.50%	65.00%	18.00%	15.00%	40.00%	22.00%	32.00%	12.00%	15.50%	18.50%	21.50%	45.00%	40.00%	23.50%	13.00%	7.50%
2019	34.00%	59.00%	23.00%	16.00%	41.00%	21.00%	34.00%	14.50%	15.00%	20.00%	20.50%	45.00%	41.00%	25.00%	15.00%	5.00%
2020	35.00%	62.00%	21.00%	16.50%	40.50%	23.00%	35.00%	16.00%	14.00%	17.00%	21.00%	46.00%	42.00%	23.00%	17.00%	6.00%
2021	36.00%	63.00%	20.00%	17.00%	42.00%	25.00%	36.00%	18.00%	16.00%	19.00%	22.00%	44.00%	43.00%	21.50%	19.00%	7.00%

Doctoral graduates

Figure 3.3 shows that the share of doctoral graduates compared to all graduates ranged from 0.8% (Makerere) to 7% (Ibadan) in 2021. The share of doctoral graduates of all the PG categories. The proportion of doctoral graduates is generally stable across the universities.

Figure 3.3. Doctoral graduates as a percentage of all graduates, 2015 – 2021

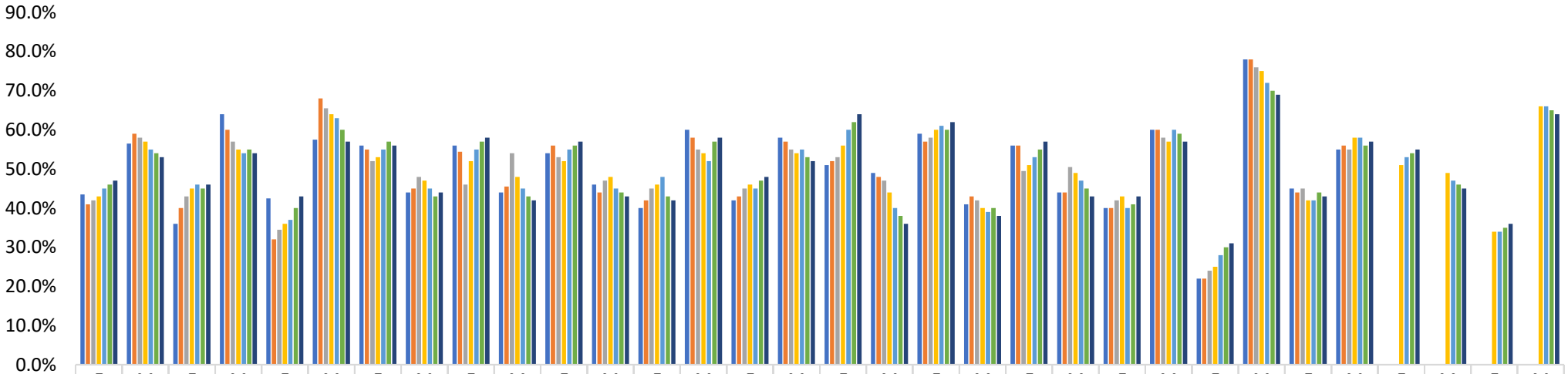


	Ghana	Ibadan	Makerere	Rhodes	SU	UCT	UCAD	UDSM	UKZN	UP	WITS	LAGOS	Addis Ababa	Nairobi	Mauritius	Rwanda
2015	0.70%	5.10%	0.60%	3.30%	3.40%	3.10%	2.00%	1.00%	3.40%	2.40%	2.60%	0.90%	2.10%	1%		
2016	0.80%	6.40%	0.60%	3.60%	3.30%	3.10%	2.00%	1.00%	3.60%	2.20%	2.70%	0.80%	2.60%	1.50%		
2017	0.50%	5.80%	0.50%	3.90%	3.40%	3.80%	2.50%	1.00%	3.50%	2.60%	3.10%	0.70%	1.80%	2.00%		
2018	1.55%	5.00%	0.50%	4.20%	3.50%	4.20%	3.50%	1.50%	4.25%	3.20%	3.30%	0.90%	2.20%	2.50%	0.60%	0.30%
2019	1.68%	5.70%	0.40%	4.50%	3.70%	4.50%	3.70%	1.30%	4.00%	3.30%	3.50%	1.20%	2.50%	2.50%	1.00%	0.50%
2020	1.50%	6.50%	0.45%	4.70%	3.80%	4.80%	3.00%	1.60%	4.10%	3.00%	3.70%	1.00%	2.40%	3.00%	1.20%	1.00%
2021	1.55%	7.00%	0.80%	5.00%	4.00%	5.20%	3.00%	1.80%	4.00%	3.50%	4.00%	1.00%	2.70%	4.00%	1.30%	1.00%

3.1 Graduates by Gender

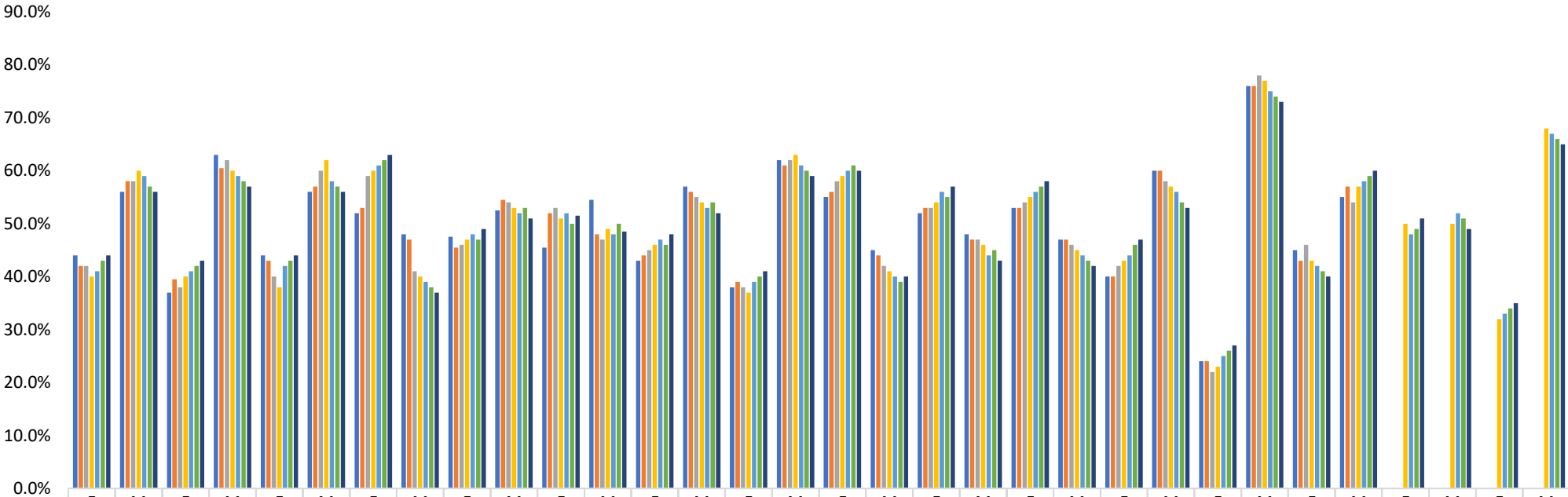
Figures 3.4 - 3.6 provide a summary of the share of graduates by gender across various postgraduate levels, namely all postgraduate graduates, master's graduates, and doctoral graduates.

Figure 3.4. Postgraduate graduates by gender, 2015 – 2021



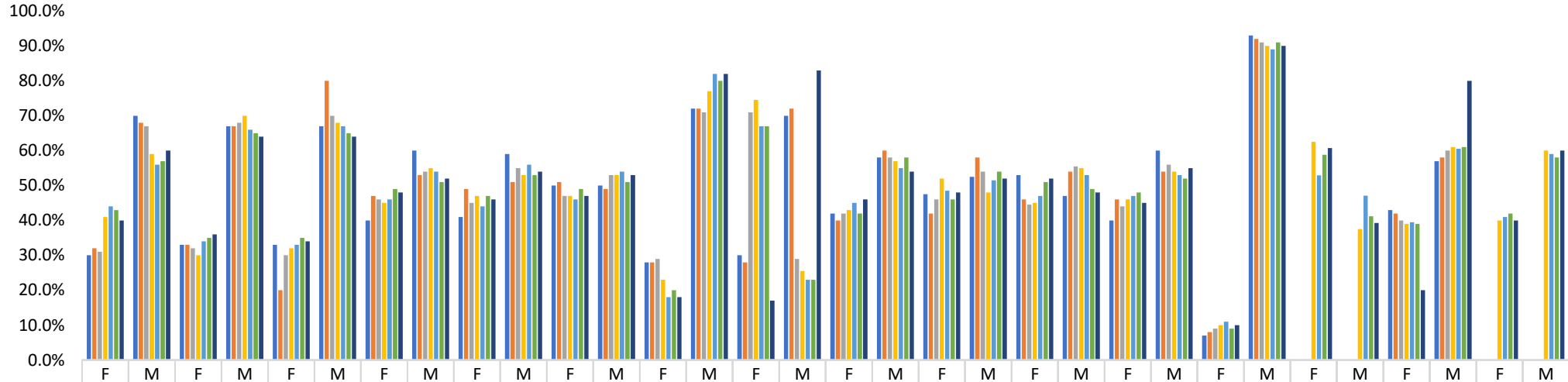
	Ghana		Ibadan		Makerere		Rhodes		SU		UCT		UCAD		UDSM		UKZN		UP		Wits		Lagos		Addis Ababa		Nairobi		Mauritius		Rwanda	
	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
2015	43.5	56.5	36.0	64.0	42.5	57.5	56.0	44.0	56.0	44.0	54.0	46.0	40.0	60.0	42.0	58.0	51.0	49.0	59.0	41.0	56.0	44.0	40.0	60.0	22.0	78.0	45.0	55.0				
2016	41.0	59.0	40.0	60.0	32.0	68.0	55.0	45.0	54.4	45.5	56.0	44.0	42.0	58.0	43.0	57.0	52.0	48.0	57.0	43.0	56.0	44.0	40.0	60.0	22.0	78.0	44.0	56.0				
2017	42.0	58.0	43.0	57.0	34.5	65.5	52.0	48.0	46.0	54.0	53.0	47.0	45.0	55.0	45.0	55.0	53.0	47.0	58.0	42.0	49.5	50.5	42.0	58.0	24.0	76.0	45.0	55.0				
2018	43.0	57.0	45.0	55.0	36.0	64.0	53.0	47.0	52.0	48.0	52.0	48.0	46.0	54.0	46.0	54.0	56.0	44.0	60.0	40.0	51.0	49.0	43.0	57.0	25.0	75.0	42.0	58.0	51.0	49.0	34.0	66.0
2019	45.0	55.0	46.0	54.0	37.0	63.0	55.0	45.0	55.0	45.0	55.0	45.0	48.0	52.0	45.0	55.0	60.0	40.0	61.0	39.0	53.0	47.0	40.0	60.0	28.0	72.0	42.0	58.0	53.0	47.0	34.0	66.0
2020	46.0	54.0	45.0	55.0	40.0	60.0	57.0	43.0	57.0	43.0	56.0	44.0	43.0	57.0	47.0	53.0	62.0	38.0	60.0	40.0	55.0	45.0	41.0	59.0	30.0	70.0	44.0	56.0	54.0	46.0	35.0	65.0
2021	47.0	53.0	46.0	54.0	43.0	57.0	56.0	44.0	58.0	42.0	57.0	43.0	42.0	58.0	48.0	52.0	64.0	36.0	62.0	38.0	57.0	43.0	43.0	57.0	31.0	69.0	43.0	57.0	55.0	45.0	36.0	64.0

Figure 3.5. Master's graduates by gender, 2015 – 2021



	Ghana		Ibadan		Makerere		Rhodes		SU		UCT		UCAD		UDSM		UKZN		UP		Wits		Lagos		Addis Ababa		Nairobi		Mauritius		Rwanda	
	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
2015	44.0	56.0	37.0	63.0	44.0	56.0	52.0	48.0	47.5	52.5	45.5	54.5	43.0	57.0	38.0	62.0	55.0	45.0	52.0	48.0	53.0	47.0	40.0	60.0	24.0	76.0	45.0	55.0				
2016	42.0	58.0	39.5	60.5	43.0	57.0	53.0	47.0	45.5	54.5	52.0	48.0	44.0	56.0	39.0	61.0	56.0	44.0	53.0	47.0	53.0	47.0	40.0	60.0	24.0	76.0	43.0	57.0				
2017	42.0	58.0	38.0	62.0	40.0	60.0	59.0	41.0	46.0	54.0	53.0	47.0	45.0	55.0	38.0	62.0	58.0	42.0	53.0	47.0	54.0	46.0	42.0	58.0	22.0	78.0	46.0	54.0				
2018	40.0	60.0	40.0	60.0	38.0	62.0	60.0	40.0	47.0	53.0	51.0	49.0	46.0	54.0	37.0	63.0	59.0	41.0	54.0	46.0	55.0	45.0	43.0	57.0	23.0	77.0	43.0	57.0	50.0	50.0	32.0	68.0
2019	41.0	59.0	41.0	59.0	42.0	58.0	61.0	39.0	48.0	52.0	52.0	48.0	47.0	53.0	39.0	61.0	60.0	40.0	56.0	44.0	56.0	44.0	44.0	56.0	25.0	75.0	42.0	58.0	48.0	52.0	33.0	67.0
2020	43.0	57.0	42.0	58.0	43.0	57.0	62.0	38.0	47.0	53.0	50.0	50.0	46.0	54.0	40.0	60.0	61.0	39.0	55.0	45.0	57.0	43.0	46.0	54.0	26.0	74.0	41.0	59.0	49.0	51.0	34.0	66.0
2021	44.0	56.0	43.0	57.0	44.0	56.0	63.0	37.0	49.0	51.0	51.5	48.5	48.0	52.0	41.0	59.0	60.0	40.0	57.0	43.0	58.0	42.0	47.0	53.0	27.0	73.0	40.0	60.0	51.0	49.0	35.0	65.0

Figure 3.6. Doctoral graduates by gender, 2015 – 2021



	Ghana		Ibadan		Makerere		Rhodes		SU		UCT		UCAD		UDSM		UKZN		UP		Wits		Lagos		Addis Ababa		Mauritius		Nairobi		Rwanda	
	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
2015	30.0	70.0	33.0	67.0	33.0	67.0	40.0	60.0	41.0	59.0	50.0	50.0	28.0	72.0	30.0	70.0	42.0	58.0	47.5	52.5	53.0	47.0	40.0	60.0	7.0%	93.0			43.0	57.0		
2016	32.0	68.0	33.0	67.0	20.0	80.0	47.0	53.0	49.0	51.0	51.0	49.0	28.0	72.0	28.0	72.0	40.0	60.0	42.0	58.0	46.0	54.0	46.0	54.0	8.0%	92.0			42.0	58.0		
2017	31.0	67.0	32.0	68.0	30.0	70.0	46.0	54.0	45.0	55.0	47.0	53.0	29.0	71.0	71.0	29.0	42.0	58.0	46.0	54.0	44.5	55.5	44.0	56.0	9.0%	91.0			40.0	60.0		
2018	41.0	59.0	30.0	70.0	32.0	68.0	45.0	55.0	47.0	53.0	47.0	53.0	23.0	77.0	74.5	25.5	43.0	57.0	52.0	48.0	45.0	55.0	46.0	54.0	10.0	90.0	62.5	37.5	39.0	61.0	40.0	60.0
2019	44.0	56.0	34.0	66.0	33.0	67.0	46.0	54.0	44.0	56.0	46.0	54.0	18.0	82.0	67.0	23.0	45.0	55.0	48.5	51.5	47.0	53.0	47.0	53.0	11.0	89.0	52.9	47.1	39.5	60.5	41.0	59.0
2020	43.0	57.0	35.0	65.0	35.0	65.0	49.0	51.0	47.0	53.0	49.0	51.0	20.0	80.0	67.0	23.0	42.0	58.0	46.0	54.0	51.0	49.0	48.0	52.0	9.0%	91.0	58.8	41.2	39.0	61.0	42.0	58.0
2021	40.0	60.0	36.0	64.0	34.0	64.0	48.0	52.0	46.0	54.0	47.0	53.0	18.0	82.0	17.0	83.0	46.0	54.0	48.0	52.0	52.0	48.0	45.0	55.0	10.0	90.0	60.7	39.3	20.0	80.0	40.0	60.0

The following are the main observations from Figures 3.4 – 3.6:

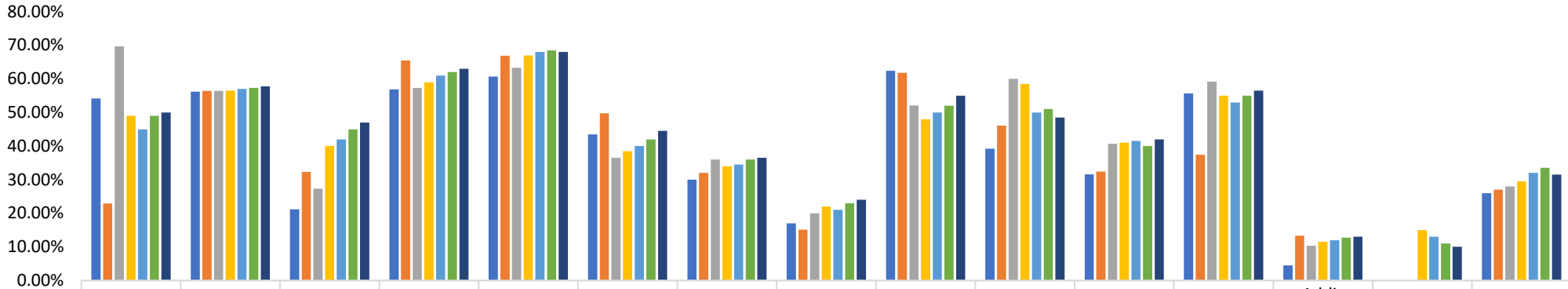
(a) The share of female PG graduates (Figure 3.5) is significantly higher than that of male graduates at the South African universities. The opposite is the case at all the other universities except for UM.

(b) The proportion of female doctoral graduates increased at nine of the universities (UG, Ibadan, Makerere, Rhodes, SU, UKZN, Lagos, Addis Ababa, and Nairobi) between 2015 and 2021, and declined at six of the universities (UCT, UCAD, UDSM, Wits, UM, and Rwanda).
(c) Female graduates are underrepresented amongst doctoral graduates (Figure 3.6) across all the universities, except for UM. This underrepresentation is more pronounced at Ibadan, Makerere, UCAD, UDSM, Addis Ababa and Nairobi, where the share of female doctoral graduates was less than 40% in 2021.
(d) UCAD had the lowest proportion of female doctoral graduates in 2021 (18%) while UM had the highest (60.7%).

4.0 Completion times for doctoral studies

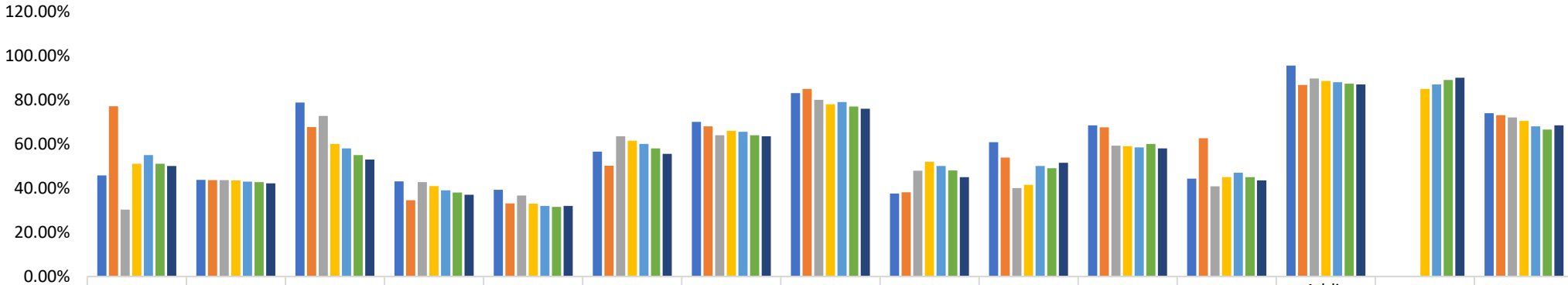
Figure 4.1 shows that all the universities, except UG, UKZN and UM, experienced an increase in the percentage of doctoral students who completed their studies within four years. The improvement recorded by several of the universities – Makerere (21.2% – 47%), Wits (31.6% – 42% and Addis Ababa (4.5% - 13%) is significant. Figure 4.2 shows the percentage of doctoral students taking longer than four years (full time) or six years (part-time) to complete their doctoral studies. SU (32%) and Rhodes (37%) had the lowest proportion of students in this category in 2021 while UM (90%) and Addis Ababa (87%) had the highest proportions. All the universities, except UG, UKZN and UM, recorded a reduction in the proportion of doctoral graduates completing their studies after more than four years (full-time) or six years (part-time), suggesting the need for these universities to strengthen the internal efficiency of their doctoral programmes.

Figure 4.1. PhD graduates who completed within 4 years



	Ghana	Ibadan	Makerere	Rhodes	SU	UCT	UCAD	UDSM	UKZN	UP	WITS	LAGOS	Addis Ababa	Mauritius	Nairobi
2015	54.20%	56.20%	21.20%	56.90%	60.70%	43.50%	30.00%	17.00%	62.40%	39.20%	31.60%	55.70%	4.50%		26.00%
2016	22.90%	56.40%	32.30%	65.50%	66.90%	49.80%	32.00%	15.10%	61.80%	46.10%	32.40%	37.40%	13.30%		27.00%
2017	69.70%	56.40%	27.30%	57.30%	63.30%	36.50%	36.00%	20.00%	52.10%	60.00%	40.70%	59.20%	10.30%		28.00%
2018	49.00%	56.50%	40.00%	59.00%	67.00%	38.50%	34.00%	22.00%	48.00%	58.50%	41.00%	55.00%	11.50%	15.00%	29.50%
2019	45.00%	57.00%	42.00%	61.00%	68.00%	40.00%	34.50%	21.00%	50.00%	50.00%	41.50%	53.00%	12.00%	13.00%	32.00%
2020	49.00%	57.30%	45.00%	62.00%	68.50%	42.00%	36.00%	23.00%	52.00%	51.00%	40.00%	55.00%	12.70%	11.00%	33.50%
2021	50.00%	57.80%	47.00%	63.00%	68.00%	44.50%	36.50%	24.00%	55.00%	48.50%	42.00%	56.50%	13.00%	10.00%	31.50%

Figure 4.2. PhD graduates taking longer than 4 years (full-time) or 6 years (part-time)

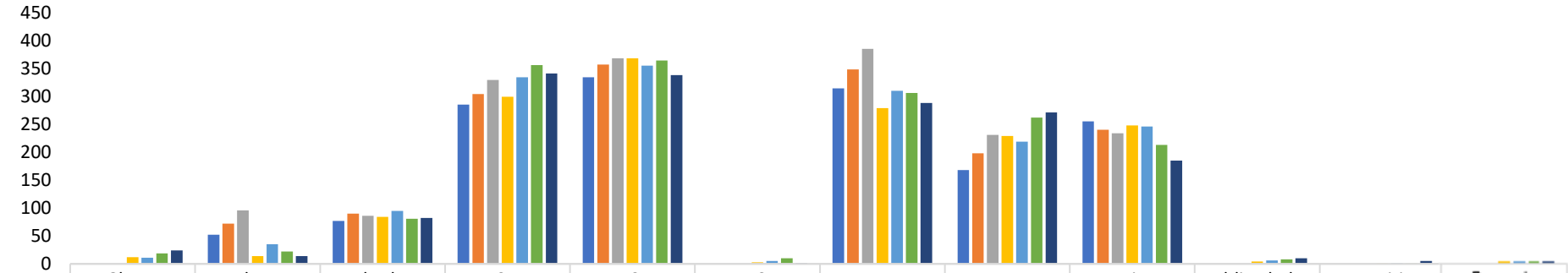


	Ghana	Ibadan	Makerere	Rhodes	SU	UCT	UCAD	UDSM	UKZN	UP	WITS	LAGOS	Addis Ababa	Mauritius	Nairobi
2015	45.80%	43.80%	78.80%	43.10%	39.30%	56.50%	70.00%	83.00%	37.60%	60.80%	68.40%	44.30%	95.50%		74.00%
2016	77.10%	43.60%	67.70%	34.50%	33.10%	50.20%	68.00%	84.90%	38.20%	53.90%	67.60%	62.60%	86.70%		73.00%
2017	30.30%	43.60%	72.70%	42.70%	36.70%	63.50%	64.00%	80.00%	47.90%	40.00%	59.30%	40.80%	89.70%		72.00%
2018	51.00%	43.50%	60.00%	41.00%	33.00%	61.50%	66.00%	78.00%	52.00%	41.50%	59.00%	45.00%	88.50%	85.00%	70.50%
2019	55.00%	43.00%	58.00%	39.00%	32.00%	60.00%	65.50%	79.00%	50.00%	50.00%	58.50%	47.00%	88.00%	87.00%	68.00%
2020	51.00%	42.70%	55.00%	38.00%	31.50%	58.00%	64.00%	77.00%	48.00%	49.00%	60.00%	45.00%	87.30%	89.00%	66.50%
2021	50.00%	42.20%	53.00%	37.00%	32.00%	55.50%	63.50%	76.00%	45.00%	51.50%	58.00%	43.50%	87.00%	90.00%	68.50%

5.0 Postdoctoral research fellows

From the data provided, and captured in Figure 5.1, only South African universities, UG, Makerere, UM and Rwanda have postdoctoral research fellows. All the universities, except Wits, UKZN, and Makerere increased their number of postdoctoral research fellows across the seven years (2015 – 2021).

Figure 5.1. Postdoctoral research fellows, 2015 – 2021



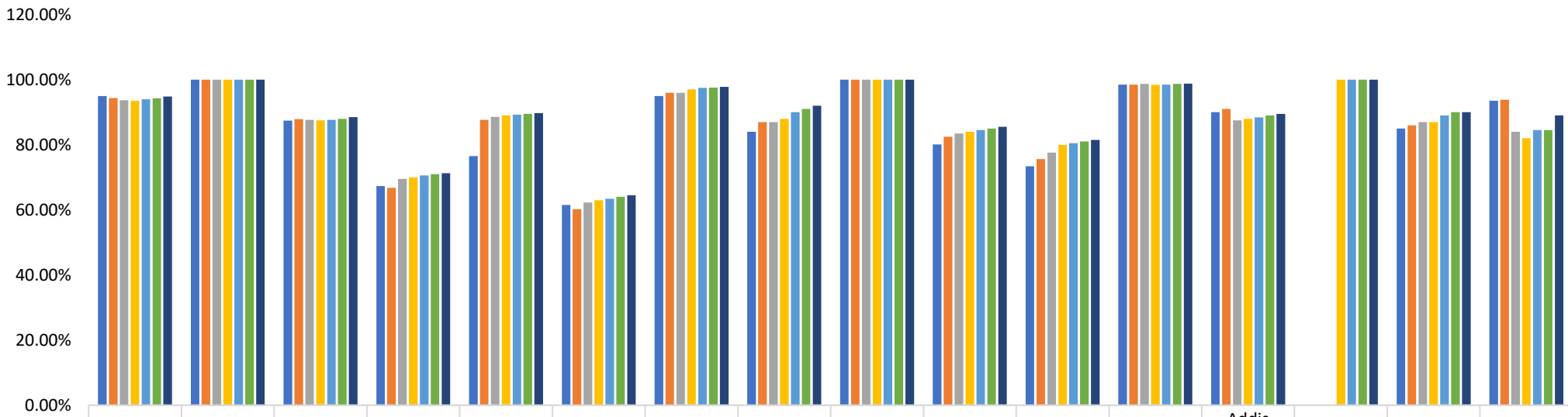
	Ghana	Makerere	Rhodes	SU	UCT	UDSM	UKZN	UP	Wits	Addis Ababa	Mauritius	Rwanda
2015		52	77	285	334		314	168	255			
2016		72	90	304	357		348	198	240			
2017		96	86	329	368		385	231	234			
2018	12	14	84	299	368	3	279	229	248	4	1	3
2019	11	35	95	334	355	5	310	219	246	6	2	3
2020	19	22	81	356	364	10	306	262	213	8	1	2
2021	24	14	82	341	338	2	288	271	185	10	5	1

6.0 Staffing

The following graphs (Figures 6.1 and 6.2) provide a summary of the proportion of permanent academic staff and women academic staff. The proportion of permanent academic staff has increased at many of the universities, albeit marginally in most cases. Wits registered the highest increase in the proportion of permanent academic staff, from 73.4% in 2015 to 81.5% in 2021. According to the data provided, all academic staff at Ibadan and UKZN are permanent staff members. With 64.5% in 2021, UCT has maintained its position as the university with the lowest proportion of permanent academic staff (Figure 6.1).

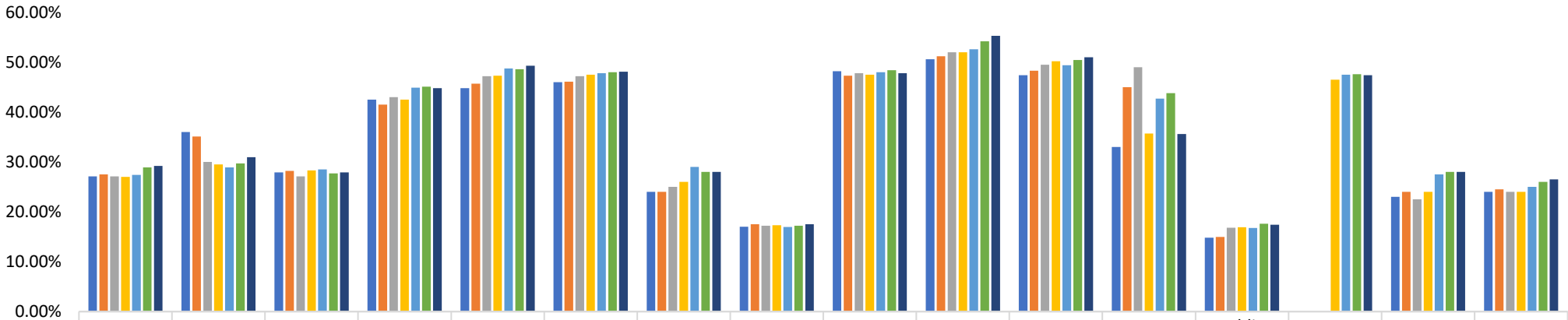
Regarding women academic staff (Figure 6.2), some progress towards bridging the gender gap has been made. At eleven of the universities – UG, SU, UCT, UCAD, UP, Wits, Lagos, Addis Ababa, UM, Nairobi, and Rwanda - the proportion of women academics grew, albeit marginally in most cases. The other universities recorded a decline, with Ibadan recording the highest decline (5.05 percentage points). UP and Wits stand out for having more than 50% of their permanent academic staff complement composed of women.

Figure 6.1. Permanent academic staff as a percentage of all academic staff



	Ghana	Ibadan	Makerere	Rhodes	SU	UCT	UCAD	UDSM	UKZN	UP	WITS	LAGOS	Addis Ababa	Mauritius	Nairobi	Rwanda
2015	95.00%	100.00%	87.40%	67.30%	76.50%	61.50%	95.00%	84.00%	100.00%	80.10%	73.40%	98.50%	90.00%		85.00%	93.50%
2016	94.40%	100.00%	87.90%	66.80%	87.70%	60.20%	96.00%	87.00%	100.00%	82.50%	75.60%	98.50%	91.00%		86.00%	93.80%
2017	93.70%	100.00%	87.70%	69.50%	88.60%	62.30%	96.00%	87.00%	100.00%	83.50%	77.60%	98.70%	87.50%		87.00%	84.00%
2018	93.50%	100.00%	87.50%	70.00%	89.00%	63.00%	97.00%	88.00%	100.00%	84.00%	80.00%	98.40%	88.00%	100.00%	87.00%	82.00%
2019	94.00%	100.00%	87.70%	70.60%	89.30%	63.40%	97.50%	90.00%	100.00%	84.50%	80.50%	98.50%	88.40%	100.00%	89.00%	84.50%
2020	94.30%	100.00%	88.00%	71.00%	89.50%	64.00%	97.60%	91.00%	100.00%	85.00%	81.00%	98.70%	89.00%	100.00%	90.00%	84.50%
2021	94.80%	100.00%	88.50%	71.30%	89.70%	64.50%	97.80%	92.00%	100.00%	85.50%	81.50%	98.80%	89.50%	100.00%	90.00%	89.00%

Figure 6.2. Proportion of permanent women academic staff

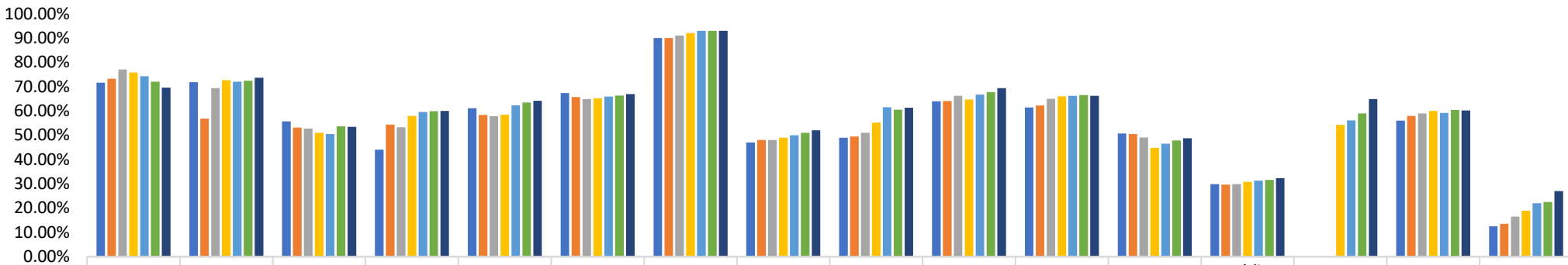


	Ghana	Ibadan	Makerere	Rhodes	SU	UCT	UDSM	UCAD	UKZN	UP	WITS	LAGOS	Addis Ababa	Mauritius	Nairobi	Rwanda
2015	27.10%	36.00%	27.90%	42.50%	44.80%	46.00%	24.00%	17.00%	48.20%	50.60%	47.40%	33.00%	14.80%		23.00%	24.00%
2016	27.50%	35.10%	28.20%	41.50%	45.70%	46.10%	24.00%	17.50%	47.30%	51.20%	48.30%	45.00%	14.95%		24.00%	24.50%
2017	27.10%	30.00%	27.10%	43.00%	47.20%	47.20%	25.00%	17.20%	47.80%	52.00%	49.50%	49.00%	16.80%		22.50%	24.00%
2018	27.00%	29.50%	28.30%	42.50%	47.30%	47.50%	26.00%	17.30%	47.50%	52.00%	50.20%	35.70%	16.90%	46.50%	24.00%	24.00%
2019	27.40%	28.90%	28.50%	44.90%	48.75%	47.80%	29.00%	16.96%	48.00%	52.60%	49.40%	42.70%	16.75%	47.50%	27.50%	25.00%
2020	28.90%	29.70%	27.70%	45.10%	48.60%	48.00%	28.00%	17.20%	48.40%	54.20%	50.45%	43.80%	17.60%	47.60%	28.00%	26.00%
2021	29.20%	30.95%	27.90%	44.80%	49.30%	48.10%	28.00%	17.50%	47.80%	55.30%	51.00%	35.60%	17.40%	47.40%	28.00%	26.50%

6.1 Permanent academic staff with PhD degrees

As shown in Figure 6.3, most of the universities recorded an increase in their proportion of academic staff with doctorates. The highest increase was recorded by Rhodes, from 44.1% in 2015 to 60.1% in 2021 (15.9 percentage points). Universities whose proportion of academic staff with doctorates declined are UG, Makerere and Lagos. UCAD has the highest proportion of academics with doctorates (93% in 2021).

Figure 6.3. Percentage of permanent academic staff with doctorates



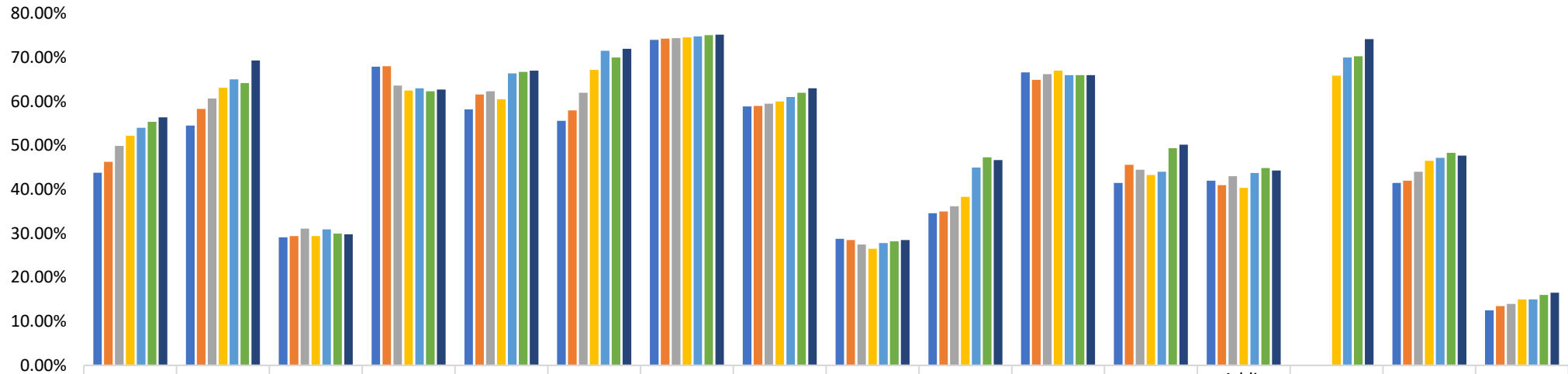
	Ghana	Ibadan	Makerere	Rhodes	SU	UCT	UCAD	UDSM	UKZN	UP	WITS	LAGOS	Addis Ababa	Mauritius	Nairobi	Rwanda
2015	71.60%	71.80%	55.70%	44.10%	61.10%	67.30%	90.00%	47.00%	49.00%	64.00%	61.40%	50.70%	29.90%		56.00%	12.50%
2016	73.30%	56.80%	53.20%	54.40%	58.40%	65.70%	90.00%	48.00%	49.50%	64.10%	62.20%	50.50%	29.70%		58.00%	13.50%
2017	77.00%	69.40%	52.70%	53.30%	57.90%	64.90%	91.00%	48.00%	51.00%	66.20%	65.00%	49.10%	29.90%		59.00%	16.50%
2018	75.80%	72.70%	51.00%	58.00%	58.50%	65.20%	92.00%	49.00%	55.20%	64.70%	66.00%	44.82%	30.80%	54.30%	60.00%	19.00%
2019	74.30%	72.00%	50.55%	59.60%	62.30%	65.90%	93.00%	50.00%	61.50%	66.76%	66.20%	46.50%	31.30%	56.10%	59.20%	22.00%
2020	72.00%	72.45%	53.70%	59.90%	63.50%	66.30%	93.00%	51.00%	60.50%	67.77%	66.55%	47.80%	31.60%	59.00%	60.40%	22.50%
2021	69.60%	73.70%	53.50%	60.00%	64.20%	66.90%	93.00%	52.00%	61.30%	69.35%	66.20%	48.80%	32.30%	64.90%	60.20%	27.00%

6.2 Permanent academic staff by rank

Figure 6.4 shows that most of the universities have increased the proportion of senior academic staff (professors, associate professors, and senior lecturers). Ibadan recorded the highest increase from 2015 – 2021 (14.8 percentage points), followed by UG and UKZN with 12.6 and 12.1, respectively. Rhodes and UDSM recorded a decrease.

UCT maintained the highest percentage of senior academics (75.2%), followed by UM (74.2%) and UCAD (72%), while UDSM had the lowest proportion of senior academics (28.5%), followed by Makerere (29.8%). The proportion of senior academics was lower than that of academics with doctorates at UG, Ibadan, Wits, and Nairobi while the opposite was the case at the rest of the Universities.

Figure 6.4. Professors, associate professors, and senior lecturers as a percentage of permanent academic staff



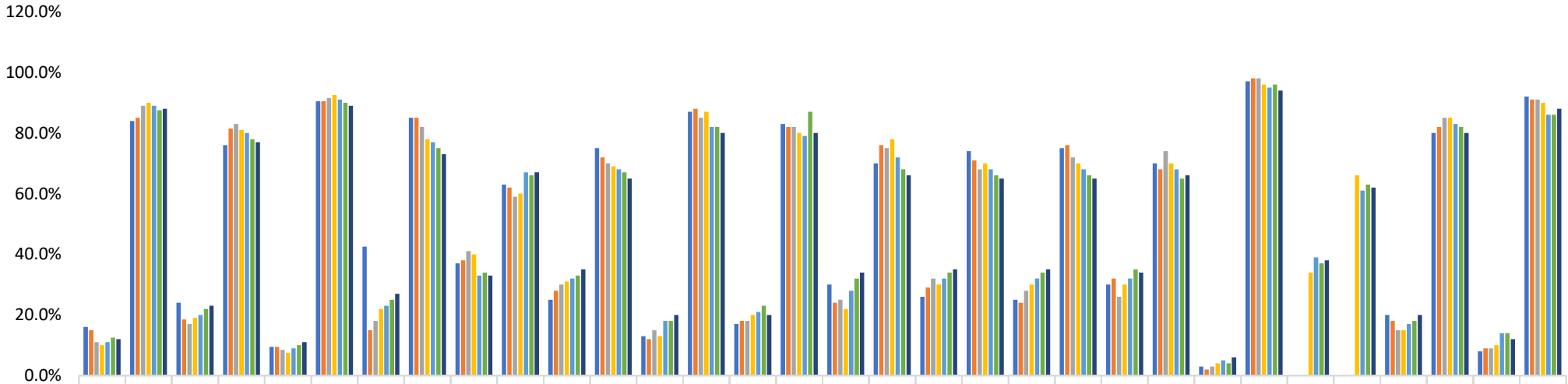
	Ghana	Ibadan	Makerere	Rhodes	SU	UCAD	UCT	Wits	UDSM	UKZN	UP	LAGOS	Addis Ababa	Mauritius	Nairobi	Rwanda
2015	43.80%	54.50%	29.10%	67.90%	58.20%	55.60%	74.00%	58.90%	28.80%	34.60%	66.60%	41.50%	42.00%		41.50%	12.50%
2016	46.30%	58.30%	29.40%	68.00%	61.60%	58.00%	74.30%	59.00%	28.50%	35.00%	64.90%	45.60%	41.00%		42.00%	13.50%
2017	49.90%	60.70%	31.10%	63.60%	62.30%	62.00%	74.40%	59.50%	27.50%	36.20%	66.20%	44.50%	43.00%		44.00%	14.00%
2018	52.20%	63.10%	29.40%	62.50%	60.50%	67.20%	74.60%	60.00%	26.50%	38.30%	67.00%	43.30%	40.35%	65.90%	46.50%	15.00%
2019	54.00%	65.05%	30.90%	63.00%	66.40%	71.50%	74.80%	61.00%	27.80%	45.00%	66.00%	44.00%	43.75%	70.00%	47.20%	15.00%
2020	55.40%	64.20%	29.95%	62.30%	66.70%	70.00%	75.10%	62.00%	28.20%	47.30%	66.00%	49.40%	44.86%	70.30%	48.30%	16.00%
2021	56.40%	69.30%	29.80%	62.70%	67.00%	72.00%	75.20%	63.00%	28.50%	46.70%	66.00%	50.20%	44.30%	74.20%	47.70%	16.50%

6.3 Permanent academic staff by rank and gender

Figures 6.5 – 6.7 provide a summary of the distribution of senior academic staff (professors, associate professors, and senior lecturers) by gender. The representation of women in the three senior ranks has generally improved, even though they remain underrepresented. All the universities increased the proportion of women in the rank of professor except UG, Ibadan and SU. UM had the highest percentage of women amongst its full professors (38%), followed by UP and Wits with 35%. For associate professors, only Ibadan and Nairobi recorded a decline, from 50.5% - 45% and 26% - 22%, respectively. For senior

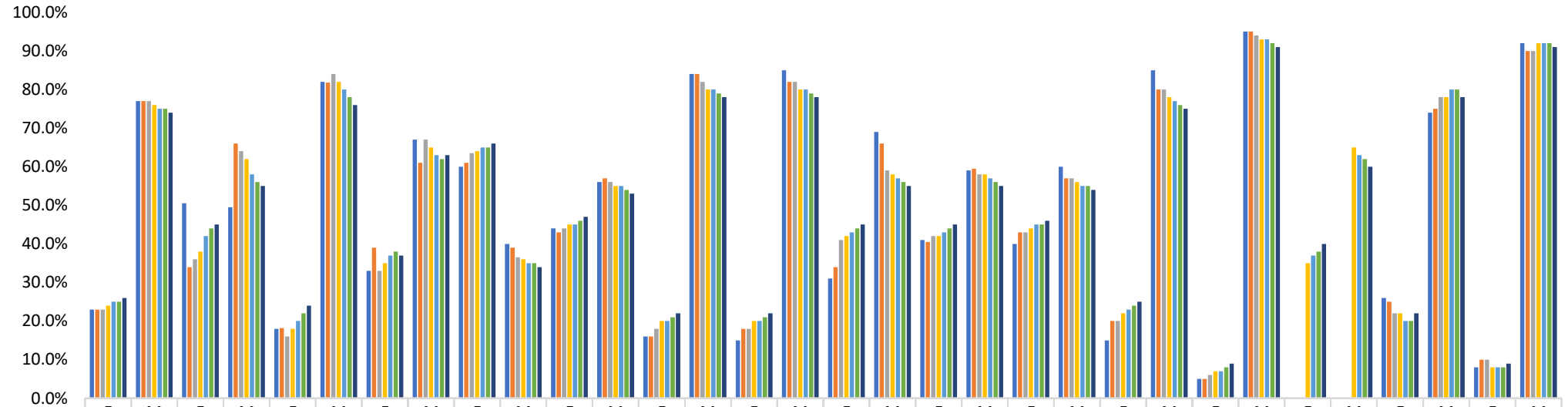
lecturers, UKZN recorded a marginal decline - from 39% in 2015 to 38% in 2021. Within the professoriate, women are better represented amongst associate professors with SU leading with 66% (2021).

Figure 6.5. Professors by gender, 2015 – 2021



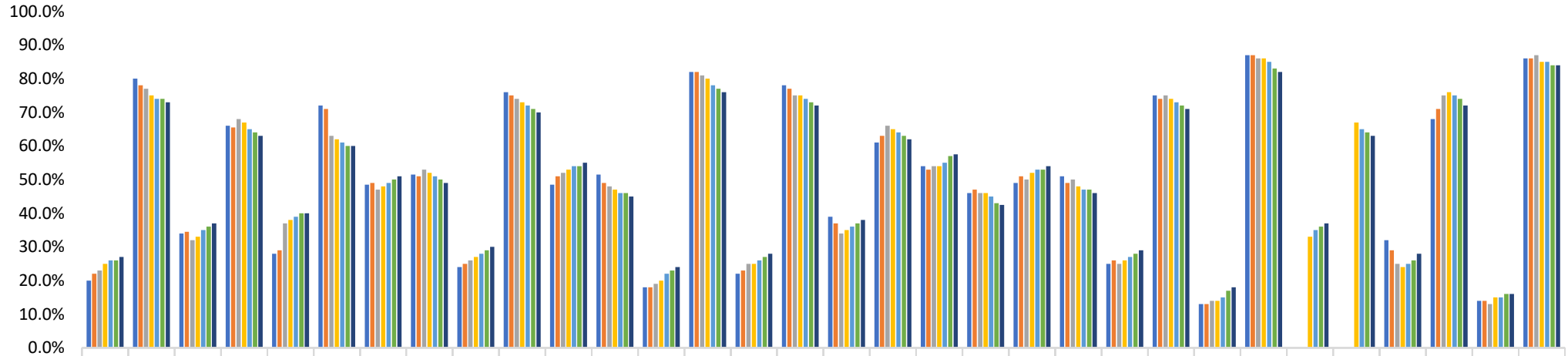
	Ghana		Ibadan		Makerere		Rhodes		SU		UCT		UCAD		UDSM		UKZN		UP		Wits		Lagos		Addis Ababa		Mauritius		Nairobi		Rwanda	
	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
2015	16.0	84.0	24.0	76.0	9.5%	90.5	42.5	85.0	37.0	63.0	25.0	75.0	13.0	87.0	17.0	83.0	30.0	70.0	26.0	74.0	25.0	75.0	30.0	70.0	3.0%	97.0			20.0	80.0	8.0%	92.0
2016	15.0	85.0	18.5	81.5	9.5%	90.5	15.0	85.0	38.0	62.0	28.0	72.0	12.0	88.0	18.0	82.0	24.0	76.0	29.0	71.0	24.0	76.0	32.0	68.0	2.0%	98.0			18.0	82.0	9.0%	91.0
2017	11.0	89.0	17.0	83.0	8.5%	91.5	18.0	82.0	41.0	59.0	30.0	70.0	15.0	85.0	18.0	82.0	25.0	75.0	32.0	68.0	28.0	72.0	26.0	74.0	3.0%	98.0			15.0	85.0	9.0%	91.0
2018	10.0	90.0	19.0	81.0	7.5%	92.5	22.0	78.0	40.0	60.0	31.0	69.0	13.0	87.0	20.0	80.0	22.0	78.0	30.0	70.0	30.0	70.0	30.0	70.0	4.0%	96.0	34.0	66.0	15.0	85.0	10.0	90.0
2019	11.0	89.0	20.0	80.0	9.0%	91.0	23.0	77.0	33.0	67.0	32.0	68.0	18.0	82.0	21.0	79.0	28.0	72.0	32.0	68.0	32.0	68.0	32.0	68.0	5.0%	95.0	39.0	61.0	17.0	83.0	14.0	86.0
2020	12.5	87.5	22.0	78.0	10.0	90.0	25.0	75.0	34.0	66.0	33.0	67.0	18.0	82.0	23.0	87.0	32.0	68.0	34.0	66.0	34.0	66.0	35.0	65.0	4.0%	96.0	37.0	63.0	18.0	82.0	14.0	86.0
2021	12.0	88.0	23.0	77.0	11.0	89.0	27.0	73.0	33.0	67.0	35.0	65.0	20.0	80.0	20.0	80.0	34.0	66.0	35.0	65.0	35.0	65.0	34.0	66.0	6.0%	94.0	38.0	62.0	20.0	80.0	12.0	88.0

Figure 6.6. Associate Professors by gender, 2015 – 2021



	Ghana		Ibadan		Makerere		Rhodes		SU		UCT		UCAD		UDSM		UKZN		UP		Wits		Lagos		Addis Ababa		Mauritius		Nairobi		Rwanda	
	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
2015	23.0	77.0	50.5	49.5	18.0	82.0	33.0	67.0	60.0	40.0	44.0	56.0	16.0	84.0	15.0	85.0	31.0	69.0	41.0	59.0	40.0	60.0	15.0	85.0	5.0%	95.0			26.0	74.0	8.0%	92.0
2016	23.0	77.0	34.0	66.0	18.2	81.8	39.0	61.0	61.0	39.0	43.0	57.0	16.0	84.0	18.0	82.0	34.0	66.0	40.5	59.5	43.0	57.0	20.0	80.0	5.0%	95.0			25.0	75.0	10.0	90.0
2017	23.0	77.0	36.0	64.0	16.0	84.0	33.0	67.0	63.5	36.5	44.0	56.0	18.0	82.0	18.0	82.0	41.0	59.0	42.0	58.0	43.0	57.0	20.0	80.0	6.0%	94.0			22.0	78.0	10.0	90.0
2018	24.0	76.0	38.0	62.0	18.0	82.0	35.0	65.0	64.0	36.0	45.0	55.0	20.0	80.0	20.0	80.0	42.0	58.0	42.0	58.0	44.0	56.0	22.0	78.0	7.0%	93.0	35.0	65.0	22.0	78.0	8.0%	92.0
2019	25.0	75.0	42.0	58.0	20.0	80.0	37.0	63.0	65.0	35.0	45.0	55.0	20.0	80.0	20.0	80.0	43.0	57.0	43.0	57.0	45.0	55.0	23.0	77.0	7.0%	93.0	37.0	63.0	20.0	80.0	8.0%	92.0
2020	25.0	75.0	44.0	56.0	22.0	78.0	38.0	62.0	65.0	35.0	46.0	54.0	21.0	79.0	21.0	79.0	44.0	56.0	44.0	56.0	45.0	55.0	24.0	76.0	8.0%	92.0	38.0	62.0	20.0	80.0	8.0%	92.0
2021	26.0	74.0	45.0	55.0	24.0	76.0	37.0	63.0	66.0	34.0	47.0	53.0	22.0	78.0	22.0	78.0	45.0	55.0	45.0	55.0	46.0	54.0	25.0	75.0	9.0%	91.0	40.0	60.0	22.0	78.0	9.0%	91.0

Figure 6.7. Senior lecturers by gender, 2015 – 2021

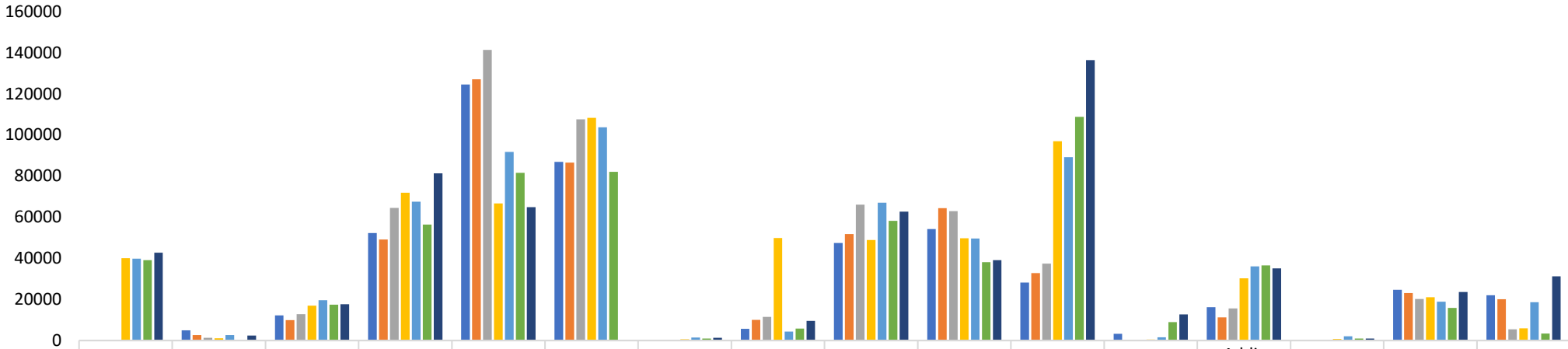


	Ghana		Ibadan		Makerere		Rhodes		SU		UCT		UCAD		UDSM		UKZN		UP		Wits		Lagos		Addis Ababa		Mauritius		Nairobi		Rwanda	
	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
2015	20.0	80.0	34.0	66.0	28.0	72.0	48.5	51.5	24.0	76.0	48.5	51.5	18.0	82.0	22.0	78.0	39.0	61.0	54.0	46.0	49.0	51.0	25.0	75.0	13.0	87.0			32.0	68.0	14.0	86.0
2016	22.0	78.0	34.5	65.5	29.0	71.0	49.0	51.0	25.0	75.0	51.0	49.0	18.0	82.0	23.0	77.0	37.0	63.0	53.0	47.0	51.0	49.0	26.0	74.0	13.0	87.0			29.0	71.0	14.0	86.0
2017	23.0	77.0	32.0	68.0	37.0	63.0	47.0	53.0	26.0	74.0	52.0	48.0	19.0	81.0	25.0	75.0	34.0	66.0	54.0	46.0	50.0	50.0	25.0	75.0	14.0	86.0			25.0	75.0	13.0	87.0
2018	25.0	75.0	33.0	67.0	38.0	62.0	48.0	52.0	27.0	73.0	53.0	47.0	20.0	80.0	25.0	75.0	35.0	65.0	54.0	46.0	52.0	48.0	26.0	74.0	14.0	86.0	33.0	67.0	24.0	76.0	15.0	85.0
2019	26.0	74.0	35.0	65.0	39.0	61.0	49.0	51.0	28.0	72.0	54.0	46.0	22.0	78.0	26.0	74.0	36.0	64.0	55.0	45.0	53.0	47.0	27.0	73.0	15.0	85.0	35.0	65.0	25.0	75.0	15.0	85.0
2020	26.0	74.0	36.0	64.0	40.0	60.0	50.0	50.0	29.0	71.0	54.0	46.0	23.0	77.0	27.0	73.0	37.0	63.0	57.0	43.0	53.0	47.0	28.0	72.0	17.0	83.0	36.0	64.0	26.0	74.0	16.0	84.0
2021	27.0	73.0	37.0	63.0	40.0	60.0	51.0	49.0	30.0	70.0	55.0	45.0	24.0	76.0	28.0	72.0	38.0	62.0	57.5	42.5	54.0	46.0	29.0	71.0	18.0	82.0	37.0	63.0	28.0	72.0	16.0	84.0

7.0 Research funding

Figure 7.1 provides a summary of the research funding by the universities. The funds came from multiple sources, amongst them, government sources, national research councils, and funding agencies and foundations in Africa and internationally.

Figure 7.1. Research funding, 2015-2021 (US $ '000)



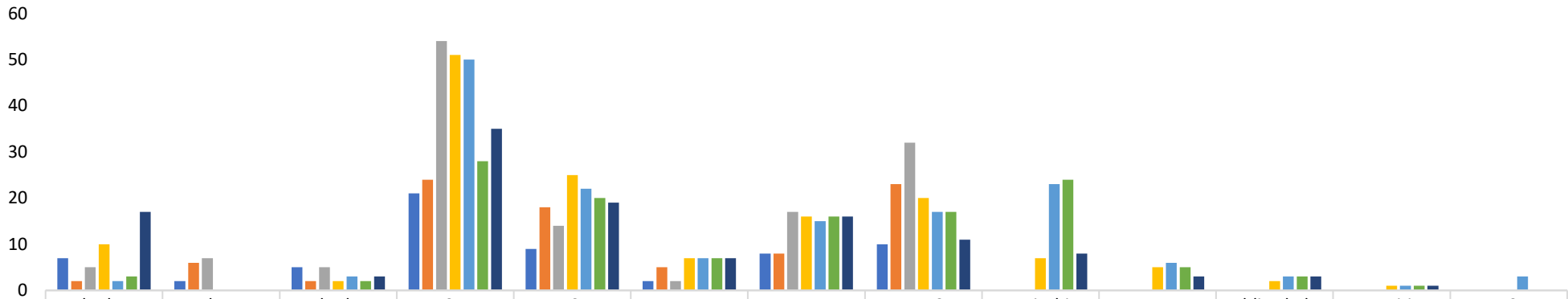
	Ghana	Ibadan	Rhodes	SU	Makerere	UCT	UCAD	UDSM	UKZN	UP	WITS	Lagos	Addis Ababa	Mauritius	Nairobi	Rwanda
2015		5021	12164	52270	124495	86850		5744	47477	54267	28150	3267	16180		24666	21983
2016		2605	9949	49129	127093	86547		10100	51845	64418	32773	394	11216		23100	20047
2017		1336	12806	64559	141326	107634		11527	66030	62924	37406	250	15600		20215	5400
2018	40100	1116	16914	71835	66722	108368	554	49862	48879	49689	96996	478	30238	717	21068	5900
2019	39850	2607	19596	67544	91703	103654	1432	4362	67051	49655	89223	1574	36010	2094	18834	18671
2020	39140	79	17455	56344	81566	82000	992	5820	58230	38063	108808	8941	36495	918	15895	3348
2021	42767	2416	17618	81315	64851		1315	9564	62687	39081	136338	12700	35116	942	23582	31181

The following universities increased their research funding across the 2015 – 2021 period: Rhodes, SU, UKZN, Wits, Addis Ababa, and Rwanda. UM, and UG increased their funding from 2018 – 2021. The decline in the funding received by Ibadan - from US$ 5 021 000 in 2015 to US$ 2 416 000 in 2021 - is significant. The same can be said of the decline in the funding received by Lagos.

8.0 Patents

Figure 8.1 presents the number of patents held by universities. All the universities that provided data on patents recorded an increase in the number of registered patents except Rhodes and UM.

Figure 8.1. Patents, 2015 – 2021



	Ibadan	Makerere	Rhodes	SU	UCT	UKZN	UP	WITS	Nairobi	Lagos	Addis Ababa	Mauritius	UDSM
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	10		2	51	25	7	16	20	7	5	2	1	
2019	2		3	50	22	7	15	17	23	6	3	1	3
2020	3		2	28	20	7	16	17	24	5	3	1	
2021	17		3	35	19	7	16	11	8	3	3	1	

9.0 Summary

The analysis shows a general increase in the proportion of postgraduate enrolments, which was also recorded in actual enrolments. The rate of increase varied, with some institutions, such as UCT, Lagos and Addis Ababa, recording stronger growth compared to the other universities. Notwithstanding the positive strides in PG enrolments, the majority of ARUA universities remain predominantly undergraduate universities.

All the universities, except for Rhodes, UCT and Lagos, offer PG programmes in all the major fields of study. The distribution of students in the various study fields, both within and across the universities, is varied. For example, while BEMS attracted the highest proportion of enrolments at UG, most PG enrolments at Rhodes are concentrated in Natural Sciences. MHS attracted the highest PG enrolments at Nairobi, Rwanda, Makerere, UCT and Wits.

The enrolment of female students has generally improved. In 2021, they constituted a majority in all the PG categories at Rhodes, UCT, UDSM, UKZN, UP, Wits and UM. A similar improvement was recorded regarding the proportion of female academic staff and the proportion of academics with doctorates.

The internal efficiency of PG programmes has generally improved. Most of the universities improved the proportion of doctoral students who completed their doctoral studies within four years, with Makerere recording the highest improvement – from 21.2% in 2015 to 47% in 2021.

The majority of the academics at ARUA universities occupy senior ranks. Except for Makerere, UDSM, UKZN, Addis Ababa and Nairobi, more than 60% of the academics at the other universities were either professors, associate professors, or senior lecturers.

Part 2

BIBLIOMETRIC ANALYSIS

10.0 Introduction

In this part of the report, a bibliometric analysis of the research produced by ARUA universities is presented. The analysis shows emerging trends in research productivity (journal articles) of ARUA universities, citations, research fields and co-authorships. All 16 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.

11.0 Data Source for Bibliometric Report and Selection Approach

The bibliometric analysis used data from the Web of Science (WoS) Core Collection, which is an extensive database, with best-in-class publication and citation data. The platform connects regional, specialty data and patent indexes to the WoS Core Collection from almost 1.9 billion cited references from over 171 million records. The analysis was limited to journal articles, including 'reviews.[1] The data that was retrieved and analysed covers the 2015 – 2021 period.

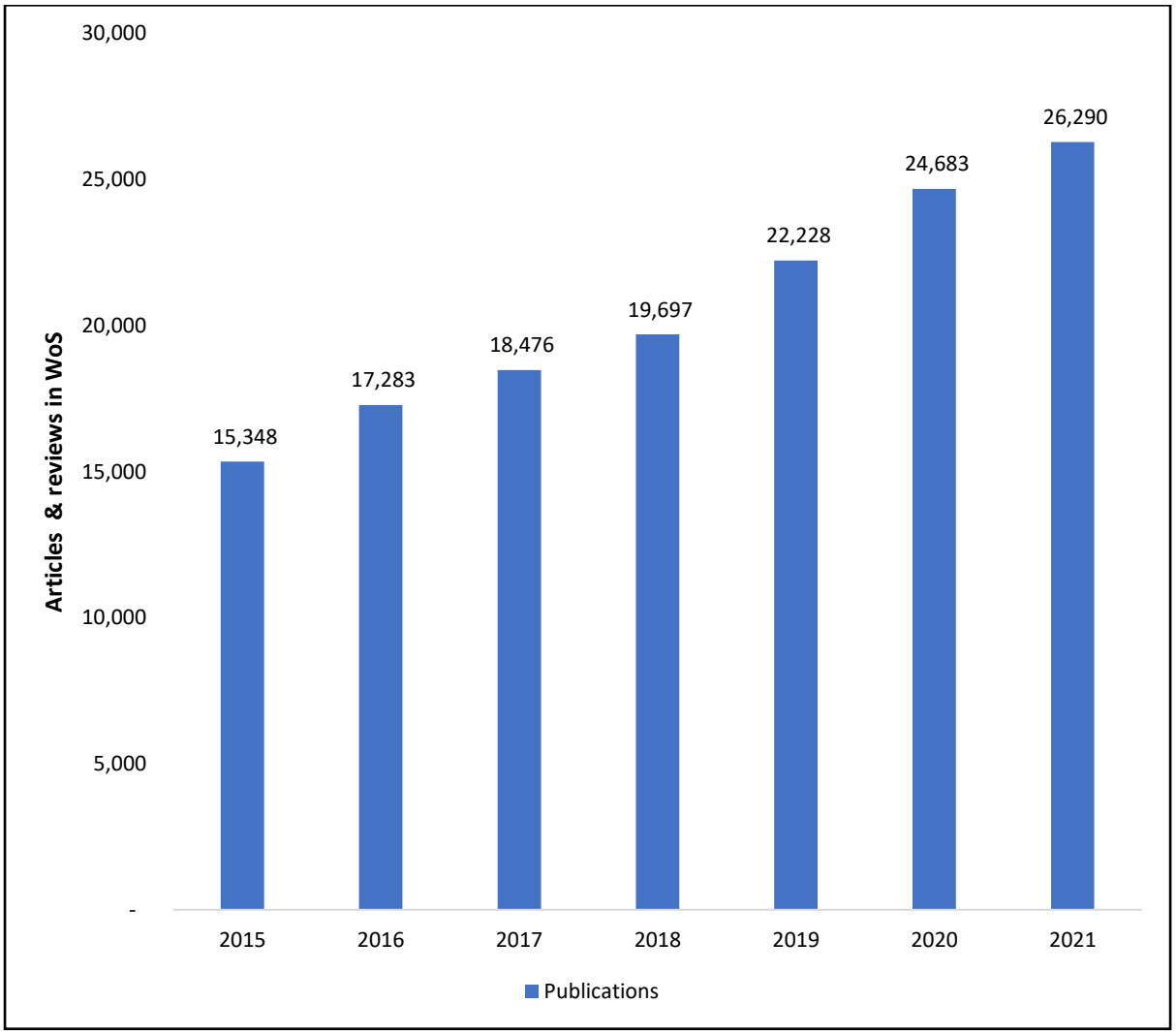
The WoS is a useful database of research publications and citations. However, it has limitations. The main one is its lack of coverage of some journals, especially in the Social Sciences and Humanities, resulting in potential underestimation of research productivity and citation impact. Only ISI-listed journals are included in WoS, and citations are also limited to these journals.

12.1 Research output in ARUA member universities

The analysis shows that the number of journal articles published by ARUA universities increased from 15 348 in 2015 to 26 290 in 2021, recording an average annual growth rate of about 9% (see Figure 12.1). Cumulatively, ARUA universities published over 117,715 articles over the seven years.

[1] WoS defined 'reviews' as "detailed, critical surveys of published research. A review article may summarize previously published studies and draw some conclusions but will not present new information on the subject. Includes reviews, review of literature, mini-reviews, and systematic reviews.

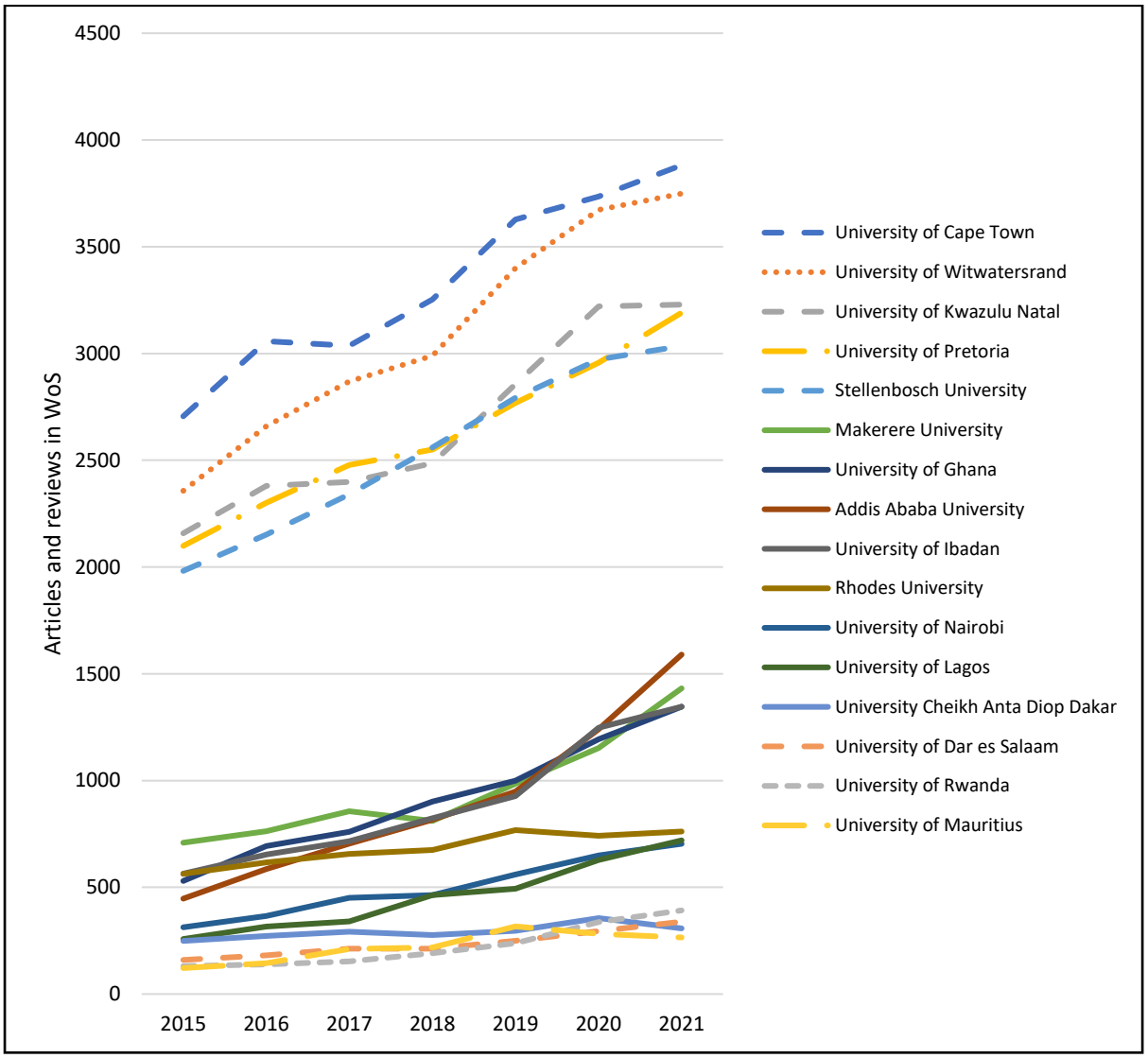
Figure 12.1. Publications output by ARUA universities, 2015 - 2021.



Note: Document type are articles and reviews over the period 2015 – 2021. InCites dataset updated September 30, 2022, and Web of Science content indexed through August 31, 2022.

Figure 12.2 shows the publications output trend of the 16 universities from 2015 – 2021. All the universities recorded an increase in their publications output, to a varying extent. As illustrated by Figure 12.2, ARUA universities can be grouped into two publications output clusters: the five South African universities (UCT, Wits, UKZN, SU and UP), which had the highest number of publications output and also the strongest growth in the number of publications, and the rest of the universities which recorded low to modest growth in publications output.

Figure 12.2. Publications by ARUA university

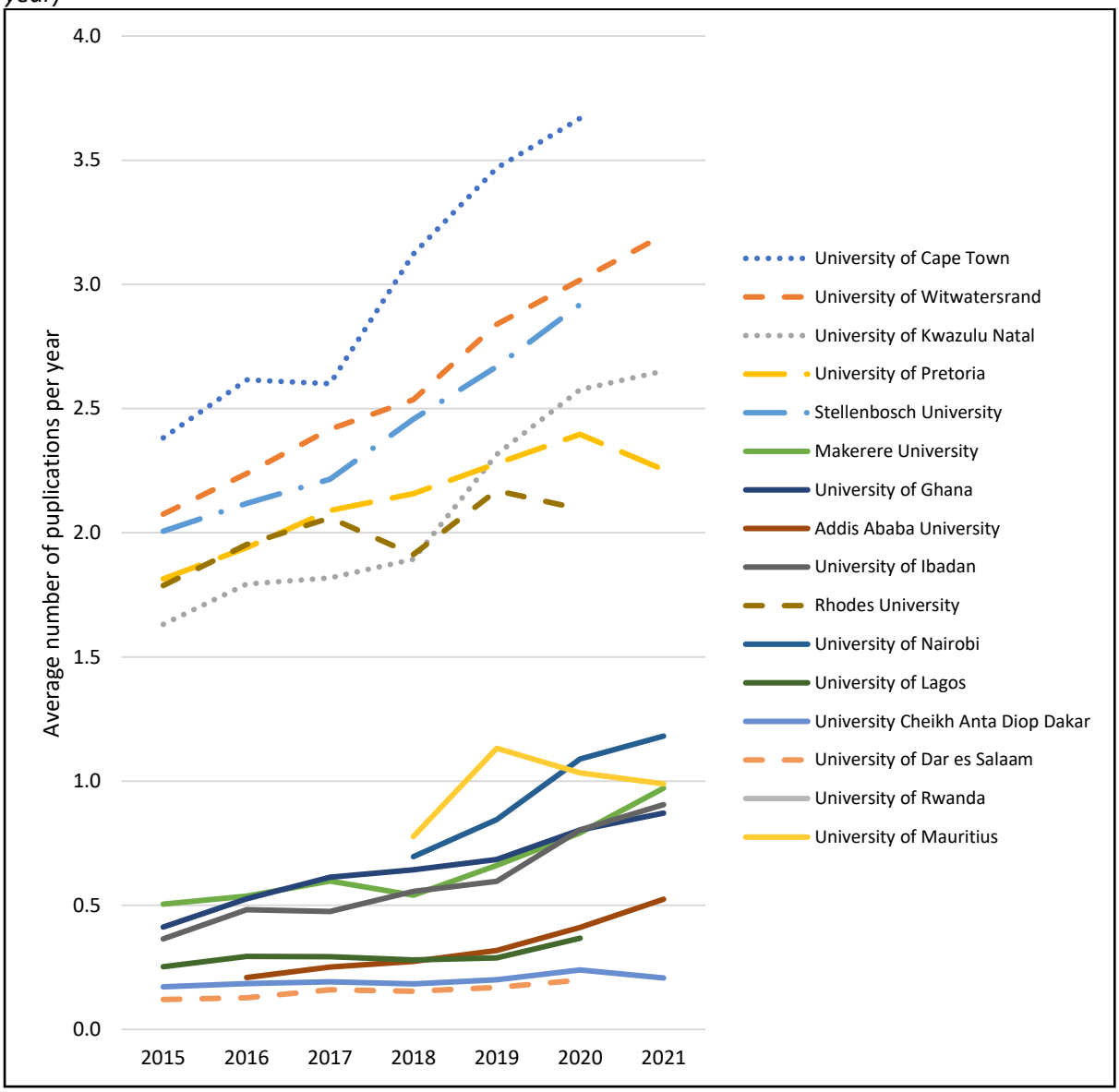


Note: Document type are articles and reviews over the period 2015 – 2021. InCites dataset updated September 30, 2022, and Web of Science content indexed through August 31, 2022.

12.2 Publications per permanent academic staff

As shown in Part I, ARUA universities vary by size, including their pool of academic staff. Thus, an analysis of research output without adjusting for size provides a skewed picture. To get a better sense of the research productivity of ARUA universities, the research output of each university is considered relative to the pool of permanent academic staff. This was done by combining data from the WoS core collection on the number of publications with institutional data on the number of permanent academic staff. The results of this analysis (Figure 12.3) suggest that research productivity (measured here as the average published documents per permanent academic staff) is highest at the six South African universities. On average, permanent academic staff at UCT, Wits and SU published more than two papers in a year between 2015 and 2021. UP, Rhodes and UKZN followed a similar pattern after 2018. Most of the remaining ARUA universities have average values below one publication throughout the period of analysis, except for UM and Nairobi.

Figure 12.3. Productivity by ARUA university (published documents per permanent academic staff per year)

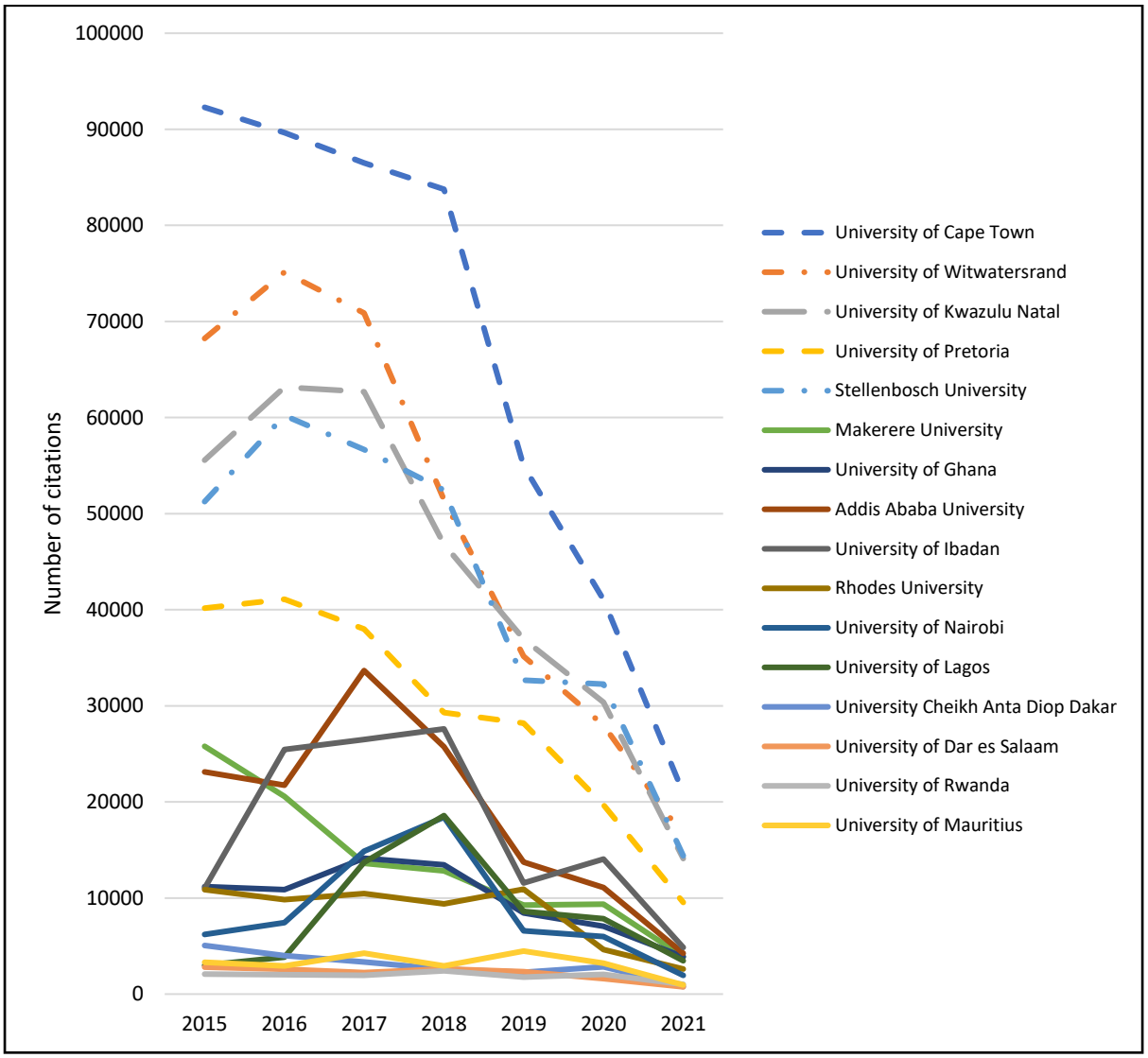


Note: Document type are articles and reviews over the period 2015 – 2021. InCites dataset updated September 30, 2022, and Web of Science content indexed through August 31, 2022.

12.3 Citations analysis

An analysis of the citations from the publications by the universities is presented in Figure 12.4 (number of citations) and Figure 12.5 (normalised citation impact). Figure 12.4 shows the pattern illustrated in Figure 12.3 regarding the performance of South African universities. The downward trend in the more recent years is expected given that older publications tend to have higher citations on average compared to more recently published works.

Figure 12.4. Number of citations by ARUA universities

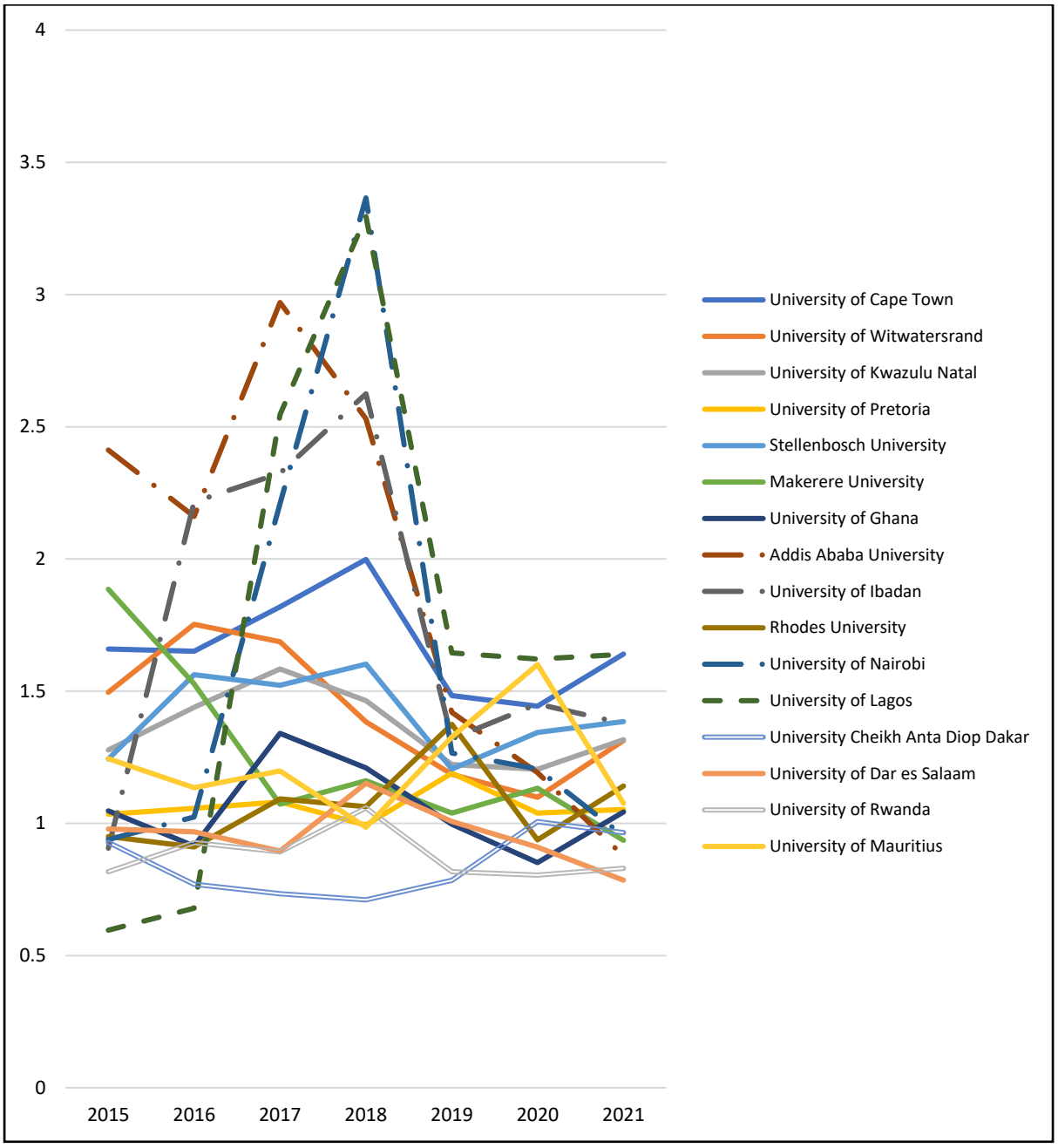


Note: Document type are articles and reviews over the period 2015 – 2021. InCites dataset updated September 30, 2022, and Web of Science content indexed through August 31, 2022.

The Category Normalised Citation Impact (CNCI) has citations normalised for the subject, year, and document type. It is calculated by dividing the actual count of cited items by an expected citation rate for documents within the same document type, year of publication and subject area. When a document is assigned to more than one subject area, an average of the ratios of the actual to expected citations is used. A CNCI value of 1 represents performance at par with the world average. A value above one is considered above the world average whilst a value below one is considered below the world average.

The findings of the CNCI, which are presented in Figure 12.5, show that although most ARUA universities are at par with the global average, there are at least four universities that had values above two (twice the world average) over the period under consideration, namely, Lagos, Nairobi, Addis Ababa, and Ibadan. The trends suggest that the knowledge impact of research from these universities is high.

Figure 12.5. Normalised citation impact of ARUA universities

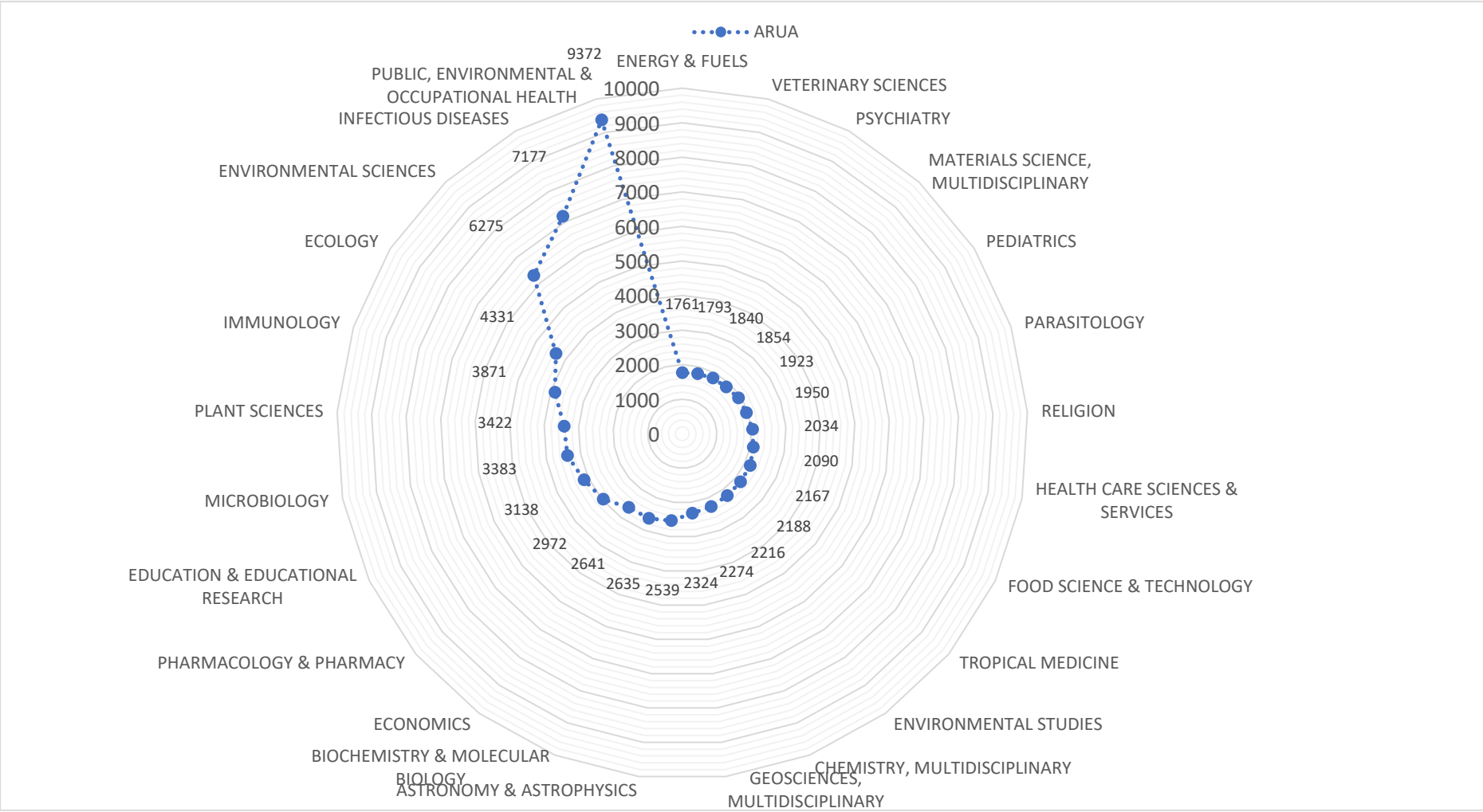


Note: Document type are articles and reviews over the period 2015 – 2021. InCites dataset updated September 30, 2022, and Web of Science content indexed through August 31, 2022.

12.4 Leading research topics

Figure 12.6 shows the main research areas in which ARUA universities published. The figure captures the top twenty-five research areas with the highest number of publications. From the analysis, one can conclude that ARUA universities are strong in the following research areas: public, environmental, and occupational health (9372 publications), infectious diseases (7177 publications), environmental sciences (6275 publications), ecology (4331 publications), immunology (3871 publications) and plant science (3422 publications). The top five research areas for each university are shown in Appendix I.

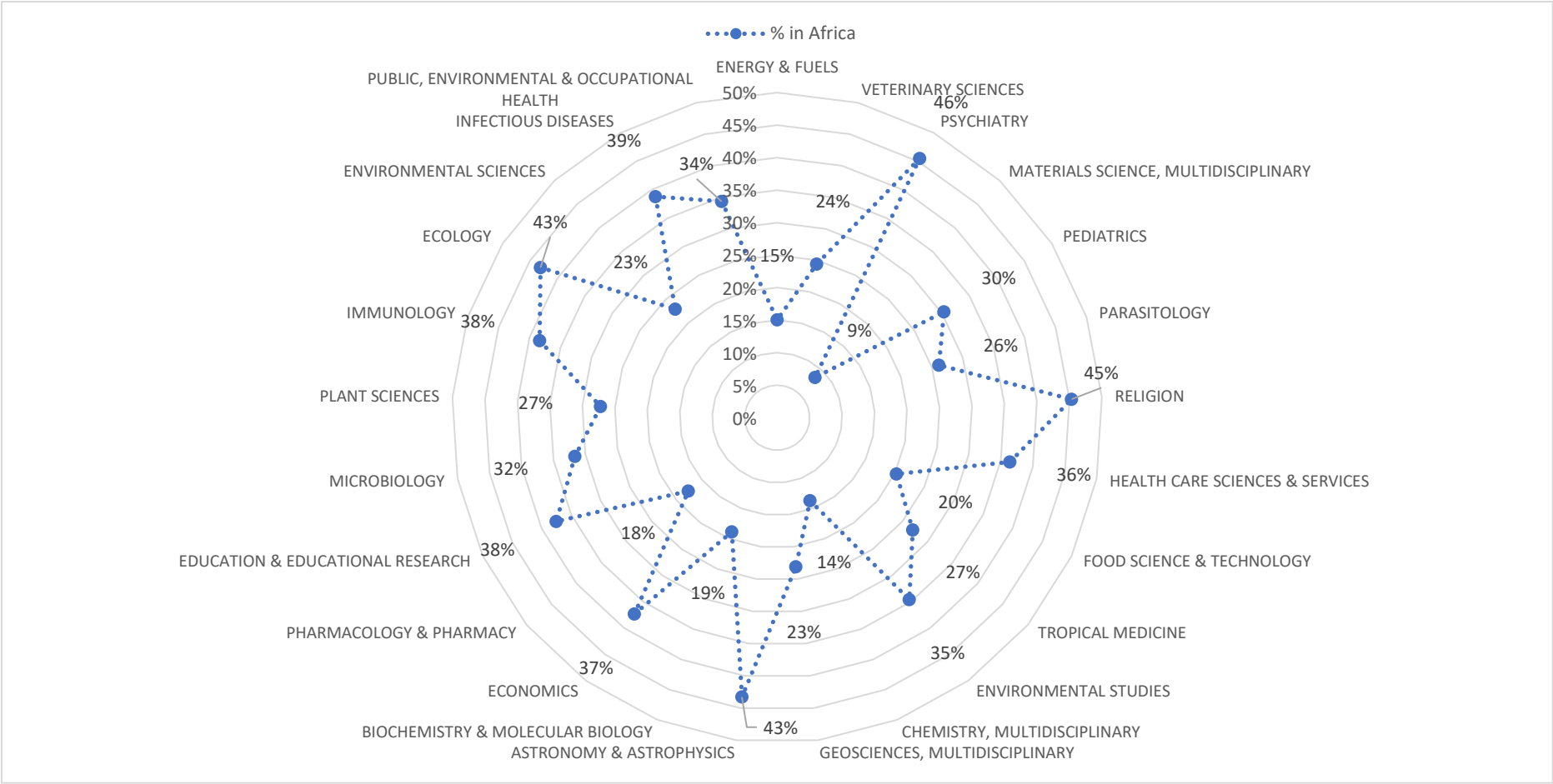
Figure 12.6. Top 25 research areas for ARUA Universities



Note: Document type are articles and reviews over the period 2015 – 2021. InCites dataset updated September 30, 2022, and Web of Science content indexed through August 31, 2022.

Figure 12.7 provides a comparison of the total research output of ARUA universities in the 25 research areas with those of all African universities. The comparison shows an impressive performance of ARUA universities in all 25 research topics except in environmental sciences where ARUA universities accounted for slightly over 25% of the publications on the continent.

Figure 12.7 Top research topics of ARUA Universities relative to all African universities (top 25 topics)



Note: Document type are articles and reviews over the period 2015 – 2021. InCites dataset updated September 30, 2022, and Web of Science content indexed through August 31, 2022.

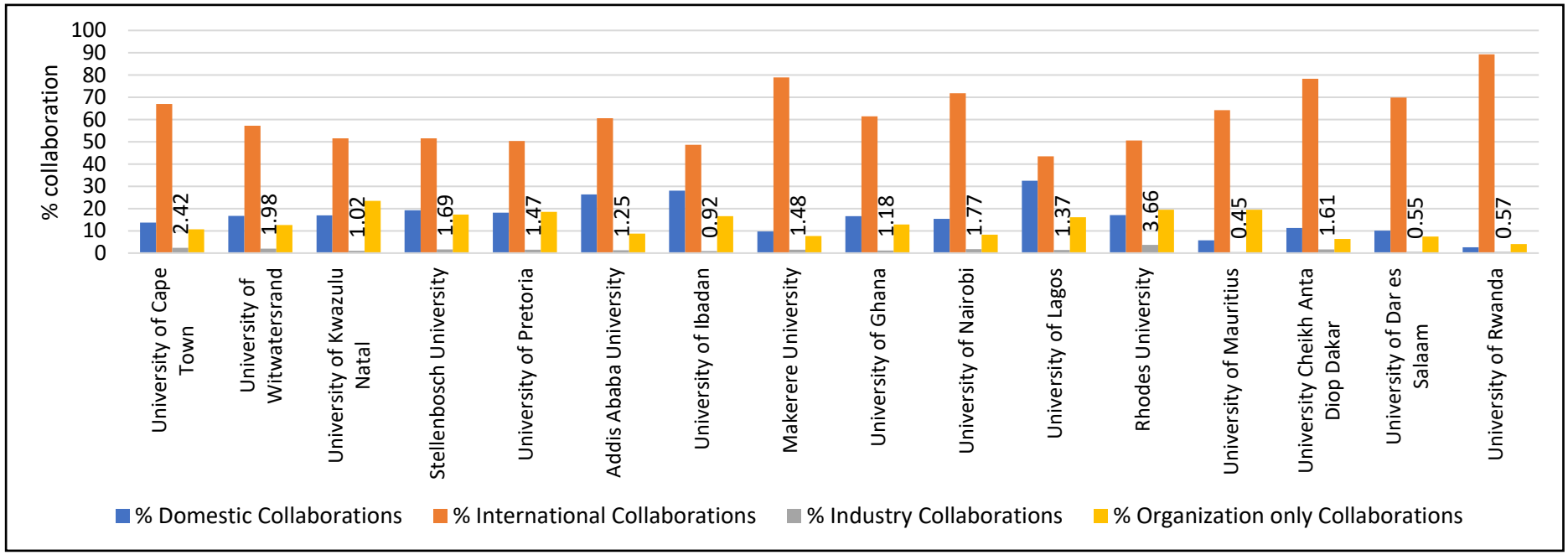
12.6 Co-authorships

The analysis of co-authorships, an important form of research collaboration, revealed that international co-authorships (papers with one or more international co-author) constitute the highest proportion of co-authorships (Figure 12.8). The University of Rwanda had the highest proportion of co-authorships with international researchers (89.3%), followed by Makerere and UCAD with 79% and 78.3%, respectively. Lagos had the lowest proportion of international co-authorships with 43%.

Co-authorships with local researchers (publications with authors from the same country) accounted for the second-highest form of co-authorships. Lagos had the highest proportion of co-authorships in this category (32.44%), followed by Ibadan (28.06%) and Addis Ababa (26.32%).

Co-authorships with researchers from industry were the lowest across all the ARUA universities. Rhodes recorded the highest such co-authorships (3.7%), followed by UCT (2.4%).

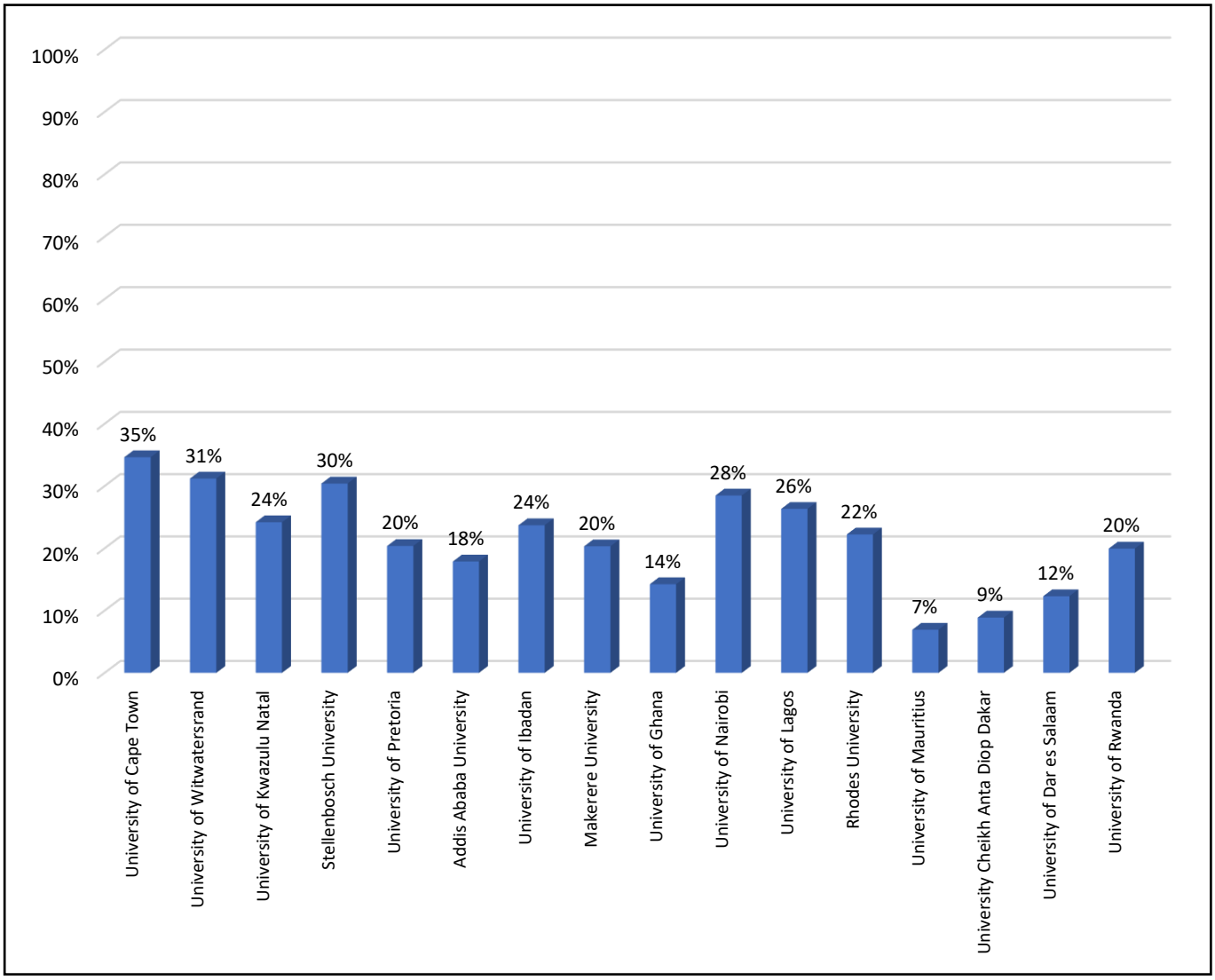
Figure 12.8. Patterns of co-authorship by ARUA universities (Cumulative 2015-2021)



Note: Document type are articles and reviews over the period 2015 – 2021. InCites dataset updated September 30, 2022, and Web of Science content indexed through August 31, 2022.

In terms of the extent to which ARUA universities are collaborating amongst themselves, the analysis revealed that such co-authorships ranged between 7% and 35% (Figure 12.9). UCT had the highest proportion of co-authorships with at least one co-author from an ARUA member university (35%). These co-authorships were mostly with researchers from other South African universities (see Appendix II). UM had the lowest proportion of co-authorships with ARUA universities (7%) and these were mainly with UP and UKZN.

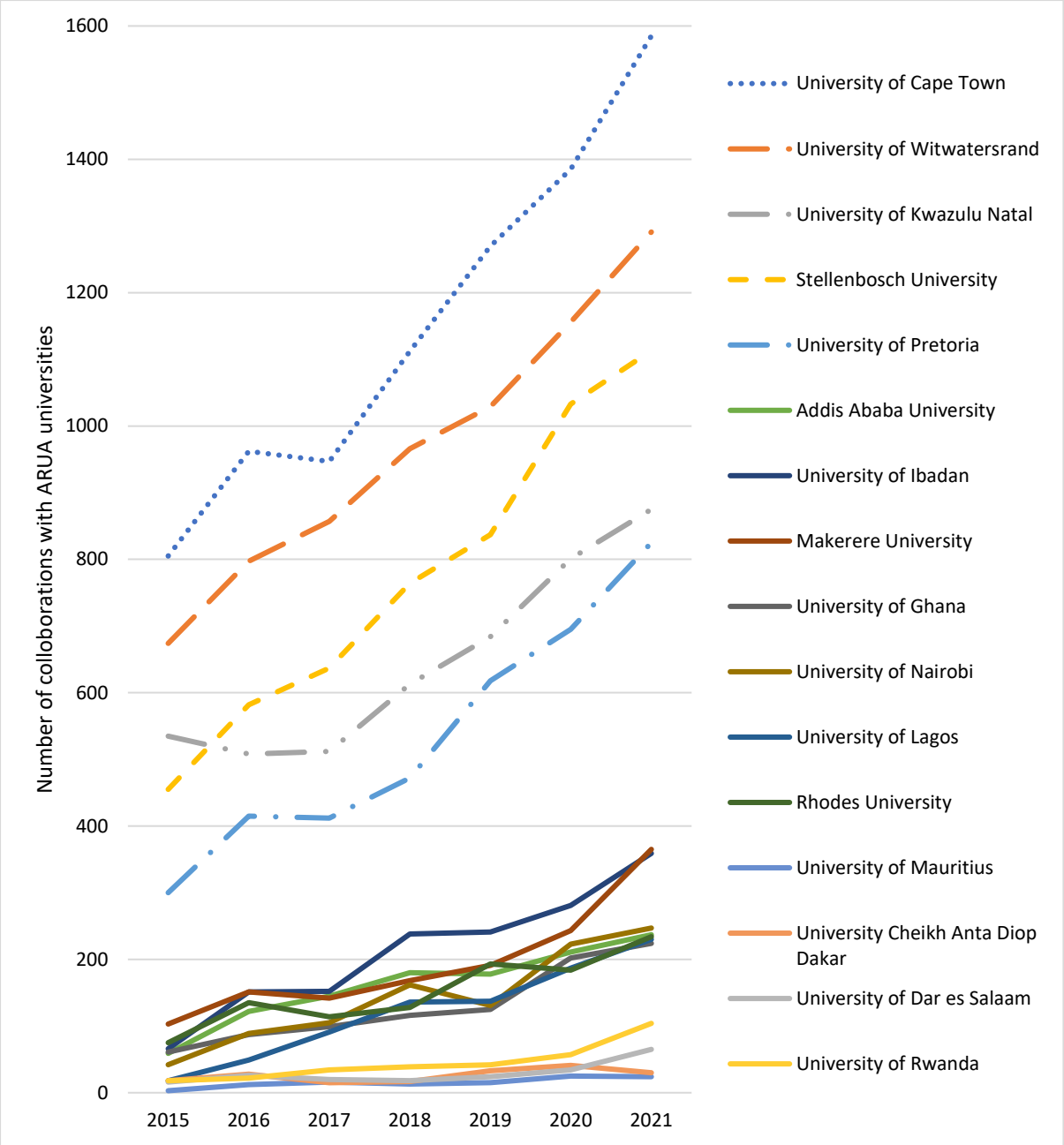
Figure 12.9. Co-authorships among ARUA universities (% of total publications)



Note: Document type are articles and reviews over the period 2015 – 2021. InCites dataset updated September 30, 2022, and Web of Science content indexed through August 31, 2022.

Co-authorships among ARUA universities have increased significantly over the 2015 – 2021 period (Figure 12.10). During this period, SU and UP more than doubled, while UCT, Wits and UKZN almost doubled, the number of publications co-authored with ARUA colleagues. The co-authorships involved researchers from the five South African universities (see Appendix II).

Figure 12.10 Number of Collaborations within ARUA Universities (2015-2021)



Note: Document type are articles and reviews over the period 2015 – 2021. InCites dataset updated September 30, 2022, and Web of Science content indexed through August 31, 2022.

13.0 Summary

The bibliometric analysis shows that the scientific output of ARUA universities has increased steadily over the 2015 – 2021 period, growing at a yearly average rate of about 9%. Notwithstanding this trend, the share of the scientific research output of ARUA universities in the total research output from Africa declined over the period. An analysis of the research output of the 16 ARUA universities shows that a large share of the research output was produced by the six South African universities. These

universities also outperformed the other universities with regard to publications output per permanent academic staff.

While the citation impact of most ARUA universities is at par with the global average, based on CNCI analysis, the highest normalised citation impact was achieved by publications produced by Lagos, Nairobi, Addis Ababa, and Ibadan. The research produced by ARUA universities was most prolific in the following areas: public, environmental, and occupational health, infectious diseases, environmental sciences, ecology, immunology, and plant science. ARUA's share of total knowledge produced in Africa in these areas is also high.

The analysis of co-authorships revealed that ARUA universities collaborate the most with international peers. On average, publications co-authored with international peers accounted for over 60 percent of research output by ARUA universities. Co-authorships among ARUA universities averaged about 21% of the total research output of each university.

14.0 Conclusion

The overall conclusion of the analysis presented in this report is that ARUA universities have recorded progress across all the metrics. The proportion of PG enrolments has generally increased, and so is the proportion of female students, female academics, academics with doctorates, research productivity and citation impact.

Going by the 'shape' of the enrolments, even though PG enrolments have increased, most ARUA universities are still predominantly undergraduate universities. The research output produced by ARUA universities, and their citation impact demonstrates that ARUA universities play a leading role in advancing research in Africa. Equally important are the areas in which ARUA universities are research leaders. These areas - public, environmental, and occupational health, infectious diseases, environmental sciences, ecology, immunology, and plant science – are aligned with the major challenges confronting the continent and the world at large. ARUA universities can thus be said to pursue research that is relevant in addressing Africa's and the world's problems and challenges. There is however room for ARUA universities to expand the scope of research areas in which they are top performers.

Whilst the significant levels of research collaboration (co-authorships) with international peers are laudable, the low levels of co-authorship among ARUA universities call for appropriate interventions. The establishment of ARUA centres of excellence is an important step in fostering research collaboration among ARUA universities.

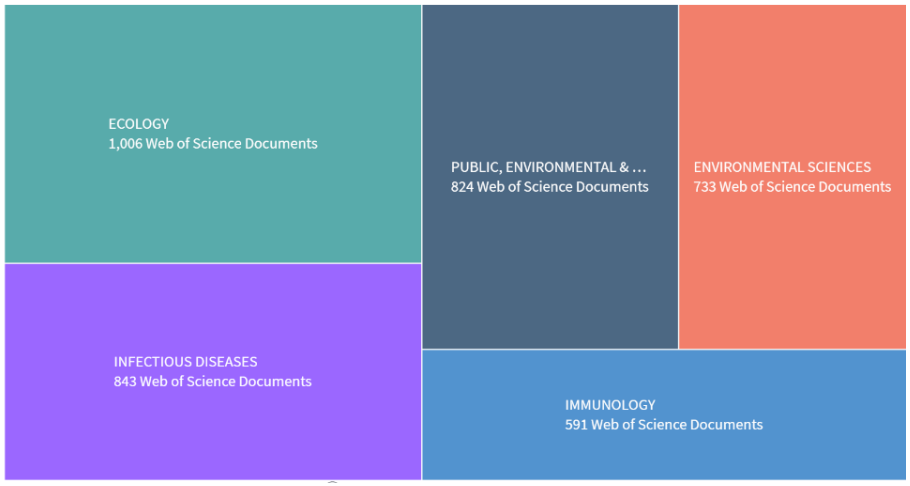
Appendices

Appendix I: Top five (5) research topics in ARUA universities (2015 – 2021)

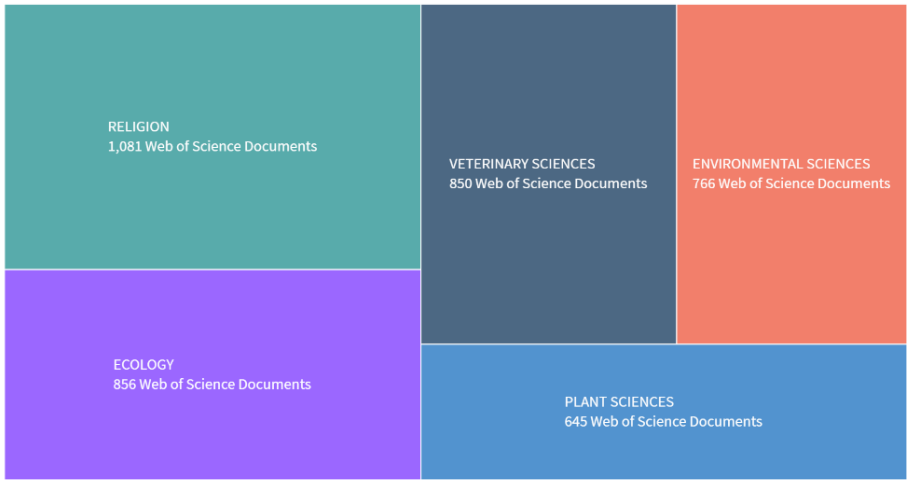
University of Witwatersrand

University of KwaZulu Natal

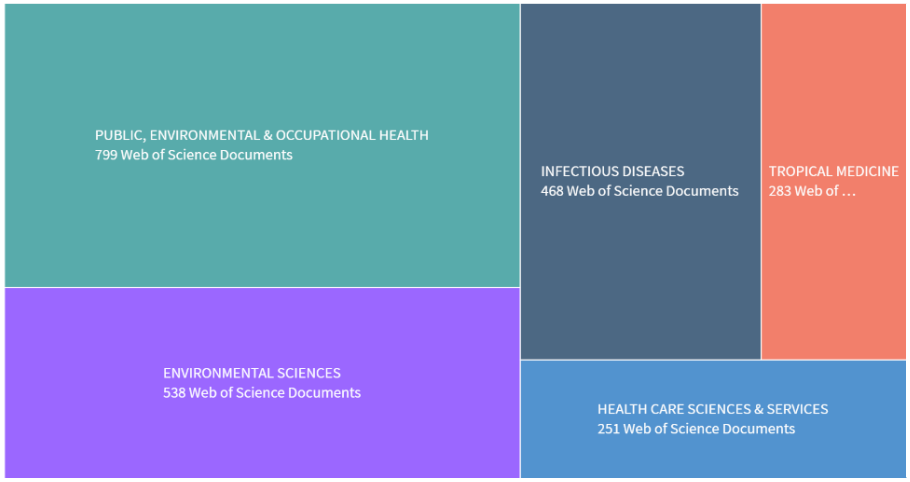
Stellenbosch University



University of Pretoria

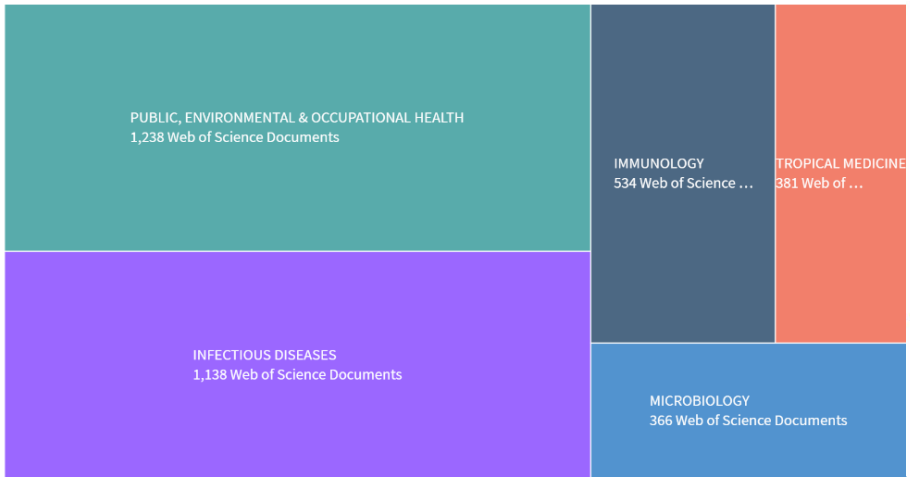


Addis Ababa University



University of Ibadan

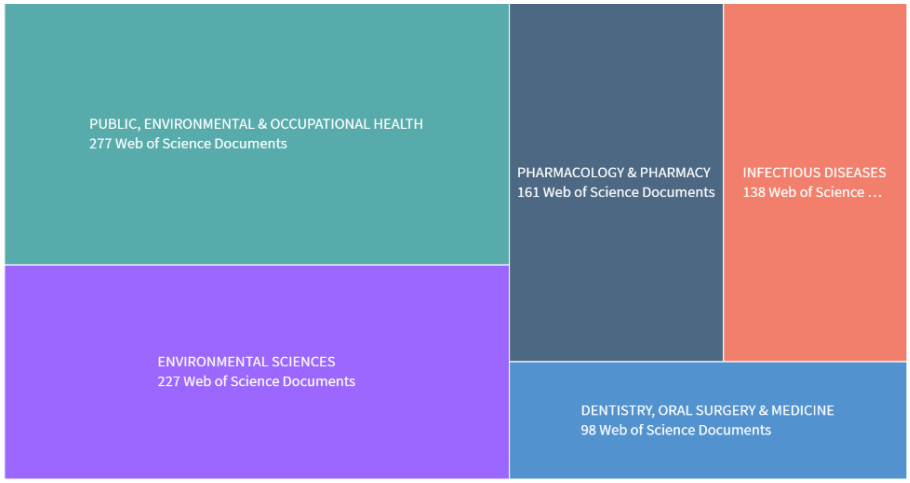
Makerere University



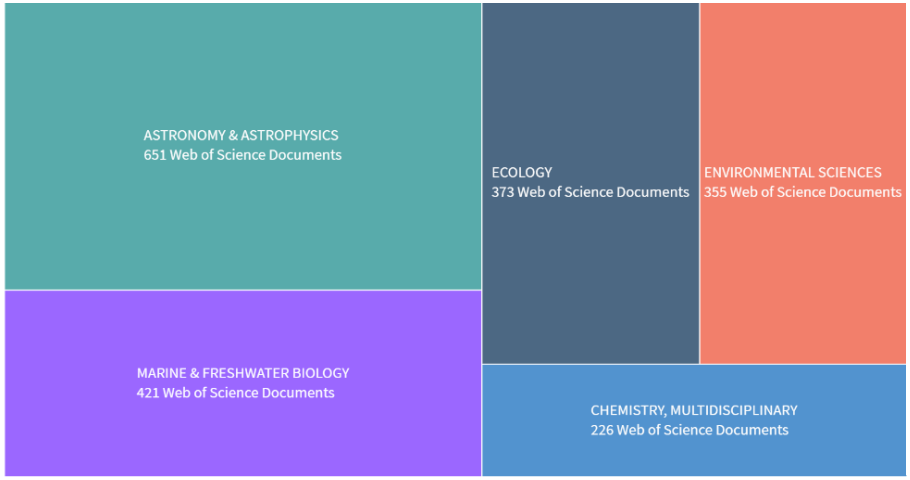
University of Ghana

University of Nairobi

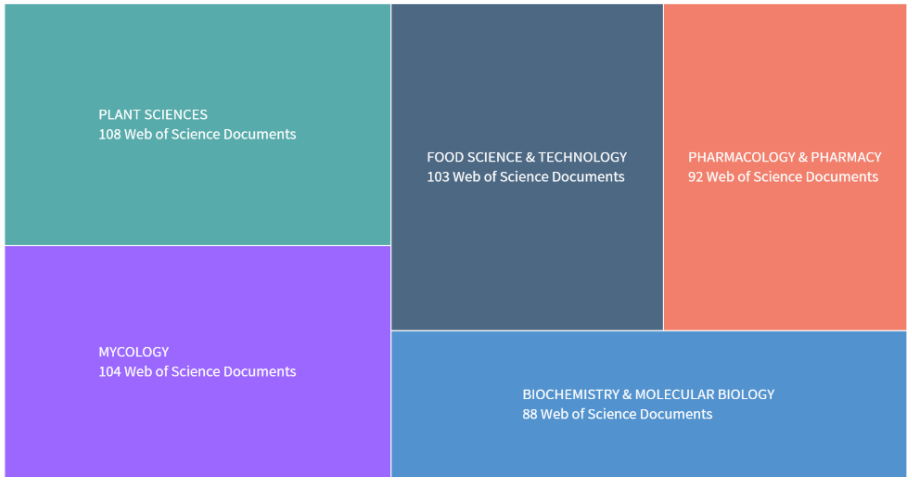
University of Lagos



Rhodes University



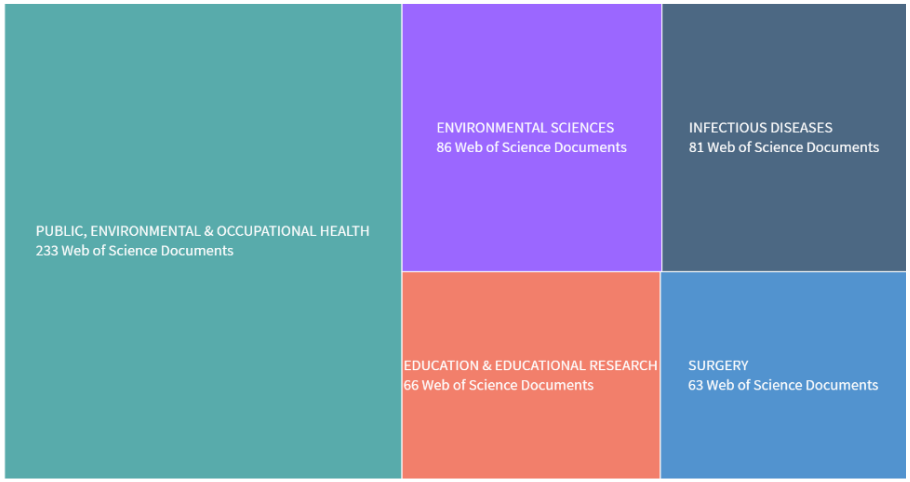
University of Mauritius



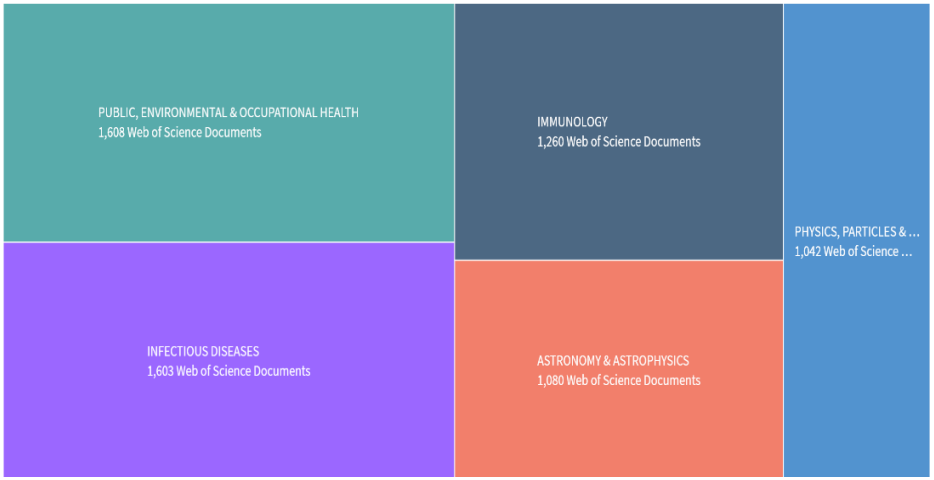
University Cheikh Anta Diop

University of Dar es Salaam

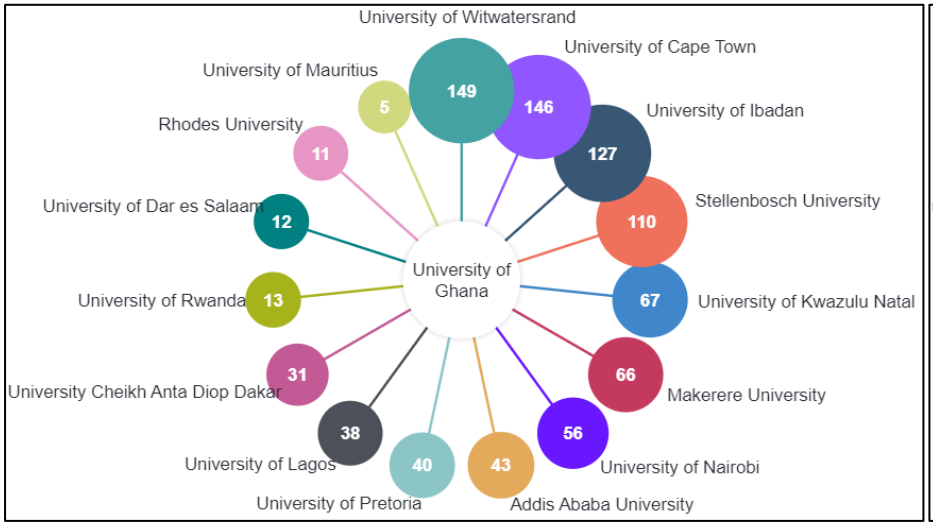
University of Rwanda

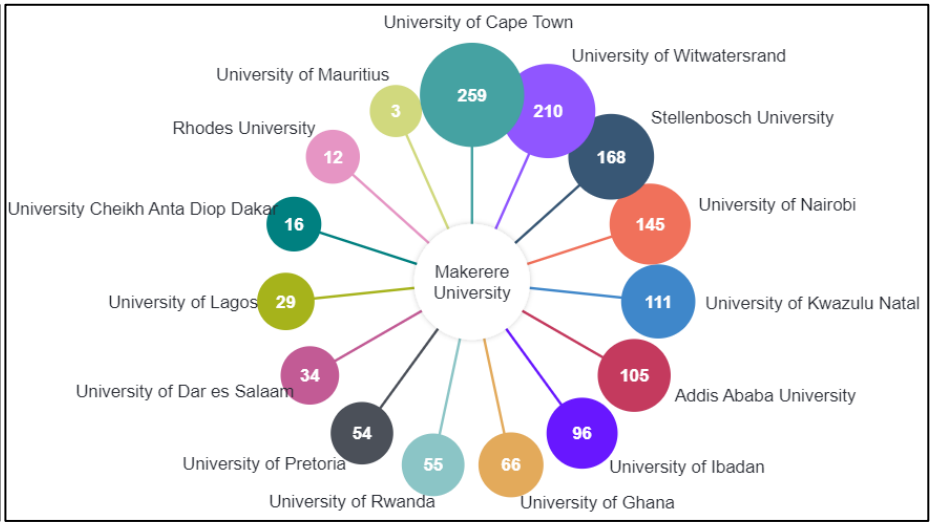


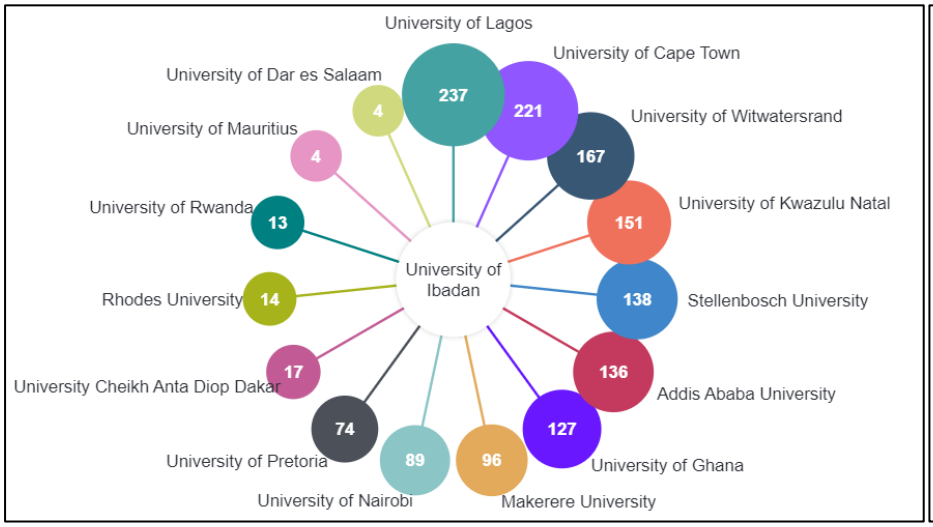
University of Cape Town

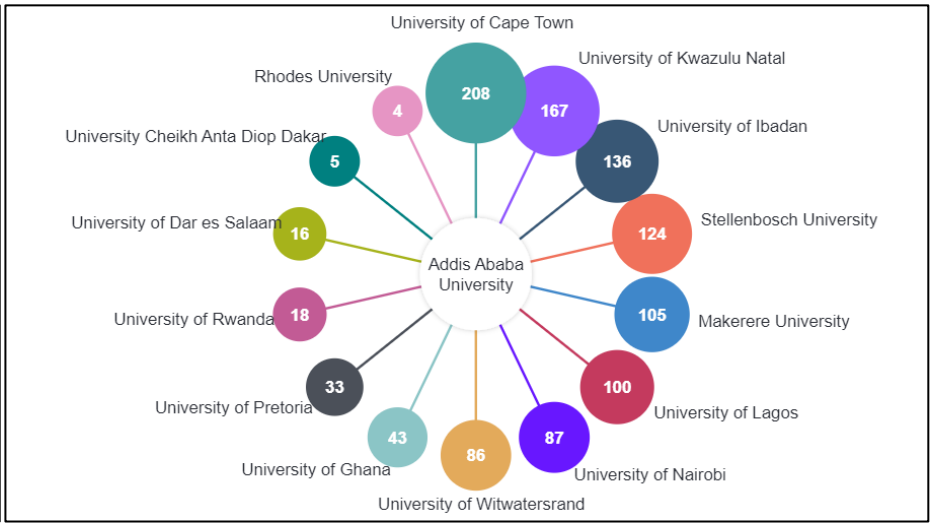


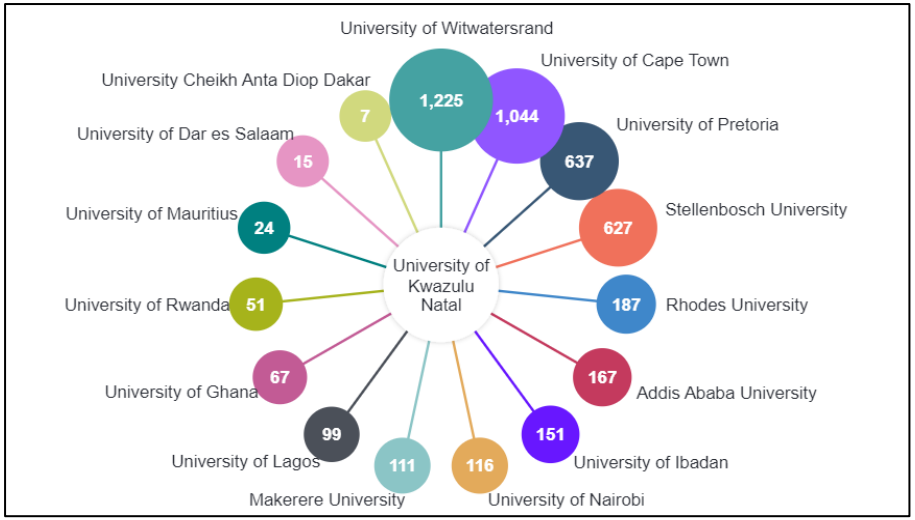
Appendix II: Cumulative collaborations between ARUA universities, 2015 – 2021







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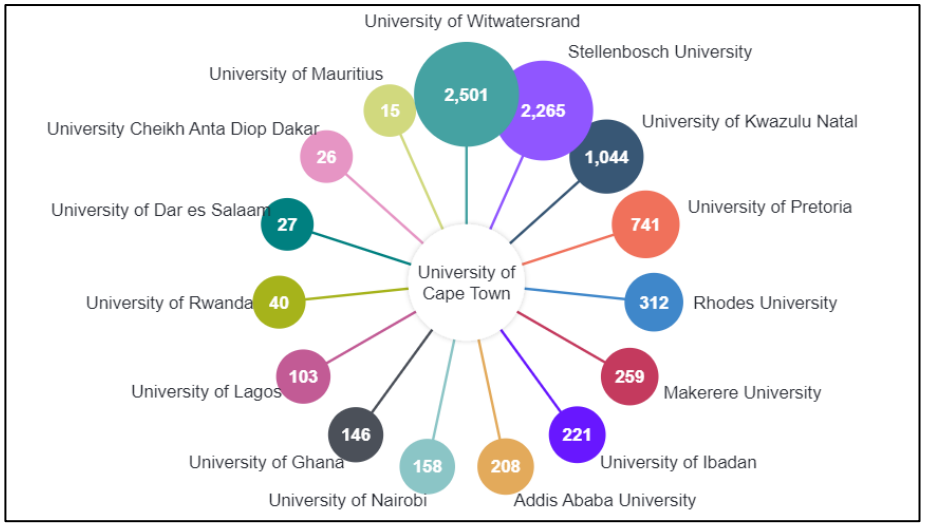
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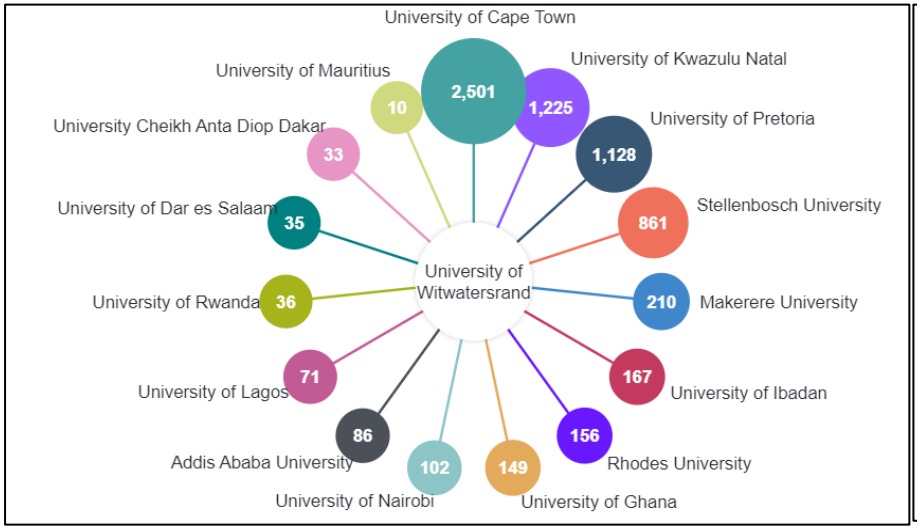
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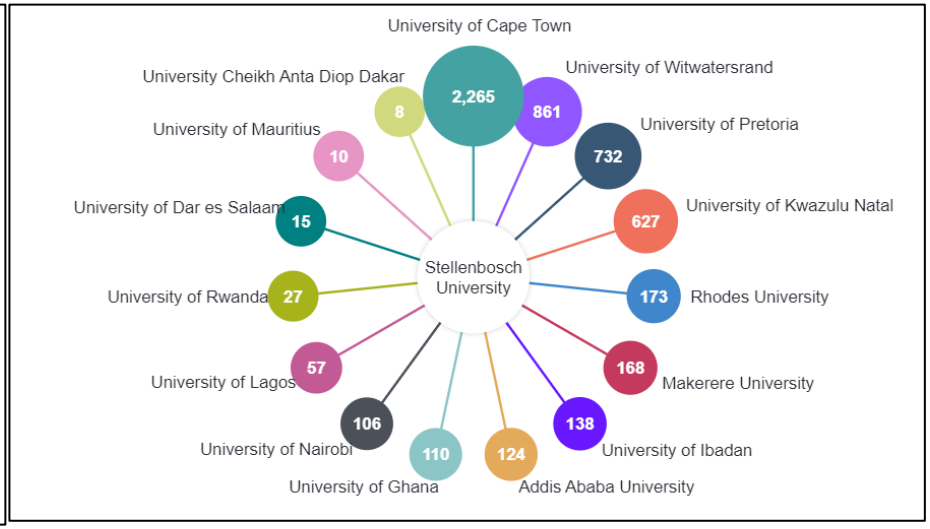
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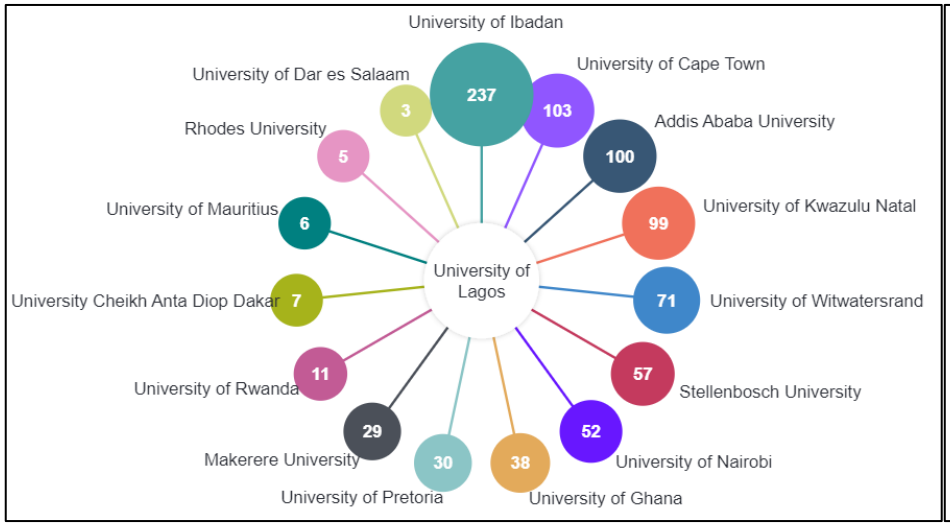
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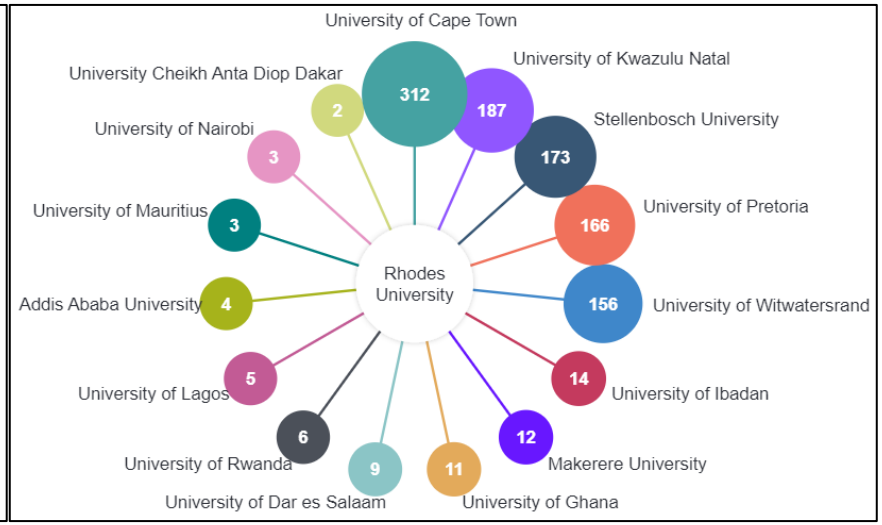
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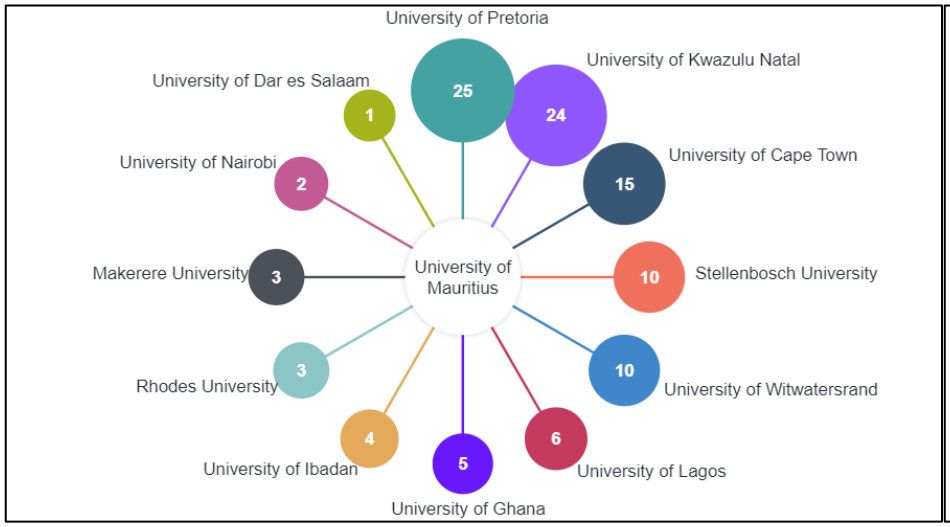
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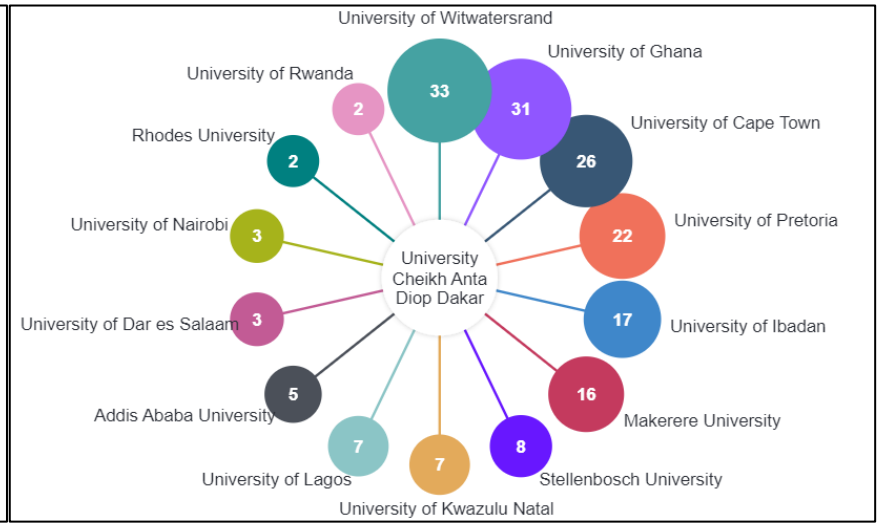
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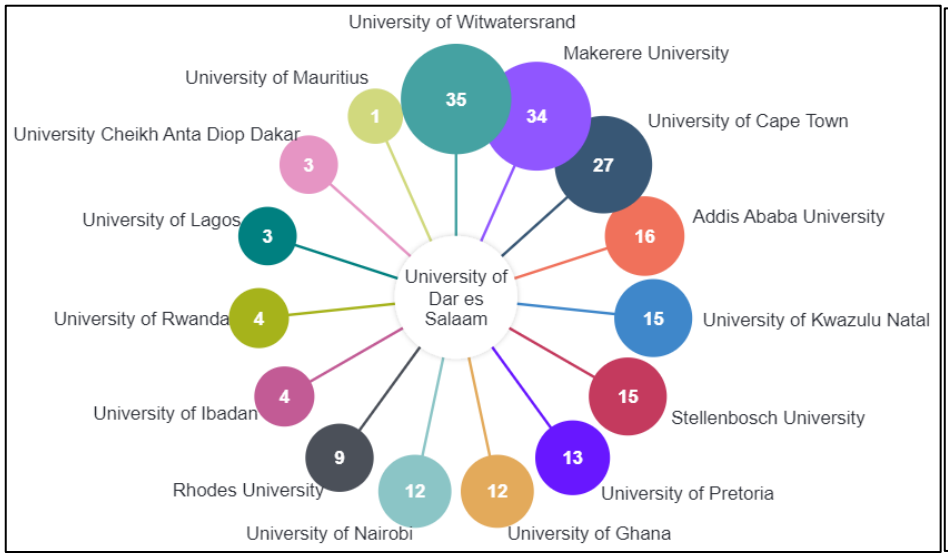
University of Kwazulu Natal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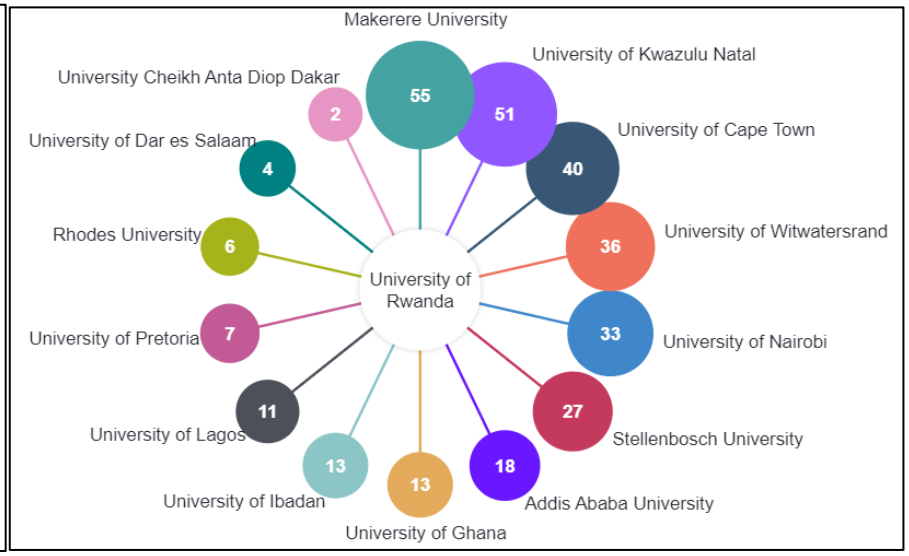
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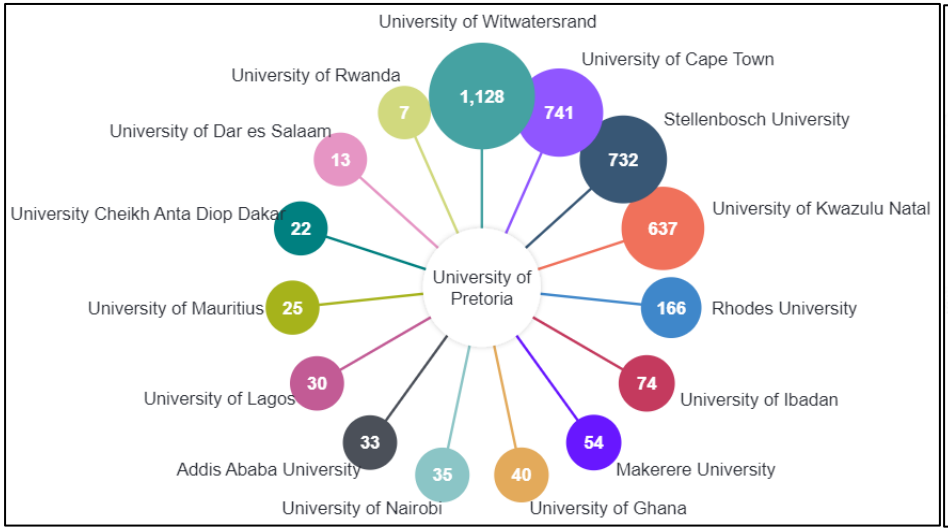
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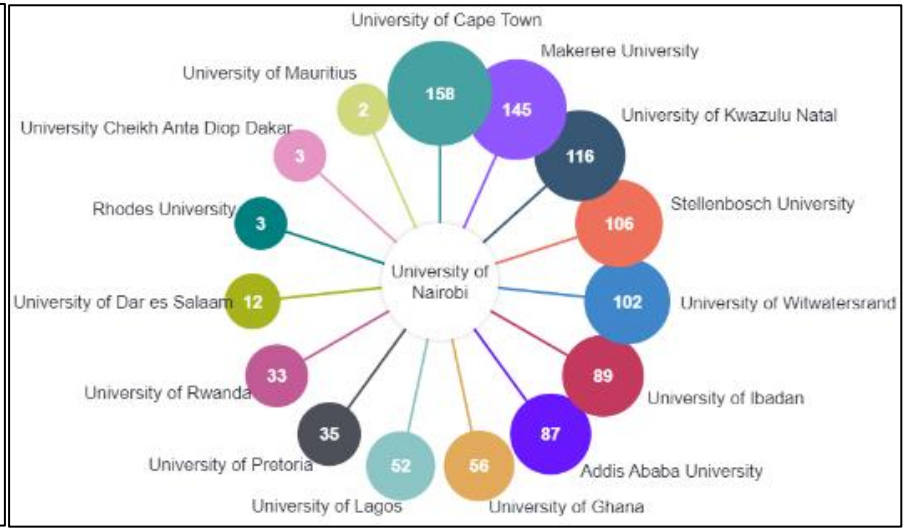
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