

BUILDING PhD CAPACITY IN SUB-SAHARAN AFRICA

International
Higher Education

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Helmut Blumbach from the DAAD and Michael Peak from the British Council drove the study forward.

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Foreword

Higher education can play a crucial role in the economic and social development of a country, and is often a natural mechanism with which to develop international relations. Consequently, the British Council and the German Academic Exchange Service (DAAD) have been working in Sub-Saharan Africa for many decades.

The British Council and DAAD hold many shared values and inspirations, and we also have a strong history of collaboration – working together on programmes and projects, as well as jointly funded research studies.

With this experience, and with these values in mind, we undertook to investigate further the nature of research and doctoral training across Sub-Saharan Africa. What are the relationships between national-level policy and institutional-level agenda; and how are institution links with business and industry developing? What progress is being made, and what challenges exist with regard to growing quality PhD provision in countries so rich in natural resource and talented youth?

Our intention with this study was to shed light on this area and provide evidence to support higher education

and PhD training in Sub-Saharan Africa. The aim was to support decision making around national-level policy, and institutional-level practice, and to provide current and potential international partners with insight into the PhD environment in the six studied countries across the region (Ethiopia, Ghana, Kenya, Nigeria, Senegal, South Africa).

When we initiated this study we knew that we had tapped an area of intense interest as the competitive tender process that we ran attracted a high degree of interest and received several quality proposals.

Fundamental to our intentions when commissioning this study was the importance of collaborating with locally based researchers, and representatives of HE institutions in the region, and this was behind our thinking when we chose to work with the African Network for Internationalization of Education (ANIE) to conduct the underlying empirical research.

To complement the research of ANIE, this study has also drawn on the skills of experts at University College London (UCL) Institute of Education: overall this has been a truly collaborative international research project.

In itself, the process of this study revealed in some ways a hint of the challenges which can face active social science researchers in the region (such as access to interviewees and survey respondents; connectivity; access to data sources; etc.)

Of course, collaborative working can also present challenges, and conducting a multi-country study such as this was not always plain sailing. But the local expertise and insight of individual researchers, the communal strength of the ANIE network, and interpretive and editorial skills of colleagues at UCL Institute of Education ensured that the final research outputs are insightful and of a high quality.

We hope that you agree, and that this study contributes to an evidence base to support PhD training and capacity building in Sub-Saharan Africa.

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Introduction

Higher education is widely recognised as being central to development, contributing not only to enhancing individual opportunities in life, but also to a vibrant democracy, innovative economy and a range of other societal benefits in areas such as health, nutrition, governance and environmental protection.¹ The development of higher education (HE) systems is particularly critical in a region like Africa, given the significant youth bulge, the need for innovation to create new forms of employment, and the potential of research to address the significant social and environmental challenges.

Nevertheless, despite strong endorsement of HE on the part of governments and international agencies, and buoyant demand from populations for furthering their studies, there are significant barriers to expansion. Shortages of academic staff mean that even when funding is in place, expansion of systems leads to significant strain on resources, very large class sizes and quality challenges. Doctoral education has often been viewed as a lower priority – given the need to attend first to the undergraduate level – but this approach underestimates the significant interdependence between these levels. Adequate staffing for the undergraduate level, and a thriving and innovative research environment, to a large extent

depend on the possibilities of high quality *doctoral* study.²

Globally, PhD training has received particular currency in HE policy circles as a response to the broader economic context of the ‘knowledge society’, ‘knowledge economy’ or ‘talentism’.³ It is commonly acknowledged that the role of researchers is essential in driving scientific output and innovation. A sign of the growing importance of PhD-trained researchers is the inclusion of not only tertiary graduate figures but specifically doctoral graduate figures in innovation indicators, such as the Innovation Union Scoreboard (IUS)⁴ used by the European Union (EU).

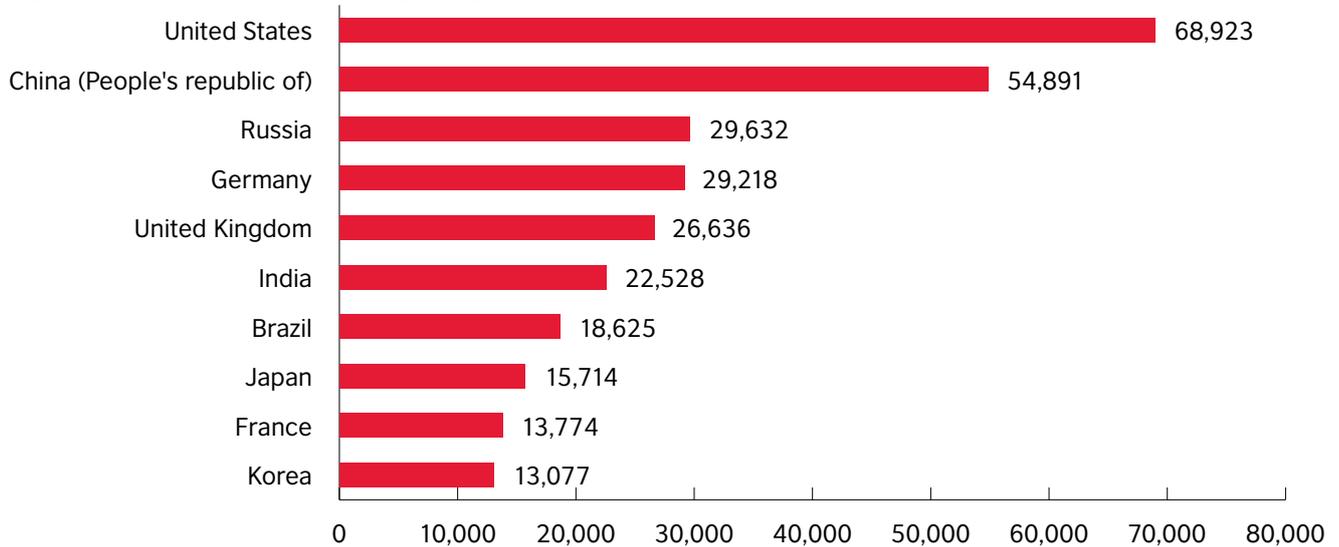
While the argument around quality of undergraduate education is widely accepted, the link between PhD provision and knowledge sector jobs and innovation has been the subject of some debate. Some scholars maintain that policymakers should be cautious of the assumed PhD-high skills jobs alignment, and instead consider all options (including vocational education) for producing graduates with relevant competencies.⁵ From the perspective of industry itself, the number of PhD graduates may be less important for innovation than contextual factors. For example the Global Innovation Index (GII), unlike the UIS used by the EU, does not include PhD graduates

as a measure, and instead places emphasis on political, regulatory and business environment.⁶ Indeed in the OECD context, some economists have even raised concerns about an oversupply of PhD graduates.⁷

Beyond the OECD context, the mood is quite different. In many countries, there is a severe lack of opportunities for obtaining higher degrees even among university staff: the 2009 *Trends in Global Higher Education* study⁸ estimated that as many as half of those teaching in universities across the world had no more than an undergraduate degree. Governments are consequently investing significant funds into PhD expansion schemes. China, India and Brazil have all made significant gains in PhD graduations. As can be seen in Figure 1, they are among the world’s leading producers of PhD graduates. PhD students from countries where doctoral training has traditionally been undertaken abroad can increasingly rely on domestic PhD provision rather than studying overseas. Nevertheless, socio-cultural factors still drive students to study abroad, which means that expansion in domestic PhD provision must compete with the attractive overseas option. In Latin America, governments have addressed this concern by investing in both domestic provision and overseas

1. Boni, A, Lopez-Fogues, A, Walker, M (2016) Higher education and the post-2015 agenda: a contribution from the human development approach. *Global Ethics* 12/1: 17–28; McCowan, T (2016) Universities and the post-2015 development agenda: an analytical framework. *Higher Education* 72/4: 505–525; Oketch, M, McCowan, T and Schendel, R (2014) *The Impact of Tertiary Education on Development: A Rigorous Literature Review*. London: Department for International Development.
2. Morgan J (2011) The rise and rise of PhDs as standard. *Times Higher Education*. Available online at: www.timeshighereducation.co.uk/415203.article, cited in Cloete, N, Mouton, J and Sheppard, C (2015) *Doctoral education in South Africa*.
3. Cloete, N, Mouton, J and Sheppard, C (2015) *Doctoral education in South Africa*. Cape Town: African Minds. Available online at: www.idea-phd.net/images/Doctoral-Education-in-South-Africa-WEB-3.pdf
4. ‘New doctorate graduates’ and ‘Population aged 30–34 with tertiary education’ are measures of Human Resources, a sub-index nested under the ‘Enablers’ index. Eurostat (2016). *Glossary: Innovation union scoreboard (IUS)*. Eurostat Statistics Explained. Available online at: [http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Innovation_union_scoreboard_\(IUS\)](http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Innovation_union_scoreboard_(IUS))
5. Gokhberg L, Shmatko N, Auriol, L (2016) ‘Rethinking the Doctoral Degrees in the Changing Labor Market Context’, in Gokhberg L, Shmatko N, Auriol, L (eds) *The Science and Technology Labor Force*. Science, Technology and Innovation Studies. Cham; Springer.
6. Cornell, INSEAD and WIPO (2017) *GII Framework. The Global Innovation Index*. Available online at: <https://www.globalinnovationindex.org/about-gii>
7. Cyranoski D, Gilbert, N, Ledford, H, Nayar, A and Yahia, M (2011) Education: The PhD factory. The world is producing more PhDs than ever before. *Is it time to stop?* *Nature* 472: 276–279.
8. Altbach, PG, Reisberg, L, Rumbley, LE (2009) *Trends in Global Higher Education. Tracking an Academic Revolution*. Paris: UNESCO.

Figure 1: Top ten countries producing PhD graduates, 2015*



Source: OECD (2018). Education indicators - Graduates by field, Doctoral or equivalent level (ISCED2011 level 8), for the year 2015

*Ranked on a list comprising the 34 OECD member states excluding Greece and the Netherlands (for whom data was not available), and eight other non-OECD countries where data was available: Brazil, People's Republic of China, Colombia, Costa Rica, India, Indonesia, Lithuania and Russia.

provision via state-funded PhD scholarships. Because the overseas PhD study in this case is supported by the state, governments are able to stipulate conditions of return, ensuring that the overseas-trained PhD graduates join the national pool.⁹

Currently, there is a 'shared optimism' in Sub-Saharan Africa (SSA) on the value of building PhD capacity, as exemplified in formal declarations such as the Kigali Communique (2014) or the Dakar Declaration on the revitalisation of African higher education (2015).¹⁰ In terms of our empirical understanding of the PhD landscape in SSA, two key studies have informed the policy discourse, namely the International Association of Universities (IAU) and

the Catalan Association of Public Universities (ACUP) joint report summarising the outcomes of a 2012 international seminar,¹¹ and a report by the Higher Education Research and Advocacy Network in Africa (HERANA) from 2014.¹² These reports have highlighted low or inconsistent PhD capacity despite significant expansion in master's level graduations – an issue related to funding and supervisory capacity. The former report also highlighted a lack of evaluative mechanisms to assess the quality and socio-economic relevance of PhD outputs.

While the above reports provide helpful context to the PhD training landscape in SSA, they draw on institutional data

from a selection of six to eight flagship institutions, rather than a comparison of national-level data on PhD provision. Therefore, there is an urgent need to contribute to the evidence base on PhD provision using national-level data, and to take into account doctoral training provision in a cross-section of diverse institution types. Given the concerns about quality and socio-economic relevance, there is also a need to assess the format and conditions of provision, and to explore patterns of engagement on the part of doctoral education providers with industry, the private sector, the community and policymakers. This study is informed by a need to address these gaps.

9. Balan, J (2008) Graduate Education in Latin America: The Coming of Age. *International Higher Education* 50: 9–11. Available online at: <https://doi.org/10.6017/ihe.2008.50.8002>

10. Molla, T and Cuthbert, D (2016) In pursuit of the African PhD: A critical survey of emergent policy issues in select Sub-Saharan African nations, Ethiopia, Ghana and South Africa. *Policy Futures in Education* 14/6: 635–654.

11. IAU-ACUP (International Association of Universities and the Catalan Association of Public Universities) (2012) International seminar on innovative approaches to doctoral education and research training in sub-Saharan Africa: Report. Available online at: www.iau-aiu.net/sites/all/files/Final_Report_IAU_ACUP_Seminar_on_innovative_approaches_to_doctoral_education.pdf

12. Bunting I, Cloete N and Van Schalkwyk, F (2014) *An Empirical Overview of Eight Flagship Universities in Africa: 2001–2011*. A report of the Higher Education Research and Advocacy Network in Africa (HERANA). Cape Town: Centre for Higher Education Transformation (CHET).

Research aims and methods

This report provides an overview of a study commissioned by the British Council and the German Academic Exchange Service (DAAD) that surveyed research and doctoral training capacity in Ethiopia, Ghana, Kenya, Nigeria, Senegal and South Africa. The aims of the study were to investigate:

- i. the availability, quality and thematic priorities of PhD programmes and how they have changed over the last ten years
- ii. the national level research agenda
- iii. the extent to which research training at institutional level is aligned with the national agenda
- iv. national-level systems (policies, legislation) that enable alignment between institutional level research training with the national agenda
- v. how institutional priorities reflect the needs of universities and emerging research and development systems, including local industry and societal needs
- vi. funding sources to develop and sustain PhD provision
- vii. the role of international collaboration in building PhD capacity.

The British Council and DAAD partnered with the African Network for Internationalization of Education (ANIE) to undertake empirical research to investigate these questions in the six case study countries. Each country report was prepared by a team of locally-based researchers familiar with the particular challenges and opportunities related to PhD provision of their country context. The teams followed a similar overall methodological approach, (albeit with some variation due to contextual and circumstantial considerations). The resulting six

country studies¹³ report their empirical findings based on policy analysis and the most recent national and institutional data available on PhD provision. Data was also collected via questionnaires and interviews with a range of stakeholders comprising representatives of national agencies responsible for building research capacity, representatives of industry, and university staff and students from a diverse sample of institutions. The country reports also include expanded discussion of the national level context and policies for research training.

This report synthesises the key findings from the six country studies with a view to contributing to the comparative evidence base on PhD provision in Sub-Saharan Africa, bearing in mind the need for future programme and policy design. In particular, the study was informed by the need to identify whether higher education expansion in the region has led to enhanced research capacity and quality of teaching in a manner that has potential to support sustainable development objectives for national governments.¹⁴ This report highlights the key findings related specifically to PhD provision and draws out implications for policy at national and international levels.

In the following three sections we provide some context for the research and doctoral training landscape in SSA. First we provide a general profile of each of the six countries (population, gross national income [GNI] per capita, size of HE system). Although the primary focus of this report is on doctoral provision, we also include a brief overview of research production in the region first. This is in line with the broader aims of the study to produce a more holistic and relational picture

of PhD production, one that is embedded in the research training landscape more generally. Against this backdrop, we then highlight data on PhD provision (enrolments, graduations, number of programmes) at a national level, alongside key policy frameworks, policy actors, or targets related to PhD provision.

The research findings section synthesises key insights from the country-level studies, informed by the empirical data collected for these studies (desk review of policies and regulations, and questionnaire and interview data with a range of HE stakeholders). Due to different contextual circumstances, slightly different sampling approaches were used in each country study. Accordingly, we do not report on summary statistics of questionnaire data here, but rather we invite readers to turn to the country reports for detailed analysis of this data. The final section draws out conclusions and recommendations for future policy and research. The implications of relying on a primarily self-funded student body for PhD graduation trends is highlighted, including low completion rates and high dropouts; inequities in terms of gender, race and historically advantaged institutions; and limited opportunities for alignment or engagement with industry, the private sector and societal needs. In addition, we highlight the need for further research clarifying the interplay between domestic and overseas (including African) PhD provision. This is particularly important in terms of post-PhD employment trajectories, and their implications for enhancing the quality of higher education and research and development systems in the region.

13. Individual reports detailing the research findings for each country in this study are available at: www.britishcouncil.org/education/ihe and also at <https://www.daad.de/download/phd201806>

14. Mohamedbhai, G (2014) *Focus on research for development, not academic rankings*. SciDevNet. www.scidevnet.com Available online at: www.scidev.net/global/education/opinion/research-development-academic-rankings.html

Country profiles

Figure 2: Country profiles

Ethiopia	
Population (millions)	101.9
Gross national income per capita (GNI)	\$1,620
Gross tertiary enrolment ratio (GTER)	8.13% (2014)
Higher education sector	
40 universities (36 public, 4 private)	
100 other private higher education institutions	

Ghana	
Population (millions)	28.03
Gross national income per capita (GNI)	\$4,070
Gross tertiary enrolment ratio (GTER)	16.23% (2015)
Higher education sector	
171 higher education institutions	
14 universities (10 public, 4 private chartered)	
72 private university colleges; 10 polytechnics; 1 distance learning institution; 45 colleges of education; 29 nurse training colleges	

Kenya	
Population (millions)	47.25
Gross national income per capita (GNI)	\$3,060
Gross tertiary enrolment ratio (GTER)	4.05% (2009)
Higher education sector	
40 chartered universities (23 public, 17 private)	
15 constituent colleges (10 public, 5 private)	
15 universities with Letter of Interim Authority (LIA)	

Nigeria	
Population (millions)	186.99
Gross national income per capita (GNI)	\$5,800
Gross tertiary enrolment ratio (GTER)	10.07% (2011)
Higher education sector	
503 higher education institutions	
153 universities (40 federal universities, 44 state, 69 private)	
84 polytechnics; 27 monotechnics 36 colleges of architecture; 50 colleges of health and technology; 84 colleges of education 69 vocational institutes	

Senegal	
Population (millions)	15.59
Gross national income per capita (GNI)	\$2,390
Gross tertiary enrolment ratio (GTER)	10.39% (2015)
Higher education sector	
5 public universities	
75 private institutions, mostly comprising management schools	

South Africa	
Population (millions)	54.98
Gross national income per capita (GNI)	\$12,830
Gross tertiary enrolment ratio (GTER)	19.38% (2014)
Higher education sector	
26 public institutions	
11 universities	
6 comprehensive universities	
9 universities of technology	

Population: UIS (2018). Total population. Data for 2016. Rounded up to nearest ten thousand. Data for 2016.
 GNI per capita: UIS (2018). GNI per capita, PPP (current international \$). Data for 2015.
 GTER: UIS (2018). Gross enrolment ratio, tertiary, both sexes (%).

The context of research production

Sub-Saharan Africa's (SSA) share of the global output in research papers is minor but growing. It increased from 0.44 per cent in 2003 to 0.72 per cent in 2012.¹⁵ In terms of citation impact, the region's share of global citations also grew, doubling from 0.06 per cent in 2003 to 0.12 per cent in 2012. Field-weighted citation impacts (FWCI) were higher than 1 throughout the region (except in West and Central Africa), meaning that these articles were cited more than the world average expected for the subject and type of publication.¹⁶

Globally, research output is dominated by natural science subjects,¹⁷ and the same is the case for SSA. Health sciences form the largest share in almost all sub-regions, with only South Africa as the exception. Social sciences (including arts and humanities) and life sciences occupied the smallest share of SSA's research output, although social science is the fastest growing group.¹⁸ A detailed breakdown of the subject groupings for 2012, as well as changes over the decade 2003–12 are provided in Table 1 and Table 2. In terms of

co-authorship and inter-connectedness of science researchers, it has been established that international collaboration accounts for most of the research output, consistently over 60 per cent in East Africa and Southern Africa.¹⁹ Intra-regional collaboration (i.e. between researchers of two African countries) accounted for a minor portion of research output (below 15 per cent),²⁰ and was even lower when no OECD country co-author was involved in the collaboration.²¹ This suggests that regional HE hubs and research centres are yet to maximise their full potential in creating networked communities of African academics.

SSA's modest growth in research output and improvement in citation impact outlined above has occurred against a backdrop of human and material resource challenges. The world average of researchers per million inhabitants in 2014 stood at 1,098.4. In SSA, the figure was only 87.8, compared to 166.5 in South and West Asia, and 434.9 in Latin America and the Caribbean.²² GDP expenditure

on research and development in the region is far below the world average of 1.68 per cent. In 2014 the figure was 0.41 per cent for Sub-Saharan Africa, compared to 0.79 per cent for Latin America and the Caribbean, and 0.72 per cent for South and West Asia.²³ Comparable data for the six countries included in this study are shown in Figure 3. Overall, South Africa, Senegal and Kenya have comparatively higher material and human resources invested in the national research infrastructure. In each country, the government bears the major share of research and development expenditure, in fact almost exclusively so in Nigeria. South Africa has a comparatively high proportion funded by the business sector, and Kenya via the HE sector. Kenya and Senegal additionally rely heavily on foreign sources for their research and development spending.²⁴

15. Elsevier and World Bank (2014) *A Decade of Development in Sub-Saharan African Science, Technology, Engineering and Mathematics Research*. [Working Paper No 91016]. Available online at: <http://documents.worldbank.org/curated/en/237371468204551128/pdf/910160WP0P126900disclose09026020140.pdf>.

16. Elsevier and World Bank, *op. cit.* P. 19.

17. For example, 69 per cent of titles (not articles) in SCOPUS are in science, comprising 27 per cent physical sciences, 26 per cent health sciences, and 17 per cent life sciences. In contrast, social science titles (including arts and humanities) comprise about a third (31 per cent) of subject coverage. Elsevier (2018). *Scopus Content Coverage Guide* [Updated August 2017]. Available online at: <https://www.elsevier.com/solutions/scopus/content>

18. Elsevier and World Bank, *op. cit.*, page 18.

19. Elsevier and World Bank, *op. cit.*, page 36.

20. Elsevier and World Bank, *op. cit.*, page 40.

21. Elsevier and World Bank, *op. cit.*, page 39.

22. UNESCO Institute for Statistics (2015) *Researchers per million inhabitants (FTE)*, 2014.

23. UNESCO Institute for Statistics (2017) *GERD as a percentage of GDP*, 2014.

24. UNESCO Institute of Statistics (2015) *GERD percentage by source of funds*. The sources comprise: higher education, government, business, private non-profit, rest of the world (abroad) and not specified.

Table 1: Percentage of total article output by subject groupings for Africa regions 2012

Subject grouping*	East Africa	West and Central Africa	Southern Africa	South Africa
Health sciences	47.8%	43.1%	44.8%	26.5%
Physical sciences and STEM	25.3%	32.3%	28.0%	44.7%
Agriculture	34.0%	28.2%	33.4%	22.9%
Social sciences and humanities	15.4%	14.0%	17.5%	21.8%
Life sciences	15.0%	15.2%	15.7%	8.7%

Source: Scopus 2003–12, reproduced in Elsevier and World Bank (2014).

*Columns do not add up to 100 per cent as cross-disciplinary articles are counted multiple times. Subject groupings were defined by All Science Journal Classification (ASJC) subject areas. Articles that matched more than one ASJC category were counted once in each relevant category. For example, an article on the impact of increased corn production on pricing is counted once in the 'agricultural and biological sciences' grouping and once in the 'economics, econometrics and finance' grouping. See Elsevier and World Bank (2014) A decade of development, Appendix C for a detailed explanation of the methodology.

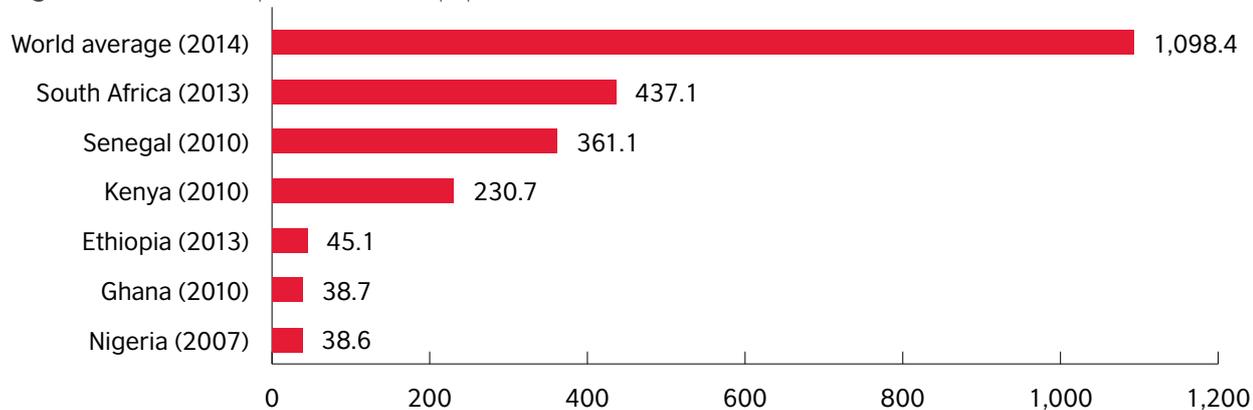
Table 2: Changes in percentage of total article output by subject groupings for Africa regions 2003–12

Subject grouping*	East Africa	West and Central Africa	Southern Africa	South Africa	SSA average
Health sciences	4.1%	3.2%	4.5%	2.8%	3.7%
Physical sciences and STEM	-0.4%	1.4%	-1.7%	-0.1%	-0.2%
Agriculture	-2.6%	-1.7%	0.2%	-3.7%	-2.0%
Social sciences and humanities	4.4%	5.1%	3.6%	3.4%	4.1%
Life sciences	-4.7%	-3.7%	-2.6%	-0.9%	-3.0%

Source: Scopus 2003–12, reproduced in Elsevier and World Bank (2014) A decade of development.

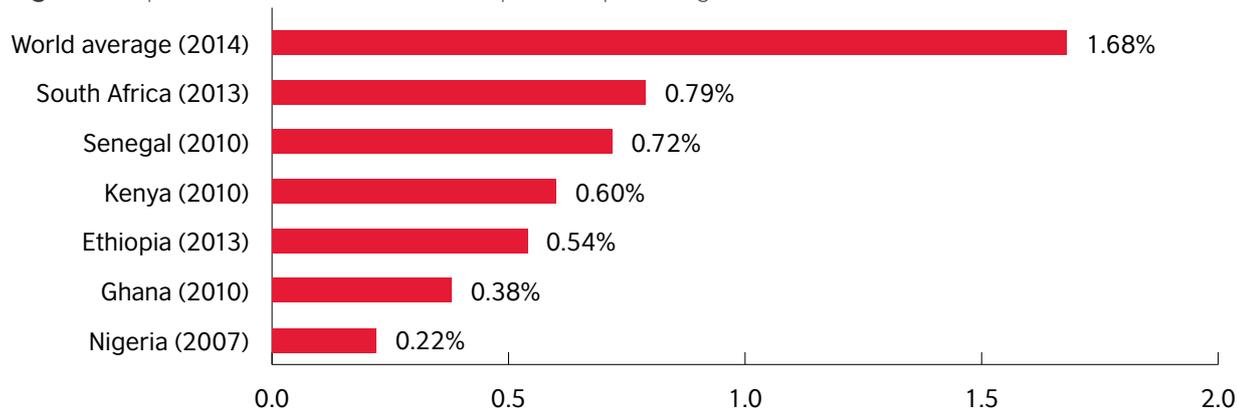
*Subject groupings were defined by All Science Journal Classification (ASJC) subject areas. Articles that matched more than one category were counted once in each relevant category. Therefore, totals do not add up to 100 per cent.

Figure 3: Researchers per million of the population



Source: UNESCO Institute of Statistics (2015) Researchers per million inhabitants (FTE). The most recent data available is provided for each country. The research and development survey includes HE staff as researchers. The full-time equivalent (FTE) statistic excludes time that researchers may spend on other tasks, such as teaching and administration, whereas the head count figure simply tallies up all research personnel who conduct research. Therefore, the FTE statistic is usually used for comparison purposes as it provides a more accurate indication of actual research capacity.

Figure 4: Expenditure on research and development as percentage of GDP



Source: UNESCO Institute of Statistics (2015) GERD per cent (by source of funds). The most recent data available is provided for each country.



The context of PhD training

Although direct country comparisons are not always possible due to variation in availability of data, Figure 5 highlights key statistics, policy frameworks/actors and national targets related to PhD capacity for each of the six countries included in the study. As can be seen, each country has witnessed some kind of recent change in the policy environment surrounding economic development and research, with potential to impact PhD provision. This may be in terms of the setting of explicit targets for PhD graduates, or the setting up

of new bodies to manage and fund research (including PhD provision), or more generally in terms of economic policy frameworks providing a mandate for investment in research capacity. Overall, the number of PhD programmes/enrolments has grown substantially in each country over the last ten years, the most striking example being Ethiopia. In 2006 there were only three PhD programmes in two subject areas, whereas in 2015 this had grown to 138 programmes in six subject areas.²⁵ In part, the expansion in PhD provision

reflects growth in the national HE systems in general, at undergraduate and master's levels as well. As is the case in most countries, PhD enrolments as a proportion of the overall student population are relatively low: below two per cent in Ghana, Kenya and South Africa, and slightly higher at 7.8 per cent in Ethiopia. However, a shortage of PhD-qualified staff in universities was a salient feature in each of the countries, with their proportion of the overall staff ranging from eight per cent to 43 per cent.²⁶

Figure 5: PhD provision: key statistics and policies

Ethiopia	Key policy frameworks, targets and actors	% of HE staff with PhD qualifications (2016)	8%
		Expatriate proportion of PhD-qualified faculty	26%
	70:30 graduate mix: 70% target in favour of science and technology subjects. <i>(Ministry of Education 2008)</i>	Number of PhD programmes (2015)	138
		Number of PhD enrolments (2015)	3,135
	Directive on linkages between education and training, research institutions and industry: addresses recent industrialisation strategy and prior lack of HE-industry engagement. <i>(Ministry of Science and Technology 2013)</i>	PhD enrolments as % of total HE enrolments (2015)	7.8%
		Prescribed time to completion for PhD	4 years
Annual PhD graduate output, average for 2006–15		90	
Ghana	Key policy frameworks, targets and actors	% of HE staff with PhD qualifications (2013)	31%
		Number of PhD programmes (2016)	200
	Ghana Shared Growth and Development Agenda II (GSDA II: 2014-2017): sets development priorities.	Number of PhD enrolments (2013)	1135
		PhD enrolments as % of total HE enrolments (2013)	0.8%
	Council for Science and Industrial Research (CSIR): oversees 13 research institutes.	Number of PhD graduates per year (2012–13) ²⁷	65
		Proportion of PhD graduates from flagship universities (UoG, KNUST 2013)	70%

25. Nega, M and Kassaye, M (2018) *A Study on Research and PhD Capacities in Sub-Saharan Africa: Ethiopia Report*. British Council and German Academic Exchange Service. Available at: www.britishcouncil.org/education/ithe and also at <https://www.daad.de/download/phd201806>

26. The figures cited for each country are taken from the country reports, which draw on government data collected by the relevant ministry. It should be noted that this data may be based on different categorisations of 'higher education' and 'higher education staff'. For example, the data may or may not include staff at vocational colleges.

27. From the six oldest public universities (KNUST, UCC, UDS, EDW, UG, UMaT) (NCTE 2014).

Figure 5: Continued

Kenya	Key policy frameworks, targets and actors	% of HE staff with PhD qualifications (2016)	34%
		Number of PhD enrolments (2016)	7146
	National Science, Technology and Innovation Policy and Strategy (Kenya Government, 2010).	PhD enrolments as % of total HE enrolments (2016)	1.3%
	National Research Fund (NRF): manages and invests the funds for research and promotes multidisciplinary collaboration among universities and research institutions in Kenya. (Established 2013).	% of PhD enrolments at private HE institutions (2016)	16.72%
		Prescribed time to completion	3 years
		Average time to completion	6 years
Nigeria	Key policy frameworks, targets and actors	% of HE staff with PhD qualifications (2012)	43%
	National Research and Innovation Council (NRIC) and National Research and Innovation Foundation (NRIF): established in 2016 to set research priorities, co-ordinate funding and evaluate research outputs.	Number of HEIs providing PhD study (2012)	63
	Nigerian Expatriate Supplementation Scheme (NESS) and Linkages with Experts and Academics in the Diaspora Scheme (LEADS): established in 2007 to enhance internationalisation of faculty and increase the proportion of faculty with PhD qualifications.		
Senegal	Key policy frameworks, targets and actors	Number of PhD enrolments at University Cheick Anta Diop of Dakar (UCAD), the largest PhD provider, 2015–16	1252
	Fund for the Development of Scientific and Technical Research (FIRST): Established in 2007 to award research grants. Priorities are health, food security, agriculture, climate change, energy and the digital economy.	Number of PhD enrolments at University Gaston Berger of Saint-Louis (UGB), the second largest PhD provider, 2015–16	625
	Senegal Emerging Plan (PSE): summarises Senegal's development priorities and projections to be achieved by 2035. Most national development agendas including education and research have to be aligned to this vision.		
South Africa	Key policy frameworks, targets and actors	% of HE staff with PhD qualifications (2014)	43%
	Targets for 2030: 100 PhD graduates per million of the population 5,000 PhD graduates per annum 75% of permanent academic staff with a PhD.	Number of PhD enrolments (2014)	2258
		PhD enrolments as % of total HE enrolments (2014)	1.9%
		PhD graduations as % of total HE graduations (2014)	1.2%
	Equity targets for National Research Fund (NRF) scholarships: 80% black, 60% female.	Proportion of PhD graduates comprising international students (2014)	40%
		Average time to completion	5 years



Research findings

The following section highlights key findings on PhD provision in terms of: the student characteristics; the structure and format of PhD degrees; the disciplinary spread of PhD provision; factors driving its expansion; the institutions that are providing doctoral education; funding of PhD provision; the quality of PhD provision from the perspective of alumni; as well as post-PhD trajectories.

Who studies for a PhD?

While it was not possible to obtain detailed characteristics of the current or recent PhD student populations in all of the countries (with the exception of South Africa), it was clear from the institutional questionnaires and interviews that the majority of PhD students are mature students, rather than younger cohorts entering directly from master's degrees. Previous research has also identified the relatively mature age of PhD cohorts in the region, for example the mean age being between 35 and 45 years in South Africa.²⁸ Indeed, as noted above, current regulations and institutional pressure to produce more PhD-qualified faculty is driving expansion in enrolments. This corroborates findings from a study of eight flagship institutions in SSA, which found that master's to PhD conversion rates were very low.²⁹

In South Africa, institutional strategies to recruit younger PhD students centre on improving the pipeline of master's graduates as a priority, as completion rates are a problem already at this level. A national level initiative to prioritise younger cohorts in state-funded PhD training is the New Generation Academics Programme (nGAP). It was launched in 2015, with universities

submitting 500 applications for these competitively awarded nGAP posts. Selection criteria are based on government-established equity targets and priority areas of research. The scheme has raised concern among some critics, however, as talented lecturers from historically disadvantaged (and typically more teaching-oriented institutions), in effect get taken up by historically advantaged institutions. This may result in concentration of research active staff in those institutions that are already better resourced and that already have higher proportions of PhD-trained faculty.

Related to this point above, there are serious equity concerns with PhD study in the region. In Ethiopia data was available on the gender distribution of PhD students. The data reveals that female enrolments have been rising in line with overall enrolments over the period 2000–15, but by 2015 females still only represented 12.1 per cent of enrolments and 6.3 per cent of graduates.³⁰ Racial inequity has of course been a concern in post-Apartheid South Africa. Significant gains have been made since the end of racial segregation; whereas 93 per cent of PhD graduates were white males in 1990, by 2015 only 37 per cent of the PhD graduates were white. International students mainly from the African continent represent 40 per cent of PhD students though, so their share may be exaggerating the positive gains in black enrolments. There may be other inequities resulting from patterns in PhD training, such as inequalities in the proportion of PhD-trained staff across the different institution types in the national systems (e.g. public versus private,

comprehensive university versus specialised colleges, polytechnics and other types, urban versus rural location). For example, based on available data we cannot say what proportion of the current PhD student body at the flagship institutions comes from those same institutions or from other institutions in the country, or even neighbouring countries.

What structure and format does PhD training typically take?

In all the countries, the PhD is typically structured on the doctorate-by-research model, (rather than the 'taught doctorate' model used in North America), culminating in an oral defence of the thesis. In Senegal, the structure had been significantly different prior to the LMD³¹ reform of 2012, with academics able to gradually build toward the PhD qualification through first and second cycle qualifications first. The LMD reform therefore represents a significant step toward standardisation of PhD provision in the West African region. Institutions in Ethiopia also reported use of the course-based mode, which requires taking advanced courses and undertaking academic research. PhD programmes included compulsory research training in all instances, but this varied by institution in the extent to which it was structured. Some institutions reported use of sole supervisors, and in fewer cases joint supervisory committees were also used. The study participants did not report on the use of a doctorate by publication route or the provision of professional doctorates – two significant growth areas in other regions, particularly the USA and the UK.³²

28. Harle, J (2013) *Doctoral Education in Africa: A review of doctoral student needs and existing initiatives to support doctoral training and research development – A needs analysis undertaken as part of the DocLinks project*. London: The Association of Commonwealth Universities (ACU). Available online at: [https://www.acu.ac.uk/publications/?filters\[submit\]=Search&filters\[keyword\]=796](https://www.acu.ac.uk/publications/?filters[submit]=Search&filters[keyword]=796), page 1.

29. Bunting I, Cloete N and Van Schalkwyk, F (2014) *An Empirical Overview of Eight Flagship Universities in Africa*.

30. Nega, M and Kassaye, M (2018) *A Study on Research and PhD Capacities in Sub-Saharan Africa: Ethiopia Report*. British Council and German Academic Exchange Service. Available at: www.britishcouncil.org/education/ihe and <https://www.daad.de/download/phd201806>

31. Licence-maîtrise-doctorat

32. Louw, J and Muller, J (2014) *A literature review on models of the PhD*. Centre for Higher Education Trust (CHET). Available online at: <https://www.chet.org.za/papers/literature-review-models-phd>

The prescribed length of programmes varied from three to six years. Alarming dropout rates and prolonged average time to completion were cited by university managers/heads of doctoral schools as a major challenge. Institutional responses in Kenya revealed that dropouts ranged from as low five per cent to as high as 50 per cent at others. In South Africa there is significant disparity between institutions and disciplines: a recent study reported that the completion rate³³ was as low as 25 per cent at the University of South Africa (UNISA), (the main institution offering online and distance provision), whereas the figure was 60 per cent at the University of the Western Cape (UWC).

In terms of format, PhD provision was almost entirely face-to-face, although in South Africa, distance PhD provision is also provided through UNISA. Enrolments in this mode were concentrated in

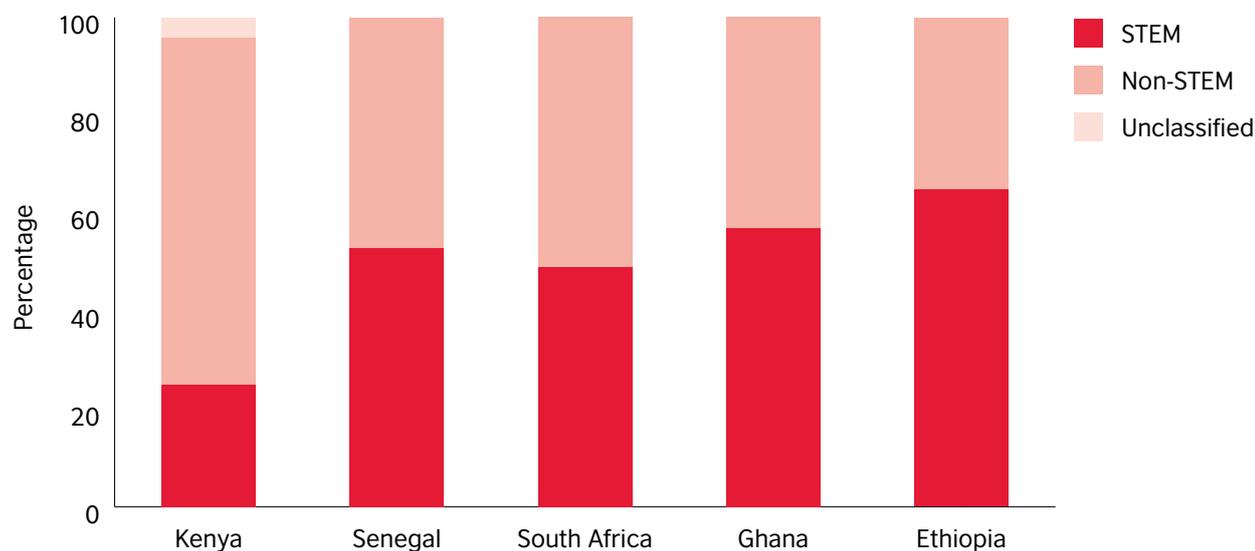
certain disciplinary areas, with 50 per cent of enrolments in education, theology, health and psychology.

What are the disciplinary trends?

In each country context, science, technology, engineering and mathematics (STEM) subjects feature strongly in both the current research output and national policy documents dictating PhD capacity building. This focus on STEM is also evident in PhD provision, with a variety of core and applied sciences provided by institutions. It should be noted here that cross-country comparisons of disciplinary focus are problematic due to different subject classifications used, and a lack of national-level data on enrolments rather than just number of available programmes.³⁴ Nevertheless, we provide the trends in disciplinary spread in Figure 6 and Table 3

to give an indicative picture. As can be seen from Figure 6, the STEM versus non-STEM split is fairly even in Ghana, Senegal and South Africa, and skewed slightly in favour of sciences in Ethiopia. Kenya is the exception, as enrolments are skewed starkly in favour of non-STEM programmes. More than a third of enrolments there are in business and administration, while science subjects comprise less than five per cent each. A comparison of data over the past ten years revealed that non-STEM subjects experienced growth in their share of PhD production even in the countries where STEM subjects have traditionally dominated. For example, in South Africa graduations in business, economics and management grew at a faster rate than in health, which experienced much slower growth despite being ranked second in terms of overall graduate output.

Figure 6: STEM versus non-STEM subject coverage in PhD provision



Note: data not available for Nigeria

33. This means the proportion of students in a cohort who complete within the prescribed study time.

34. For example, there may be fewer programmes in the humanities, but higher student enrolments per programme than in the sciences. There may be high enrolments in a programme, but also high rates of dropout.

Table 3: Detailed breakdown of disciplinary spread of PhD provision

Country*	Source of data	Unit of data	Disciplinary spread	
Ethiopia	National data (EMIS 2015)	programmes	STEM 64% Agriculture and life sciences 22% Natural and computational sciences 16% Engineering and technology 16% Medicine and health sciences 10%	Non-STEM 34% Social Sciences and Humanities 29% Business and Economics 5%
Kenya	National data (CUE 2016)	enrolments	STEM 25.17% Health and welfare 4.8% Life sciences and physical sciences 4.8% Environment 3.91% Agriculture, forestry and fisheries 3.5%	Non-STEM 71.42%** Business and administration 35.1% Humanities and arts 10.9% Education 9% Social and behavioural science 8.2%
			The remainder of subjects comprise >3.5%	
Ghana	Sample of 10 institutions (2016)	programmes	STEM 57.3% Natural sciences, engineering and technology 57.3%	Non-STEM 42.7% Education 16% Humanities and social sciences 15.1% Business, economics and management sciences 11%
Senegal	UCAD 2014 (flagship institution)	enrolments	STEM 46.33% Environmental, health and life science 20.8% Physics, chemistry, earth and universe sciences and engineering 11.4% Mathematics and computer science 10.8% Water, quality and water use 3.33%	Non-STEM 53.67% Management, economic, political and legal sciences 24.6% Studies on the human being and the society 17.4% Arts, cultures and civilizations 12%
South Africa	National data (HEMIS 2014)	graduates	STEM 49.03% Life sciences and physical sciences 22.4% Health professions and related clinical sciences 10.8% Engineering 6.8% Agriculture, agricultural operation related sciences 3.5 %	Non-STEM 50.97% Education 10.1% Business, economics and management studies 8.5% Social sciences 7.4% Philosophy, religion and theology 5.9% Languages, linguistics and literature 4.9% Psychology 4.7 %
			The remainder of subjects have >3.5%	

* Note: Data not available for Nigeria

** Percentages do not add up to 100%. 3.54% of enrolments are classified as 'other', meaning we are unable to assign them to a STEM vs Non-STEM grouping

Research at institution-level also revealed that some institutions are now offering interdisciplinary programmes, driven in part by a need to pool resources (supervision, research training, general research infrastructure as well as research equipment). In Ethiopia, university staff stated that this strategy of pooling resources had been crucial for achieving the significant expansion in PhD provision there over the past decade. A separate survey from 2010 investigating PhD provision in the social sciences in SSA similarly noted the emergence of interdisciplinary programmes alongside traditionally defined disciplines.³⁵ The study found that 'core' social sciences such as anthropology and sociology were (a) fewer in number, and (b) often integrated into applied social science programmes such as Development Studies, or thematically-framed programmes such as Peace and Conflict Studies.³⁶ This trend toward interdisciplinary or thematically-organised PhD provision may help to generate socially relevant and innovative research output. A degree of flexibility and autonomy in HE governance structures is needed to support this trend. Accordingly, any strategies to expand this type of interdisciplinary or thematically-organised PhD provision will need to take into account the confines of existing governance structures. In Kenya, for example, it was noted that the parent-satellite campus model of HE expansion is very rigid, creating overlap in HE provision, as the satellite campus must provide exactly the same subjects as the parent campus.

Factors driving PhD expansion and disciplinary spread

As noted above, a minority of current HE staff have doctorates. The most significant factor driving expansion in PhD provision indeed has come from pressure at the national level to upgrade the qualifications of higher education staff to the PhD level. In the case of South Africa, the government has set a specific target for this, namely 75 per cent of permanent staff by 2030. In three of the countries, there were specific laws or regulations mandating PhD qualifications for staff. In Senegal, a PhD qualification became mandatory for all teacher-researchers in public universities as part of the 2012 *licence-maîtrise-doctorat* (LMD) reform. The Kenya Commission for University Education (CUE) has passed a regulation mandating PhD qualifications for university teaching staff by 2018. A similar directive was issued by the Nigerian University Commission (NUC) in 2015 for lecturers wanting to rise to the rank of senior lecturer and above. In Ghana, while there is no such official regulation, there is still an implicit expectation for staff to obtain PhDs. In Ethiopia, the expansion in PhD enrolments is being driven mainly by the need to fill academic positions in the newly expanded HE sector, which has experienced phenomenal growth in the past decade; the number of public institutions grew from two in 2000 to 36 in 2015, and is expected to reach 45 by 2020.³⁷

In terms of institutional decision-making on disciplinary focus of PhD programmes, the questionnaire data revealed that the most common factors are: institutional mission, department or faculty level capacity in terms of human resources, and to a lesser extent also the national research or national development agenda. While there was often alignment between institutional research planning and national development objectives, a key finding from the Ethiopian questionnaire was that there is a disconnect between PhD research topics and the broader institutional/national research agenda. Indeed, a policy gap identified in the Ethiopia study was the need for an evaluative framework at national level for judging the quality and relevance of research output, including PhD research output. A slightly different mood was observed in Ghana, where university leaders were divided on the merits and feasibility of aligning institutional research activity to a set national agenda. Another factor that needs to be considered in relation to the disciplinary spread of PhD enrolments is the nature of the student body. As will be discussed in the section below on funding, the majority of students are self-funding. Without paid studentships in priority areas, and the fairly high cost of PhD studies, it is not surprising that PhD research output reflects the demand side of individuals' research interests, capabilities and access to research resources, rather than the supply side of nationally-dictated priorities.

35. Harle, J (2010) *Scoping study of graduate teaching provision in the social sciences, governance and public policy* [Final Report]. The Association of Commonwealth Universities and Partnership for African Social & Governance Research. Available at: www.pasgr.org/publications/graduate-teaching-provision-in-the-social-sciences-governance-and-public-policy/

36. Harle, J (2010), *op. cit.* p.2. The data is drawn from national-level data on PhD programmes from Uganda, Kenya, Tanzania, Ghana, Zambia and Mozambique.

37. (Ministry of Education [MoE], 2016).

Industry and the private sector do not tend to be engaged in the process of determining new PhD programmes. This is consistent with the findings related to PhD students and alumni which confirmed that the majority of PhD students either already work or expect to find work in universities post-graduation. Hence, current PhD provision caters primarily to the academic workforce and institutional priorities, which must respond to in-demand subject areas in undergraduate and master's level enrolments. One recent policy was identified, however, pushing PhD provision more towards an industry, private sector and local development orientation: a 2017 governance reform affecting public universities in Senegal dictates that governing boards must now comprise a diverse range of stakeholders drawn from the private sector, business communities, local government, and professional corporations, including employers' organisations. This reform aims to stimulate HE-industry and private sector engagement, which may in turn result in diversification or specialisation of future PhD provision in the direction of commercial applicability.

Who is providing PhD training?

Although there are no limits on PhD expansion imposed on institutions based on their characteristics (for example universities of technology, specialised colleges, comprehensive universities), in practice PhD provision tends to be concentrated in a small number of elite universities, in other words 'first generation', 'flagship', 'traditional' or 'historically advantaged' institutions. This is not surprising, as these tend to be the best-resourced institutions. They also have access to international/donor networks that can provide supplementary material and human resources, as discussed below. Private HE institutions are also beginning

to provide doctoral training in Kenya (Mount Kenya University, University of East Africa – Baraton) and in Senegal (African Institute of Management (IAM), Sup De Co – Dakar, African Center for Superior Studies in Management (CESAGI)). However, their collective enrolments constitute a minor share of PhD provision.

The issue of whether governments should pursue a strategy of concentration of PhD provision either geographically or according to institution type has been contentious. This in part reflects existing tensions and inequalities in the national systems. For example, in Nigeria there are plans to create six new 'mega-universities' across the country with a capacity of 150,000 students each in order to alleviate undercapacity in the existing public institutions. Critics argue that government funds should be invested in revitalising the existing public institutions. In terms of PhD provision specifically, there has been a debate among HE circles in South Africa whether institutions should be explicitly differentiated in terms of their research and PhD training functions, rather than every institution offering at least some PhD provision (as is the case now). Due to the complex political history, which resulted in advantaged and disadvantaged universities, the current government policy is to avoid such concentration of research activity into certain institutions, as this might exacerbate equity issues. These debates highlight the fact that government plans to expand PhD provision at the national level (whether directly via material support such as infrastructure and research equipment, or indirectly via funding formulas or regulations that incentivise or disincentivise PhD provision) need to strike a balance between the two considerations of efficiency and equity.

Quality of PhD provision from student and alumni perspectives

The student and alumni questionnaire responses revealed that students were generally satisfied with their PhD education, although funding support was cited as inadequate. In addition, the following specific recommendations were given. Handbooks and regulations lacked specific evaluative criteria to judge the quality of students' progress, and in the case of Kenya, there was a need for a handbook on supervisory ethics. Although the Senegal report did not mention the issue of ethics of supervision specifically, the related issues of hierarchical organisational culture and poor supervisory commitment were cited by the authors as a challenge to quality PhD provision. Financial resources were also lacking to enable students to participate in international conferences or doctoral summer schools. A salient feature in each country context was the challenge of adequate supervision, whether in terms of finding a suitable supervisor with relevant expertise, or frequency and quality of supervisory meetings. In Ethiopia, it was noted that compulsory research training modules were often taught in intensive doctoral schools by visiting scholars, as there is a lack of staff within institutions to provide this training. The concerns raised by participants surrounding supervisory capacity and quality are not surprising given the resource constraints on the higher education sector in general in these countries, and in particular the shortage of PhD-qualified staff. The reliance on visiting scholars in Ethiopia highlights the challenges brought about by rapid expansion of PhD provision without sufficient staffing levels.

Funding

In each country context, government funding for higher education in general is under strain, with institutions prioritising funding for their undergraduate provision. The proportions of university budgets allocated to research and PhD provision are low. Consequently, departments and doctoral schools do not normally offer paid studentships to PhD researchers. Instead, the majority of students are self-funding, relying primarily on teaching contracts, research consultancy, personal savings and financial support from their families to generate the necessary income. In Nigeria, it was noted that some institutions offer a 50 per cent rebate on tuition fees for their own staff members, as well as reduced teaching loads to aid with timely completion. Even in the case where government expenditure on higher education is relatively high, as in Ethiopia, there was still ambiguity and contention over the expected government contribution to PhD programmes. This is because no clear formulas have been established to standardise the per-student cost of PhD programmes. This serves as a reminder that extensive consultation between governments and institutions is needed prior to pursuing PhD expansion.

Government funding for PhD students takes the form of bursaries/grants and scholarships. In the case of Kenya, the funding can also be in the form of a loan. In the examples cited by interviewees/alumni, eligibility for government-sourced funds is based on academic merit, although there are a few examples where other criteria are used. In South Africa, eligibility for the National Research Fund (NRF) bursaries and scholarships

generally is based on merit, but top-ups are provided to incentivise certain subjects, namely those that fall under the Scarce Skills Development Fund (SSDF) criteria or the Department for Science and Technology (DST) research priority areas. In Senegal, FIRST awards research grants for higher education researchers, including PhD students, in the priority areas of health, food security, agriculture, climate change, energy and the digital economy.

A few instances of equity-related criteria were also identified. The Higher Education Loans Board (HELB) in Kenya provides a specific postgraduate bursary based on financial need, while the South African NRF has set equity targets of 80 per cent black and 60 per cent female for its awards. In Senegal, there is an initiative PAPES to support women researchers and researcher-teachers, which includes funding to help women complete their doctoral research.

Overall, however, it should be noted that in all country contexts, the student and alumni questionnaire data revealed that government funding (whether in the form of grants or loans) was minimal, and so did not have an impact on participation and completion. The exception to this was Senegal, where low tuition fees coupled with a national programme of doctoral grants means that PhD study is relatively affordable for many students. In Ghana, students and alumni were also asked whether regional governments (i.e. local or state governments as opposed to the federal government) or industry offer funding, but none of the respondents had received funding from these sources.

International collaboration in PhD provision

Given the resource constraints described above, there is interest in exploring whether international collaborations could help either (a) expand PhD outputs via fully or partly funded PhD scholarships, or (b) enhance quality of current provision (e.g. specific aspects such as access to equipment, exchange of subject expertise, or skills training in PhD supervision). A survey of existing initiatives to support doctoral education on the continent by the Association of Commonwealth Universities (ACU)³⁸ identified several examples of the first mode of collaboration to grow student numbers. Such examples of fully-funded PhD scholarships include: (i) schemes that target the field of development studies, such as the Austrian Partnership Programme in Higher Education and Research for Development, or the Danish International Development Agency PhD scholarships; (ii) schemes that target mid-career professionals, such as the NUFFIC Netherlands Fellowship programme and the Swedish International Development Agency (SIDA) scholarships; (iii) schemes based on geographical and historical ties, such as the Commonwealth Scholarship Commission in the UK (with DFID), the New Zealand Commonwealth Scholarships, or the Canadian International Development Agency's (CIDA) Francophone Scholarship Programme; or (iv) funded PhD places which fall under broader partnerships schemes, such as DAAD's Inter-University Partnerships. In addition to these types of schemes funded by national governments or development agencies, this study also identified an example of private sector funding for PhD study

38. Harle, J (2013) *Doctoral Education in Africa: A review of doctoral student needs and existing initiatives to support doctoral training and research development – A needs analysis undertaken as part of the DocLinks project*. London: The Association of Commonwealth Universities (ACU). Available online at: [https://www.acu.ac.uk/publications/?filters\[submit\]=Search&filters\[keyword\]=796](https://www.acu.ac.uk/publications/?filters[submit]=Search&filters[keyword]=796)

in the case of Nigeria. The Petroleum Development Trust Fund (PDTF) scheme in Nigeria funds students on PhD programmes split between a Nigerian and an overseas partner institution (the so-called 'sandwich' or 'split-site' degree format).

The DAAD, in addition to its own scholarships for PhD studies at German universities (some of them also in the 'sandwich' format) has entered agreements with Kenya, Ethiopia, Ghana and Rwanda to jointly fund substantial numbers of extra doctoral scholarships to Germany.

There are three important caveats to mention regarding the international funding of PhD study. Firstly, it is important to note that comparatively little support goes to PhD study, while the majority of postgraduate scholarships target master's-level study.³⁹ Secondly, only a minority of schemes offer full funding intended for full-time study mode, leaving students and institutions to seek the remaining contribution.⁴⁰ Thirdly, the majority of scholarships fund PhD study outside of Africa in donor countries, rather than PhD study within the region. The exceptions to this trend are the DAAD-funded *In-Country and In-Region Scholarship* schemes for postgraduate study available to students from Sub-Saharan African countries.⁴¹ The provision of in-country PhD study reflects two strategic commitments that the DAAD has made for its activities in Africa, namely to (i) upgrade the qualifications of university lecturers and (ii) build capacity for graduate education and research locally.⁴²

The second area where international collaborations have potential impact is enhancing the quality of existing programmes. The institutions involved in this study revealed that they are indeed most commonly engaged in international collaborations that fall into this category, rather than increasing the number of PhD students. In terms of format, international collaborations typically comprise bilateral institution-to-institution arrangements between South–North members. The most common type of collaboration cited by institutions was that of joint research or doctoral training, although some arrangements include activities to enhance the quality of PhD provision specifically. For example the Next Generation of African Academics funded by the Carnegie Corporation includes skills training for supervisors and mentors to strengthen the quality of PhD supervision, (in addition to other activities aimed at early career researchers). More commonly, however, activities resulting from international collaborations comprise staff or student exchange, research training, workshops, joint research projects, mentoring and post-doctoral fellowships. Even when collaborations were not dedicated solely to PhD training, institutional leaders and heads of doctoral schools felt that they nevertheless had a positive knock-on effect on the PhD training environment. They were seen to benefit PhD students by enhancing the quality of the research environment more generally. A cautionary note should be added here highlighted by respondents from the Ethiopian study. Partnerships can be short-lived and lacking impact,

especially when the majority of funding is spent on acquiring visiting scholars to teach summer schools, rather than on building internal capacity to provide PhD training. The extremely rapid expansion of PhD provision in Ethiopia thus demonstrates the dilemmas created by outstripping supervisory capacity – institutions may utilise international collaborations to meet immediate, short-term needs of the current student body, and not for long-term capacity building.

Given the limitations of the bilateral model of international collaboration, there is interest in gauging the relevance of multi-institutional models. Furthermore, given the tendency for funded PhD awards to be granted for study outside of the continent, there is also a need to explore the option of South–South (or South–South–North) models of collaboration. Evidence from the country reports suggests that multi-institutional and South-South collaborations may indeed have greater potential to address the second qualitative concern of enhancing the effectiveness and quality of PhD training. The consortium for Advanced Research Training in Africa (CARTA) is one such scheme in the field of health science. Although it is funded by OECD donors, the consortium is led jointly by the African Population and Health Research Center (APHRC) in Kenya and the University of the Witwatersrand in South Africa. CARTA organises residential doctoral schools (called joint advanced seminars) for participating PhD students, which have reportedly been successful in promoting networking, peer support, and timely graduation. There is a South–North

39. Harle, J (2013) *op. cit.*

40. Harle, J (2013) *op. cit.* page 4.

41. Harle, J (2013) *op. cit.* page 6.

42. DAAD (May 2014). *DAAD Strategies for Countries and Regions: Academic collaboration with the countries of Sub-Saharan Africa*. Bonn: Deutscher Akademischer Austauschdienst (DAAD), page 4.

component as well, but its main objective is to provide mentorship and peer review on research outputs (such as draft thesis chapters). Another scheme following this model is the African Doctoral Academy PhD training hub based at Stellenbosch University in South Africa, funded by the Carnegie Corporation. It has an even wider remit than CARTA, as it is open to PhD students from any discipline. There is a plan to create a similar PhD training hub in West Africa at the University of Ghana, namely the Ghana Pan-African Doctoral Academy.

Given the study aims, less attention was paid to North-to-South inflow models of PhD training. Nevertheless, one example was identified in the Senegal country study, highlighting the potential for African research centres to provide doctoral training for Global North partners. The German Historic Institute in Paris and the Sorbonne Political Research Centre have partnered with UCAD to offer French and German students in-country doctoral training on a specific theme within African political studies. Further research is needed to gauge the potential for national or regional hubs in Sub-Saharan Africa to serve PhD students beyond the continent in this type of inflow model. Additionally, the potential for this type

of provision to enhance institutional ability to attract external funding for local PhD students in exchange type arrangements needs to be explored.

It was noticeable that institutions varied in the extent of their international networks. Those institutions with the most advanced and systematic internationalisation strategies driven by the senior management were naturally in a better position to develop and sustain international collaborations.

Where do PhD graduates go?

As can be expected based on the typical PhD student profile as mature cohorts largely comprising existing university staff, the majority of students and alumni interviewed either are expecting to work in or have secured work in academia. There is little absorption into industry or the private sector. A comment from a member of the university staff in South Africa highlights this point: industry do not want employees with doctorates to conduct blue sky research; rather, they want practitioners with relevant practical skills to serve key development needs in areas such as clean drinking water.

In terms of institutional trajectories, the data collected was not able to reveal to what extent PhD students return to work in their 'home' institutions post-graduation, or whether they in effect get recruited to join the institution where they complete their PhD. The case of the nGAP in South Africa reminds us that concentration of PhD-qualified staff at elite or flagship institutions is a possibility. In Senegal, an issue raised was competition for academic posts with foreign-trained PhD graduates. This demonstrates that policies in domestic PhD provision need to be examined in tandem with existing patterns in overseas PhD provision. Therefore, further research is needed on trends in overseas PhD provision, and in particular on post-PhD employment patterns of returnee PhD graduates. Close monitoring of post-PhD trajectories for the domestically-produced cohorts is also needed to assess whether current post-graduation employment patterns are enhancing quality in the system overall or perhaps concentrating human resources in unequal ways.

Conclusion and recommendations

On the basis of the findings generated from this study, and existing knowledge about doctoral provision in Africa, the following key conclusions and recommendations can be put forward:

- 1. All countries need to significantly expand their pool and increase their rate of production of PhD graduates*

PhD enrolments are on the increase across the African continent, in line with rapid expansion of the higher education sector as a whole. However, the doctoral level is not keeping pace with current needs of the countries. While attention to PhDs might appear a luxury in low and middle-income countries, this expansion is necessary both to facilitate the growth of undergraduate education while maintaining quality, and to ensure a vibrant research community (both inside and outside universities) to address societal challenges.
- 2. Substantial increases in investment in doctoral education are essential, including state investment*

Adequate financing is essential not only to ensure the quality of the programmes – and provide appropriate infrastructure and equipment – but also, through the provision of scholarships, to ensure that PhD students can dedicate themselves to their studies and complete in a timely fashion. Targeted funding can also serve to ensure equality of opportunity in doctoral programmes, supporting access for under-represented groups, on the basis of gender, race/ethnicity, rural/urban etc., and ensure successful completion.
- 3. Quality of programmes must not be jeopardised in the context of rapid expansion*

There are significant quality concerns across the countries, with evidence showing that standards of provision are slipping in the context of rapid increases in enrolments and diffusion across more institutions. Attention is needed to human resources in terms of availability of PhD supervisors, physical infrastructure in institutions and procedures of quality assurance. To an extent, countries are caught in a 'Catch-22' situation in that it is hard to ensure enough PhD supervisors without creating a faster throughput of PhD graduates. International partnerships can assist in overcoming this obstacle, as discussed further below.
- 4. Higher education systems need to seek a balance between concentration and diffusion of doctoral programmes*

There is considerable debate amongst the countries as to whether to allow the progressive diffusion of doctoral programmes across new public institutions and private institutions, or to concentrate in flagship universities and small numbers of centres of excellence. There are pros and cons to each of these options: centralising provision can serve to ensure high quality and create thriving centres of specialisation, but at the same time restrict access and prevent the development of new providers and programmes. Countries must find ways of reconciling these different considerations.
- 5. Countries should aim for a broad disciplinary spread in doctoral studies*

Many African countries are concerned about the levels of graduation in STEM subjects at all levels, including PhD. The findings above show that all of the countries have a substantial number of PhD programmes in STEM, though it is not clear in all cases how many students are graduating from these programmes. This is a complex challenge, as disparities at lower levels of education make it hard in the short term to increase the number of PhDs, and enrolments are determined as much by demand as any supply-side interventions. While it is important to promote STEM subjects, this should not be done to the detriment of other areas, and it is essential to national development to ensure vibrant research communities also in arts, humanities and social sciences, and in both basic research and applied areas, as is the case in OECD countries. The trend towards interdisciplinary PhD study in African countries also presents some interesting possibilities.

6. *Strong linkages should be developed between universities, communities, industry and government*

The quality and relevance of doctoral education and the research produced by PhD students can be significantly enhanced by interaction with stakeholders in non-university institutions. In some cases partnerships may develop commercial applications of research, but it is also important for doctoral students to engage with community interests to ensure that research addresses developmental needs of all segments of society.

7. *More extensive and more reliable data must be collected to inform policymaking around PhD provision*

Higher education institutions and national agencies must work together to ensure that relevant information on programmes, disciplinary focus, enrolments, completions, onward trajectories and other information are collected and available for analysis by policymakers and researchers.

8. *International partnerships can play a pivotal role in strengthening PhD provision*

There are a number of current initiatives underway supporting doctoral education in African countries, involving overseas higher education institutions, bilateral donors, multilateral agencies, philanthropic foundations, NGOs and international networks. These initiatives can have a significantly positive impact as long as the focus is on strengthening provision within the African countries, rather than siphoning off talent towards institutions in the Global North. South–South collaborations, often supported by international agencies, have significant potential in this regard.

