

What percentage of academic staff in South Africa holds a doctoral degree?

Milandré van Lill

Background

One of key goals of the South African NSI is to strengthen and expand the human capabilities for science and innovation. This includes an explicit imperative to improve PhD attainment by university staff (DSI Decadal Plan, 2022). The National Development Plan in 2008 set a target to increase the percentage of **academic staff with a PhD to 75% in 2030** (DSI, 2008). The Draft Decadal Plan (2022) included once again this objective but put the spotlight on historically disadvantaged universities (HDIs), Universities of Technology (UoTs) and specifically women and black academics.

This aim to improve the qualifications of academic staff is rooted in the need to contribute to national development by enhancing the skills of faculty to absorb the growing number of doctoral graduates. By producing graduates with the necessary skills and knowledge to tackle the major social and economic challenges facing the country, South African universities can play a significant role in national development. Moreover, improving the qualifications of academic staff can enhance the quality of education, as staff with PhDs have a higher level of expertise and knowledge in their field. A doctoral qualification can also lead to increased research productivity and provide more opportunities for funding and collaboration.

As of 2021, 48% of all permanent instructional/research staff at the public universities in South Africa held a doctoral degree with the 'traditional' research universities having a higher percentage of academic staff with PhDs at 60%, compared to an average of 33% for academic staff at UoTs, as reported by HEMIS data. However, there are significant differences across disciplinary fields, which this SciByte aims to highlight.

Although the DSI Decadal Plan has refined the National Development Plan's original target to account for the differentiated university sector, there is no consideration of the differences between the basic, fundamental sciences, and the applied and professional fields. Basic scientific disciplines aim to advance knowledge and understanding of a particular field without any direct or immediate application to real-world problems. Basic research is often curiosity-driven and seeks to answer fundamental questions about nature, the universe, or human behaviour (Van Lill, 2019). Applied disciplines, on the other hand, typically seek to apply existing knowledge and theories to solve practical problems or improve real-world outcomes. Applied research is often problem-driven and seeks to find practical solutions to challenges facing society or industry. Examples of disciplines that are predominantly applied or problem-driven include Engineering, Medicine, Economics, and Computer Science, while fields such as Physics, Mathematics, and Philosophy are often cited as examples of basic sciences. Within the applied sciences, fields such as Accounting, Education and Law (among others) are more professional fields which prepares students for a specific profession or career, and it typically

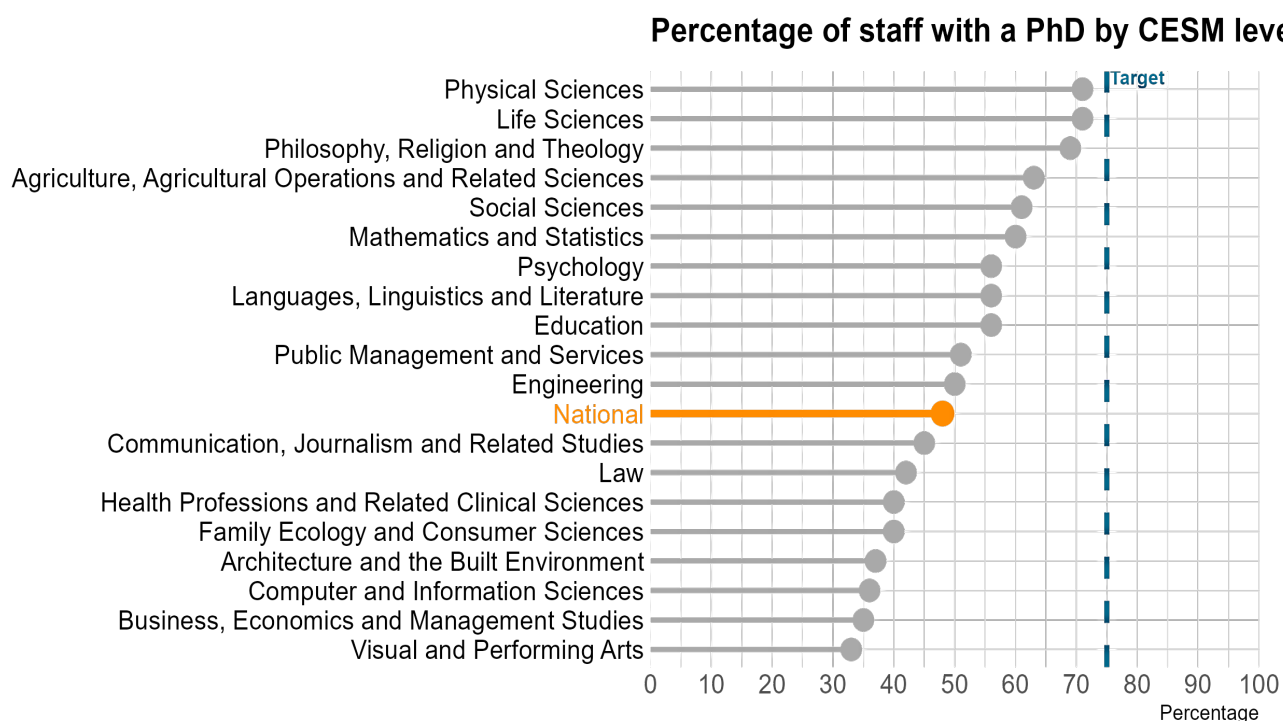
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involves the practical application of knowledge and skills to real-world problems or challenges. These disciplines often have a strong focus on developing the practical skills and competencies required for successful employment in their respective fields. We generally find low conversion rates to Doctoral studies in these fields and students tend to exit the academic pipeline at an Honours or at most, a Master’s level.

In this SciByte we compare the share of permanent academic staff across academic disciplines. Using the HEMIS data, we have selected fields where the sum of staff FTE (full-time equivalent) is greater than 10 and summed the permanent instructional/research staff FTE, with a highest qualification as the doctorate, for 2021 (the latest year for which HEMIS data is available).

How does the share of academic staff with a PhD compare across disciplinary fields?

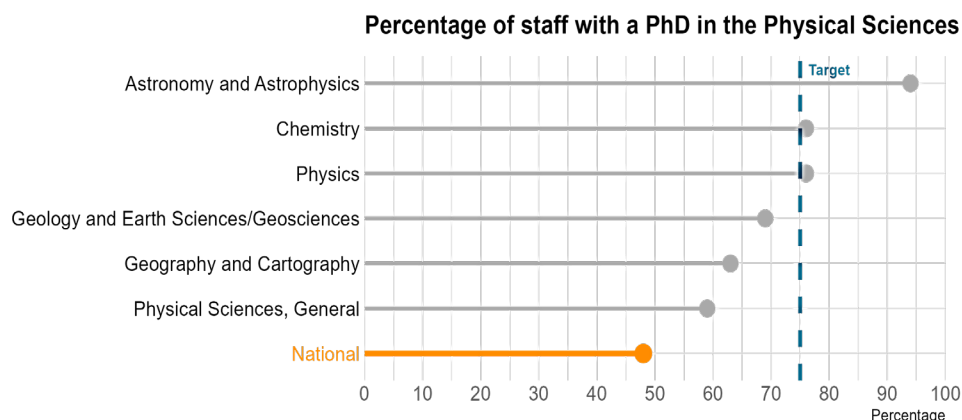
In the figure below we compare the percentage of academic staff with a PhD in 2021 across the 20 CESM level one (Classification of Educational Subject Matter) categories. We also compare the disciplines against the national average of 48% as well as the NDPs target of 75%. The data show that academic staff in the Physical Sciences and Life Sciences had the highest percentage of doctorate staff at 71% followed closely by academics in Philosophy, Religion and Theology at 69%. The graph also shows that the basic sciences are clustered towards the top half of the chart – above the national average – compared with more applied and professional fields such as Law (42%), Health Sciences (40%), and Computer and Information Sciences (36%). The exceptions are Psychology (at 56%) and Engineering (50%). We find the lowest percentage of academic staff with a PhD in the Visual and Performing Arts at 33% in 2021, followed closely by the Business, Economics and Management Sciences (35%).



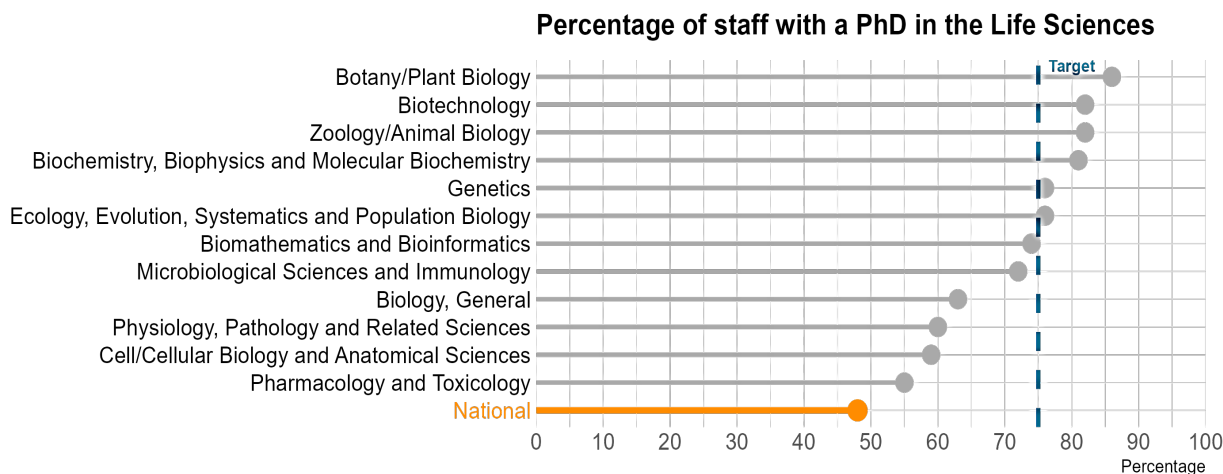
The classification of disciplines at the CESM level one resulted, in some cases, in a broad configuration of disciplines that may pronounced differences at the next level. This is especially true when looking at the Physical and Life Sciences, Health Sciences and Social Sciences. It is therefore important to further disaggregate the above results into the respective disciplinary fields. In the sections below we hence report on the percentage of academic staff with a doctorate at CESM level two.

Physical sciences and Life Sciences

When we look at the disciplines within the Physical Sciences, we find that the percentage of academic staff with a PhD is high and well above the national average for all fields. The data show that academic staff in Astronomy and Astrophysics (94%), Chemistry (76%) and Physics (76%) have in fact met the targeted 75% as set out in the NDP.

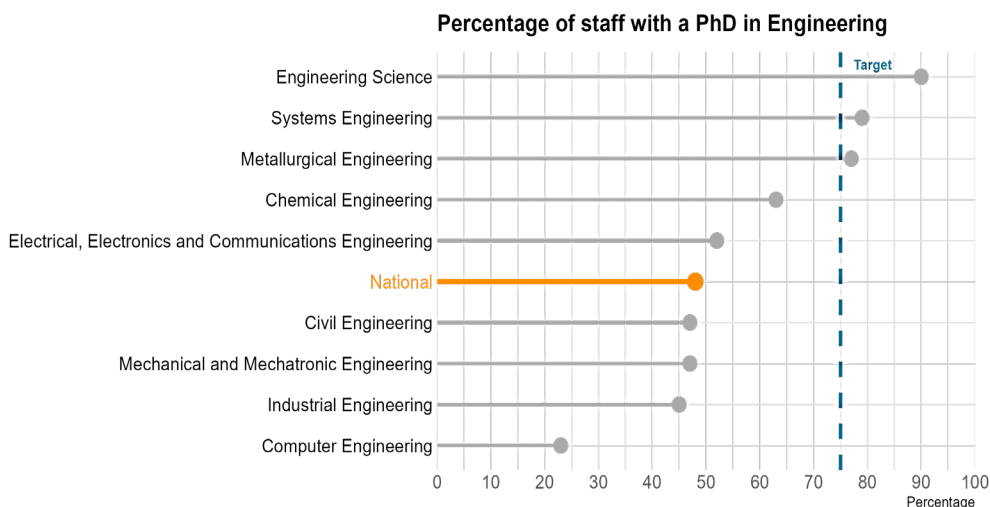


In the figure below we report on the subfields in the Life Sciences. We find, once more, high shares of academic staff with a doctorate where all the fields report a share larger than that of the national average: Botany/Plant Biology (86%), Biotechnology (82%), Zoology/Animal Biology (82%), Biochemistry (81%), Genetics (76%), and Ecology, Evolution and Systematics and Population Biology (76%) have met the desired target of 75%.



Mathematics and Engineering

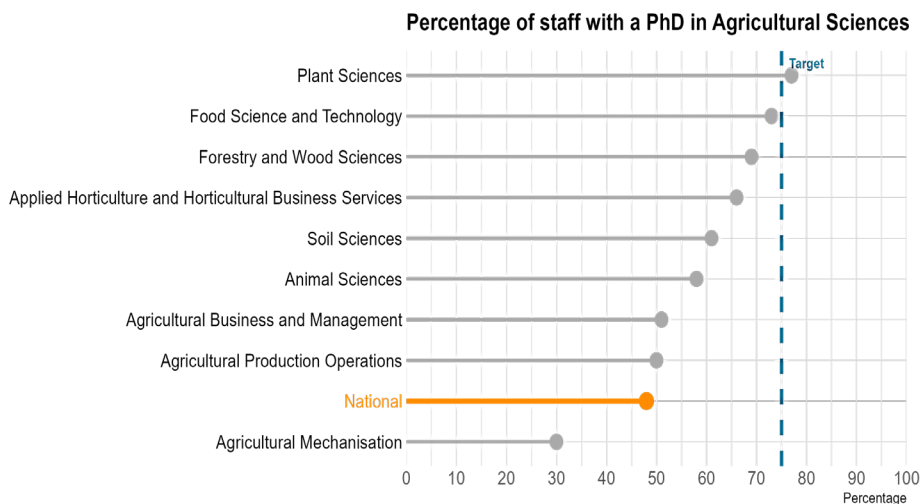
Within the Engineering sciences, we find surprisingly high shares of academic staff with a doctoral qualification in some sub-disciplines, given the professional and applied nature of the field. This is the case for Engineering Science (90%), Systems Engineering (79%), and Metallurgical Engineering (77%). However, it is still the case that the larger sub-fields (Chemical, Electrical and Electronic and especially Civil, Mechanical and Industrial Engineering all recorded percentages around 50% and less.



Within the fields of Mathematics and Statistics we see that both Mathematics and Applied Mathematics have a high percentage of academic staff with a PhD (64% and 62%) with Statistics slightly above the national average at 53%.

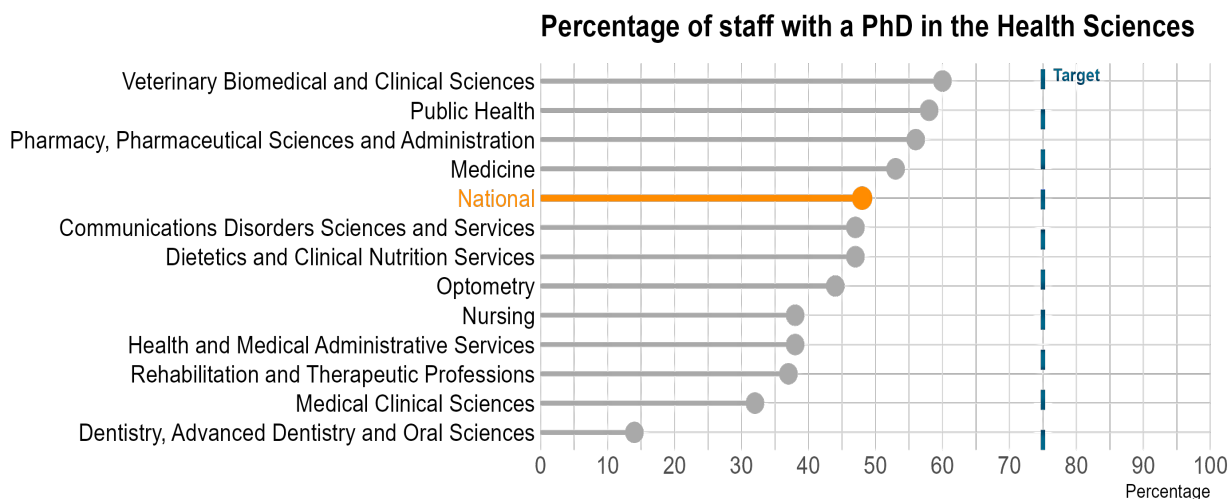
Agricultural Sciences

The Agricultural Sciences recorded the fourth highest share of academic staff with a PhD when comparing across the first level of CESH. When we disaggregate the subfields in the Agricultural Sciences, we find that all fields, except for Agricultural Mechanisation (30%), recorded percentages above the national average. The majority of these fields remain below the target. The exception is the field of Plant Sciences (with 77% of all staff with a PhD) whilst Food and Technology, is close to the target at 73%.



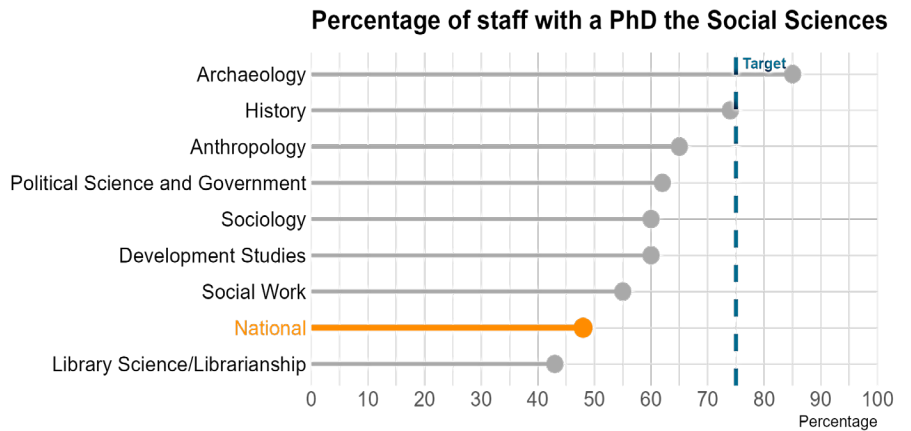
Health Sciences

The Health Sciences are composed of a very heterogeneous group of disciplines and consists of mostly applied and professional (including clinical) fields. We find fewer disciplines where the share of academic staff with a doctorate is above the national average and no field is likely to meet the target set for 2030. The Veterinary Biomedical and Clinical Sciences have the highest percentage of academic staff with a doctorate at 60%, followed by Public Health (58%), the Pharmaceutical Sciences (56%), and Medicine (53%). The percentages of doctorate holders are recorded for professional fields such as Dentistry (14%), the Medical Clinical Sciences (32%) and Rehabilitation and Therapeutic Professions (37%).



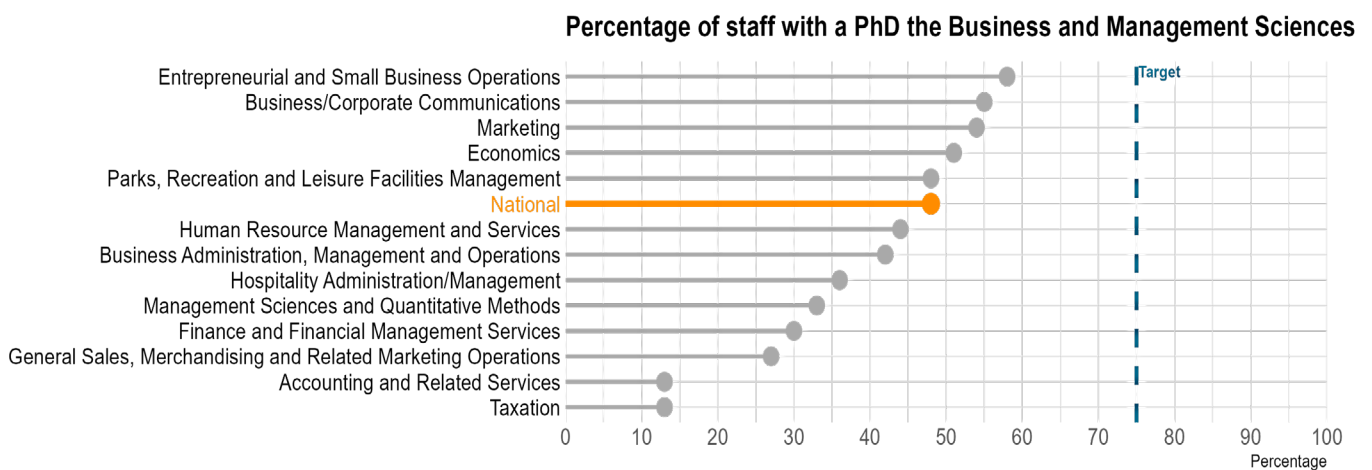
Social Sciences and Humanities

The Social Sciences, as a group, recorded an average of 61% at the first CESM level. When we compare individual disciplines in the Social Sciences, we find that all disciplines (except Library Science at 43%) record shares of doctoral holders above the national average of 48%. Archaeology at 85%, has met the NDP's desired target and History at 74%, would certainly meet the target by 2030. Social Work, as an applied Social Science, has a relatively high share of 55% in 2021.



The percentages of doctorate staff in the Visual and Performing Arts are, not surprisingly low with Music as the only discipline above the national average at 55%, with Drama at 34%, Fine Arts at 26%, and Design and Applied Arts at 14% in 2021. As far as the Humanities are concerned, we see high percentages of doctorate staff in Theology at 86%, with lower percentages for Philosophy at 61%, and Religion at 52% in 2021.

The comparison across the first CESM level showed that Business and Management Sciences had a lower percentage of academic staff with a doctoral degree compared to the other Sciences. However, the CESM clustering groups together a heterogeneous group of disciplines as shown in the figure below. While none of the disciplines approximate the NDP's desired target, we see the highest share of academic staff with a PhD in the Entrepreneurial Sciences (58%), followed by Business/Corporate Communications (55%), Marketing (54%), and Economics (51%). Again, we see low percentages recorded for the professional fields of Accounting and Related Services (13%), and Taxation (13%).



Discussion

We have shown in this SciByte how the qualifications of academic staff differ significantly across disciplinary fields. The data clearly show that fields in the basic sciences are more likely to have higher shares of academic staff with a doctoral qualification. This is especially true for disciplines in the Physical and Life sciences. When we consider the NDP's national target of 75%, we see that some fields have already achieved this target by 2021 but these disciplines are mostly in the Biological/Life Sciences, selected fields in the Physical Sciences (such as Astronomy and Astrophysics, Chemistry and Physics), and Engineering Sciences. Among the applied and professional fields – especially the Health, Computer and Business Sciences – much lower percentages of staff hold a doctoral degree. The exception being Theology which as a professional field, has an extremely high share (86%) of staff with a PhD.

The main take-away policy message from our analysis is that any target setting related to the qualifications of staff in a specific scientific or academic discipline, must consider the large differences in the nature of these differences. This should not only apply to the national level – where it is increasingly clear that the NDP target of 75% across all fields is an unattainable goal – but also for university and even Faculty or School-level policies and strategies. When universities and their Faculties and Departments undertake strategic planning concerning this issue and when they want to set targets for their staff on the attainment of doctoral qualifications, it is clearly essential that the disaggregated picture that we showed here, needs to be taken into account.

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