Voice of Early-Career Researchers 2020 study

Data Report and Development of a Research Positivity Scale

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Acknowledgements:

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1 Introduction and background

In this time of global crisis, research and evidence is more important than ever. INASP's AuthorAID project supports an online community of over 22,000 early-career researchers in 100+ low- and middle-income countries to publish and communicate their work.

During April 2020, INASP, through its AuthorAID project, conducted a "Voices of Early-Career Researchers" (VoECR) study to determine how the research environment is changing and affecting early-career researchers across the globe. Responses were received from 752 researchers in 94 countries and across the whole spectrum of academic disciplines. Our aim is for the results of this survey to contribute to the body of evidence on how opportunities and challenges for LMIC researchers impact the perception of their ability to contribute to national and international research systems, and attitudes towards research careers.

Previous research by INASP and others has focused mostly on the training needs and barriers to communicating their research. This has often focused on particular challenges such as open access publication, access to research literature, and the impact of training interventions such as online courses and mentoring. This and other research has highlighted common problems – a lack of funding and opportunities, difficulty in writing in academic English, and getting published in journals.

Through this research, we also know that researchers experience frustrations in their career, for example, with difficulties accessing equipment, literature, mentors, networks and collaborators; at the same time they experience a lot of pressure to publish and intense teaching workloads. There are also perceived problems with credibility of research conducted in their region, which makes it difficult to get their voice heard both by local policymakers/practitioners, and on the global stage. These issues are often exacerbated for women who have reported additional barriers to writing and publishing their research, as well as fewer opportunities for career progression.

Few studies have examined in depth the motivations and job satisfaction of Southern researchers; how they are supported and evaluated; how positive they feel about their career; where they see the role of research in national development; how they feel about the quality of the research in their region and how it could be improved; and what could change this in the future. Whilst there has been some research on career progression, support and opportunities to collaborate, this has tended to focus on particular disciplinary and regional groups.

We wanted to build a more complete, evidence-based picture of the evolving needs, motivations and contexts of researchers in the global South. Building on our knowledge of the barriers that early-career researchers in our network face (from previous member surveys, online course feedback and anecdotal evidence), we aimed to delve deeper to understand:

Incentives and motivations

- How positive do they feel about their research career now and in the future?
- How do they perceive their opportunities and career pathways?
- Are they motivated and empowered to make an impact on national development?

Research assessment and the concept of research excellence

- How is their research and career evaluated, and by whom? Do they feel evaluation is fair and supportive?
- How do they define research excellence? What kind of 'impact' do they consider most important?
- What kind of research communication is most important, and do they have the support and opportunities for this?
- How do they perceive the quality of the research being done in their institution and regional context?

Perspectives on who is shaping the future

- What steps could be made to improve research in their region, and where should funding be focused?
- Do they have sufficient access to research funding, and opportunities to network, travel and collaborate?

Significant gender and other demographic differences

- Do the answers to these questions differ by gender, geography, institution, or experience?

Using the survey data, we piloted a new 'research positivity' index covering 'personal positivity' and 'context positivity'. The aim of this index is to understand, and subsequently monitor, the factors contributing to, and intersecting with both researchers' personal experience of their research, and the context in which they work. Our intention is that the index will serve as a protocol for studying research positivity in future research, allowing for comparison with new or broader datasets, and monitoring changes in attitudes over time.

2 Summary findings

Respondents have an overall sense of optimism and positivity about careers as researchers, but the data confirmed some well-known challenges.

- There are asymmetries in access and attainment by gender, and these result in inequitable professional outcomes for women researchers
- Research assessment and measures of research excellence continue to emphasise output over impact
- Collaboration is a contributing factor to researcher positivity, but there are limited opportunities/funding to enter into such collaborations, and some researchers feel there are inequities within international collaborations
- Insufficient access to funding was an issue cited by 93% of respondents

Gender differences as a cross cutting theme

Women are more disadvantaged in terms of opportunities, and have fewer reported outputs

The survey data showed that women feel less positive (RPosP) about their research careers than men. Responses indicated that they are disadvantaged in research opportunities, more uncertain about their future, and have less opportunities for collaboration.

The men who responded to our survey were generally more advanced in their careers. Our data indicated that men are more prolific in most research outputs (papers in international and national journals, sharing data, submitting open access). In contrast, fewer women believed that they had sufficient opportunities to present and promote their work.

The following are the areas where statistically significant gender differences were observed in the data:

1. Seniority of researchers in the sample - only 10% women identify as being at senior career level compared with 16% men.
2. Opportunities for women – there was a marked gender difference with a higher proportion of women believing that women are disadvantaged when it comes to research opportunities (49% women compared to only 26% men).
3. Remaining in research careers - A disproportionate number of those who were uncertain about their future in research were women (31/51 = 60% - compared to 37% women in the whole population).

4. Research activities - in general, a higher proportion of men indicated engagement in research activities than women with particular differences when it came to publishing research – eg Publication in International Journals - 59% men, 46% women
5. Opportunities to do collaborative research - There is a possible gender difference with 39% men claiming they had sufficient opportunities compared to only 31% women.
6. There were some gender differences in opinions about opportunities to present and promote research work.

But there are also some more unexpected results. It is often thought that women ECRs suffer from lack of mobility and opportunities for travel (Quadrio-Curzio, 2020; Prozesky, 2019) but the survey data did not show any gender inequity in conference attendance. In addition, fewer women respondents (40%) felt that their location was a disadvantage, than men (47%) did.

Research evaluation: output over impact

Researchers believe strongly in making real societal impact, but are driven much more towards publications and presentations within academia

The intense pressure for academics to publish their research in 'high-impact' journals, also known as the "publish or perish" culture, is a well-known challenge for researchers all over the world, including in the global South. Some think this is a positive force - according to Abubakar (2016), the slow growth in research productivity in the global south demonstrates that that 'publish or perish' is working, and that such incentives reward "productive researchers and institutions". Whilst other evidence suggests that the pressure to publish in the global South is not as intense as in the UK and US, and seen as more of an incentive (van Dalen & Hankens (2012). Nevertheless, most respondents in this research identified major 'cons' of publish-or-perish being excessive publication, lack of citations and a neglect of important policy issues. It can also create a dilemma for researchers to choose between relevance (local) or recognition (international), which are extremely difficult to achieve at the same time (Vurayai & Ndofirepi 2020). This is particularly harsh on novice scholars under pressure to publish within their notice period (ibid.) Additionally, this can also mean that time and energy invested in the publication process is neglected in important outreach, for example to the public, media and policymakers (Ssentongo 2017). Publish or perish is also a well know exacerbator or gender inequities, for example African women academics who are under the same pressure to publish as their male counterparts, despite juggling additional family pressures (ibid).

The well-known "publish or perish" pressure came across strongly from our data. Respondents are passionate about real development impact - making a contribution to development and society – over and above recognition and publications (Q11). But their research is predominantly assessed on their outputs - papers, citations, conferences presentations. (Number of papers produced (80%), conferences attended (60%) and peer review journal metrics (54%) are cited as the most common indicators by which researchers have been assessed). Many experience a high level of pressure to publish (with 56% agreeing that "I feel under pressure to publish my work as quickly as possible"), a focus on publications in journals over other outputs (72%) and publishing in journals with prestige.

Research evaluation is seen as fair (60%) and helping to nurture research careers (72%), but the majority of respondents feel that they are evaluated more on the identity of the journal in which they have published than research itself (52%). Despite the dominance of journal publications in assessment, impact case studies (28%), technology transfer and patents (26%) and policy briefs (18%) were also commonly referenced as indicators or metrics used for assessment.

Respondents feel that they CAN have an impact on development (higher with seniority) and have a responsibility to make their work known outside of academia (also higher with seniority), BUT only 50% feel that they have opportunities to promote their work(Q35). 29% have communicated their research via social media and 14% have presented to a policy maker.

66% of respondents have been evaluated by their institution (66%). A great deal less experience evaluation by a national government body (38%). The overlap between those who have been evaluated by either body is high – more so according to seniority. Further studies would be needed to assess the

extent to which the link between national research agendas and individual research output are evaluated.

A definition of 'Research Excellence'

The expression 'research excellence' is a commonly used phrase in research assessment, but definitions vary, and researchers are rarely consulted. This term is often defined by stakeholders in the global North.[1]

We asked respondents to complete the following sentence: "Excellent research is research which..." Aggregating the most commonly cited responses, participants in this survey defined research excellence as follows:

*Excellent Research is research which is **methodologically robust,** is conducted ethically, **has practical impact** and is published in a reputable journal.*

Access to research funding

Funding is difficult for less experienced researchers to find and international funding is particularly difficult to win.

93% of respondents said that they do not receive sufficient funding for their research. There was variation according to seniority, with more senior researchers more likely to report sufficient funding. Funding was highly cited as likely to have the most positive, or the most negative impact on their research work in the future.

93% of respondents said that they do not receive sufficient funding for their research. There was variation according to seniority, with more senior researchers more likely to report sufficient funding.

In total, 31% of respondents had applied for and received funds from institutional funding, 20% from national funders, and 19% from international funder. However, 53% of respondents and not applied (directly) for international research grants, 50% had not applied for funding from national funding bodies, and 45% had not applied for funding from local or institutional research funds.

Research collaboration

Collaborative research is vital, but there is limited funding, opportunities and support for this – and some inequity within international research teams

Collaborating with researchers outside their own institution was seen as vitally important (by 87% of respondents). 63% of respondents had collaborated with other national researchers, 43% with researchers internationally. More experienced researchers were more likely to have undertaken collaborative research and there is also a possible indication of a small gender difference on both national collaboration (65% men compared to 61% women) and international collaboration (45% men compared to 38% women).

Analysis suggested that collaboration contributes towards higher research positivity - those who had taken part in a collaboration within their own country, or international collaboration had a higher personal positivity RPosP than those who had not.

But responses also pointed to limited funding and collaboration opportunities, along with poor institutional support, time, and access to collaborators.

77% of respondents who had experienced an international research collaboration felt that their contributions had been sufficiently recognised. Amongst the remaining 33%, there were a small number of comments critical of their international partners.

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[1] Cameron Neylon https://hcommons.org/deposits/item/hc:26133/ and
Kraemer-Mbula et al , Is the rhetoric of research 'excellence' holding us back?
https://www.universityworldnews.com/post.php?story=20200708131007532

3 Methodology

The approach taken for this study was developed via the following phases:

1. A literature review
2. Initial survey design
3. Pilot of the survey with small group
4. Survey refinement and roll-out to our network

Literature review and survey design

A number of relevant surveys and literature were reviewed to identify the information and understanding we already had within INASP and externally, as well as the gaps in our data that needed further exploring. A list of references consulted is included in Appendix 1.

The survey was designed to ensure that gaps identified during the literature review (see Introduction) would be addressed as well as capture information related to our areas of focus.

Survey pilot

The survey was piloted with a small group of mentors (36) from INASP's AuthorAID network, selected because of their significant experience in research, and with gender balance and regional diversity in mind. Based on feedback from the pilot, we changed the framing of some questions for greater clarity.

During the pilot survey phase, the corona pandemic started to spread across the world. It was felt there was a responsibility and an opportunity to understand the impact of the pandemic on early-career researchers, hence a question was developed to capture this [see question 41 in Appendix 2]. The coronavirus question was not included in the pilot survey. A separate report of the results of this question are published in our paper, The impact of COVID-19 on early-career researchers.[2]

Main survey

The survey was sent to 15,660 members of the AuthorAID community via email, publicised on the AuthorAID website and social media accounts and shared with selected partner institutions to circulate in their networks.

In total 785 people were included in the survey (33 pilot and 752 final version respondents).

The respondents came from 95 different countries and worked in a wide range of different institution types. They represented range of disciplines with the most frequently represented being Medicine and Healthcare (30%). The majority had between one and five years of research experience. More details on respondents is included in the following section.

Analysis of responses: Pilot Research Positivity Index

In addition to analysis of quantitative and qualitative responses, we piloted a new index for research positivity to understand, and subsequently monitor, the factors contributing to researchers' personal experience of a research career and perspectives on the context of their research.

The research positivity index (RPos) was developed combining the responses from 20 individual questions into two subscales representing personal career positivity and contextual positivity (positivity about institution, national and international research).

Analysis of variances were carried out to determine dependence of positivity on different demographic factors – gender, geographical regional, academic discipline - and experiences.

To utilise the index in the future, we plan to create a simplified version of the survey incorporating only demographics plus the 20 questions that make up the index.

Limitations

Due to changes in the phrasing and structure of questions between the pilot and final versions, the data could not be combined directly. Approximately 50% of the 36 responses to the pilot version could be directly incorporated into the complete dataset – however, this included most of the open-ended questions.

While responses were received from researchers across 94 countries, a majority (62%) were from Sub-Saharan Africa. The uneven nature of regional distribution limits the reliability of region as a categorical

[2] Dooley, G., (2020). The impact of COVID-19 on early-career researchers, INASP. https://www.inasp.info/publications/impact-covid-19-early-career-researchers

variable for analyses of this data. In addition, while we were ablet to develop the pilot approach and analytical protocol for our Research Positivity index, we were not able to apply it reliably across our data set due to uneven regional distribution of responses.

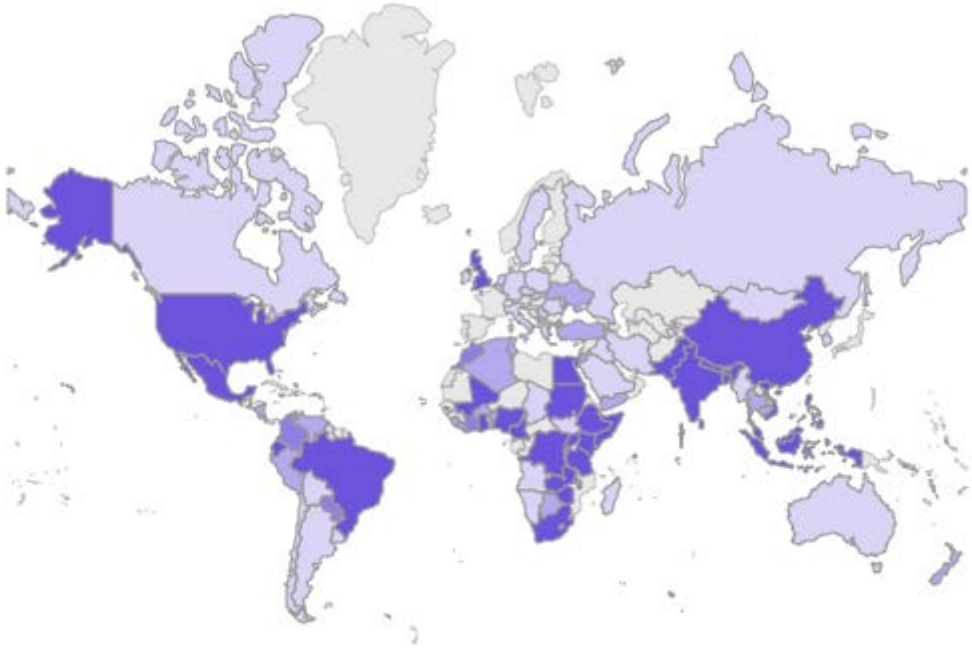
The last nine months of global pandemic have drawn fresh attention to the processes of exclusion that run through our knowledge systems – that is, the ways in which we produce, communicate and use knowledge. Although we included a question specifically targeted at 'outing' the immediate impact of the pandemic on research experience, the timing of the survey (early on in the pandemic) meant that countries were at different stages in feeling the effects of COVID-19. The wider impact of changes to the research environment, context and practices caused by COVID-19 may not be reflected in the survey responses.

4. Who responded

The respondents consisted of 785 individuals 37% female, 63% male <1% (N=4) other or unspecified.

They were based in 99 different countries, the most frequently represented being Nigeria 27%, India 5%, Ghana 5% - all other countries <5%.

The figure below shows the geographical distribution with intensity of colour representing the frequency in a country:



786 total participants across 95 countries.The darker the colour, the more participants. Countries with the largest numbers of participants include Nigeria (N=213), India (N=42) and Ghana (N=39)

An interactive version of this map indicating the number of respondents from each country can be found online at https://infogram.com/world-map-1hdw2jwkzy0p4l0?live

Geographic Regions

Latin America	5.35%	42
Middle East & North Africa	2.55%	20
Other	5.61%	44
South Asia	20.13%	158
South East Asia	3.44%	27
Africa	62.93%	494

In all the geographic regions the proportions of men and women were consistent with the overall marginal proportions, except for Latin America where there were proportionally more females than in other regions.

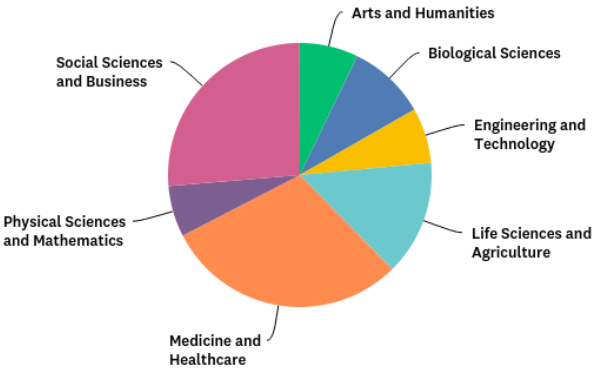
Employment Institution Type:

Row Labels	Institution by %	Institution by No. reponses
Academy of science	1.16%	9
Government	8.52%	66
Government - regional	1.55%	12
Hospital	7.35%	57
International NGO	2.32%	18
Learned/Professional Society	0.39%	3
National or regional NGO	3.87%	30
National Research and Education Network (NREN)	0.26%	2
Other (please specify)	4.52%	35
Publishing platform	0.52%	4
Research institute - international	0.90%	7
Research institute - private	3.35%	26
Research institute - public	7.74%	60
Research network	2.32%	18
University - private	8.00%	62
University - public	34.84%	270
University network	12.39%	96
Grand Total	**100.00%**	**775**

17 different types of organisation were cited as primary employers with the most common being Public Universities 35%; University Networks 12%; Government 9%; Private Universities 8%; Hospitals 7%; Public Research Institutes 8% - all other institution types <5%.

Respondents came from across a whole range of disciplines with the most frequently represented being Medicine and Healthcare 30% and the least frequently represented being Physical Sciences and Mathematics 6%.

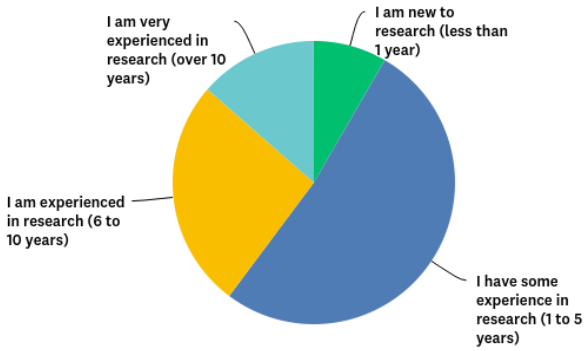
Q5 Which of the following best describes your main area of research or study?



There was no indication of any gender differences in proportions.

The majority (51%) had between one and five years of research experience; 8% were new to research and 13% were very experienced with over 10 years' experience.

Q6 How much research experience do you have?



There was no indication of any gender differences in proportions.

14% consider themselves to be at a senior career stage, 43% mid-career and 43% early career.

There is a gender difference with 10% women identifying as being at senior career level compared with 16% men.

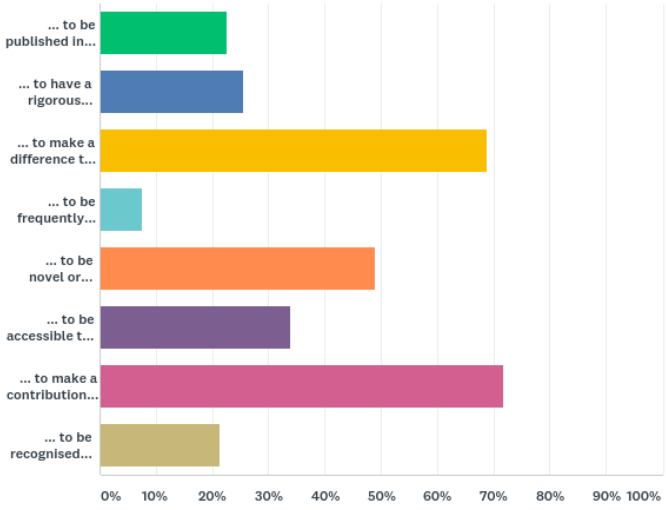
2% (N=13) considered themselves to have a disability with a further 2% (N=12) opting not to answer the question.

5. Detailed findings

Researcher motivation and experiences

Respondents were asked to choose 3 from a list of 8 options indicating the most important factors for research. The most frequently chosen factors were “To make a contribution to the nation’s scientific development” (72%) and “to make a difference to society (68%)”. The least commonly cited factor was “to be frequently cited in the literature” (7%).

Q11 Which factors are most important for your research (select the 3 factors you consider the most important)



There is no evidence of any gender differences – the same factors are considered to be the most important by similar proportions of men and women.

Respondents were asked to indicate whether they agreed with a number of statements on the general state of research. The statements are shown below in order of level of consensus (ie highest level of Agreement or Disagreement):

1. Researchers can make an impact on development in their country (*96% Agreement)*
2. Research is a good career choice (*93% Agreement)*
3. If I could go back in time, I would not choose a research career (*10% Agreement)*
4. Researchers have a responsibility to make their findings known outside of academia (*88% Agreement)*
5. My location is a disadvantage to developing a research career (*44% Agreement)*
6. Women in research get less opportunities than men in similar positions *(34% Agreement)*

We looked at whether there were particular demographic factors that might be related to respondents tendency to agree with these statements. The following is a summary of where we identified statistically significant factors associated with agreement.

Women in research get fewer opportunities than men in similar positions

Gender and Discipline (Biological Science) are significant

- 40% Women compared with 22% Men Agree
- 42% Biological Sciences compared with 27% across other disciplines

Research is a good career choice

Regions (Sub-Saharan Africa and Southern Africa) are significant

- 81% Sub-Saharan Africa and 79% Southern Africa compared to 65% across other regions

Researchers have a responsibility to make their findings known outside of academia

Experience is significant

- Tendency to agree increases with increasing amount of research experience – 57% of new researchers agree compared with 77% of those with 10+ years of experience.

Researchers can make an impact on development in their country

Experience is significant

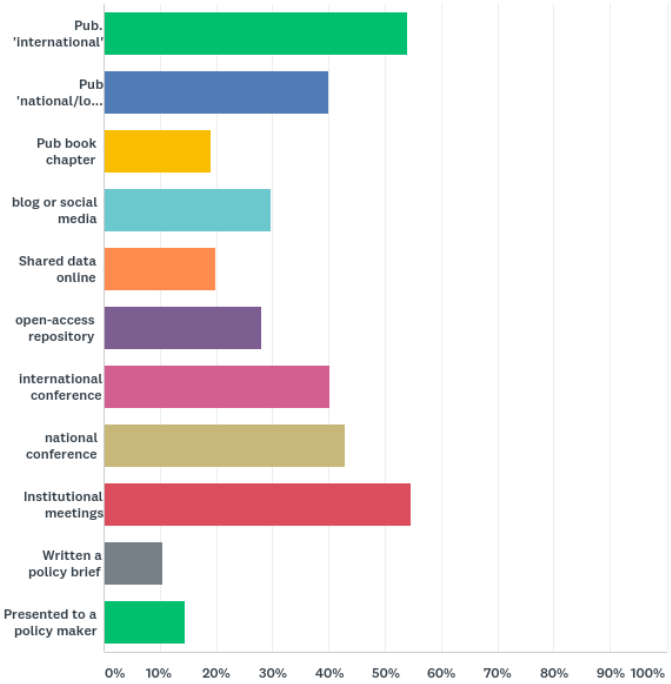
- Tendency to agree increases with increasing amount of research experience – 70% of new researchers agree compared with 85% of those with 10+ years of experience.

The most contentious statements involved the role of location and opportunities for women. On both of these issues there are some gender differences in the opinions. A higher proportion of men think that location is a disadvantage (47% of men compared to 40% of women). Conversely, a higher proportion of women believe that women are disadvantaged when it comes to research opportunities (49% women compared to only 26% men).

Research activities

Respondents had been involved in a wide range of activities within their own institutions, nationally withing their countries and internationally. 54% of respondents had presented their research findings at meetings within their own institutions, 54% had published at least one paper in an international research journal.

Q34 Please indicate which, if any, of the following research activities/outputs you have accomplished in the last year



In some areas there were large gender differences, with men being more likely to report activity than women. The areas where there were the largest differences were:

- Publication in international journals - 59% men, 46% women
- Publication in national/local journals - 44% men, 32% women
- Sharing data online - 24% men, 12% women
- Submitting data to an open-access repository - 32% men, 21% women

The only area where women reported more activity than men was:

- Presentation at international conferences - 39% men, 42% women

… and this difference is marginal and unlikely to be significant.

Overall, 50% believed that they had sufficient opportunities to present and promote their work, but again there was a gender difference - 53% men believed they had sufficient opportunities compared to only 43% women.

Research evaluation

66% of respondents claim that their work is “routinely evaluated for quality and impact by an institutional research body” (19% say their work is not evaluated and 15% don’t know).

38% of respondents claim that their work is “routinely evaluated for quality and impact by a national or government body” (40% say their work is not evaluated and 23% don’t know).

There is an effect of seniority – as researchers become more senior, there is a tendency for an increasing proportion to report that their work is evaluated at both institutional and national levels.

Career level	Institutional Evaluation	National Evaluation
Early career	62%	31%
Mid career	68%	41%
Senior	70%	44%

Respondents were asked to indicate whether they agreed with a number of statements on their personal experience of research evaluation. The statements are shown below in order of level of consensus (ie highest level of Agreement or Disagreement):

1. Getting my research published in academic journals has more impact on my career than disseminating the research to other audiences (*72% Agreement)*
2. The way my research productivity is evaluated helps nurture my career (*72% Agreement)*
3. There is too much emphasis on quantity of publications at the expense of research quality (*70% Agreement)*
4. The evaluation of my research is fair, and I feel that the quality of my research is recognised and rewarded (*60% Agreement)*
5. I feel under pressure to publish my work as quickly as possible *(56% Agreement)*
6. I am evaluated on the quality of my research more than the identity of the journal in which it is published *(47% Agreement)*

We looked at whether there were particular factors that might be related to respondents tendency to agree with the statements. There was a distinct gender difference with men having a greater tendency to agree with all the statements except 2 ("The way my research productivity is evaluated helps nurture my career") where 15% more women agree than men. The following is a summary of where we identified the most statistically significant differences associated with agreement.

I am evaluated on the quality of my research more than the identity of the journal in which it is published

Gender and Region (South Asia) are Significant

- 46% Men Agree compared with 34% Women
- 51% of respondents from Southern Africa Agree compared with 39% across the other regions

Getting my research published in academic journals has more impact on my career than disseminating the research to other audiences

Gender and Experience are Significant

- 58% Women compared with 67% Men Agree
- Tendency to agree increases with increasing amount of research experience – 56% of new researchers agree compared with 71% of those with 10+ years of experience.

The way my research productivity is evaluated helps nurture my career

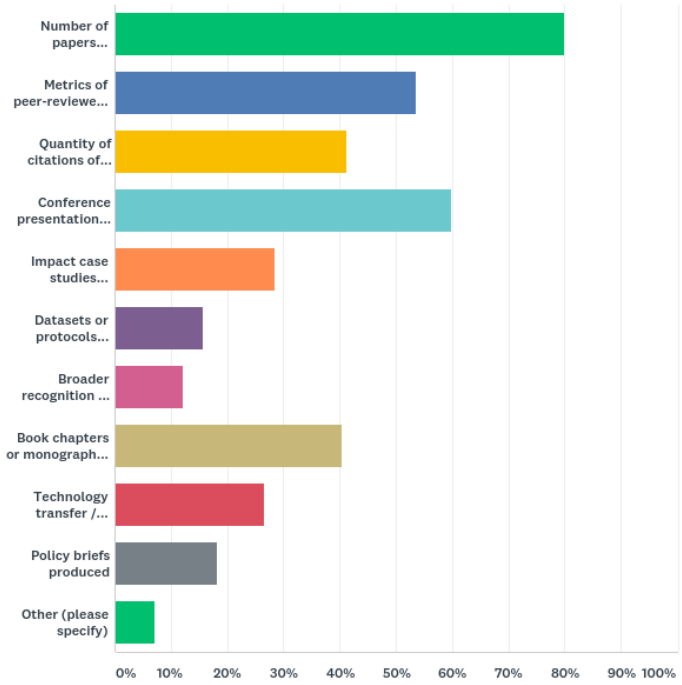
Gender and Regions (Sub-Saharan Africa and South Asia) are Significant

- 59% Women compared with 67% Men Agree
- 67% from Sub-Saharan Africa and 68% from Southern Africa Agree compared with 50% across the other regions combined.

Assessment metrics

The number of papers produced (80%), conferences attended (60%) and peer review journal metrics (54%) are cited as the most common metrics used to assess research.

Q14 What indicators or metrics are used to assess you as a researcher (for career and promotion purposes)? Tick all that apply



Amongst the 'other' options (N=47), teaching and supervising were mentioned several times as well as attracting money or research grants to the institution. There were also a couple of mentions of completion of administrative work for the institution and level of qualifications attained.

One respondent indicated that evaluation was not always based on merit:

> *Political connection can aid promotion and if you are not part of the cabals, even with all best high impact journal, there won't be promotion at some points e.g, Professorial cadre.*
>
> Mid-career male researcher from Nigeria working in a public university

In terms of promotion and career progression, the most dominant theme was publication, with emphasis on number of publications and quality of journals. In answer to the question "What do you feel has the biggest impact on your opportunities for promotion as a researcher? (Q15), many respondents mentioned journal publication and particularly those with high impact factor.

> *Publishing researchers in Hi impact journals that can facilitate the sector development*
>
> Mid-career female researcher from Sri Lanka

A few people stressed that the research need to be locally relevant and applicable:

> *Producing credible, compelling and convincing evidence to the policy actors to influence policy change*
>
> Mid-career female researcher from Kenya working in a public university

Wordcloud 1: What do you feel has the biggest impact on your opportunities for promotion as a researcher?

Research excellence

Respondents were asked to complete the statement "Excellent Research is research…" Responses were wide ranging and varied from the brief…

> *…is published.*
>
> Senior female researcher from Uganda working in Government

To the expansive…

> *…in which the various researchers from different fields of specialization come together to perform experiments in the laboratory with the sole aim of proffering solution to a particular problem at hand. This experiment is carried out in stages and at various levels, which can fail but it will still be done, until the result is gotten, tested, confirmed, and approved for usage; for the benefit of mankind.*
>
> Early-career female researcher from Nigeria working in a public university

Two overarching areas of concern emerged:

1. *Application of research* - Practicality, applicability, societal relevance.
2. *The way in which research is carried out* - Rigour, replicability, publishability

If we were to try to summarise the responses into a single statement, it would look something like….

*Excellent Research is research which is **methodologically robust,** is conducted ethically, **has practical impact** and is published in a reputable journal**.***

The main themes were:

- Robustness of methods and adherence to scientific standards
- Practical impact and relevance
- Benefit to Society
- Research Ethics
- Publication

Each of these areas are discussed below with examples:

1. **Robustness of methods and adherence to scientific standards**

…conducted with robust methodology to yield high-quality or reliable results/evidence.

Early-career Male researcher from Cameroon working in a public University

… is having a sound methodology and internationally recognized scientific excellence.

Early-career Female researcher from Sri Lanka working in a private University

Wordcloud 2: Excellent research is research which …

Methodological soundness was the key to excellent research for many respondents. It was often combined with the idea of producing replicable results.

One aspect of scientific method that received specific comment was the issue of bias. Lack of bias was most often cited something that defined excellent research. Though two senior researchers suggested that excellent research could be research that controlled for bias, rather than lacked it altogether:

which takes into account issues of biases and specific topical ethical issues.

Senior male researcher from Zambia working in a national or regional NGO

… test hypothesis and controls bias

Senior male researcher from Lesotho working in Government

2. **Practical impact and relevance**

Often, respondents demanded more than 'valid' results, requiring the results to be of practical application, or 'relevance'. This was usually expressed in terms of relevance of output, but some went further, stressing that relevance should be a driver of the research and also that it needed to be resource effective:

… demand driven research that seeks to provide solutions to society problems using minimal resources

Mid-career male researcher from Uganda working in a public research institute

3. **Benefit to society**

Comments concerning the benefit to society could be read as part of the theme of practical relevance, but they go somewhat beyond the merely practical or relevant, stressing the importance of the societal change that can be fuelled by research.

Some of the comments focused on benefits to local communities, some on national development and some on international development:

… can be evidence for policy change for marginalized indigenous communities. It is also an excellent research when it becomes an input for creating action plans by communities themselves

Mid-career female researcher from India working in a private university

… which solves local problem with international impacts.

Early-career male researcher from Nigeria working in a public university

…can connect the findings to the socio-economic welfare of the nation and mankind.

Mid-career male researcher from Nepal working in a university network

4. Research ethics

Ethics featured in a number of responses and was often combined with the idea of societal relevance:

…Is relevant, is useful to policy makers, has appropriate design, follows ethical guidelines and can be replicated

Mid-career female researcher from Nigeria working in a public university

… is ethical, can be used for policy and make a difference in society

Senior male researcher from United Republic of Tanzania working in a public research institute

5. Publication

There was a theme throughout that research had to be disseminated, applied and practical. This was often explicitly expressed in terms of publishing. Some were blunt enough to suggest that publication was the *only* prerequisite for excellent research:

…is published

Senior female researcher from Uganda working in a Government

Though this may be due to an alternative reading of the question - i.e. 'excellent research is published' rather than 'publication is what defines excellent research.

Many of the respondents who mentioned publication also referred to the status or impact of the journal:

… is published in journals with a high impact factor

Mid-career male researcher from Egypt working in a public university

One researcher was careful to specify that the target journals should be accessible as well as high impact:

…is published in journals with a high impact factor and the content will be free for everyone so that other researchers can use it and cite easily

Mid-career female researcher from Bangladesh working in a private university

Finally, a few quotes which embody multiple themes:

…provides answers to local and international community problems using scientific and ethical principles.

Early-career male researcher from Cameroon working in a public university

… generates new knowledge, improves practices, inform policy and has positive impact to the targeted community livelihoods.

Senior male researcher from Tanzania working in a public university

We looked at the factors (both positive and negative) that mitigate for and against the achievement of excellence. Importantly, the two questions that were asked about this were forward-looking – asking people what would be the most important factors in the future, rather than asking what had influenced their research in the past. People were asked to complete the statements:

· In the future, the thing that is most likely to have a positive impact on my research work is...

· In the future, the thing that is most likely to have a negative impact of my research work is...

Funding and finance was the most frequently referenced area for both positive and negative factors. The need for collaboration also came up in both positive and negative answers.

Wordcloud 3: What is likely to have a positive/negative effect on your research career in the future?

Participants were asked for their view of the status of national research and international research in their disciplines. The perception of research in their discipline in their country was mixed, with most (41%) describing it as 'moderate' – and only 32% describing it as 'good' or 'thriving'. In comparison, 71% of respondents described international research in their discipline as 'good' or 'thriving'.

Respondents were asked to comment on "What is the most significant thing that could be done to improve the recognition of research produced in your country? "The common themes emerging from this question (illustrated by an example comment) are:

- Support – primarily financial but also in terms of recognition:
  Make available funding and open opportunities for collaborative research between researchers from the same region
  Early-career male researcher from Mali working in a public university

- Formation of bodies to oversee and/or promote research:
  Have a national body funding the dissemination of our research.
  Mid-career male researcher from Ecuador working in a public university

- Dissemination including media and establishment of awards:
  Disseminating the research and writing about it in popular press. 2. Awards, recognition and writing in press about it.
  Early-career male researcher from India

- Collaboration - both internationally and locally:
  Improve the quality and increase international collaboration
  Mid-career female researcher from Nigeria working in a hospital

- Need for interest and input from governments:
  The problem is leadership. We produce excellent research yearly. And they address national issues but our political leaders are not interested in academic research. They don't even fund it.
  Mid-career male researcher from Nigeria working in a public university

- Need for local relevance and applicability:

Research findings should inform policy and influence practice especially for those of us in the health sciences

Mid-career male researcher from Nigeria working in a public university

- Increasing the rigour and robustness of research:

Emphasis on evidence based research by de-emphasizing politics especially in policy decisions.

Early-career male researcher from Kenya working in a university network

Collaborative research

There was widespread agreement that doing collaborative research outside of one's own institution was "very important" (87%). This level of agreement was independent of gender or career level, with all groups showing similarly high levels of agreement.

63% had done some collaborative research within their own country and 43% had done some international collaboration (65% men compared to 61% women had undertaken national collaboration, and 45% men compared to 38% women had undertaken international collaboration) As might be expected, there was a clear effect of career level with more senior level researchers reporting collaborations than early-career researchers. Overall, only 34% felt that that they have sufficient opportunities to do collaborative research, with 39% men claiming they had sufficient opportunities compared to only 31% women, and 44% of senior career researchers indicating that they had sufficient opportunities compared with 31% of early-career researchers.

Of those who had undertaken international collaboration, 77% felt that their contributions had been sufficiently recognised. This was independent of gender or career level.

8% (N=23) of those who had done at least one International collaboration believed that their contribution had not been sufficiently recognised.

16 provided descriptions of why/how their contributions were not sufficiently recognised

A few commented on being junior collaborators/researchers on projects where only the principal researchers received recognition in terms of publication:

Not included in publishing

Early-career Male researcher from Ghana working in a Hospital

Not mention in the publication

Early-career Male researcher from Sierra Leone working in a Research network

I have participated on data generation or methodology part but I was omitted from list of publishers.

Mid-career Male researcher from Ethiopia working in a Research institute – public

One reported being included, but not sufficiently high up on the list of authors:

I made the first draft and I believe I should be the representing author because of my input in the work but because the financial aspect is to be handled by some of the co-authors, I was listed as the co-author while some other person (who financed the publication) took the first author position.

Early-career Male researcher from Nigeria working in a University - public

Finally, 3 comments of note:

being a female I felt there was academic bullying

Early-career Female researcher from United Republic of Tanzania working in a University – public

Taken as one to be filled with knowledge as opposed to one who had something to offer.

Senior Female researcher from Kenya working in a University – private

North based researchers act like they know better

Mid-career Male researcher from Zimbabwe working in an International NGO

There were 210 responses to an open-ended question about barriers to international collaboration. About 10% of these indicated that there were no additional barriers ("none", "nil", "nothing" etc).

In the remaining responses, the main themes were:

1. **Financial resources -** this merged as the strongest general barrier to collaboraiton. Some wanted more finance for travel to conferences to make the contacts for collaboration. One researcher felt that her country was excluded from financial opportunities that would facilitate collaboration:

   Lack Fund and facilities for analysis has really made research difficult in my country. Nigeria is normally not included in most international grants and scholarships.

   Early-career female researcher from Nigeria working in a public research institute

Some pointed to lack of finance within their own institution, let others highlighted the lack of finance from potential collaborators.

2. **Equipment/Facilities/Time.** Some respondents pointed to lack of equipment and/or facilities within their own institutions as being a limiting factor to collaboration. Lack of physical infrastructure including Internet stability was mentioned several times:

   Internet access in most African universities is a barrier

   Mid-career male researcher from Nigeria working in a research network

   Time was also often cited as a limiting factor, with many indicating that commitments in other areas like teaching limited their ability to carry out collaboration.

   Most international researchers don't understand what we in developing country are suffering in the area of electricity, internet among others

   Early-career male researcher from Nigeria working in a public university

3. **Identifying and engaging collaborators** was seen to be a major issue, especially since many early-career researchers do not have any established network. Some did not know had to go about establishing collaborative relationships and even suggested that there ought to be more information available about whole process:

   lack of guidance in collaborative research

   Mid-career male researcher from Somalia working in a hospital

   No proper guidelines or legal aspects to support /provide guidance our collaborative research works

   Mid-career female researcher from Sri Lanka

Some thought there ought to be dedicated organisations for establishing collaborative research:

I think lack of research organizations to connect researchers.

Early-career male researcher from Zambia working in a public university

There were some indications of closed circles that early-career researchers found it difficult to break into, with suggestions senior colleagues within one's own research institution being protective of their personal research contacts.

I don't know how to express it correctly but my main advisor (boss) wants to have all the credit to himself and does not allow me or my peers (phd students) to even do networking with other institutions. He does not like to share the credit and our work is affected by his ego.

Early-career female researcher from Mexico working in a private university

Even when collaborators have been identified it was sometimes difficult to engage with them in active collaboration:

> *unwillingness of researchers to work with me...citing no funds or unwilling to work with me due to poor communication network and relationship with my university*
>
> Mid-career female researcher from Kenya working in Government

Some who had past experience in collaboration, seemed to suggest that collaborators would treat them like subordinates, rather than as equals.

> *One of the barriers is when the person you intend to collaborate do not show interest or will want you to do almost all work and only expect his or her name to appear on the paper*
>
> Early-career female researcher from Nigeria working in a university network

Funding

Funding was perceived to be a significant issue with only 7% reporting that they received sufficient funding to carry out their research.

- 19% reported having received funding from **international research grants or institutions**
- 20% reported having received funding from **national funding bodies**
- 31% reported having received funding from **local or institutional funds**

There was a marginal indication that a higher proportion of women than men had received funding from both local and national funds – but the differences were small <5%.

As we might expect, there is a link between career level and having received funding from all different sources. The table below shows the proportions reporting receiving funding as a function of Career level:

	Early Career	Mid-Career	Senior
International Funding	16%	21%	22%
National Funding	15%	24%	26%
Local Funding	31%	29%	40%

Given that funding was thought to be the major factor in future research development, it is potentially interesting to look at how respondents feel that additional funds would be best spent if they were available. We asked "If you or your institution could receive additional financial support, which areas would be most important to invest in, and ultimately help you achieve your research goals?" Respondents were given the opportunity to enter three areas.

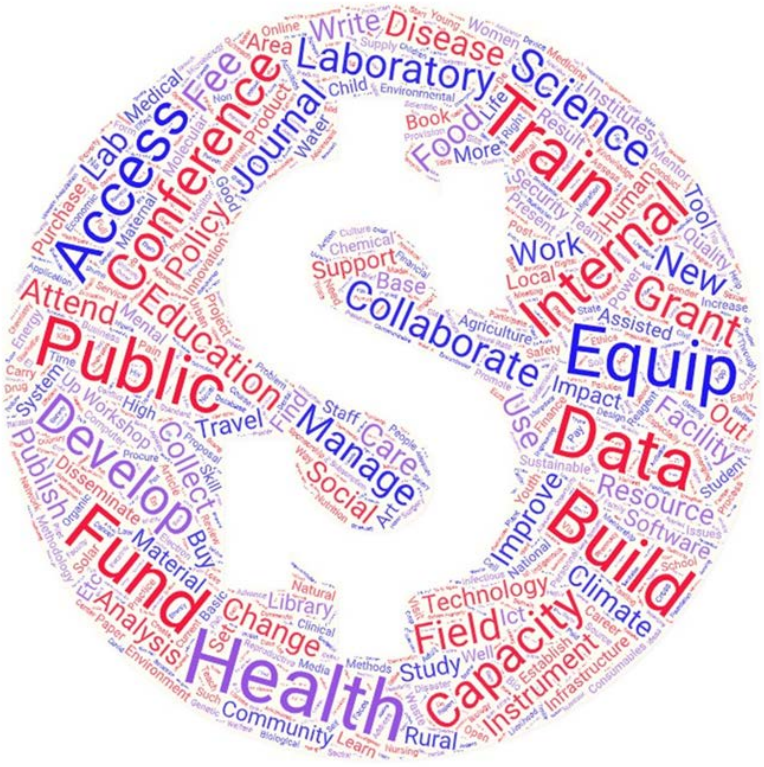
Almost 20% of those surveyed did not provide an answer to this question. Of those that did reply, there was a definite division between those who interpreted the question as meaning what disciplines/areas of research:

> *1: Technology and Agriculture 2: Health 3: Education*
>
> Mid-career male researcher from Uganda working in a university network

versus those who identified specific things within their own research area that would profit from additional funding.

> *1: procure state of the art research equipment 2: build research laboratories 3: train junior staff*
>
> Early-career female researcher from Tanzania working in a public university

The following wordcloud illustrates the frequency of words used:



Wordcloud 4: If you or your institution could receive additional financial support, which areas would be most important to invest in, and ultimately help you achieve your research goals?

Plans for the future

Respondents were asked whether they thought they would still be in a research career in five years' time (Q30). Overall, 90% expected to remain in research, 8% didn't know and 1% said they would not remain in research.

Of those who did not expect to be in research, a number indicated that it was because they were nearing retirement age.

A disproportionate number of those who were uncertain about their future in research were women (31/51 = 60% - compared to 37% women in the whole population). Reasons cited for uncertainty about a future in research included:

> *I am looking out for better opportunities outside my home Country and once I find something more challenging, I would go for it, even if it isn't research*
>
> Mid-career female researcher from Nigeria working in a university network

> *Uncertainty regarding access to funding and job opportunities*
>
> Early-career female researcher from Mexico working in a public university

> *In Mexico the research jobs are almost zero. Mexicans researchers are doomed to a life of teaching with a very bad pay in both public and private sectors. I am aiming to work for a global consultancy or an international agency.*
>
> Early-career female researcher from Mexico working in a private university

> *The working environment is not supportive and challenging*
>
> Early-career male researcher from Ethiopia working in a public university

Overall, 23% thought that it was likely that they would move abroad, 20% anticipated remaining in their current country and 58% thought that working abroad was a possibility.

There was a strong feeling that the opportunity to work abroad was important for researchers with 87% overall thinking it was 'Important' or 'Very Important'.

There was no gender difference in either perceived likelihood of working abroad or importance of working abroad.

6. RPos – A Research Positivity Index

We piloted the development of a metric using data from the survey to capture positivity around research.

The pilot Research Positivity Index is designed to be straightforward and usable without a high level of statistical expertise. While statistically more sophisticated ways of creating scales that incorporate variance, weighting and item redundancy exist, we believe there is value in a simple summary measure of the way people feel about their own research career and the state of research in general.

The index is made of two components. One is related to researcher's personal experience of a research career – whether it is a career choice and offers opportunities for progression and development. The other is related to researcher perception of the research context – including institutional, national and international infrastructure. Higher overall numbers indicate higher levels of positivity. As the approach is refined and becomes more embedded in future survey analysis we will use this index to track changes in positivity levels over time.

The possible uses of this index include:

- Attempting to determine predicators for scale score - eg determining whether gender or location are linked with high positivity
- Looking at individuals or groups to compare with scale score norms - eg asking whether a particular individual is amongst the more positive people.
- Tracking positivity over time – measuring positivity at different times and determining whether there is a change

We called the index RPos (for 'Research Positivity').

a. Index development

RPos consists of two components (or dimensions, or subscales) which, initially kept separate as RPosP and RPosC.

RPosP – Personal Research Positivity – contains 12 elements pertaining to the researcher's personal experience of a research career – whether it is a good career choice, offers individual opportunities and sufficient individual funding. It is constructed using the following elements:

- Q16.3 – I feel under pressure to publish my work as quickly as possible
- Q16.6 - The evaluation of my research is fair, and I feel that the quality of my research is recognised and rewarded
- Q19 – Do you have sufficient opportunities to do collaborative research?
- Q23.1 – to what extent does lack of funding affect ability to do collaborative research?
- Q23.2 – to what extent does lack of institutional support affect ability to do collaborative research?
- Q23.3 – to what extend do lack of time and resources for collaborative research affect ability to do collaborative research?
- Q29.2 – Is research FRUSTRATING?
- Q29.3 – Is research EXCITING?
- Q33.2 – Research is a good career choice.
- Q33.6 – If I could go back, I would still choose research career.
- Q35 – Do you have sufficient opportunity to promote and present your research?
- Q36 – Do you have sufficient funding?

In summary, someone who felt positive about their choice of a research career, felt they had sufficient opportunities, adequate funding and was supported by their institution would score highly on RPosP.

RPosC – Context Research Positivity – contains 8 elements pertaining to the researcher's opinions concerning the context of their research, institutional, national and international – whether the social, infrastructure and context of their chosen research discipline is generally positive. It is constructed using the following elements:

- Q26.1 – how much recognition does work produced in your country receive NATIONALLY

- Q26.2 – how much recognition does work produced in your country receive INTERNATIONALLY
- Q28.1 – Rate the status of DEPARTMENTAL RESEARCH
- Q28.2 – Rate the status of INSTITUTIONAL RESEARCH
- Q28.3 – Rate the status of NATIONAL RESEARCH
- Q28.4 – Rate the status of INTERNATIONAL RESEARCH
- Q33.1 - my location is a disadvantage to developing a research career
- Q33.5 - Researchers can make an impact on development in their country

In summary, someone who believed that the national and international context of their research work was strong and sufficiently recognised would score highly on RPosC.

All RPos values were normalised to a range of 0-100 where 0=lowest positivity and 100=highest. The scale uses only those people who answered all 20 component questions (N=586).

Factors relating to the RPos index

A series of one-factor analyses were carried out to determine whether research positivity was dependent upon certain factors:

Gender

For RPosP (Personal Positivity) men are more positive than women. There was no effect for overall or context positivity.

	Average of Rpos	Average of RPosP	Average of RPosC	n
Female	49.20	48.77	49.64	214
Male	50.96	52.45	49.46	367
Grand Total	**50.31**	**51.09**	**49.53**	**581**

For RPosP (Personal Positivity) men are more positive than women.

Geographical Region

There is a difference in RPosC (context positivity) between geographical regions (p<0.05).

	Average of Rpos	Average of RPosP	Average of RPosC	n
LA	45.55	50.54	40.57	35
MENA	46.86	52.17	41.55	14
SA	50.14	51.28	49.00	127
SEA	48.85	50.96	46.75	20
SSA	50.80	50.96	50.63	358
Other	53.70	52.22	55.19	27
Grand Total	**50.31**	**51.09**	**49.53**	**581**

There is a difference in RPosC (context positivity) between geographical regions (p<0.05).

Discipline

There is a difference in RPosC (context positivity) between disciplines (p<0.05).

	Average of Rpos	Average of RPosP	Average of RPosC	n
Arts and Humanities	52.30	50.74	53.85	42
Biological Sciences	48.98	49.29	48.67	59
Engineering and Technology	50.44	52.40	48.48	44
Life Sciences and Agriculture	52.05	50.68	53.42	80
Medicine and Healthcare	49.68	50.18	49.17	178

Physical Sciences and Mathematics	52.72	54.13	51.31	33
Social Sciences and Business	49.51	52.19	46.84	145
Grand Total	**50.31**	**51.09**	**49.53**	**581**

There is a difference in RPosC (context positivity) between disciplines (p<0.05).

Experience

There was no indication that experience was related to positivity. Subsequent analysis with just two experience groups (<5 years and >5years) also showed no relationship.

	Average of Rpos	Average of RPosP	Average of RPosC	n
I am experienced in research (6 to 10 years)	49.09	51.27	46.92	159
I am new to research (less than 1 year)	51.98	53.38	50.58	43
I am very experienced in research (over 10 years)	50.16	51.45	48.87	78
I have some experience in research (1 to 5 years)	50.76	50.58	50.93	301
Grand Total	**50.31**	**51.09**	**49.53**	**581**

There was no indication that experience was related to positivity. Subsequent analysis with just two experience groups (<5 years and >5years) also showed no relationship.

Collaboration

Respondents were asked whether they had taken part in any collaborations, either internationally or within their own country. We looked at positivity index for those who had taken part in collaboration vs. those who had not…

National research collaboration

	Average of Rpos	Average of RPosP	Average of RPosC	n
No	49.50	49.43	49.58	216
Yes	50.79	52.08	49.50	365
Grand Total	**50.31**	**51.09**	**49.53**	**581**

Those who had taken part in a collaboration within their own country had a higher personal positivity than those who had not.

International research collaboration

Row Labels	Average of Rpos	Average of RPosP	Average of RPosC	Count of RPosP2
No	48.92	49.16	48.68	336
Yes	52.22	53.74	50.69	245
Grand Total	**50.31**	**51.09**	**49.53**	**581**

Those who had taken part in an international collaboration had a higher personal positivity and overall positivity than those who had not.

Appendix 1: Literature review

Whilst INASP has carried out previous research on the views and challenges of early-career researchers in LMICs through the AuthorAID project, we also conducted a short literature review to assess what other research had been done in this area, which might compliment this research; provide a broader context of the challenges and aspirations of researchers and their context; and identify gaps in knowledge that we could cover this this study. The following literature was reviewed:

Abubakar, K. M. (2016). "Publish or perish" is good for African research, BMJ; 352 :i121. https://www.bmj.com/content/352/bmj.i121.abstract

Beran, D., Byass, P., Gbakima, A., Kahn, K., Sankoh, O., Tollman, S., Witham, M. & Davies, J. (2017). Research capacity building—obligations for global health partners, *The Lancet*, 5, E567-E568. https://doi.org/10.1016/S2214-109X(17)30180-8

Besharati, N. A. (2019). Measuring Effectiveness of South-South Cooperation, *Southern Voice*. http://southernvoice.org/measuring-effectiveness-of-south-south-cooperation/

Bezuidenhout, L., Karrar, O., Lezaun, J. & Nobes, A. (2019). Economic sanctions and academia: Overlooked impact and long-term consequences, *PLOS One*. https://doi.org/10.1371/journal.pone.0222669

Chattopadhyay, S., Myser, C., Moxham, T. & De Vries, R. (2017). *A Question of Social Justice: How Policies of Profit Negate Engagement of Developing World Bioethicists and Undermine Global Bioethics*, The American Journal of Bioethics, 17:10, 3-14, DOI: 10.1080/15265161.2017.1365185

Chomsky-Higgins, K., Miclau, T., Mackechnie, M., Aguilar, D. Rubio Avila, J, Baldy dos Reis, F., Balmaseda, R., Barquet, A., Ceballos, A. Contreras, F., Escalante, I., Elias, N., Iriarte Vincenti, S., Lozano, C., Medina, F., Merchan, G., Segovia, J., Guerado, E., Quintero, J., Morshed, S., Bhandari, M. & Miclau, T., (2017). Barriers to Clinical Research in Latin America, *Front. Public Health*, 18 April 2017 | https://doi.org/10.3389/fpubh.2017.00057

Collyer, F., (2018). Global patterns in the publishing of academic knowledge: Global North, global South, *Current Sociology*, 66 issue: 1, page(s): 56-73. https://doi.org/10.1177/0011392116680020

Dahdouh-Guebas, F., Ahimbisibwe, J., Van Moll, R. et al. (2003). Neo-colonial science by the most industrialised upon the least developed countries in peer-reviewed publishing, *Scientometrics* 56: 329. https://doi.org/10.1023/A:1022374703178

DePasse, J. & Celi, L. A., (2016). Collaboration, capacity building and co-creation as a new mantra in global health, *International Journal for Quality in Health Care*, 28, Issue 4, Pages 536–537, https://doi.org/10.1093/intqhc/mzt077

Ezeh, A. & Lu, J. (2019). Transforming the Institutional Landscape in Sub-Saharan Africa: Considerations for Leveraging Africa's Research Capacity to Achieve Socioeconomic Development, Center for Global Development. https://www.cgdev.org/publication/transforming-institutional-landscape-sub-saharan-africa-considerations-leveraging-africa

Foxalla, K. (2019). The current state of African oncology research publication: how to increase Africa's research impact, *ecancer*. https://doi.org/10.3332/ecancer.2019.ed93

Franzen, S., Chandler, C., Lang, T. (2017). Health research capacity development in low and middle income countries: reality or rhetoric? A systematic meta-narrative review of the qualitative literature, *BMJ Open* 7:e012332. doi: 10.1136/bmjopen-2016-012332

Friesenhahn, I., Beaudry, C. (2014). The Global State of Young Scientists' Project Report and Recommendations, Global Young Academy. https://globalyoungacademy.net/wp-content/uploads/2015/06/GYA_GloSYS-report_webversion.pdf

Fussy, D. (2018). Research dissemination practices in Tanzania: Limitations and potentialities, *International Journal of Educational Development*. https://doi.org/10.1016/j.ijedudev.2018.05.003

Geffers, J., Beaudry, C., Yang, H-C., Huang, F., Phanraksa, O., Dominik, M., Lin, Y-C., Huang, M-C., Komai, S., Lorimer, K., Piyawattenemetha, W., Saengchantr, P., Saleh, H., Tagg, B., Veerakumarasivam, A., (2017). Global State of Young Scientists ASEAN, Global Young Academy. https://globalyoungacademy.net/wp-content/uploads/2017/01/GloSYS-in-ASEAN_webversion.pdf

Hedt-Gauthier, B., Riviello, G., Nkurunziza, T. & Kateera, F. (2019). Growing research in global surgery with an eye towards equity, *BJS*, 106: e151–e155. https://doi.org/10.1002/bjs.11066

Hrdličková, Z., Dooley, G. (2017). AuthorAID capacity development impact study, INASP. https://www.inasp.info/AuthorAIDstudy

Kalinga, C. (2019). Caught between a rock and a hard place: navigating global research partnerships in the global South as an indigenous researcher, *Journal of African Cultural Studies*, 31:3, 270-272. DOI: 10.1080/13696815.2019.1630261

Larkan, F., Uduma, O., Lawal, S.A. et al. Developing a framework for successful research partnerships in global health. Global Health 12, 17 (2016). https://doi.org/10.1186/s12992-016-0152-1

Lebel, J. & McLean, R., (2018). A better measure of research from the global south, *Nature* 559, 23-26. doi: https://doi.org/10.1038/d41586-018-05581-4

Medie, P. A. & Kang, A. (2018). Global South scholars are missing from European and US journals. What can be done about it, *The Conversation*, July 28, 2018. https://theconversation.com/global-south-scholars-are-missing-from-european-and-us-journals-what-can-be-done-about-it-99570

Merritt, C., Jack, H., Mangezi, W., Chibanda, D., & Abas, M. (2019). Positioning for success: Building capacity in academic competencies for early-career researchers in sub-Saharan Africa. *Global Mental Health*, 6, E16. doi:10.1017/gmh.2019.14

Mormina, M., (2019). Technology and Innovation as Social Goods for Development: Rethinking Research Capacity Building from Sen's Capabilities Approach. *Sci Eng Ethics* 25, 671–692. https://doi.org/10.1007/s11948-018-0037-1

Morrell, R. (2019). The global South is changing how knowledge is made, shared and used, *The Conversation*. http://theconversation.com/the-global-south-is-changing-how-knowledge-is-made-shared-and-used-113943

Nobes, A. & Harris, S. (2019). Open Access in low- and middle-income countries: attitudes and experiences of researchers [version 1; peer review: 2 approved with reservations]. *Emerald Open Res* 2019, **1**:17. https://doi.org/10.35241/emeraldopenres.13325.1

Prozesky H, Beaudry C. Mobility, Gender and Career Development in Higher Education: Results of a Multi-Country Survey of African Academic Scientists. *Social Sciences*. 2019; 8(6):188. https://doi.org/10.3390/socsci8060188

Quadrio-Curzio, A., Blowers, T. & Thomson, J. Women, science and development: The leading role of OWSD. *Econ Polit* **37,** 1–12 (2020). https://doi.org/10.1007/s40888-020-00173-w

Serwadda, D., Ndebele, P., Grabowski, M. K., Bajunirwe, F. & Wanyenze, R. (2018). Open data sharing and the Global South—Who benefits? *Science*, 359, pp. 642-643. DOI: 10.1126/science.aap8395

Ssentongo, J. & Draru, M. (2017). Justice and the Dynamics of Research and Publication in Africa: Interrogating the Performance of "Publish or Perish", Uganda Martyrs University. http://ir.umu.ac.ug/handle/20.500.12280/501

van Dalen, H.P. & Henkens, K. (2012), Intended and unintended consequences of a publish-or-perish culture: A worldwide survey. *J Am Soc Inf Sci Tec*, 63: 1282-1293. https://doi.org/10.1002/asi.22636

Vurayai, S. & Ndofirepi, A. P. (2020) 'Publish or perish': implications for novice African university scholars in the neoliberal era, *African Identities*, DOI: 10.1080/14725843.2020.1813084

Appendix 2: Survey questions

About You

1. Full Name (optional)

* 2. What is your gender?

- o Female
- o Male
- o Other
- o Prefer not to say

* 3. In what country do you live?

[Drop down list of countries]

4. Please select the type of organisation that you primarily work in:

[Drop down list of types of organisations

- Government
- Government – regional
- Hospital
- Learned/Professional Society
- Library Consortium
- Academy of science
- NREN
- Research Network
- University Network
- International NGO
- National or regional NGO
- Open access advocacy group
- Publishing platform
- Research institute – international
- Research institute – private
- Research institute – public
- University – private
- University – public]

5. Which of the following best describes your main area of * research or study?

- o Arts and Humanities
- o Biological Sciences
- o Engineering and Technology
- o Life Sciences and Agriculture
- o Medicine and Healthcare
- o Physical Sciences and Mathematics
- o Social Sciences and Business

*6. How much research experience do you have?

- o I am new to research (less than 1 year)
- o I have some experience in research (1 to 5 years)
- o I am experienced in research (6 to 10 years)
- o I am very experienced in research (over 10 years)

* 7. What career level/stage are you currently?

- o Early-career
- o Mid-career

- o Senior

* 8. Do you consider yourself as a person with a disability?

- o Yes
- o No
- o Prefer not to say

9. If yes, how would you describe your disability

- o Hearing Disability
- o Learning/cognitive Disability
- o Motor/physical Disability
- o Visual Disability

Excellence in Research

*10. Complete the following sentence: "Excellent research is * research which..."

[Text box]

*11. Which factors are most important for your research ?

(please select the THREE (3) factors you consider the most important)

- ☐ ... to be published in high-impact journals
- ☐ ... to have a rigorous methodology
- ☐ ... to make a difference to society
- ☐ ... to be frequently cited in the literature
- ☐ ... to be novel or innovative
- ☐ ... to be accessible to a wide range of readers
- ☐ ... to make a contribution to your nation's scientific development
- ☐ ... to be recognised internationally

Research Evaluation

* 12. Is your research work routinely evaluated for quality and impact by an institutional research body

- o Yes
- o No
- o Don't Know

* 13. Is your research work routinely evaluated for quality and impact by a national or government body ?

- o Yes
- o No
- o Don't Know

14. What indicators or metrics are used to assess you as a researcher (for career and promotion purposes)? (tick all that apply)

- ☐ Number of papers published in peer-reviewed journals
- ☐ Metrics of peer-reviewed journals in which you publish (for example Journal Impact Factor)
- ☐ Quantity of citations of your research (or H-index)
- ☐ Conference presentations given
- ☐ Impact case studies produced
- ☐ Datasets or protocols produced
- ☐ Broader recognition in media or social media
- ☐ Book chapters or monographs published
- ☐ Technology transfer / patents

- □ Policy briefs produced
- □ Other (please specify)

  _____

15. What do you feel has the biggest impact on your opportunities for promotion as a researcher?

[Text box]

* 16. Please state whether you agree or disagree with the following statements:

	Agree	Don't Know or Not Applicable	Disagree
The evaluation of my research is fair, and I feel that the quality of my research is recognised and rewarded			
There is too much emphasis on quantity of publications at the expense of research quality			
I am evaluated on the quality of my research more than the identity of the journal in which it is published			
I am evaluated on the quality of my research more than the identity of the journal in which it is published			
I feel under pressure to publish my work as quickly as possible			
Getting my research published in academic journals has more impact on my career than disseminating the research to other audiences			
The way my research productivity is evaluated helps nurture my career			

17. Do you have anything to add about how your research is evaluated by either institutional, national or government bodies?

[text box]

Collaborative Research

* 18. How important is it to you to do collaborative research with other researchers outside your own institution?

- o Very important
- o Moderately important
- o Not at all important

* 19. Do you feel that you have sufficient opportunities to do collaborative research?

- o Yes
- o No

* 20. Have you ever carried out any collaborative research with anyone in another institution in your own country ?

- o Yes
- o No

* 21. Have you ever carried out any collaborative research with anyone in another country ?

- o Yes
- o No

22. In your last international collaboration, do you think your expertise and contribution to the project was sufficiently recognised?

- o Yes
- o No
- o Not applicable / don't know

If 'no' in what way was your contribution not recognised?

[text box]

* 23. To what extent do the following affect your ability to do collaborative research:

	Not a problem / does not affect me	To a small extent	To a moderate extent	To a great extent
Lack of funding opportunities				
Lack of institutional support				
Lack of time and resources for collaborative research				
Lack of access to collaborators				

Please share any other barriers you have experienced to collaborative research

[text box]

* 24. Would you like to carry out more collaborative research if you had the opportunity to do so?

- o Yes
- o No

25. Why do you not want to do more collaborative research?

[open text box]

The State of Research

26. How much recognition do you think the research produced in your country receives?

	High recognition	Sufficient recognition	Low recognition	Unsure
Nationally				
Internationally				

27. What is the most significant thing that could be done to improve recognition of research produced in your country?

[text box]

* 28. How would you broadly describe the status of ....

	In Crisis	Poor	Moderate	Good	Thriving
Research in YOUR DEPARTMENT					
Research across disciplines within YOUR INSTITUTION					
Research in your discipline IN YOUR COUNTRY					
INTERNATIONAL RESEARCH in your discipline					

Career Path

* 29. Thinking of your experience as an early-career researcher, indicate the extent to which you would describe it as ...

	Not at all	Slightly	Moderately	Very	Extremely
Challenging					
Frustrating					
Exciting					

* 30. Do you think you will still be in research in 5 years time?

- o Yes
- o No
- o Don't know

If no, why not?

[text box]

* 31. Do you anticipate that your research career will lead to you working in another country?

- o No, I will probably remain in my present country
- o Possibly, there is a chance that I will move in the future
- o Probably, it is likely that I will move to another country

* 32. How important is it to you to experience research in another country?

- o Very important
- o Important
- o Moderately Important
- o Slightly Important
- o Not Important at all

In what ways is it important (or not)?

[text box]

* 33. indicate to what extent you agree/disagree with the followingstatements ...

	Agree	Don't Know or Not Applicable	Disagree

my location is a disadvantage to developing a research career			
research is a good career choice			
women in research get less opportunities than men in similar positions			
Researchers have a responsibility to make their findings known outside of academia			
Researchers can make an impact on development in their country			
If I could go back in time, I would not choose a research career			

Research Communication

* 34. Please indicate which, if any, of the following research activities/outputs you have accomplished in the last year:

- ☐ Published in an 'international' journal
- ☐ Published in a 'national/local' journal
- ☐ Published a book chapter
- ☐ Shared your research in a blog post or on social media
- ☐ Shared your research data online
- ☐ Submitted your research to an open-access repository
- ☐ Presented your research at an international conference
- ☐ Presented your research at a national conference
- ☐ Presented your research at meetings of your colleagues in your own institution
- ☐ Written a policy brief
- ☐ Presented results to a policy maker

* 35. Do you feel that you have sufficient opportunities to present and promote your research work ?

- o Yes
- o No

If 'No', then in what way could things be improved ....?

[text box]

Research Funding

36. In general, do you receive sufficient funding to carry out your research?

- o Yes
- o No
- o Not Applicable or Don't Know

* 37. Have you received funding from the following sources

	Yes	No, have not applied	Applied but did not receive
International research grants or institutions			
National funding bodies			
Local or Institutional research funds			

* 38. If you or your institution could receive additional financial support, which areas would be most important to invest in, and ultimately help you achieve your research goals:

1: [text box]

2: [text box]

3: [text box]

The Future of Research

39. In the future, the thing that is most likely to have a positive impact on my research work is...

[text box]

40. In the future, the thing that is most likely to have a negative impact of my research work is...

[text box]

41. What impact, if any, do you think that the Coronavirus (COVID-19) pandemic will have on your research work?

[text box]

42. If you could improve the research system in your country, what areas would you focus on?