

Female scientists in Africa are changing the face of their continent

International researchers should be lining up to collaborate with women working in science across Africa.

Female scientists in Africa are entrepreneurial and resourceful. They are finding innovative solutions to problems that affect their communities, and many are actively seeking to engage others in their work. But for more women on the continent to achieve in science, they need policies that help to lower the barriers to their success and that incentivize international collaborations. These are among the findings of a special series of articles in *Nature* (see page 709), as well as a poll that received responses from 249 African researchers. The majority (217) work in African countries, and 103 identified as female.

Our series shows that women working in research in African countries are thriving – founding businesses, launching non-profit science-education efforts, training the next generation of scientists and joining their countries' health, agricultural and space ministries.

They include Khady Sall in Senegal, who in 2020 led a project to manufacture face shields against COVID-19, and Veronica Okello in Kenya, who is researching green approaches to cleaning up heavy metals such as chromium and arsenic. We also profile Aster Tsegaye, an HIV/AIDS researcher helping to train researchers in Ethiopia, and Elizabeth Kimani-Murage, who studies malnutrition in Nairobi's urban communities.

Pontsho Maruping has switched from working in South Africa's mining sector to helping to develop the country's astronomy and space programme. Meanwhile, Angela Tabiri in Ghana studies quantum algebra and founded a network of female mathematicians. Adidja Amani helps to run vaccination programmes at Cameroon's public-health ministry, and Nigerian microbiologist Amina Ahmed El-Imam researches the production of fuels from microorganisms.

Many also work in community empowerment, are helping to communicate science to wider audiences or are working to boost science education. And their achievements have often come after a period of study or research abroad – a finding echoed in our poll. Of our poll's 103 female respondents, 59 had studied abroad; their reasons for doing so included gaining international experience, building professional networks and bringing back specific expertise.

It is also clear from the profiles that many of the women

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made huge personal sacrifices to obtain their PhDs – those who studied overseas and are mothers, for example, often spent months at a time away from their children, leaving them in the care of others, such as fathers and grandparents.

Women in Africa experience greater barriers to developing careers in science, technology, engineering and mathematics (STEM) than do women in high-income countries, with lack of funding a particular problem. Some challenges, however, will be familiar to women the world over. Many women need to take time out for pregnancy, maternity leave and breastfeeding, and women also tend to do a higher share of childcare and domestic duties.

Moreover, some women told *Nature* that they have not been promoted as quickly as their male counterparts, even though they are publishing at the same rate and bringing in as much research funding and equipment to their institutions as men. The reasons vary, but include being evaluated according to outdated criteria. Often, for example, adjustments are not made for the gaps in publication and funding records that result from women taking parental leave. Although the gender gap is closing, the World Economic Forum forecasts that, at current rates, this could take 95 years in sub-Saharan Africa ([go.nature.com/3i90xb9](https://www.nature.com/3i90xb9)).

Our series also illustrates the impacts of chronic funding shortages in Africa, and the resourcefulness needed to push many projects forwards. In countries where universities lack access to national grant programmes, some researchers and students pool funds from their salaries to buy reagents and small items of equipment. They are willing to make these and other sacrifices, knowing that research experience will both make them valuable and benefit their communities.

Africa's researchers badly need long-term, stable investment from internal and external funding sources, including venture capital. In our poll, 56% of respondents (122 of 217) working in science in Africa cited a lack of funding as their greatest career challenge, and it was the top concern for both men and women. Work-life balance was the second-most mentioned concern for women. If only Africa's governments and the international donor community could do more to help scientists to realize their ambitions: even modest funding increases could go a long way towards accelerating nation-building.

That said, some continent-wide initiatives are helping to address systemic challenges for female scientists in Africa. Since 2011, the Consortium for Advanced Research Training in Africa (CARTA), based in Nairobi, has sponsored 228 doctoral and postdoctoral fellows, 57% of whom were women, across a number of countries. CARTA has two women at its helm: co-directors Catherine Kyobutungi and Sharon Fonn.

Similarly, the African Institute for Mathematical Sciences (AIMS) is a pan-African network of centres that has trained almost 2,500 students in intensive, residential mathematics master's programmes, with more than 800 going on to get PhDs. AIMS is led by the educationalist Lydie Hakizimana, and its main goals include increasing the continent's number of maths students and the representation of women in STEM fields. One-third of its alumni are women.

Such networks are further strengthened when researchers in high-income countries, which tend to have more-mature

scientific infrastructures, get involved. Researchers in such countries have an important part to play by collaborating with researchers in Africa.

Such partnerships would benefit scientists not just in Africa, but throughout the world. African researchers include leaders in their fields; scientists on the continent can also bring fresh perspectives, informed by their knowledge and experiences, to research projects. International collaboration needs to be more common. As the COVID-19 pandemic has shown, such exchanges can happen seamlessly on virtual platforms. Africa's female scientists are on the rise – and partnering with them could give sky-high returns.

Keep science out of Europe's post-Brexit arguments

Scientific collaboration has become a casualty of Switzerland's and the United Kingdom's tussles with the European Union.

A year ago, researchers from across Europe breathed sighs of relief when the United Kingdom and the European Union agreed the terms of their relationship after Brexit.

Although a majority of UK researchers did not support their country's exit from the EU, there was relief that they would still be permitted to participate in the EU's €95.5-billion (US\$107-billion) collaborative research programme, Horizon Europe, through a category of membership called association.

The UK government would pay the EU a total of around £15 billion (US\$20.4 billion) over 7 years. In exchange, UK researchers would be able to apply for prestigious grants from the European Research Council (ERC), and participate in Horizon Europe collaborations, including taking leadership roles. The United Kingdom would no longer have the right to contribute to governance decisions, but UK representatives could sit on committees as observers.

That was then. A year later, it all seems very different. Some 46 researchers in the United Kingdom who have been selected for ERC grants are being prevented from accessing their funding because of an ongoing Brexit-linked dispute over trade and borders with Northern Ireland. Furthermore, Switzerland – which is not an EU member but has associated to EU science programmes in the past – has not had its association renewed. This is because of unresolved negotiations over the country's wider relations with the EU.

The EU says that these outstanding disagreements need to be fixed before UK and Swiss participation can resume. For now, a swift resolution is not looking likely.

This is a concern for researchers on all sides, not least

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because EU schemes are time-limited. Horizon Europe, which began last year, is due to end in 2027. Unless the wider disagreements can be resolved quickly, grant winners will remain in limbo. Already, there are reports that some UK grant recipients might choose to relocate to an EU country to take up their funding, instead of risking losing it. Looking further ahead, there might be fewer opportunities for EU researchers to collaborate with UK and Swiss colleagues.

These delays are worrying in another sense: it seems to be a farewell to the principle that nations should not let political or policy disagreements prevent their scientists working together. Linking science funding to the outcomes of international disputes makes little sense when the funding schemes have nothing to do with the disagreements, and when the countries have paid, or agreed to pay, into a joint fund.

Researchers are being used as “a bargaining chip on both sides” of the English Channel, explained Kurt Deketelaere, head of the secretariat of the League of European Research Universities in Leuven, Belgium, to a UK parliamentary committee during hearings earlier this month. And the damage to science could be considerable.

Frustrated researchers from across the continent have launched the Stick to Science campaign, with the subtitle: ‘Put science collaboration before politics’. So far, it has gathered around 4,000 signatures. “Every month's delay weakens European science,” says Jan Palmowski, secretary-general of the Guild of European Research-Intensive Universities in Brussels.

UK science minister George Freeman is trying to reassure researchers that extra funds will be available for international collaborations if association to Horizon Europe doesn't work out. But collaborative projects are about much more than money. Materials physicist Robin Grimes, a former science adviser to the UK foreign-affairs department, told this month's parliamentary committee that Europe's researchers have been able to make advances in their fields because of long-standing relationships, which often transcend a single funding cycle.

It is true that, for decades, research has been one of the ways in which Europe's people have been able to work together. Relations between previous UK governments and the EU hit rocky periods long before Brexit, but governments on all sides agreed that, regardless of the state of wider relations, science links needed to remain an important priority. Joint European funding schemes (previously known as the Framework programmes) have been part of the EU and its predecessor bodies since at least the 1980s.

More than a year ago, *Nature* warned about a creeping anti-research narrative across all of Europe (see *Nature* 588, 370; 2020); now, divisions between nations are spilling over into science. EU officials, together with their counterparts from Switzerland and the United Kingdom, should reflect on the implications of what they are doing. Both Switzerland and the United Kingdom should be allowed to associate to EU funding schemes, regardless of ongoing political disagreements. Dragging research and scholarship into international disputes helps no one.