Work

Your story

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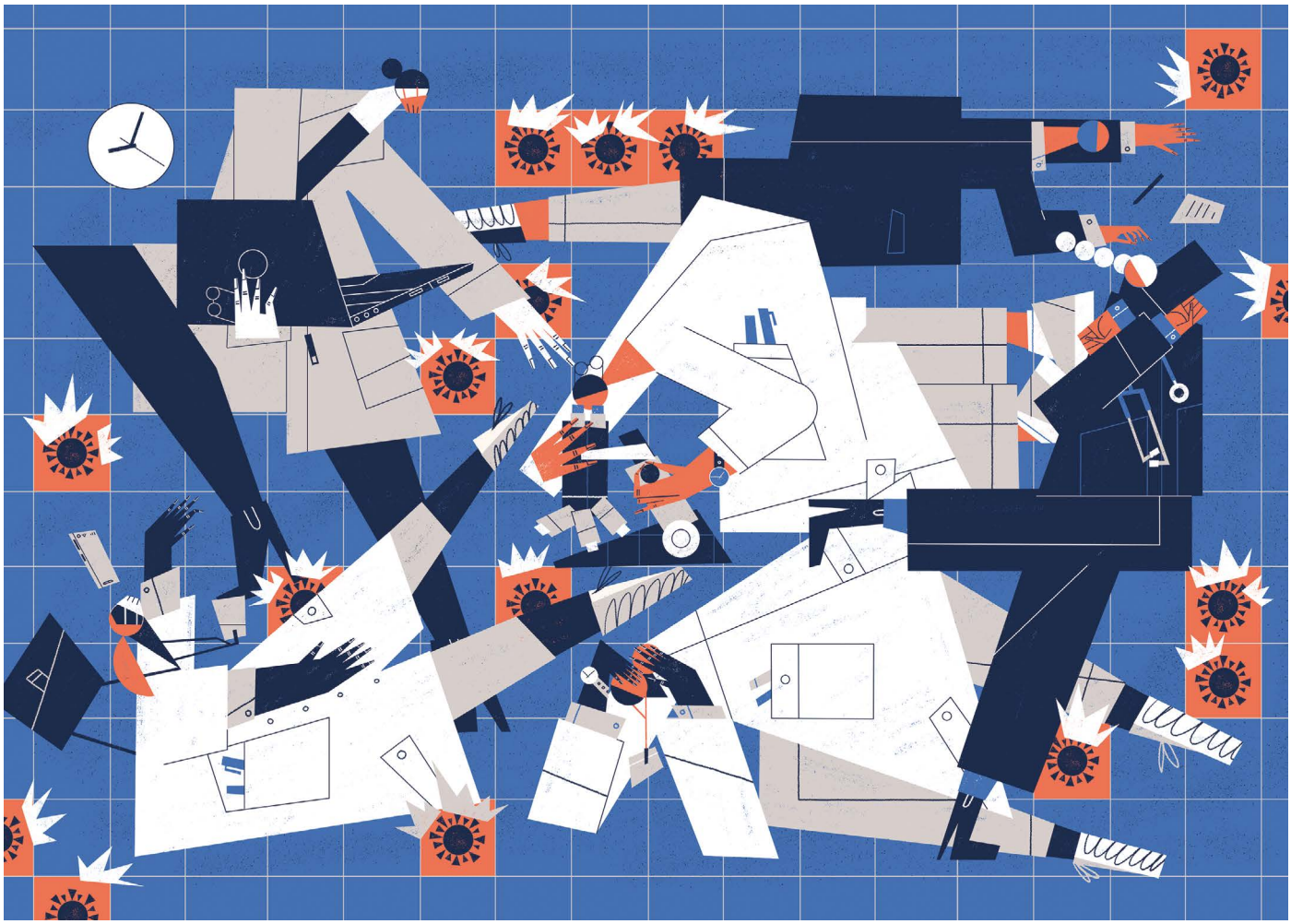


ILLUSTRATION BY ANTONIO RODRÍGUEZ

SCIENTISTS COUNT THE CAREER COSTS OF COVID

As the pandemic continues, researchers are coming to terms with what they've learnt and lost so far, finds *Nature*'s global survey. **By Chris Woolston**

Martha Nelson was in her element in early 2020. As the world grappled with the outbreak of the coronavirus SARS-CoV-2, Nelson, who studied viruses with pandemic potential at the US National Institutes of Health (NIH), felt her work was suddenly more urgent and relevant than ever. Friends and family assumed that she had ultimate job security. "People were telling me that I must be on top of the world because my work is so important," she says.

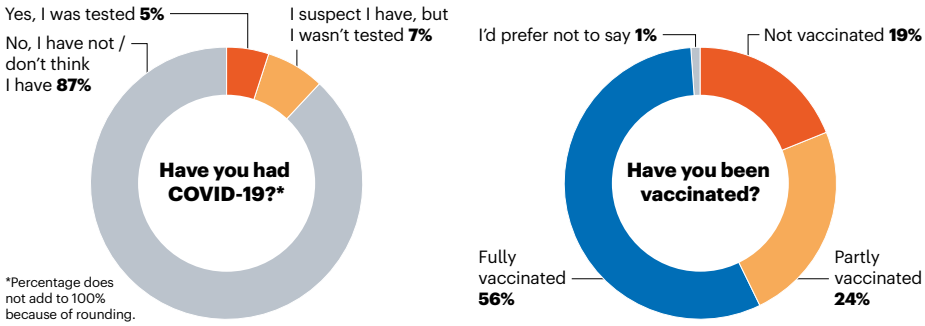
In reality, Nelson says she was barely hanging on. Balancing work and family life was often a struggle even before the pandemic, and that was when she had paid childcare support and nearby help from her young son's grandparents. The pandemic removed that support system, and it became harder to keep pace at work. In October 2020, her annual contract wasn't renewed. In turbulent times, even important jobs can disappear.

Nelson was one of more than 3,200 self-selected scientists around the world who took *Nature*'s 2021 Salary and Job Satisfaction Survey, which ran from June until early July. *Nature* is presenting the survey results in a series of articles that will shed light on the state of science at a pivotal time (see '*Nature*'s salary and job survey'). As with last year's survey of postdoctoral researchers, this year's included a series of questions about the impact of the pandemic on lives and careers.

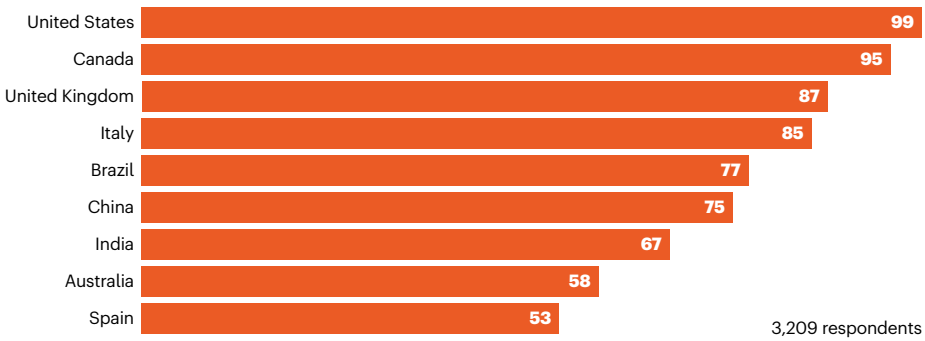
After more than a year of lockdowns and delays, scientists everywhere are still coming to terms with what they've learnt and

GEOGRAPHY OF A PANDEMIC

Despite wide geographical disparities in vaccination rates, relatively few respondents reported having been infected with COVID-19.



Proportion partly or fully vaccinated by region (%)



what they've lost, says Alessandra Minello, a demographer at the University of Padua in Italy. "We have more information now about what really happened during the pandemic," says Minello, who co-authored an August 2020 interview-based study showing that female academics often had to de-emphasize their careers during the pandemic (A. Minello *et al. Eur. Soc.* **23** (Suppl. 1), S82–S94; 2020). "We all suffered from the social isolation, but it will take years to know the full impact on careers."

Even though relatively few respondents reported having COVID-19 (see 'Geography of a pandemic'), the outbreak transformed workplaces and careers. Overall, 12% of respondents said they had lost a job offer because of COVID-19, and 43% said that the pandemic had negatively impacted their career prospects. The majority of respondents (57%) said that it had impaired their ability to collect data. Similar proportions said that it hampered collaborations with internal colleagues (56%) and the ability to conduct laboratory-based experiments (55%; see 'Careers at risk').

Only time will tell how this lost productivity during the pandemic will affect future careers, says Tiffany Reese, an immunologist at the University of Texas Southwestern Medical Center in Dallas. Ideally, she says, funding agencies and hiring committees won't penalize scientists whose work was disrupted through no fault of their own. "What worries me is that memories are short," she says. "There's been a lot of talk about how you should take COVID into account when you review a grant. Is that going to be true two or three years from now? It's going to be hard for reviewers to consider the fact that there was so much lost productivity."

Researchers at risk

Junior researchers were especially vulnerable. More than half (53%) of early-career researchers — including 65% of all postdoctoral researchers — said that the pandemic had hampered their prospects. Those results are in line with last year's survey of postdoctoral researchers, in which 61% of respondents shared that concern. In this year's survey, respondents who described themselves as 'late career' scientists were the outliers: just over one-quarter (26%) felt that the pandemic had negatively impacted their career prospects.

Men and women were equally likely to report that the pandemic negatively affected their careers, but other factors also came into play. For instance, researchers in the fields of ecology and evolution (51%) and physics (49%) were especially hard hit. This is perhaps because ecology and evolution is a discipline that depends largely on fieldwork, and because physics, similarly, often requires lab-based experiments that might have been difficult to conduct during lockdowns. Geography mattered, too. Researchers in the United States (38%), China (41%) and the United Kingdom (43%) were much less likely than those in Brazil (72%) and India (61%) to say that the pandemic had slowed down their careers.

Edmond Sanganyado, an environmental chemist at Shantou University in Guangdong province in China, says the pandemic brought his research to a halt. "In China, we hire outside labs to do routine analysis," he says. "Most of those labs closed because they weren't considered essential." Travel restrictions stopped him from visiting his home country of Zimbabwe and attending international conferences, an important opportunity for networking and career advancement. "In China, you are evaluated by the conferences you attend, and online conferences are rarely recognized."

Likewise, the pandemic put the brakes on Jucelaine Haas's plant-science research at the Federal University of Technology in Paraná, Brazil. Haas says the research system in her home country was already fragile. "We don't have the technology to do anything other than basic research," she says. Like many Brazilian scientists, she had to count on the labour of graduate students and others to do tasks that could have been automated. In her case, that meant watering plants by hand. "In Brazil, even growing plants is difficult," she says. When graduate students and others had to stay at home, those plants didn't get watered and the research couldn't move forward. "Some colleagues continued asking some students to do this and that, but I thought that was not good for their health," she says.

Haas left Brazil in November 2020 for a sabbatical as a visiting researcher at the Helmholtz Centre for Environmental Research in Leipzig, Germany. She returned to Brazil last month, a move that she had been dreading. "Brazil is just chaos," Haas says. Referring to the spread of COVID-19 there, she explains: "The government never took action and it snowballed. The president [Jair Bolsonaro] says it's just the flu and won't wear a mask. That makes it easy for others to not take it

NATURE'S SALARY AND JOB SURVEY

A series of four articles gives a snapshot of the state of science at a pivotal time.

This article is the first of four linked to *Nature*'s global salary and job satisfaction survey. Further articles are scheduled for the following weeks, exploring job satisfaction, compensation, career prospects, diversity and inclusion, and other aspects of scientific life.

The salary survey runs every three years and last took place in 2018. It was created together with Shift Learning, a market-research company in London, and was advertised on nature.com, in Springer Nature digital products and through e-mail campaigns. It was offered in English, Mandarin Chinese, Spanish, French and Portuguese. The full survey data sets are available at go.nature.com/3eqcpk9.

seriously. I don't feel safe there." Last month, the Brazilian Senate recommended charging Bolsonaro with "crimes against humanity" over his handling of the pandemic.

Short supplies

In one sign of far-reaching effects, the pandemic also disrupted supply chains of basic lab materials, forcing scientists to scramble. "Obtaining supplies has been the biggest challenge, hands down," wrote a South African researcher in the biomedical field. "We are waiting 3–6 months for any one order to arrive in the lab." In the United Kingdom, a researcher in the field of food and agriculture lamented that he was waiting much longer than usual for supplies, although he couldn't be sure how much of the delay was pandemic-related and how much was caused by well-documented supply problems as a result of the country's departure from the European Union. Overall, nearly half (49%) of all respondents reported having trouble getting materials for the lab. Those problems were especially common in India (63%) and Australia (57%), but notably less so in China (27%).

Scientists are resourceful, and they found ways to work around shortages. Slightly over half of respondents who faced supply problems said they were able to find materials from alternative suppliers. Another 42% said they were able to make substitutions using materials that were more readily available. But 17% said they weren't able to obtain supplies, no matter what they tried.

For some, the pandemic and the flood of related research that followed provided an opportunity. Twenty-seven per cent of researchers in the health-care field said that the pandemic improved their career prospects, the highest of any field. Overall, 14% of respondents saw a silver lining for their careers.

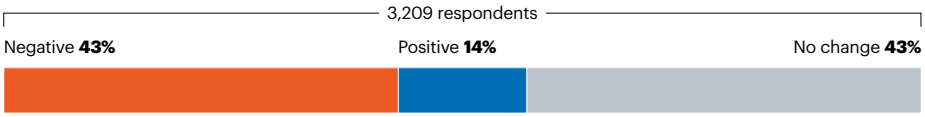
Sören Lukassen was working as a postdoc in bioinformatics at Charité – University Medicine Berlin when the pandemic sent his workload into overdrive. As part of his research into lung cancer, he had data on lung cells that would prove crucial to understanding the pathology of SARS-CoV-2 infections. "We knew we had to get the information out as quickly as possible," he says. "Our first COVID publication took ten days from conception to submission.'

Lukassen's work on COVID-19 proved pivotal to his career. He racked up several high-profile publications, including a June 2020 report in *Nature Biotechnology* that found a correlation between the severity of COVID-19 infections and interactions with immune cells in the airway (R. L. Chua *et al. Nature Biotechnol.* **38**, 970–979; 2020), and he worked directly with the head of Charité on various projects. He says that connection came in handy when he applied to become a group leader there, a

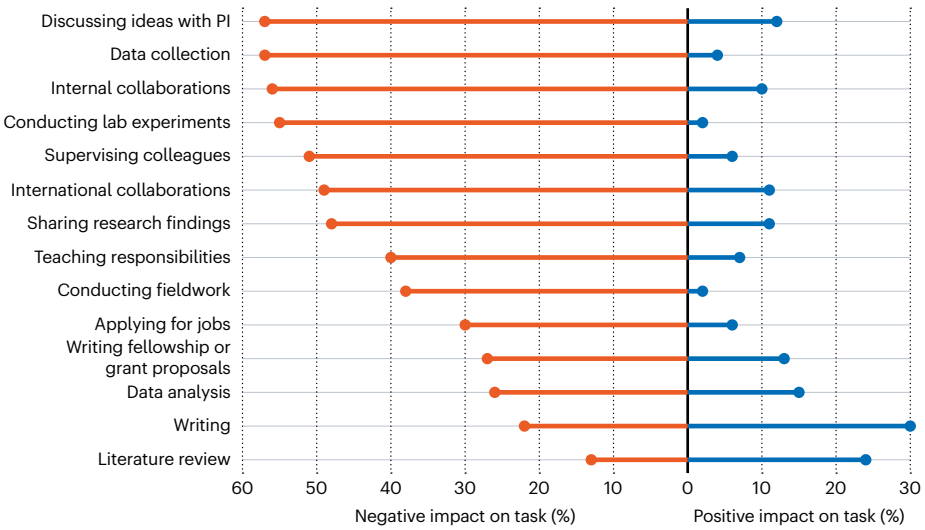
CAREERS AT RISK

Whereas some scientists — especially those in health-care fields — saw a career-related upside to the pandemic, many more felt professionally threatened by shutdowns, supply shortages and strained collaborations. Most foresee long-term impacts, for better or worse.

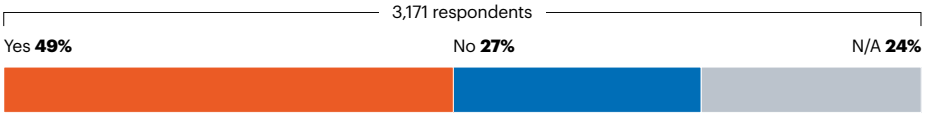
What effect has the COVID-19 pandemic has on your career prospects?



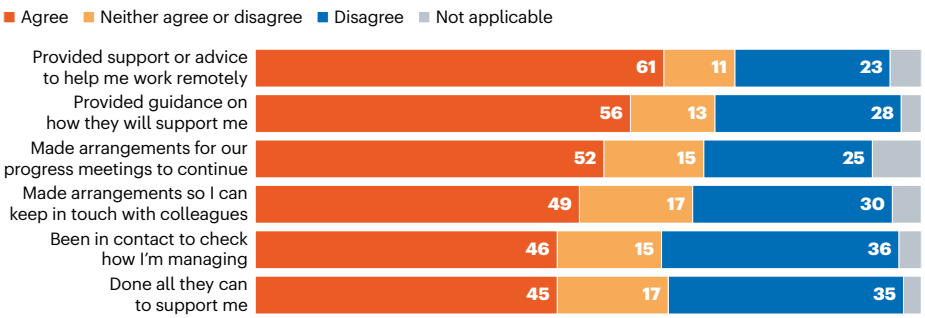
How has COVID-19 affected your ability to perform the following work? *n* = 3,171



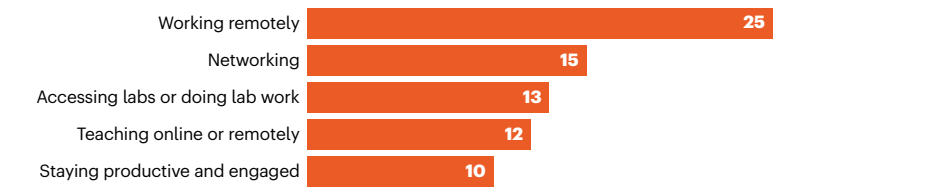
Have you faced problems getting lab or workplace supplies during the pandemic?



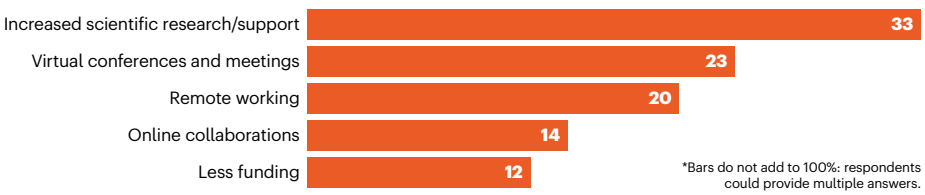
My employer has ... (%) *n* = 3,171



What is your biggest professional challenge during the pandemic? (%)* *n* = 2,606



How do you think the pandemic will change science? (%)* *n* = 2,437



*Bars do not add to 100%: respondents could provide multiple answers.

position he started in January. "My work on COVID definitely increased my chances," he says.

For Lukassen, however, his career progress came at a cost. From April to June 2020, he says he was working up to 16 hours a day, wiping out any hope of attaining a work–life balance. "In hindsight, I'm glad I did, but there were moments when that wasn't the case," he says.

The frantic speed of pandemic science proved overwhelming for Nelson, especially when she spent so much time caring for her young son. "I could barely handle the pace of science before," she says. "The pandemic put it on steroids. I realized I was very vulnerable."

Evidence is mounting that the pandemic was especially challenging for researchers with childcare responsibilities. In a survey of 1,347 researchers conducted in February and March by UKRI, the UK government research body, 61% of all respondents and 88% of respondents with childcare responsibilities said that the pandemic had reduced the amount of time they could spend on research (see go.nature.com/3chq7jt).

"It just amplified some of the problems that already existed for women," Reese says. In February, she co-authored an editorial in *Science Advances* calling for universities to support women in academia and eliminate gender inequities (T. A. Reese *et al. Sci. Adv.* **7**, eabg9310; 2021).

In *Nature*'s survey, women (40%) were more likely than men (34%) to report that their employer hadn't done all they could do to support them during the pandemic. Female respondents were also more likely than male respondents to say that they hadn't received clear guidelines for navigating changes in their ability to work: 32% to 26%.

Men had their share of complaints about institutional support. A male biomedical researcher at a state university in California wrote: "I never stopped coming to work during COVID; there was a three-month period at the beginning where I worked from home three days a week and in the lab two days a week, but after that, it was back to full-time lab work. The institution did nothing for all the lab staff that kept the labs across the university running during COVID."

Many scientists anticipate that the pandemic will change their careers and lives for years to come (see 'How do you think the pandemic will change science?'). One-third of respondents predicted that the pandemic will lead to increased scientific research; nearly one in four anticipated more virtual conferences; and 14% foresee more online collaborations. However, about one in three predicted that science wouldn't change at all, for better or worse. "Everything will return to the status quo soon enough," wrote a UK staff scientist who works in the biomedical field.

For Nelson, the future looks promising. After losing her contract job at the NIH, she was able to find a permanent position with the same agency. She is now an evolutionary biologist in the Intramural Research Program at the US National Institute of Allergy and Infectious Diseases in Rockville, Maryland. After settling for a series of one-year contracts, she finally took charge of her career. All she needed was a nudge from a pandemic. "All of these years I was just focusing on the science and I wasn't a good self-advocate," she says. "I had the CV and publication record. But I came so close to falling off, it made me realize how many other people were also in vulnerable positions. The pandemic takes you to a tipping point."

Chris Woolston is a freelance writer in Billings, Montana.

How do you think the pandemic will change science?

Free-text comments in *Nature*'s salary and job satisfaction survey highlight many of the issues scientists are grappling with during the pandemic. Comments have been edited for length and clarity and, when necessary, translated into English.

• Eighteen months ago, I would have told you that I could not work away from my desk for a prolonged period of time. Now I wonder whether it is necessary to go into the office one day per week. I have a two-hour Zoom meeting with colleagues in China and Poland (almost) every morning. ***Staff scientist in the steel industry, Belgium.***

• Science will be more focused on issues that make headlines. ***Postdoc in physics, Poland.***

• I hope remote seminars are here to stay. I have attended more and a greater diversity of seminars than ever before without leaving my desk. ***Postdoc in biomedicine, United States.***

• The cost of lab and research supplies in Brazil skyrocketed. We will have to rethink how to perform experiments using cheaper methodologies. One positive aspect is that the team members are less selfish and are helping colleagues. ***Staff scientist in biomedicine, Brazil.***

• We are already an overworked and underpaid sector, especially considering our high level of education. COVID has increased childcare burdens and paused some field and lab work. Our careers are fast-paced and I fear COVID might cause some women scientists and under-represented groups to be further pushed out of the field. ***Postdoc in geology and environmental science, United States.***

• I am very concerned about the huge negative impact on early-career researchers, who were unable to get papers out or to generate data for grant applications at this crucial stage in our careers. ***Assistant professor in biomedicine, United States.***

• I hope I'm wrong, but I'm deeply concerned about those of us in our first couple of years of a tenure-track position. I have not seen much understanding from reviewers or many senior colleagues of the enormous impact the pandemic has had on those of us. I worry that many of us might ultimately leave or be forced out of science. ***Assistant professor in chemistry, United States.***

• Perhaps the investment in online international collaborations will be a good thing. However, I now attend meetings and seminars at all hours of the day and night, so it has done nothing to address the lack of work–life balance in academia. ***Professor in geology and environmental sciences, United Arab Emirates.***

• I thought science would change for the better, but I'm not so optimistic any more; I see the same petty attitudes as always. ***Technician in the health-care industry, Argentina. (Translated from Spanish.)***

• Hopefully people will realize biomedical research in the twenty-first century is similar to physics research in the twentieth century, which has completely changed the world and the course of history. ***Biomedical consultant, United States. (Translated from Chinese.)***

• I hope it will make people realize the importance of global issues, and the absolute requirement for rich countries to give better support to research and the implementation of solutions in poorer countries. I also hope it will result in more requirements for research institutions to include and support researchers from countries that are less well-resourced. ***Staff scientist in agriculture and food, United Kingdom.***