



Biochemist Christal Sohl (right) interacts with trainees Isaac Marquez (left) and Mowaffaq Adam (center) in her lab at San Diego State University.

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Undergraduate research data crucial to equity

Despite decades of US federal investment in scientific training programs (1) and routine surveys about the demographics of undergraduate and graduate student populations (2), the proportion of the undergraduate student population that participates in faculty-led research experiences (including in laboratories and fieldwork) remains unknown. Given that research experience is critical for recruitment and advancement in science, technology, engineering, and medicine (STEM) (3), governments, funders, and higher-education institutions should prioritize systemic collection of demographic data about undergraduate research experiences.

Collecting such data is essential to the goal of ensuring inclusive and equitable participation in STEM (4). Faculty-led research experience represents a gateway into graduate programs and advanced STEM workforce opportunities (5). Opportunity gaps at this stage of the STEM educational path affect equity gaps in graduation outcomes (6) and likely preclude or delay the matriculation of some students to doctoral programs, many of which implicitly or explicitly require previous research experience. Demographic data are critical for identifying whether (and for which groups) participation gaps exist, informing decisions about STEM

education and workforce pathway programs, and assessing impacts over time.

National policies and structures will be required to implement and standardize the collection of undergraduate research data. At the laboratory and institutional level, creative data tracking solutions will be needed to accomplish the goal. Tracking who is participating in undergraduate research is an urgent piece of designing effective solutions to inequities in STEM (2, 6).

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Building on NIH's data sharing policy

In 2023, the National Institutes of Health (NIH) implemented a new Data Management and Sharing (DMS) Policy, which aims to maximize the amount of scientific data shared (1). For all research conducted at or funded by NIH, the policy requires a DMS Plan that describes how data will be managed and shared over the life of a project, including key information such as repositories where the data will be deposited. To increase the policy's impact, NIH should empower stakeholders by expanding the resources provided to prepare, review, and implement DMS Plans.

As with most grant-related information, funded DMS Plans are considered public information, and NIH should make the documents accessible (2). Providing access to DMS Plans would allow public oversight of researcher compliance and would demonstrate NIH's commitment to research transparency. Given that DMS Plans contain vital information about researchers' current data management and sharing practices, access to these plans could facilitate innovation in technology to support these activities. For example, accessibility and utility of publicly funded research data could be increased by ensuring compatibility across repositories, indexes (such as PubMed), journal websites, and other modes of scholarly communication (3).

Stakeholders would also benefit from additional information from NIH on how plans are assessed across disciplines

and funding mechanisms during grant review. Increased transparency in review processes would help librarians and data support professionals create more thorough and specific training for researchers and in turn assist in policy compliance.

Last, NIH must expand support for repository infrastructure projects, especially at the national scale. Expanded national infrastructure would help reduce administrative burden and redundant institutional efforts, facilitate data standardization, and leverage limited funds (4, 5). NIH should also increase funding levels for individual grants to support data sharing activities and overcome data sharing barriers. Dedicated DMS funding will incentivize researchers to evaluate their needs for long-term and ethical data access.

To build on the NIH policy's promise and the utility of DMS Plans, NIH and the scientific community must work together to accelerate the cultural shift in data sharing and to foster public trust in science (6).

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Self-advocacy for young African scientists

Knowledge resources and financial capital are mainly concentrated in the Global North (1), whereas the Global South, particularly Africa, lacks both investment in research (2, 3) and researchers (4). As a result, less than 1% of the global research output is produced by African institutions (5). Moreover, the majority of scientific articles reporting research conducted in Africa include foreign coauthors (6, 7), and African researchers rarely attain prestigious first or last authorship positions (8). Intra-African cooperation is also rare (5). Although research investment is a systemic problem that will require changes by the governments and institutions in African countries, individual African researchers can still take steps to improve the quality and quantity of research conducted in Africa by Africans.

African researchers have expertise, especially related to the local biodiversity and environment, and they should ensure that foreign collaborators recognize the value of that knowledge by granting them equitable roles in research and publications rather than relegating them to mere acknowledgments or listing them as middle authors despite limited involvement in the study or paper. Before committing to a project, African early-career scientists should also insist on career advancement benefits and mentorship commitments by more senior collaborators.

Young African scientists involved in grant-funded research projects should advocate for complete transparency regarding the grant's budget. This step ensures that the benefits derived from the grant are distributed fairly among all collaborators, extending beyond solely covering field expenses. As an alternative to fully disclosed budgets, foreign research leaders could hire local researchers as consultants and pay them rates competitive with those in the Global North.

African PhD graduates returning home face limited opportunities, prompting a brain drain as many seek work abroad (9). Mandatory service at local universities counters this trend [e.g., (10)] but often isolates such researchers from global academic networks and eventually leads to their permanent departures (9). Instead, early-career scientists should negotiate flexible roles with their institutions. Institutions should remain open to creative agreements given that scientists are more likely to remain long term if

they can balance local contributions with international engagement.

To enhance African research capacity and create a more unified and robust scientific community, native scientists should assume leadership roles and collaborate with fellow African scientists. Local researchers can train for leadership positions by prioritizing skill development in academic writing, data analysis, and laboratory work. Intra-African collaboration can enhance region-specific knowledge sharing and build a supportive network, which is critical for long-term professional growth. To overcome systemic barriers, African early-career researchers should proactively seek and negotiate equitable partnerships and career positions with Global North counterparts, local institutions, and fellow Africans.

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ERRATA

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Erratum for the Report "Phosphorylation-dependent ubiquitination of cyclin E by the SCFFbw7 ubiquitin ligase" by D. M. Koeppe *et al.*, *Science* **384, eadp7159 (2024).**

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