

Navigating the ‘fluid’ scholarly publishing environment for African academics

Enhancing the visibility, quantity and impact of African research

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Abstract

In the dynamic landscape of scholarly dissemination, the traditional models of academic publishing have been subject to substantive change. However, this has often been met with several challenges including resource constraints, language diversity, historical disparities, and infrastructure gaps. These challenges can slow down academic progress and are especially pronounced on the African continent. To navigate such a fluid environment strategically, academics on this continent must enhance the visibility and impact of their research in order to achieve global recognition to attract more international collaborations and research funding, as well as to facilitate knowledge exchange, collaboration, and access to resources. Here, we explore the impact of a fluid nature of scholarly publishing on the continent and provide an overview of how researchers in Africa may navigate this dynamic environment. We explore mechanisms for enhancing the visibility, quantity and impact of African research.

Introduction

Inadequate funding, restricted access to well-resourced laboratories, as well as a low number of qualified researchers, are some of the reasons explaining why Africa remains severely underrepresented in global research outputs (Tijssen and Kraemer-Mbula, 2018). For example, approximately 3% of all COVID-19-related articles were authored by African scientists, and just over 4% were focused on Africa (Kana et al., 2021; Naidoo et al., 2021). These limited outputs imply that the knowledge deficit regarding the effects of the pandemic on Africans remains substantial, and that, for example, the relatively low number of deaths on the continent remains unexplained. The knowledge deficit and the lack of studies on the long-term effects of the pandemic is alarming when considering the fact that Africa has the second largest population of any continent (Fonn et al., 2018). Nevertheless, only a fraction of the global research publications is produced in Africa (Sooryamoorthy, 2022), and these are primarily conducted in a handful of countries including South Africa and Egypt (Ali and Elbadawy, 2021; Fonn et al., 2018). An array of challenges on the continent (e.g., political and economic instability, uneven distribution of research facilities, scarcity of qualified researchers, and language barriers) limit research productivity in several African countries, adding to the low representation in the global academy (Chu et al., 2014; Conradie et al., 2018; Teng-Zeng, 2005).

In addition, sub-Saharan African countries contribute ~0.4% of Gross Domestic Product (GDP) to research and development expenditure (Fonn et al., 2018). This is well below the global average with OECD recommending that at least 1% of GDP is spent on research. The lack of prioritization on science spending, combined with the inadequate and uneven distribution of research infrastructure are further reasons for the lack of research productivity in many countries on the African continent (Teng-Zeng, 2005). The general lack of science policies articulating priority research areas, the absence of competitive funding dedicated to research, limited opportunities for collaboration, and the fact that highly trained academics rapidly progress to higher levels of academia further exacerbate the situation.

Demographic predictions suggest that the number of Africans is likely to increase substantially by 2100 (Gerland et al., 2014). In light of these substantial challenges

and the increasing population, Africa as a continent must strategically aim to meet its potential and contribute significantly to global research outputs. These strategies include enabling academic discussions, and tangible joint efforts, to enable increased research productivity on the continent. This article therefore aims to highlight some of the challenges limiting African research productivity, and vigorously advocates for innovative solutions which must promote inclusiveness, equity and collaboration. By supporting these efforts, African scientists can amplify their voices, disseminate their research, and have their work recognized around the world.

Challenges faced by African academics in traditional publishing models

The current publication models, which include subscription-based journals, remain the predominant mechanism for disseminating research outputs. Publishers that follow this approach typically charge libraries, institutions, or individuals for access to publicly funded research or databases on an annual basis. For many years, this model was the primary model in academic publishing, particularly for established journals, and typically includes strict copyright restrictions on article use and distribution. As a result, these approaches are associated with high subscription costs, limited accessibility to published research, and restricted readership (Laakso et al., 2016; Langham-Putrow et al., 2021). African academics, particularly those from under-resourced universities, are subject to access related difficulties. The fact that most research is locked behind 'paywalls' significantly limits scholarly endeavours. Specifically, most African scholars are unable to carry out unrestricted literature surveys due to inadequate access to non-open access journals. The inability to evaluate the latest research outputs, interferes with the design of African studies, and may limit the ability to sufficiently consider data generated by these scholars against the state-of-the-art studies.

The traditional publication model is subject to substantial criticisms globally. Well documented criticisms include the misuse of journal metrics, particularly the Clarivate Analytics journal impact factor (JIF) (Roldan-Valadez et al., 2019). The JIF is disproportionately driven by a few highly cited articles and there has been concerns that this metric has little to no correlation with the impact of individual articles published by the journal (Abramo et al., 2023; Dougherty and Horne, 2022). However, the JIF may fail to accurately measure the quality of any particular

individual article due to the inherent variability in citation counts (Dougherty and Horne, 2022), despite showing the capacity to provide an overview of a journal's impact within a specific field. Nonetheless, the use of the JIF for assessing individual articles and their authors remains a topic of extensive debate (Waltman and Traag, 2021). This implies that while certain statistical arguments question the JIF's accuracy at the article level, acknowledging the variability in citation counts, it is equally important to acknowledge that the JIF can provide meaningful insights under specific conditions (Waltman and Traag, 2021). Thus, a balanced assessment should focus on a critical discussion of the JIF's role in research assessments, taking into account both its limitations and potential merits within specific contexts. Furthermore, it is critical to consider different indicators and assessments, such as transparency, openness, and reproducibility (Dougherty and Horne, 2022).

It is worth mentioning that many academics, including those in Africa, still value JIFs when deciding where to submit their work (Roldan-Valadez et al., 2019). This may be because the JIF is used by university managers and administrators as a key criterion for evaluating promotions and tenure (McKiernan et al., 2019; Moher et al., 2018). These factors may largely explain why the JIF remains influential on the evaluation of scientific research and researchers in Africa's academic landscape. The downside is that scholars that are unable to publish in high-impact factor journals may struggle to meet requirements demanded by universities (McKiernan et al., 2019; Moher et al., 2018). This may lead to delays in professional growth and further limit their capacity to raise research funding. Therefore, the use of the JIF may create additional disparities within research communities, especially those scholars in historically underprivileged universities, which constitute the bulk of institutions on the African continent. Hence, conventional methods of evaluating research contribute to research productivity inequity. Thus, it is imperative for scholars in Africa to adopt a more proactive and hands-on approach to effectively address these issues. While traditional publication models have several disadvantages, the ability for African scholars to publish their work without paying fees is certainly an enabler for disseminating research produced on the continent. However, this model is currently facing challenges and the traditional models are rapidly being replaced by open access publishing which often involve paying a few. However, various models like green and diamond open access exist, and these often not involve author fees.

Understanding open access publishing and research visibility in Africa

The OAP model and related challenges

Open access publishing (OAP) offers a promising alternative to traditional models as it allows unrestricted access to research articles (Allen and Mehler, 2019). While the OAP model promotes increased research visibility, a clear downside, particularly in the case of APC (Article Processing Charge)-based gold open access, is that it shifts publication costs to academic institutions and authors — it's worth mentioning that this situation differs in green open access, where authors can share their work openly without direct publication fees. Despite this, the OAP model rose to prominence over the years and has since received great support from African scholars given that it enables them to showcase their intellectual prowess (Strydom et al., 2022). The OAP model is thus attractive to Africans in many respects, including boosting access to research findings, wider readership, and compliance with funding agency requirements, all of which positively influence one's career trajectory in academia (Strydom et al., 2022). However, many scholars on the African continent face several challenges including a lack of resources, typically disproportionately spread in favour of some institutions.

While the shift towards open access is generally regarded as positive, especially in the case of green open access, OAP has several downsides. Chief among these downsides are APCs, which can be prohibitively high for most African scholars (Strydom et al., 2022). These APCs are resulting in an uneven playing field in terms of access to publishing opportunities, with pronounced adverse effects on historically disadvantaged universities. In some cases, the costs of APCs may exceed the annual salaries of postdoctoral fellows or research budgets and often the justification for these charges is unsatisfactory. For instance, starting in 2021, making a paper open access in Nature may be up to \$11,000, comparable to a postdoc fellowship in a typical South African institution. Therefore, the goal of open access is not well balanced with the financial realities of researchers and institutions in resource-constrained environments, resulting in African scholars seeking more affordable alternatives. Of note, alternative forms of open access, such as green and diamond open access, provide avenues for disseminating research without imposing

direct financial burdens on authors or institutions, making them more viable options for researchers in resource-constrained settings.

The rise of predatory publishing exploits the OAP model by charging lower fees often accompanied by less stringent peer review with limited editorial oversight (Beall, 2017; Shen and Björk, 2015). Predatory publishing has been a significant problem in Africa for many years, with several studies investigating these practices on the continent in research intensive countries including South Africa and Nigeria (de Jager and de Kock, n.d.; Mouton and Valentine, 2017; Shen and Björk, 2015; Xia et al., 2015). These studies have highlighted several intriguing trends. For example, Xia and colleagues (2015) showed that young researchers who publish in predatory journals often have few or no publication or citations. This is not surprising as unethical publishers may appear legitimate to inexperienced scholars without a clear understanding of their discipline specific publication landscape. The fact that some predatory publishers offer journals with high JIF further complicates the publication environment. Mouton and Valentine (2017) presented some insightful strategies to effectively tackle these issues, emphasising the involvement of senior academics. The challenge, however, is that the African research landscape often has a dearth in senior academics, especially in areas classified as scarce skills. This is particularly relevant as predatory journals lure inexperienced academics by promising quick publication, and these authors are sometimes lured into joining the editorial boards of these predatory journals and offered substantial discounts on APCs. Consequently, such predatory tendencies increase the presence of unreliable and misleading research. These predatory publishers result in negative assessments of African scholarly outputs (Mills et al., 2021; Strydom et al., 2022).

Predatory publishers may combine their efforts with the so-called paper mills, also referred to as fake-paper factories, by accepting and publishing research papers without rigorous peer review (Mills et al., 2021). Paper mills are “contract-cheating organisations” that generate and sell pre-written or custom-written papers, to be published by their clients (Byrne et al., 2022; Mills et al., 2021). This collaboration may allow paper mills to rapidly generate academic content, which is then published in predatory journals under an illusion of legitimacy. In turn, predatory journals may profit from the fees paid by the authors. Although the collaboration between predatory publishers and paper mills has received limited investigation, the existence of both

models highlights the need for increased awareness, scrutiny, and ethical practices in academic publishing.

It is crucial to increase awareness of predatory publishing, and other unethical practices, among African academics. We need to investigate methods to channel the desire or pressure to disseminate research towards reputable publishing outlets that prioritize research quality, integrity, and societal impact. These can include altering reward systems, such as rewarding social impact instead of the journal impact (JIF), support African journals embracing the OAP model in an ethical manner, and promoting research ethics and integrity. Implementing these potential strategies may reduce the extent of publishing in predatory journals, while considering the institutional, economic and political contexts in each African country (Mills and Inouye, 2021). Given the advantages and disadvantages of the OAP and traditional publishing models, it is important to explore alternatives which could be applied on the African continent.

The Equitable Open Access Publishing (EOAP) model as a viable alternative

The African academic landscape has been subject to significant growth and development, with increased contributions to the global knowledge systems. Some of these contributions may be demonstrated by the rich and diverse indigenous knowledge systems, which have been passed down through generations. To further advance knowledge creation, dissemination, and accessibility, African institutions are also exploring innovative models such as EOAP, while focusing on moderating the risks and challenges discussed earlier. EOAP aims to promote fair and equal access to scholarly research (Powell et al., n.d.; Vervoort et al., 2021), irrespective of financial means or institutional affiliation. By virtue of its underlying principles, EOAP thus recognizes the unique challenges faced by African researchers and researchers from other developing nations (Powell et al., n.d.). By embracing EOAP principles, African scholars can overcome the barriers imposed by traditional publishing systems and ensure their work is accessible to a global audience. This inclusive approach may ensure that research contributions are evaluated based on their merit rather than financial resources, ultimately leading to a more equitable and impactful scholarly publishing ecosystem.

Embracing the EOAP_{FI} and EOAP_{TD} model

As previously noted, EOAP, which we now distinguish as EOAP_{FI} to emphasize its core principles of fairness (F) and inclusivity (I), aims to address the inequalities prevalent in traditional subscription-based publishing. However, a question remains regarding the academic landscape in Africa fully embracing the EOAP_{FI} model in its various forms including gold, diamond, and green. Below, we advocate for the wide spread use of preprints, preliminary versions of research papers which are made publicly available on dedicated servers (e.g., bioRxiv, Research Square, Preprints.org, etc.) before or simultaneously while undergoing peer review.

Preprints have emerged as a valuable addition to the publishing landscape (Puebla et al., 2022). These preprints provide a broader range of options for disseminating scholarly outputs. The advantages include opportunities for receiving direct feedback from peers. With permissive policies, many journals allow researchers to submit manuscripts that have previously appeared as preprints (Puebla et al., 2022). These policies acknowledge the value of sharing work early and engaging with the broader scientific community. Additionally, preprints are often indexed by platforms like PubMed Central, Europe PubMed Central, and other bibliographic databases (Puebla et al., 2022), ensuring their discoverability alongside peer-reviewed articles. However, these platforms must adapt to effectively validate preprints as valuable research outputs that enrich the broader scientific discourse (Waltman and van Eck, 2023). Given the limited resources on the continent of Africa, we strongly advocate for policies encouraging the use of preprint servers as a mechanism of sharing publicly funded data.

Among the fundamental aspects that discriminates preprints from peer-reviewed journal articles is earlier disclosure and immediate announcement of new discoveries before peer review (Bourne et al., 2017; Ibragimova and Phagava, 2022). Therefore, preprints embody the principles of the Early Open Access Publishing model, which we consequently refer to as EOAP_{TD} (Early Open Access Publishing for Timely Dissemination). This practice stands in contrast to the disclosure of discoveries through peer-reviewed journal articles, which often undergo a prolonged review process ranging from days to months, or even years (Vale, 2015).

Cultivating a preprint culture in African research communities

While the benefits of preprint articles may be the subject of several debates, their significance and engagement has surged, particularly in the life sciences. This increased significance was demonstrated during the early phase of the COVID-19 pandemic, where results were rapidly disseminated (Brierley et al., 2022; Fraser et al., 2021). Preprints represent work which is shared before publication or peer review, something which was central for sharing COVID-19-related discoveries. Preprints are well aligned to a model which emphasizes the early release of findings i.e., EOAP_{TD} to facilitate scientific engagement. In this way, preprints also promote EOAP_{FI} by allowing for widespread dissemination of research findings, at no cost, fostering an arguably more equitable publishing landscape. As a result, preprints effectively address issues linked to the costs of publishing, as well as potential delays in publication due to prolonged peer review processes. This implies that researchers can publish their work without being subject to 'gatekeeping'. This is likely to facilitate the seamless inclusion of knowledge from the African continent in the global scientific discourse.

However, because preprints are not peer reviewed, they have been subject to considerable criticisms. For example, while there were several valuable contributions to the scholarly literature during the early phase of the COVID-19 pandemic, several dubious publications were published on preprint servers. These articles led to considerable disinformation as they were reported as scholarly outputs in the mainstream media. Therefore, we advocate for responsible preprinting practices if these are to be widely adopted in Africa. These practices may include, for instance, clearly labelling preliminary findings, ensuring timely updates which incorporate feedback from peer reviews, and ensuring responsible media communication to mitigate the risk of premature or misleading reporting of scientific results. Nevertheless, there is some evidence that preprints are increasingly regarded as trusted sources of information. This is due in part to increased open peer review of posted preprints, which results in more robust scholarly contributions. The adoption of open peer-review facilitates the transparent sharing of peer-review reports, and the authors are able to respond to both peers and the public, ensuring more rigorous, inclusive, accountable, transparent and high standard of peer-review while minimizing the potential unintended biases and conflicts. Open peer review of preprints is largely facilitated by a number of journal-independent preprint peer review

services (e.g., PREreview, Open Research Africa, Review Commons, Peer Community In, and eLife). Some of these services, including Peer Community In and eLife, have been considered sufficient for meeting the publication requirements for various PhD programs which require published outputs as requirements for attaining doctoral degrees (Avisar-Whiting et al., 2023). Several African-based preprint archives, including AfriRxiv and Open Research Africa, as well as a number of regional servers like UnisaRxiv founded by the University of South Africa, have embraced the preprint peer review model, indicating the increased importance of preprints in Africa.

According to Invest in Open Infrastructure (IOI), a global initiative aimed at securing funding and support for the infrastructure that underpins open scholarship and research, the preprint ecosystem is not yet financially viable and relies significantly on volunteer labour and in-kind donations (Penfold, n.d.). Open infrastructure - the digital tools, systems, and services - facilitate the dissemination, sharing, and preservation of scholarly outputs in an open and accessible manner. Such infrastructure includes platforms for open access publishing, preprint servers, data repositories, and other services which support the dissemination of scholarly outputs. African stakeholders should consider partnering with initiatives such as IOI to better shape the future of scholarly communication and research dissemination on the continent.

Preprints are a viable and valid avenue for research dissemination and may contribute to significantly improving the visibility of African research. However, the use of preprints remains substantially low in Africa, relative to other regions in the global north. Despite this, several countries are beginning to recognize preprints as a valid form of scholarly dissemination. For example, conducting a basic search using institutional affiliations as keywords reveals a significant trend in preprint server utilization, with prominent South African universities like the University of Pretoria, University of Cape Town, Stellenbosch University, University of KwaZulu-Natal, North-West University, and University of the Witwatersrand, showing an increase in preprint submissions during the periods of 2014-2018 (63 submissions) and 2019-2022 (203 submissions). Perhaps in future, preprints may become the most likely publishing option for achieving the open science agenda, as some governments are beginning to demand immediate and autonomous access to all scientific

publications supported by public funds (Hachigonta, n.d.; Tollefson and Van Noorden, 2022).

The low use of preprints in Africa may be attributed to a wide range of factors. These factors include the lack of institutional support, policies and infrastructure, and concerns over reputation and perceived lower quality of preprints relative to journal publications. Entities such as the Africa Open Science Platform (AOSP) play a pivotal role in promoting open science in Africa by providing a framework for collaborative efforts. Such advocacy groups can fulfil a very important role by furnishing the essential infrastructure, support, and advocacy required for enhancing preprint adoption in Africa. However, the success of such an initiative hinge on several key factors, including the level of engagement and collaboration among stakeholders, funding, and community buy-in. Therefore, aligning actions and policies with preprint promotion will foster a more inclusive scholarly publishing ecosystem. This will enable African scholars to overcome the current systematic barriers, increase the impact of their research, and actively contribute to the global knowledge system.

Other possible barriers to preprint adoption by African scholars include limited access to technology, such as computers and internet connectivity. These may pose additional challenges, particularly for researchers in remote areas, hindering the adoption and use of preprints in Africa. In addition, cultural differences in norms and expectations around scientific publishing may also influence the acceptance of preprints in the continent. These norms vary across different countries and regions within Africa. For instance, there may be a strong emphasis on publishing in reputable journals within specific disciplines, as a measure of scholarly achievement and recognition. However, due to hierarchical structures, senior researchers and established institutions hold significant authority and influence. The fear of being 'scooped' by competitors may greatly influence attitudes towards preprints, especially in Africa where competition for resources is especially pronounced, and the pursuit of novelty and priority is crucial. Therefore, concerns about being scooped may be a deterrent to embracing preprints in Africa. However, since preprints come with a time stamp that authors can use to establish their priority claims, they can therefore safeguard against the concern of being scooped by others.

Additionally, awareness of the benefits of preprints is severely lacking in Africa. This is due, in part, to the limited experience of how the preprint landscape operates. There are efforts to heighten awareness of this landscape. For example, a non-profit organization, Accelerating Science and Publication in Biology (ASAPbio), is working with various stakeholders to address this knowledge gap. Each year, individuals interested in preprints and other forms of open science are trained for ~6 months via a comprehensive training curriculum that covers various aspects of preprints and open science. This training includes focused sessions on preprint servers, preprint policies, open peer review, and responsible preprinting practices. To provide a global perspective on preprints and open research, participation in the ASAPbio Fellows Program has consistently included African fellows since inception. This is, in fact, contributing innovative ideas and discussions on preprints and open science in Africa. Such initiatives will help to bridge the gap in the current understanding of preprint trends and acceptance specifically between African researchers and the global preprint community.

Concluding remarks

Rather than solely highlighting the deficits due to financial disparities between African countries, we should focus on mechanisms for implementing solutions which will promote equitable access to knowledge. Given the deficiencies of the existing publication models, we advocate for the adoption of EOAP_{FI} and EOAP_{TD} (preprinting) as concrete strategies for closing the current knowledge gap regarding African research outputs. This will enable African academics to increase their contributions to the global knowledge ecosystem. By embracing these two models, African scholars can seize the opportunity to redefine scholarly publishing norms, challenge existing power dynamics, and establish a more inclusive and equitable landscape. Therefore, EOAP_{FI} and EOAP_{TD} provide avenues for African academics to have their voices heard, their research disseminated widely, and their contributions acknowledged on a global scale. However, raising awareness and increasing education on these models will be key in achieving this goal.

In adopting EOAP_{FI} and EOAP_{TD}, governments and funding institutions must provide infrastructure and financial incentives to facilitate the adoption of these models. Adequate funding will also expediate access to state-of-the-art research facilities

including access to cutting-edge laboratories and equipment. This will enable African researchers to conduct high-quality research. Moreover, to reduce the difficulties associated with the current publication models and allow African researchers to share their findings with a wider audience will require supportive policies including those focused on research and publications. We further encourage more robust institutional frameworks linked to research ethics and the establishment of compliance mechanisms. These must be implemented to encourage open access publishing and preprinting. In addition, African universities must take a proactive and pivotal role by incorporating topics related to open access publishing and preprinting in their curricula, particularly in terminal modules at third- and fourth-year. By so doing, these institutions will increase student awareness of these issues, as well as build an academic culture that supports innovative models of research distribution.

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