

1 **Navigating the ‘fluid’ scholarly publishing environment for African academics**

2 *Enhancing the visibility, quantity and impact of African research*

3 Thabiso E Motaung,<sup>1\*</sup> Philani J Dlamini,<sup>1,2</sup> Otlotleng Moloto,<sup>1,2</sup> Thulani P

4 Makhalanyane,<sup>3</sup> Ludo Waltman,<sup>4</sup>

5 <sup>1</sup>Department of Biochemistry, Genetics, and Microbiology (BGM), University of  
6 Pretoria, Private Bag X20, Hatfield 0028, South Africa

7 <sup>2</sup>Agricultural Research Council (ARC), Biotechnology Platform, Private Bag X5  
8 Onderstepoort, Pretoria, South Africa

9 <sup>3</sup>Department of Microbiology, Faculty of Science, Stellenbosch University,  
10 Stellenbosch and The School of Data Science and Computational Thinking,  
11 Stellenbosch University, Stellenbosch, South Africa

12 <sup>4</sup>Centre for Science and Technology Studies, Leiden University, Leiden, The  
13 Netherlands

14 Correspondence: Email: [thabiso.motaung@up.ac.za](mailto:thabiso.motaung@up.ac.za)

15 **Abstract**

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

## 28 **Introduction**

29 Inadequate funding, restricted access to well-resourced laboratories, as well as a low  
30 number of qualified researchers, are some of the reasons explaining why Africa  
31 remains severely underrepresented in global research outputs (Tijssen and Kraemer-  
32 Mbula, 2018). For example, approximately 3% of all COVID-19-related articles were  
33 authored by African scientists, and just over 4% were focused on Africa (Kana et al.,  
34 2021; Naidoo et al., 2021). These limited outputs imply that the knowledge deficit  
35 regarding the effects of the pandemic on Africans remains substantial, and that, for  
36 example, the relatively low number of deaths on the continent remains unexplained.  
37 The knowledge deficit and the lack of studies on the long-term effects of the pandemic  
38 is alarming when considering the fact that Africa has the second largest population of  
39 any continent (Fonn et al., 2018). Nevertheless, only a fraction of the global research  
40 publications is produced in Africa (Sooryamoorthy, 2022), and these are primarily  
41 conducted in a handful of countries including South Africa and Egypt (Ali and  
42 Elbadawy, 2021; Fonn et al., 2018). An array of challenges on the continent (e.g.,  
43 political and economic instability, uneven distribution of research facilities, scarcity of  
44 qualified researchers, and language barriers) limit research productivity in several  
45 African countries, adding to the low representation in the global academy (Chu et al.,  
46 2014; Conradie et al., 2018; Teng-Zeng, 2005).

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

57 Demographic predictions suggest that the number of Africans is likely to increase  
58 substantially by 2100 (Gerland et al., 2014). In light of these substantial challenges and  
59 the increasing population, Africa as a continent must strategically aim to meet its

60 potential and contribute significantly to global research outputs. These strategies  
61 include enabling academic discussions, and tangible joint efforts, to enable increased  
62 research productivity on the continent. This article therefore aims to highlight some of  
63 the challenges limiting African research productivity, and vigorously advocates for  
64 innovative solutions which must promote inclusiveness, equity and collaboration. By  
65 supporting these efforts, African scientists can amplify their voices, disseminate their  
66 research, and have their work recognized around the world.

### 67 **Challenges faced by African academics in traditional publishing models**

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

83 The traditional publication model is subject to substantial criticisms globally. Well  
84 documented criticisms include the misuse of journal metrics, particularly the Clarivate  
85 Analytics journal impact factor (JIF) (Roldan-Valadez et al., 2019). The JIF is  
86 disproportionately driven by a few highly cited articles and there has been concerns  
87 that this metric has little to no correlation with the impact of individual articles published  
88 by the journal (Abramo et al., 2023; Dougherty and Horne, 2022). However, the JIF  
89 may fail to accurately measure the quality of any particular individual article due to the  
90 inherent variability in citation counts (Dougherty and Horne, 2022), despite showing  
91 the capacity to provide an overview of a journal's impact within a specific field.

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

102 It is worth mentioning that many academics, including those in Africa, still value JIFs  
103 when deciding where to submit their work (Roldan-Valadez et al., 2019). This may be  
104 because the JIF is used by university managers and administrators as a key criterion  
105 for evaluating promotions and tenure (McKiernan et al., 2019; Moher et al., 2018).  
106 These factors may largely explain why the JIF remains influential on the evaluation of  
107 scientific research and researchers in Africa's academic landscape. The downside is  
108 that scholars that are unable to publish in high-impact factor journals may struggle to  
109 meet requirements demanded by universities (McKiernan et al., 2019; Moher et al.,  
110 2018). This may lead to delays in professional growth and further limit their capacity to  
111 raise research funding. Therefore, the use of the JIF may create additional disparities  
112 within research communities, especially those scholars in historically underprivileged  
113 universities, which constitute the bulk of institutions on the African continent. Hence,  
114 conventional methods of evaluating research contribute to research productivity  
115 inequity. Thus, it is imperative for scholars in Africa to adopt a more proactive and  
116 hands-on approach to effectively address these issues. While traditional publication  
117 models have several disadvantages, the ability for African scholars to publish their  
118 work without paying fees is certainly an enabler for disseminating research produced  
119 on the continent. However, this model is currently facing challenges and the traditional  
120 models are rapidly being replaced by open access publishing which often involve  
121 paying a few. However, various models like green and diamond open access exist, and  
122 these often not involve author fees.

123

## 124 **Understanding open access publishing and research visibility in Africa**

### 125 **The OAP model and related challenges**

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

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

155 institutions, making them more viable options for researchers in resource-constrained  
156 settings.

157 The rise of predatory publishing exploits the OAP model by charging lower fees often  
158 accompanied by less stringent peer review with limited editorial oversight (Beall, 2017;  
159 Shen and Björk, 2015). Predatory publishing has been a significant problem in Africa  
160 for many years, with several studies investigating these practices on the continent in  
161 research intensive countries including South Africa and Nigeria (de Jager and de Kock,  
162 n.d.; Mouton and Valentine, 2017; Shen and Björk, 2015; Xia et al., 2015). These  
163 studies have highlighted several intriguing trends. For example, Xia and colleagues  
164 (2015) showed that young researchers who publish in predatory journals often have  
165 few or no publication or citations. This is not surprising as unethical publishers may  
166 appear legitimate to inexperienced scholars without a clear understanding of their  
167 discipline specific publication landscape. The fact that some predatory stables offer  
168 journals with high JIF further complicates the publication environment. Mouton and  
169 Valentine (2017) presented some insightful strategies to effectively tackle these issues,  
170 emphasising the involvement of senior academics. The challenge, however, is that the  
171 African research landscape often has a dearth in senior academics, especially in areas  
172 classified as scarce skills. This is particularly relevant as predatory journals lure  
173 inexperienced academics by promising quick publication, and these authors are  
174 sometimes lured into joining the editorial boards of these predatory journals and offered  
175 substantial discounts on APCs. Consequently, such predatory tendencies increase the  
176 presence of unreliable and misleading research. These predatory publishers result in  
177 negative assessments of African scholarly outputs (Mills et al., 2021; Strydom et al.,  
178 2022).

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

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

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

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

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

218 Embracing the EOAP<sub>FI</sub> and EOAP<sub>TD</sub> model

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

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

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

249 **Cultivating a preprint culture in African research communities**

250 While the benefits of preprint articles may be the subject of several debates, their  
251 significance and engagement has surged, particularly in the life sciences. This  
252 increased significance was demonstrated during the early phase of the COVID-19  
253 pandemic, where results were rapidly disseminated (Brierley et al., 2022; Fraser et al.,  
254 2021). Preprints represent work which is shared before publication or peer review,  
255 something which was central for sharing COVID-19-related discoveries. Preprints are  
256 well aligned to a model which emphasizes the early release of findings i.e., EOAP<sub>TD</sub> to  
257 facilitate scientific engagement. In this way, preprints also promote EOAP<sub>FI</sub> by allowing  
258 for widespread dissemination of research findings, at no cost, fostering an arguably  
259 more equitable publishing landscape. As a result, preprints effectively address issues  
260 linked to the costs of publishing, as well as potential delays in publication due to  
261 prolonged peer review processes. This implies that researchers can publish their work  
262 without being subject to 'gatekeeping'. This is likely to facilitate the seamless inclusion  
263 of knowledge from the African continent in the global scientific discourse.

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

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

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

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

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

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

343 Additionally, awareness of the benefits of preprints is severely lacking in Africa. This is  
344 due, in part, to the limited experience of how the preprint landscape operates. There  
345 are efforts to heighten awareness of this landscape. For example, a non-profit  
346 organization, Accelerating Science and Publication in Biology (ASAPbio), is working

347 with various stakeholders to address this knowledge gap. Each year, individuals  
348 interested in preprints and other forms of open science are trained for ~6 months via a  
349 comprehensive training curriculum that covers various aspects of preprints and open  
350 science. This training includes focused sessions on preprint servers, preprint policies,  
351 open peer review, and responsible preprinting practices. To provide a global  
352 perspective on preprints and open research, participation in the ASAPbio Fellows  
353 Program has consistently included African fellows since inception. This is, in fact,  
354 contributing innovative ideas and discussions on preprints and open science in Africa.  
355 Such initiatives will help to bridge the gap in the current understanding of preprint  
356 trends and acceptance specifically between African researchers and the global preprint  
357 community.

### 358 **Concluding remarks**

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

372 In adopting EOAP<sub>FI</sub> and EOAP<sub>TD</sub>, governments and funding institutions must provide  
373 infrastructure and financial incentives to facilitate the adoption of these models.  
374 Adequate funding will also expediate access to state-of-the-art research facilities  
375 including access to cutting-edge laboratories and equipment. This will enable African  
376 researchers to conduct high-quality research. Moreover, to reduce the difficulties  
377 associated with the current publication models and allow African researchers to share  
378 their findings with a wider audience will require supportive policies including those

379 focused on research and publications. We further encourage more robust institutional  
380 frameworks linked to research ethics and the establishment of compliance  
381 mechanisms. These must be implemented to encourage open access publishing and  
382 preprinting. In addition, African universities must take a proactive and pivotal role by  
383 incorporating topics related to open access publishing and preprinting in their curricula,  
384 particularly in terminal modules at third- and fourth-year. By so doing, these institutions  
385 will increase student awareness of these issues, as well as build an academic culture  
386 that supports innovative models of research distribution.

## 387 **References**

- 388 Abramo, G., D'Angelo, C.A., Di Costa, F., 2023. Correlating article citedness and  
389 journal impact: an empirical investigation by field on a large-scale dataset.  
390 *Scientometrics* 128, 1877–1894. <https://doi.org/10.1007/s11192-022-04622-0>
- 391 Ali, W., Elbadawy, A., 2021. Research output of the top 10 African countries : An  
392 analytical study. *COLLNET Journal of Scientometrics and Information*  
393 *Management* 15, 9–25. <https://doi.org/10.1080/09737766.2021.1934181>
- 394 Allen, C., Mehler, D.M.A., 2019. Open science challenges, benefits and tips in early  
395 career and beyond. *PLoS Biol* 17, e3000246.  
396 <https://doi.org/10.1371/journal.pbio.3000246>
- 397 Avissar-Whiting, M., Belliard, F., Bertozzi, S.M., Brand, A., Brown, K., Clément-  
398 Stoneham, G., Dawson, S., Dey, G., Ecer, D., Edmunds, S.C., Fischer, T.D.,  
399 Farley, A., Franko, M., Fraser, J., Funk, K., Ganier, C., Harrison, M., Hatch, A.,  
400 Hazlett, H., Hindle, S., Hook, D.W., Hurst, P., Kamoun, S., Kiley, R., Lacy,  
401 M.M., LaFlamme, M., Lawrence, R., Lemberger, T., Leptin, M., Lumb, E.,  
402 MacCallum, C., Marcum, C.S., Marinello, G., Mendonça, A., Monaco, S.,  
403 Neves, K., Pattinson, D., Polka, J., Puebla, I., Rittman, M., Royle, S.J., Saderi,  
404 D., Sever, R., Shearer, K., Spiro, J., Stern, B., Taraborelli, D., Vale, R.,  
405 Vasquez, C., Waltman, L., Watt, F., Weinberg, Z.Y., Williams, M., 2023.  
406 Advancing the culture of peer review with preprints (preprint). *Open Science*  
407 *Framework*. <https://doi.org/10.31219/osf.io/cht8p>
- 408 Balaji, B., Dhanamjaya, M., 2019. Preprints in Scholarly Communication: Re-  
409 Imagining Metrics and Infrastructures. *Publications* 7, 6.  
410 <https://doi.org/10.3390/publications7010006>
- 411 Beall, J., 2017. What I learned from predatory publishers. *Biochemia Medica* 27,  
412 273–278. <https://doi.org/10.11613/BM.2017.029>
- 413 Bourne, P.E., Polka, J.K., Vale, R.D., Kiley, R., 2017. Ten simple rules to consider  
414 regarding preprint submission. *PLoS Comput Biol* 13, e1005473.  
415 <https://doi.org/10.1371/journal.pcbi.1005473>

- 416 Brierley, L., Nanni, F., Polka, J.K., Dey, G., Pálffy, M., Fraser, N., Coates, J.A., 2022.  
417 Tracking changes between preprint posting and journal publication during a  
418 pandemic. *PLoS Biol* 20, e3001285.  
419 <https://doi.org/10.1371/journal.pbio.3001285>
- 420 Byrne, J.A., Park, Y., Richardson, R.A.K., Pathmendra, P., Sun, M., Stoeger, T.,  
421 2022. Protection of the human gene research literature from contract cheating  
422 organizations known as research paper mills. *Nucleic Acids Research* 50,  
423 12058–12070. <https://doi.org/10.1093/nar/gkac1139>
- 424 Carneiro, C.F.D., Queiroz, V.G.S., Moulin, T.C., Carvalho, C.A.M., Haas, C.B.,  
425 Rayê, D., Henshall, D.E., De-Souza, E.A., Amorim, F.E., Boos, F.Z., Guercio,  
426 G.D., Costa, I.R., Hajdu, K.L., Van Egmond, L., Modrák, M., Tan, P.B., Abdill,  
427 R.J., Burgess, S.J., Guerra, S.F.S., Bortoluzzi, V.T., Amaral, O.B., 2020.  
428 Comparing quality of reporting between preprints and peer-reviewed articles in  
429 the biomedical literature. *Res Integr Peer Rev* 5, 16.  
430 <https://doi.org/10.1186/s41073-020-00101-3>
- 431 Chu, K.M., Jayaraman, S., Kyamanywa, P., Ntakiyiruta, G., 2014. Building Research  
432 Capacity in Africa: Equity and Global Health Collaborations. *PLoS Med* 11,  
433 e1001612. <https://doi.org/10.1371/journal.pmed.1001612>
- 434 Conradie, A., Duys, R., Forget, P., Biccard, B.M., 2018. Barriers to clinical research  
435 in Africa: a quantitative and qualitative survey of clinical researchers in 27  
436 African countries. *British Journal of Anaesthesia* 121, 813–821.  
437 <https://doi.org/10.1016/j.bja.2018.06.013>
- 438 de Jager, P., de Kock, F., n.d. Do not feed the predators.
- 439 Dougherty, M.R., Horne, Z., 2022. Citation counts and journal impact factors do not  
440 capture some indicators of research quality in the behavioural and brain  
441 sciences. *R. Soc. open sci.* 9, 220334. <https://doi.org/10.1098/rsos.220334>
- 442 Fonn, S., Ayiro, L.P., Cotton, P., Habib, A., Mbithi, P.M.F., Mtenje, A., Nawangwe, B.,  
443 Ogunbodede, E.O., Olayinka, I., Golooba-Mutebi, F., Ezeh, A., 2018.  
444 Repositioning Africa in global knowledge production. *The Lancet* 392, 1163–  
445 1166. [https://doi.org/10.1016/S0140-6736\(18\)31068-7](https://doi.org/10.1016/S0140-6736(18)31068-7)
- 446 Fraser, N., Brierley, L., Dey, G., Polka, J.K., Pálffy, M., Nanni, F., Coates, J.A., 2021.  
447 The evolving role of preprints in the dissemination of COVID-19 research and  
448 their impact on the science communication landscape. *PLoS Biol* 19,  
449 e3000959. <https://doi.org/10.1371/journal.pbio.3000959>
- 450 Gerland, P., Raftery, A.E., Ševčíková, H., Li, N., Gu, D., Spoorenberg, T., Alkema, L.,  
451 Fosdick, B.K., Chunn, J., Lalic, N., Bay, G., Buettner, T., Heilig, G.K., Wilmoth,  
452 J., 2014. World population stabilization unlikely this century. *Science* 346,  
453 234–237. <https://doi.org/10.1126/science.1257469>
- 454 Hachigonta, D.S., n.d. Unpacking the AOSP and NRF Open Science agenda.
- 455 Ibragimova, I., Phagava, H., 2022. Editorial: Preprints and peer-reviewed journals.  
456 *IJHG* 27, 237–239. <https://doi.org/10.1108/IJHG-09-2022-149>

- 457 Kana, M.A., LaPorte, R., Jaye, A., 2021. Africa's contribution to the science of the  
458 COVID-19/SARS-CoV-2 pandemic. *BMJ Glob Health* 6, e004059.  
459 <https://doi.org/10.1136/bmjgh-2020-004059>
- 460 Klein, M., Broadwell, P., Farb, S.E., Grappone, T., 2019. Comparing published  
461 scientific journal articles to their pre-print versions. *Int J Digit Libr* 20, 335–350.  
462 <https://doi.org/10.1007/s00799-018-0234-1>
- 463 Laakso, M., Solomon, D., Björk, B., 2016. How subscription-based scholarly journals  
464 can convert to open access: A review of approaches. *Learned Publishing* 29,  
465 259–269. <https://doi.org/10.1002/leap.1056>
- 466 Langham-Putrow, A., Bakker, C., Riegelman, A., 2021. Is the open access citation  
467 advantage real? A systematic review of the citation of open access and  
468 subscription-based articles. *PLoS ONE* 16, e0253129.  
469 <https://doi.org/10.1371/journal.pone.0253129>
- 470 McKiernan, E.C., Schimanski, L.A., Muñoz Nieves, C., Matthias, L., Niles, M.T.,  
471 Alperin, J.P., 2019. Use of the Journal Impact Factor in academic review,  
472 promotion, and tenure evaluations. *eLife* 8, e47338.  
473 <https://doi.org/10.7554/eLife.47338>
- 474 Mills, D., Branford, A., Inouye, K., Robinson, N., Kingori, P., 2021. "Fake" Journals  
475 and the Fragility of Authenticity: Citation Indexes, "Predatory" Publishing, and  
476 the African Research Ecosystem. *Journal of African Cultural Studies* 33, 276–  
477 296. <https://doi.org/10.1080/13696815.2020.1864304>
- 478 Mills, D., Inouye, K., 2021. Problematizing 'predatory publishing': A systematic review  
479 of factors shaping publishing motives, decisions, and experiences. *Learned*  
480 *Publishing* 34, 89–104. <https://doi.org/10.1002/leap.1325>
- 481 Moher, D., Naudet, F., Cristea, I.A., Miedema, F., Ioannidis, J.P.A., Goodman, S.N.,  
482 2018. Assessing scientists for hiring, promotion, and tenure. *PLoS Biol* 16,  
483 e2004089. <https://doi.org/10.1371/journal.pbio.2004089>
- 484 Mouton, J., Valentine, A., 2017. The extent of South African authored articles in  
485 predatory journals. *South African Journal of Science* 113, 79–87.  
486 <https://doi.org/10.17159/sajs.2017/20170010>
- 487 Naidoo, A.V., Hodkinson, P., Lai King, L., Wallis, L.A., 2021. African authorship on  
488 African papers during the COVID-19 pandemic. *BMJ Glob Health* 6, e004612.  
489 <https://doi.org/10.1136/bmjgh-2020-004612>
- 490 Penfold, N., n.d. Lack of sustainability plans for preprint services risks their potential  
491 to improve science | *Impact of Social Sciences*.
- 492 Powell, A., Johnson, R., Herbert, R., n.d. Achieving an Equitable Transition to Open  
493 Access for Researchers in Lower and Middle-Income Countries.
- 494 Puebla, I., Polka, J., Rieger, O., 2022. Preprints: Their Evolving Role in Science  
495 Communication. *Against the Grain (Media)*, LLC.  
496 <https://doi.org/10.3998/mpub.12412508>

- 497 Roldan-Valadez, E., Salazar-Ruiz, S.Y., Ibarra-Contreras, R., Rios, C., 2019. Current  
498 concepts on bibliometrics: a brief review about impact factor, Eigenfactor  
499 score, CiteScore, SCImago Journal Rank, Source-Normalised Impact per  
500 Paper, H-index, and alternative metrics. *Ir J Med Sci* 188, 939–951.  
501 <https://doi.org/10.1007/s11845-018-1936-5>
- 502 Shen, C., Björk, B.-C., 2015. ‘Predatory’ open access: a longitudinal study of article  
503 volumes and market characteristics. *BMC Med* 13, 230.  
504 <https://doi.org/10.1186/s12916-015-0469-2>
- 505 Sooryamoorthy, R., 2022. Science in Africa: Contemporary Trends in Research.  
506 *JSCIRES* 10, 366–372. <https://doi.org/10.5530/jscires.10.3.54>
- 507 Strydom, A., Mellet, J., Van Rensburg, J., Viljoen, I., Athanasiadis, A., Pepper, M.S.,  
508 2022. Open access and its potential impact on public health – A South African  
509 perspective. *Front. Res. Metr. Anal.* 7, 975109.  
510 <https://doi.org/10.3389/frma.2022.975109>
- 511 Teng-Zeng, F.K., 2005. Research infrastructure and innovation systems in Africa:  
512 enhancing higher education sector research. University of Stellenbosch
- 513 Tijssen, R., Kraemer-Mbula, E., 2018. Research excellence in Africa: Policies,  
514 perceptions, and performance. *Science and Public Policy* 45, 392–403.  
515 <https://doi.org/10.1093/scipol/scx074>
- 516 Tollefson, J., Van Noorden, R., 2022. US government reveals big changes to open-  
517 access policy. *Nature* 609, 234–235. <https://doi.org/10.1038/d41586-022-02351-1>
- 519 Vale, R.D., 2015. Accelerating scientific publication in biology. *Proc. Natl. Acad. Sci.*  
520 *U.S.A.* 112, 13439–13446. <https://doi.org/10.1073/pnas.1511912112>
- 521 Vervoort, D., Ma, X., Bookholane, H., 2021. Equitable Open Access Publishing:  
522 Changing the Financial Power Dynamics in Academia. *Glob Health Sci Pract*  
523 9, 733–736. <https://doi.org/10.9745/GHSP-D-21-00145>
- 524 Waltman, L., Traag, V. A., 2021. Use of the journal impact factor for assessing  
525 individual articles: Statistically flawed or not? [version 2; peer review: 2  
526 approved]. *F1000Research* 2021, 9:366  
527 (<https://doi.org/10.12688/f1000research.23418.2>)
- 528 Waltman, L., van Eck, N. J., 2023. The preprint revolution - Implications for  
529 bibliographic databases. *Upstream* 2023, <https://doi.org/10.54900/fk7p22x-xydnebd>
- 531 Xia, J., Harmon, J.L., Connolly, K.G., Donnelly, R.M., Anderson, M.R., Howard, H.A.,  
532 2015. Who publishes in “predatory” journals? *J Assn Inf Sci Tec* 66, 1406–  
533 1417. <https://doi.org/10.1002/asi.23265>