PUBLISHING STM RESEARCH

UNDERSTANDING THE DIFFERENT NEEDS, OPTIONS AND OUTCOMES

RESEARCHER NEEDS

The publishing needs and goals of university-based STM researchers vary widely.*

RAPID

Rapid publishing is the norm in some fields. In other fields, researchers might publish quickly in order o share urgent medical research, establish discovery, or get feedback.

REQUIRED

Publishing is required for all research grants. In most cases, publishing is basically about creating an official record of the research in the best available venue.

IMPACT

Every researcher wants their work to have high impact and be read by other researchers in their field. Therefore, getting published in the best possible journals is a common goal.

VISIBILITY

Researchers want their work to be visible. The perceived prestige of certain journals can therefore be a factor in deciding where to publish.***

OPTIONS & OUTCOMES

Currently, 3.5 million research articles are published annually in over 50,000 journals, plus many preprint servers.

	DECEPTIVE JOURNALS	PREPRINT SERVERS	REGIONAL JOURNALS	SPECIALTY JOURNALS	PRESTIGE JOURNALS
	Publish anything quickly for a fee. Most are fakes and have no peer review or quality processes; many later disappear.	Mostly research articles posted online to generate feedback before submitting to a journal, or to claim discovery.**	Small, affordable, focusing mostly on topics of regional importance, often in local languages. Quality varies widely.	International, selective, conduct peer review, have rigorous quality processes, widely read and cited, good visibility.	Multiple fields, novel findings, followed by major media. Prestigious for researchers, funders, and institutions.
Articles published ①	**9% of total?**	**3% of total**	**12% of total?**	**75% of total**	**<1% of total**
Accessibility ⑤	Open access	Open access	Mostly open access	50% open access	90% subscription
Language	English + local	English + local	English + local	Mostly English	English
Speed ②	< 1 month	Immediate	Varies	3-9 months	6-9 months
Rejections ③	None	None	About 10-30%	60-65%	Up to 90%
Peer review ④	None	Generally none	Varies	Quality	Quality
Cost ⑤	Low	Free	Free to moderate	Varies	Expensive
Research impact ⑥	None	Varies	Mostly regional	High	High
Career impact	Varies	Varies	Varies	Good	High
Quality	Poor	Varies	Varies	High	High
Discoverability ⑦	Varies	Varies	Regional indexes	All major indexes	All indexes + media

SUBMIT, REJECT, REPEAT

* These needs and goals vary by career stage, research field, topic, funder expectations, and more. Non-university STM researchers don't rely as much on journal publishing, using white papers and other less accessible publishing modes instead (conferences are a common communication tool used by both of these groups). Humanities research is published mostly in book format, not journals.

** Preprints can be a publishing end-state in some fields (most notably physics and astronomy, which have relied on the arXiv preprint server since 1991). In general, preprints comprise a very wide range of articles in terms of subject matter and quality.

*** Whether this should be the case is a different matter. At present, this high visibility can benefit early career researchers who are seeking promotion and tenure, or researchers who are seeking grant funding. This visibility incentive ends up influencing publishing choices and outcomes. Efforts like DORA (https://sfdora.org) are trying to reform this emphasis on perceptions of "prestige" in journals, and focus instead on the significance of research articles themselves.

① There are no definitive estimates of how much research is being published in each category. The estimates here assume that 3.5 million articles per year are being published (see https://bit.ly/3r0a794); that 3% of these are preprints (see https://doi.org/10.1371/journal.pgen.1008565); that 700,00 articles annually are coming from regional and deceptive journals together (extrapolated from the 2015 estimate of 420,000 at https://doi.org/10.1186/s12916-015-0469-2; since this time, these categories of publishing have continued to grow, with Cabell's currently tracking 14,183 predatory journals); and that the top 100 ranked journals in SJR published 21,143 articles in 2019.

② How quickly articles get published depends in part on how long the review process takes. Generally, high impact journals have review times that average around 4.5 months (see https://go.nature.com/2YBF5rS). Once this hurdle is crossed, publishing speed depends on how quickly publishers can format and otherwise prepare an article for viewing.

③ Across all kinds of journals, the average rejection rate of articles is 60-65% (https://doi.org/10.3145/epi.2019.jul.07). Individual rates vary widely by journal, ranging from 0-90% and higher. The regional rate is an estimate drawn from conversations in OSI. About 20% of papers get rejected before peer review for being out of scope, among other reasons (see https://bit.ly/2YnYoVv). Almost two-thirds of research articles are rejected at least once (see https://bit.ly/2YkPpo2), but most eventually get published somewhere. As noted above, preprints are most often not an "end-state" in publishing (except for a few fields). Two-thirds of preprints posted before 2017 were later published in peer-reviewed journals within 12-18 months (see https://doi.org/10.7554/eLife.45133).

④ Researchers place a high value on peer review as a screening function, and see strong peer review as a signal of quality (see https://bit.ly/3otwKRs). Therefore, peer review is important to many researchers. Generally, specialty and prestige journals provide high quality peer review; even some preprint servers are experimenting with new forms of peer review. Regional journals don't always provide the kind of peer review required by specialty journals; peer review quality here varies widely. All this said, the evidence is unclear whether peer review actually improves research (beyond making articles more readable).

⑤ About half of all new articles are currently being published in open access format (most journals, however, are subscription based). Most often, the publishing costs for open access articles are paid by an author funding mechanism known as APCs, or article publishing charges. In the US and EU, APCs are normally subsidized in whole or part by institutions or governments; in the Global South, these charges are largely paid by researchers. A typical APC for an article in a specialty journal is around US$2,500; prestige journals can charge US$10,000 per article or higher; regional journals normally charge lower APCs (or in some cases, these costs can be subsidized by governments, foundations or institutions), which is more in line with what authors can afford. The cost of accessing subscription journals is normally paid by libraries (authors might pay for miscellaneous publishing charges, like color graphics). Most specialty and prestige journals are still subscription based, although the trend is that more of these are becoming APC-financed instead.

⑥ Research impact can be difficult to measure. The number of citations per article is one metric. Over 90% of the articles in specialty and prestige journals are cited at least once, averaging about 18 citations over their lifetimes. For regional journals, that number is 40%, with and average number of citations per article of 2.6 (see https://bit.ly/3iWV2AoQ). Part of the reason for this disparity is that many regional journals have lower readership, different quality standards, and/or a more niche focus (see https://www.aje.com/arc/regional-journals/). Deceptive journals (also known as predatory journals) perform worse. See https://doi.org/10.13021/osi2019.2419 for a fuller discussion of these journals and practices. Downloads are another metric of impact. Articles that are published first as a preprint can eventually get more downloads (and also more citations) than articles without a preprint (https://doi.org/10.7554/eLife.52646).

⑦ A key consideration for researchers is whether their articles will be discoverable after publishing. Google Scholar is the most widely used search tool and tends to locate much research work. Preprints benefit from a variety of other discovery options, as do specialty and prestige journals. Key among these is being indexed, or cataloged by a research journal encyclopedia. Regional journals are mostly cataloged by less well-known indexes, making discovery more difficult (this is a bug in the system, not a feature).