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SPECIAL ARTICLE

Is Open Access to medical research literature relevant to low- and middle-income countries?

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Summary

At the end of 2003, the United Nations held the first phase of the World Summit on the Information Society, the aim of which is to develop a better understanding of the international impact of the information and communication technology revolution. Part of the first meeting's declaration referred to the Open Access movement. This article describes what Open Access is, its implications for medical research in low- and middle-income (LAMI) countries, and considers whether Open Access will make a difference.

Introduction

At the end of 2003, the United Nations held the first phase of the World Summit on the Information Society, the aim of which is to develop a better understanding of the international impact of the information and communication technology revolution. Part of the first meeting's declaration referred to the Open Access movement, stating "we strive to promote universal access with equal opportunities for all to scientific knowledge and the creation and dissemination of scientific and technical information, including open access initiatives for scientific publishing" [1]. What is Open Access, what are its implications for medical research in LAMI countries, and will Open Access make a difference?

Open Access was formally defined in April 2003 at a meeting in Bethesda, USA. The so-called Bethesda Statement [2] defines Open Access as not only being able to access research articles online for free immediately upon publication, but also ensuring that readers can: use, distribute and display articles; make and distribute derivative works; and print copies when needed. Moreover, for an article to be considered Open Access it must be archived in at least one free-access, online repository supported by a well-established organisation - in the biomedical sciences, PubMed Central is one such repository [3].

A little history

Open Access is only possible when articles are online, so it is important to understand how the journal environment has changed with the arrival of the Internet. Traditional print journals have been setting up co-existing websites for some time. In fact, some journals now make more material available online than in print, while others have become online-only. Access to these websites (effectively the online versions of the journals) is generally restricted to subscribers.

As more journals went online, publishers realised that the delivery of scientific information no longer needed to be on a per journal basis - it could be on a per article basis. This is part of the rationale behind publisher's online catalogues, such as Science Direct

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[4], and Blackwell Synergy [5]; by making all their content available online, these publishers are now able to offer a document delivery service. Therefore, instead of subscribing to an entire journal only to read a few of the articles, readers can now buy the specific articles they are interested in. While there are clearly some advantages for the reader, the motivation for some commercial publishers has been that the revenues in a "per article" market are potentially greater than in a "per journal" market. For instance, for a print journal to provide access to an extra reader means paying for the extra paper, printing, binding and postage costs. In contrast, distribution costs via the Internet are virtually zero (the *BMJ* have calculated it as 0.3 pence per article [6]).

Such cynicism towards some publishers is not entirely misplaced. In recent years, subscription prices have often increased faster than the rate of inflation, which has meant that more and more libraries have been unable to subscribe [6]. This has reduced the number of researchers with access to journals, breeding discontent among researchers [7,8].

The research community's growing dissatisfaction with journal subscription prices, and the low-cost distribution possibilities provided by the Internet, facilitated the development of alternatives to the subscription-based model for communicating scientific research, one of which is Open Access.

The current problems for research in LAMI countries

LAMI countries vary widely in their capabilities and assets [9], but still face common problems in formulating, conducting and distributing their research. The political, social and economic instability of everyday life, and the demands on clinicians due to the heavy disease burden, preclude abundant research activity [10,11]. Subbiah Arunachalam, one of India's leading information scientists, thinks that the most restrictive element is access to information [12], due to the limited amount of up-to-date journals and books available [13-15].

The detriment is two fold: the lack of available knowledge makes it hard to appreciate the value of gathering information [16]; and, even for the willing, formulation of research questions is hindered by ignorance of previous work [15]. Weak peer networks, made worse by brain drain (the movement of trained people to developed areas [17]), make the exchange of ideas even less likely [10], particularly for isolated rural practitioners [18]. Furthermore, many LAMI governments are reluctant to allocate funding to health research [11] leading to poor research infrastructure [12,13], particularly with respect to training, resources, and technical and secretarial support [10,11].

While researchers from these settings may not always appreciate the value of making their work available through publication, those that do are likely to encounter numerous editorial biases. Firstly, the lack of experience of writing research articles coupled with the difficulty of writing in a foreign language is more likely to result in poorly communicated research that is not considered to be worth peer reviewing [10,13]. Secondly, the comparative anonymity of LAMI researchers is likely to lead to a higher rejection rate by journals being run out of high-income countries [15,19], with editors [10] and peer reviewers [20] applying different standards to those used for research from high-income countries. Thirdly, this bias is consolidated by the under-representation of researchers from LAMI countries on Editorial Boards of journals claiming to be "global" [21]. Fourthly, publishers of subscription journals are likely to want to tailor their content to the readership that can pay for the journal; hence articles dealing with issues specific to LAMI countries may not be considered high priority [10,21]. Finally, differing perceptions about research ethics [10,13], and the ability to conform to requirements such as getting informed consent [10], may also hinder publication. All of these editorial biases create barriers to the flow of information between high-income and LAMI countries.

What can Open Access do to overcome these problems?

Open Access cannot begin to solve all of the issues mentioned above, but it does have the potential to make a difference by offering empowerment through information. Open access can provide the valuable health care information that is currently missing, which could help to reinforce the importance of knowledge. Insight into the work of others will encourage stronger peer networks, contributing to a research culture and perhaps even helping to stem the brain drain. Access to previous research will not only set and drive forward the research agenda but will also educate on good practice in conducting and reporting research. Unlimited access removes the temptation for journals to tailor their content to those that can pay, which may encourage journals based in high-income countries to consider more research from LAMI countries. Free online availability substantially

increases an article's impact [22], which can help to raise the profiles of the authors, their institutions, and ultimately their country. Greater prominence of work can also be the stimulus for more collaboration with high-income countries.

Limitations of Open Access

These potential benefits will only be realised by addressing the broader issues, such as, making Internet access more reliable. This can be hugely expensive in LAMI countries [12,15,16,23], and it is hard for governments to justify investing in information communication technologies when they are not meeting their basic health needs [18]. According to Dr Clements, chief executive of Satellife [24], the problem of introducing any electronic system is 10% equipment and 90% cultural [9]. The cultural factors need to be overcome for Open Access to make as big an impact as it could. While there are many agencies involved in trying to improve technologies, there is some suggestion that they are not being co-ordinated effectively [23].

In addition, the availability of information does not guarantee that it will be put into practice [25]. Leaders - including editors of journals - need to become more involved with continuing medical education to help bridge the gap between evidence from research and what is being practiced [26]. The way Open Access is funded (described below) also requires careful thought, so as not inhibit authors from LAMI countries from partaking [13].

Funding Open Access

Open Access journals forgo revenue from the reader and so need to be funded in an alternative way to the traditional subscription-based model . Initially it was thought that advertising and reprint revenue could fund Open Access but it soon became apparent that they were not sufficient and an alternative model was required . The two largest proponents of Open Access, BioMed Central [27] and the Public Library of Science [28], cover the costs of peer review and publication with an "input-paid" model - an article-processing charge (APC) is levied on articles that are accepted for publication. To try to ensure that this form of publishing is available to all, the charge can be waived for those who cannot pay, particularly authors from LAMI countries. This form of payment is often, but misleadingly, called "author pays". While it may be true that authors are responsible for arranging payment, the funds may come from their institution, or even from the funders of the institution. In fact, some funding agencies have already specified that their grants may be used to ensure an article is Open Access [29].

Variations of the "input-paid" model will be required to accommodate the variety that exists in how journals operate. Charging for accepted articles may work for journals with a low rejection rate but may not be so useful for highly selective journals, where the minority of accepted authors would be funding peer review for the majority of rejected authors. A combination of submission and acceptance charges is being considered by some journals. A more egalitarian model may be to charge authors a fee relative to their country's resources, akin to the system adopted by the Health InterNetwork (HINARI) [30]. Open Access publishers will continue to experiment with the funding possibilities to find one that suits as many researchers worldwide as possible.

Conclusion

Information plays - and will continue to play - a significant role in overcoming the healthcare problems in LAMI countries. Anything that makes this information more readily available should be applauded. Open Access not only makes the information freely available through the World Wide Web, but also through careful funding strategies can help to level the playing field of science communication. Healthcare professionals and their institutions should join the debate around Open Access to ensure that it serves the needs of low- and middle-income countries; only then will it realise its full potential and help make a difference.

Competing interests

RK and PST are employees of BioMed Central, an Open Access publisher that is funded through article-processing charges levied on accepted manuscripts. RK and PST receive a fixed salary, which is unaffected by the amount of money received by BioMed Central from article-processing charges.

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