

Comments

The bibliographic "impact factor" of the Institute for Scientific Information: how relevant is it really for public health journals?

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Ecrire toute sa vie, ça apprend à écrire. Ça ne sauve de rien.

Marguerite Duras¹

For reasons that few of us would pretend to comprehend, the so called "impact factor" has become the starring bibliometric indicator of the *Journal Citation Reports* (JCR), themselves a major product of the Institute for Scientific Information, Inc (ISI) in the field of information science. Importantly, there are different JCR editions; in the health sciences the best known is the Science Citation Index JCR, while the Social Sciences Citation Index JCR, the Nursing Citation Index JCR, and the Arts & Humanities Citation Index JCR have lower profiles. Journals on epidemiology, preventive medicine, public health, and community health are essentially covered in the first two of these editions.^{2,3} The company produces still other well known products and services, such as the newsletter, *Science Watch*, and several editions of *Current Contents* (Life Sciences, Clinical Medicine, Social & Behavioral Sciences, Health Services Administration, Agriculture, Biology & Environmental Sciences, etc).

Focusing almost entirely on the Science Citation Index JCR, the international scientific community has painstakingly debated the virtues and weaknesses of the impact factor, and important contributions have been made on its appropriate and inappropriate uses. There is little doubt that ISI's *bibliographic* impact factor – as I think it would be more appropriate to call it – can have both beneficial and adverse effects; I am afraid it has both *placebo* and *nocebo* effects. It is not the purpose of this piece to enter fully into this debate, necessary as it is that we in epidemiology and public health do so. Rather, I would here wish to pose two questions that I deem prerequisites for a sound analysis. Firstly – How does ISI decide about "source" (or "citing") journals? And secondly – When producing the bibliographic impact factor, does ISI achieve the quality standards generally required in scientific research? By attempting to find the answers to these and to a few other relevant issues, I hope we can gain a deeper insight into the nature, validity, and relevance of the bibliographic impact factor for public health journals, or at least gain some appreciation of our relative ignorance.

The bibliographic impact factor: a simple average of citedness for a given journal

Before proceeding, though, it must be recognised that ISI openly acknowledges that the JCR "are intended to *complement* (their italics), not replace, traditional qualitative and subjective inputs, such as peer surveys and specialist opinions".⁴ Disclaimers of different sorts are found in the different sections of the JCR. However, at other times ISI is less modest. Thus, JCR provide, "a view that is unobtrusive, quantitative, objective, unique," and "JCR tell you what are the "hottest" journals".⁴ Through its different publications, ISI continually publishes "top lists" of journals, scientists, academic departments, and even countries in all scientific fields. According to an article in *Science*,⁵ the bulletin *Science Watch* is ISI's "primary showcase" and "public relations vehicle"; as such, it "maintains science's version of baseball statistics".⁵ *Science Watch* editor, D Pendlebury, reportedly believes that, "lists are irresistible; the top 10 anything, no matter how silly, is a point of focus for people".⁵ (If right, would he be to blame?). A visit to ISI's World Wide Web site⁶ will further illustrate the complex blend of science and business oriented goods that seems to be the company's major *raison d'être*.

Let us remember that the bibliographic impact factor of a journal J in year Y is the number of citations in year Y (in articles published by "citing" journals) of papers published by J in years Y-1 and Y-2, divided by the number of citeable documents published by J in years Y-1 and Y-2. As an example, let's take the *Journal of Epidemiology and Community Health* (*JECH*):

- Number of citations received by *JECH* during 1994 in articles published by "citing" journal = 1451
 - Of which, citations to documents published by *JECH* in 1993 and 1992 = 271
 - Number of citeable documents ("source items") published by *JECH* in 1993 and 1992 = 217
 - 1994 bibliographic impact factor of *JECH* $(271 \div 217) = 1.249$
- (Source: 1994 Science Citation Index JCR, published in 1995²)

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Misunderstandings and inappropriate uses of ISI's indicators may stem from different sources and have different actors. Some users of the JCR, for example, may wrongly focus on the bibliographic impact factor instead of on other figures such as the "immediacy index", the "cited half life" or, simply, the total number of citations a journal received in year Y (to articles it published during the previous two years or during a longer time span); all these figures are also available in the JCR. Similarly, users may not be sufficiently aware that the JCR offer information on self citations, of which they distinguish two types⁴:

- 1 The "self citing rate", where the denominator is the total number of citations made by articles published by the journal in question, and
- 2 The "self cited rate", where the denominator is made of all citations received from "citing" journals.

In both cases the numerator is the number of times the journal cites its own articles. Self citations from non-source (or "cited-only") journals are not considered. According to the JCR,⁴ on average self citations represent "about 13%" of the citations that a journal receives, although the figure varies widely.

In summary: (a) only citing journals are taken into account by ISI to compute the bibliographic impact factor of both citing and cited-only journals,²⁻⁴ and (b) a significant proportion of the citations a journal receives are self citations (references to articles it has published).²⁷ Therefore, being or not being a citing journal can significantly influence the bibliographic impact factor.⁷⁸

Importantly, empirical evidence indicates that, as a proxy measure of citedness, a journal's bibliographic impact factor is representative only for large, random samples of these journal articles, a conclusion which – as lucidly acknowledged by PO Seglen – is bordering on self definition.⁹ Even more engaging is the following finding: highly cited and less cited authors differ consistently in citedness, no matter how high or low is the bibliographic impact factor of the journal in which they publish. And the overall, average bibliographic impact factor of a journal is often heavily determined by a few, extremely frequently cited articles.⁹

In general, the figures provided by the JCR are strictly applicable only to journals, not to specific articles or authors. Would this reminder be needed at all if everyone remembered the first word of the origin of the bibliographic impact factor (*Journal Citation Reports*)? And is it not a bit paradoxical that so simple a figure has given rise within the scientific community to the wide and wild impact factor *imagery*?

How does ISI decide about "citing" journals?

Are the views of experts in each discipline considered? If so, how are they and who are they? Is the rationale for such decisions (which

journals get included, when does a journal start or stop being citing, etc) explicit and transparent enough? The answers to these questions are somewhat ambiguous.¹⁰

Let us then ask an even simpler question – How do we know whether a journal is "citing" or "cited-only"? There is no easy way. According to ISI, a citing journal, "is any source journal covered in the combined Science Citation Index/Social Sciences Citation Index/Arts & Humanities Citation Index database" and "in the JCR a source journal is a citing journal". In principle, "users can identify cited-only journals by checking the *Citing Journal Listing*. Any journal that appears elsewhere in the JCR, but not in the *Citing Journal Listing*, is a cited-only journal". In practise, this task will entail reading many microfiches, although a printed list of source publications may be available in some institutions.¹¹ Whereas ISI does not greatly facilitate the search of the "citing status" of a journal, overlooking these conditions will, properly speaking, not be their fault. Note that the *Citing Journal Listing* section of the JCR will differ for each edition (Science Citation Index, Social Sciences Citation Index, Nursing Citation Index and Arts & Humanities Citation Index). Some public health journals will appear only in the Science Citation Index, others will do so only in the Social Sciences Citation Index, and still others will appear in both editions, although the database is a common one; therefore, once a journal has been picked up as citing its influence spans to all JCR editions.

Undoubtedly, compiling a unified listing of journals of public health is made complex by the multidisciplinary nature of the discipline and the many connections its branches share with other clinical and social specialties. Defining the boundaries of most scholarly disciplines is not straightforward.¹² Nonetheless, at the simplest operational level, a daunting task is faced by the professional who is interested in knowing from where indicators such as the bibliographic impact factor are derived, how, with which strengths and limitations, or what caveats must be kept in mind. The professional may simply attempt to weigh some data from a limited number of journals, such as the citing or cited-only status, number of citeable or source items, number of citations, journals that it more often cites, or journals that commonly cite it. The task may be undertaken in relatively simple and non-conflictive situations, such as when wondering where to submit a paper; but even this will commonly require accessing the two databases (Science Citation Index and Social Sciences Citation Index) and searching through many microfiches. My personal view is that this process should be encouraged and assisted, since it will provide a very realistic sense of the value and richness of the JCR data, thus complementing established images of journals.¹³ Conversely, the reliance on one single figure such as the bibliographic impact factor is often inappropriate, particularly when its context is ignored.

"Citing" and "cited-only" journals: how complete is the picture?

At present, whereas ISI's citing journals comprise many of the most reputable journals in public health – including *JECH* – some journals that are less well-known are also granted the citing status. Cited-only journals include *Cancer Causes and Control*, *Epidemiology*, *European Journal of Epidemiology*, and *Revue d'Épidémiologie et Santé Publique*.

Other journals do not even make it to the cited-only group – that is, they do not appear in the Science Citation Index JCR. Some examples from the 1994 edition are²: *Annals of Epidemiology*, *Australian Journal of Public Health*, *Community Medicine*, and *European Journal of Public Health*.

Additional journals that you will not find in the Science Citation Index JCR include *Accident Analysis & Prevention*, *Canadian Journal of Public Health*, *Health Education Quarterly*, *Health Policy*, *Health Services Research*, *Inquiry*, *International Journal of Health Services*, *Journal of Health Economics*, *Journal of Health Politics, Policy & Law*, *Milbank Quarterly*, or *Social Science & Medicine*. Surprised? Well, don't be; you will find them in the Social Sciences Citation Index JCR. And then again, you will have to go through a great many different microfiches if you wish to know where the data stem from.

Morbidity and Mortality Weekly Report (MMWR) is an illustrative case. It did not appear in the Science Citation Index JCR of 1990, but in the 1989 and 1991 editions we see that MMWR had received 3821 and 4808 citations, respectively. The respective bibliographic impact factors were 4.86 and 4.77, well above those of any other public health journal. MMWR would even have ranked fourth (in 1989) and seventh (in 1991) in the "Medicine, General & Internal" subject category. Yet, MMWR was not mentioned in any subject category listing at all. In 1992, the Science Citation Index JCR noted that MMWR had received 5453 citations, but zero "source [citeable] items in 1992" were registered and no bibliographic impact factor was provided for the journal. The 1993 Science Citation Index JCR attributed to the MMWR 5850 citations, zero "source items in 1993", and no bibliographic impact factor. Finally, in the 1994 Science Citation Index JCR, MMWR is mentioned nowhere.² Nor is it in the Social Sciences Citation Index JCR.³ The evolution of this journal in the JCR over a few years is the sort of thing that leaves you wondering about ISI's criteria and procedures. Even more so because MMWR is quite a symbol for public health; it reminds us weekly that a strong connection between scientific research and public health practice is possible. Its high bibliographic impact factor, when it was available, was no surprise. Its being cited-only was difficult to understand. Its erratic presence in the JCR is puzzling.

Some journals, such as *Cancer Epidemiology Biomarkers and Prevention*, were "citing" from the first issue (late 1991).¹⁴ Others, like *Epidemiology* or *Cancer Causes and Control* were still cited-only in 1995,² although both were

first published in 1990. *Revue d'Épidémiologie et Santé Publique*, which recently celebrated its 20th anniversary, is a "cited-only" journal, too. *Annals of Epidemiology* also began publication in 1990 and, as we just saw, it is not yet mentioned in the JCR.

Other journals of excellent quality that seldom or never use English are also excluded from both the Science Citation Index and Social Sciences Citation Index JCR; two examples are *Epidemiologia e Prevenzione* (mostly in Italian) and *Gaceta Sanitaria* (almost exclusively in Spanish). On the other hand, current Science Citation Index citing journals include *Archiv für Lebensmittel Hygiene*, *Zentralblatt für Hygiene und Umweltmedizin* (largely in German) and *Zentralblatt für Bakteriologie-International Journal of Medical Microbiology, Virology, Parasitology and Infectious Diseases*. *Revista de Saude Publica* (largely in Portuguese) appears in the Social Sciences Citation Index JCR.

Although very few studies have been conducted in the area of public health, there may be limited overlap between the set of citing journals and what experts deem to be the highest quality journals.¹⁵⁻¹⁹ Differences have also been noted in other scientific areas. Thus, scientists from the US National Institutes of Health have expressed marked discrepancies with ISI in their ranking of the most prestigious journals.²⁰

TENTATIVE CONCLUSIONS

- 1 ISI ought to explain better how and why it chooses journals for the cited-only and for the citing categories;
- 2 It may be warranted for ISI to review partly its list of citing journals in public health;
- 3 A unified Science Citation Index/Social Sciences Citation Index listing of journals in epidemiology, preventive medicine, and public health is at present unavailable;
- 4 Assembling such a list might be helpful, particularly if it included basic information across several years (for example, citing or cited-only status, number of citeable items, raw number of citations, percentage that were self citations, bibliographic impact factor, etc); and
- 5 A study based on the judgements of specialists in epidemiology, preventive medicine, and public health would enable a comparison of the experts' assessment of journals with ISI's figures and with data from other sources.¹⁵

Then the tough questions would come up: are we talking about quality, quantity, relevance, value, reputation, performance, productivity, success, size, coverage, dissemination, circulation . . . ? About reading and understanding? About scientific, societal, or clinical "impact"? Are we not also dealing with parochialism, rituals, myths, phobias, and the like? Or would we, by any chance, consider the influence journals have on the public's health?⁸

But for now let's stick to the basics.

How accurate and reliable are the Journal Citation Reports?

There seem to be grounds for raising the issue of the technical quality of the JCR production process. Should the quality standards achieved by ISI satisfy equally policy makers, science administrators, and scientists of all disciplines?

According to the editor of *Science Watch*,⁵ in 1992 ISI was indexing and filing, "everything between the covers of 3,241 journals, which amounted to about 639,000 papers" and yielded more than 12 million citations. The 1993 Science Citation Index JCR were based on the processing of 550 778 source items (published in 4541 journals), which included 10 693 076 citations. The corresponding figures for the 1994 Science Citation Index JCR were 581 960 items, 4514 journals, and 11 341 030 citations. (Not surprisingly, most figures, including the journals' bibliographic impact factor, increase with the simple passing of time).^{8,21} The processing of over 10 million citations per year must really be complex. At least, that is how most of us would regard the selection, collection, computerisation, and analysis of an equivalent amount of samples, specimens, or subjects. Too many not to know better how they are handled. For instance, how accurately does ISI deal with the different styles of citing, citation errors, and title changes? How does it select the documents and sections of each journal that are citeable (that is, which references of which articles of which sections are counted)? Can the criteria be implemented homogeneously and consistently over time? It seems that ISI does not provide information detailed enough – as per common scientific practice – on these matters. For example, it was recently clarified by experts from The Netherlands,²² that in calculating the numerator of the bibliographic impact factor, the company counts citations to all types of documents, whereas as citable documents in the denominator it includes as a standard only normal articles, notes, and reviews. It is not that ISI conceals this, it just is not stipulated with great detail. More troublesome is the possibility that, "journal editors or scientific publishers (not ISI) could artificially raise the bibliographic impact factors of their journals".²²

Do errors occur? On one occasion, a US chemistry department normally considered among the "top 10" was left out of the "top 50" list. After the department's chairman wrote bitterly to *Science*, a "bookkeeping error" was acknowledged. *Science Watch* editor Pendlebury thought there was no flaw in their philosophy or methodology.⁵ He might well be right, but even so . . . shouldn't ISI just pay closer attention to "bookkeeping"? On another occasion, the *European Journal of Cancer* announced²³ that its true bibliographic impact factor of 2.141 had wrongly been published by the JCR as 0.789 – a 2.7 fold error that caused the journal to appear in the 59th instead of the 24th place on the oncology ranking.² Journal editors do seem to care about the bibliographic impact factor and, when figures are favourable, they are well publicised. A few decimal points can have a substantial effect upon the ranking

of a journal, particularly in fields such as public health which do not have a number of citing journals as large as other scientific disciplines. We should also recognise that bibliographic impact factors are strongly field-dependent, and thus cannot be compared unless the journals have a similar subject coverage.^{9,24,25}

There clearly is also room for improvement in the classing of journals in the subject categories of the JCR. In the 1991 Science Citation Index JCR the "public health" category included for the first time the journal, *Diabetes*, which climbed to the highest position in the ranking by bibliographic impact factor of that section. The same happened with *Diabetes Care* (third position in "public health"), but not with *Diabetologia*, although the bibliographic impact factor of the latter was in between the former two diabetes journals. Whereas most clinical journals often publish epidemiological articles, many journals (or none) would need to be included in "our" section (please note the quotes). After I inquired, ISI acknowledged that the two diabetes journals were wrongly placed under the "public health" category and that they would be removed from it; they were on the following year.²⁶ Clearly, a close look at the JCR will uncover a variety of inconsistencies. Yet other problems will simply be impossible to detect unless access to the original database is gained.

Before we get too philosophical

"Spending all your life writing may teach you to write. It won't achieve anything else". As Marguerite Duras¹ reminded us shortly before her death (quoted in the original at the beginning of this paper), in the end the harvest of a life devoted to research may seem rather meagre. And even that (inquiring, publishing, contributing a drop to the ocean of scientific knowledge) may provide little solace. It surely would do us good to remain lucid and modest.^{8,26-28} At least, before we get too philosophical about the "impact factor", let's get rid of the mystification, as we look at it.

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