

# What are research metrics?

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Research metrics are quantitative indicators or measures that provide some evidence of the impact of research output. A research output can be a journal article, a book, a book chapter or the overall research productivity. Bibliometrics is the traditional citation-based metrics. They are based on citation counts, counting how many times a publication has been cited in another publication. Altmetrics are web-based metrics. They are used for measuring the attention or interest of a scholarly work on various types of online platforms that include social media, research blogs, Wikipedia, news outlets, online forums, and any other online resources.

## Metrics for Journals

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### Journal Impact Factor

It is the most established metric for journals and the very first metric designed for journal evaluation. It was designed by Professor Eugene Garfield in 1955 as a measure to help librarians select the purchase of important journals. When a journal has an impact factor of 5 it means that in the last three years, this journal averaged 5 citations per published article. For example, if a journal has published 100 articles during the last two years and received 500 citations then the impact factor will be calculated using the following formula:

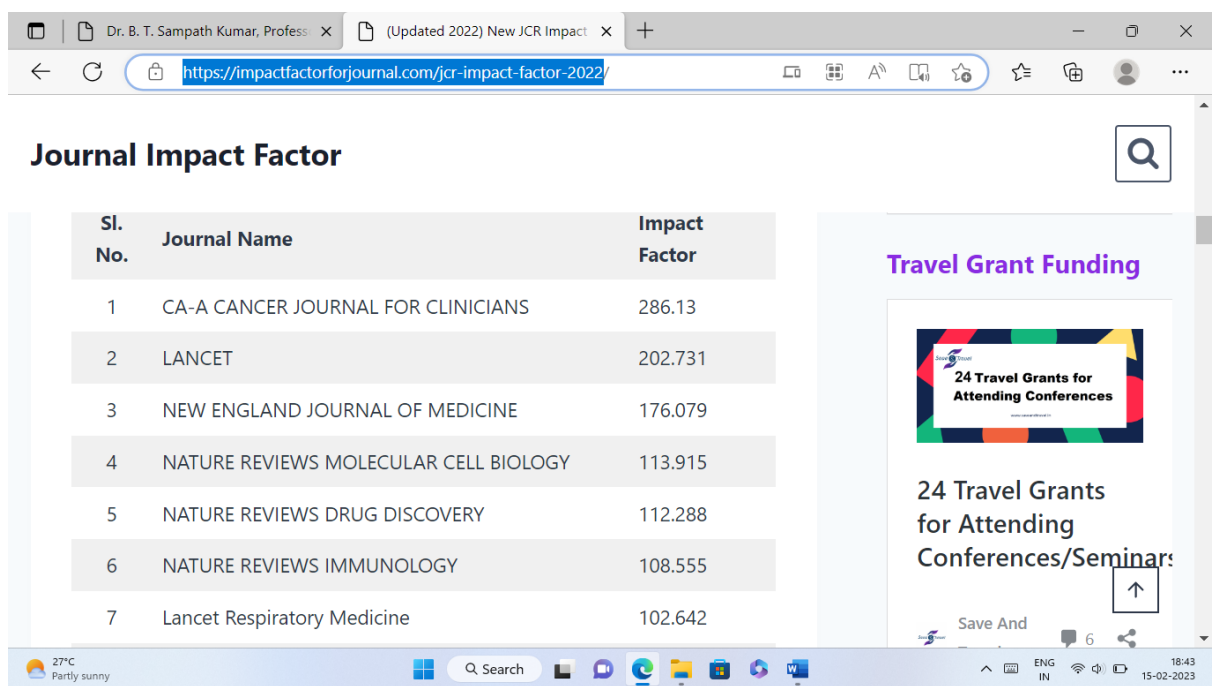
$$\text{Impact factor} = \frac{\text{Total citations in 2020 and 2021}}{\text{Total number of publications in 2020 and 2021}}$$

$$\text{Impact Factor} = 500/100 = 5$$

## Journal Citation Reports (JCR)

It provides you with the transparent, publisher-neutral data and statistics you need to make confident decisions in today's evolving scholarly publishing landscape, whether you're submitting your first manuscript or managing a portfolio of thousands of publications. The impact factor of various journals can be seen on the website:

<https://impactfactorforjournal.com/jcr-impact-factor-2022/>



The screenshot shows a web browser displaying the 'Journal Impact Factor' website. The page features a table with the following data:

Sl. No.	Journal Name	Impact Factor
1	CA-A CANCER JOURNAL FOR CLINICIANS	286.13
2	LANCET	202.731
3	NEW ENGLAND JOURNAL OF MEDICINE	176.079
4	NATURE REVIEWS MOLECULAR CELL BIOLOGY	113.915
5	NATURE REVIEWS DRUG DISCOVERY	112.288
6	NATURE REVIEWS IMMUNOLOGY	108.555
7	Lancet Respiratory Medicine	102.642

On the right side of the page, there is a promotional banner for '24 Travel Grants for Attending Conferences/Seminars' with a 'Save And' button below it. The browser's address bar shows the URL <https://impactfactorforjournal.com/jcr-impact-factor-2022/>. The Windows taskbar at the bottom shows the date as 15-02-2023 and the time as 18:43.

## Source Normalized Impact per Paper (SNIP)

It measures contextual citation impact by weighting citations based on the total number of citations in a subject field. The impact of a single citation is given higher value in subject areas where citations are less likely and vice versa. Unlike the well-known journal impact factor, SNIP corrects for differences in citation practices between scientific fields, thereby allowing for more accurate between-field comparisons of citation impact.

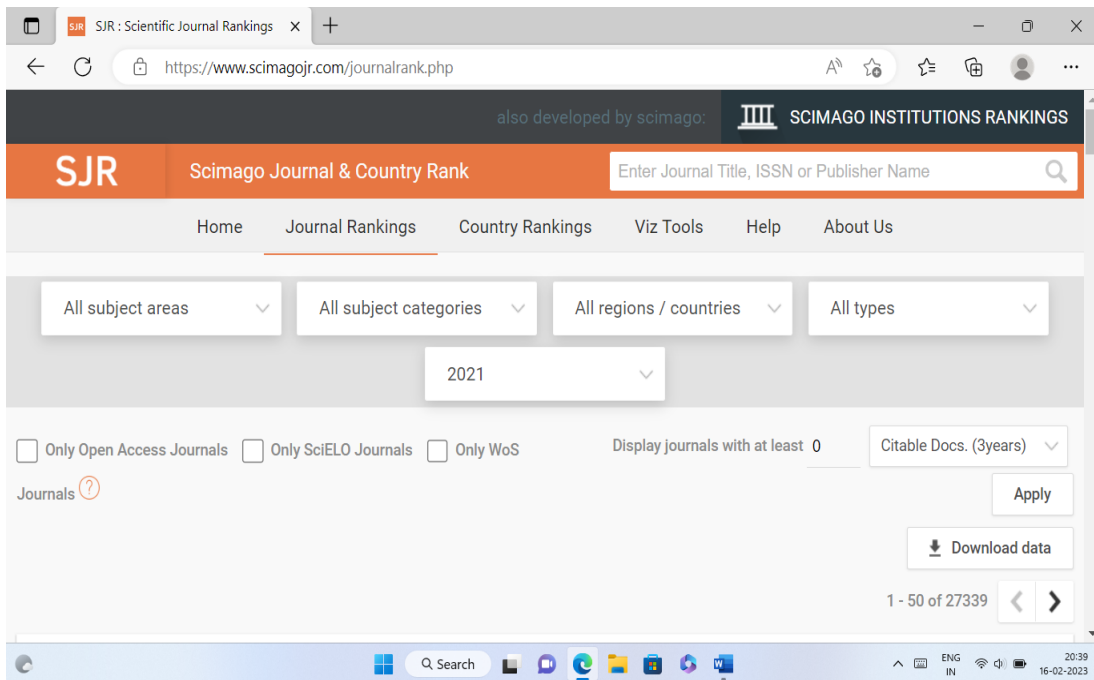
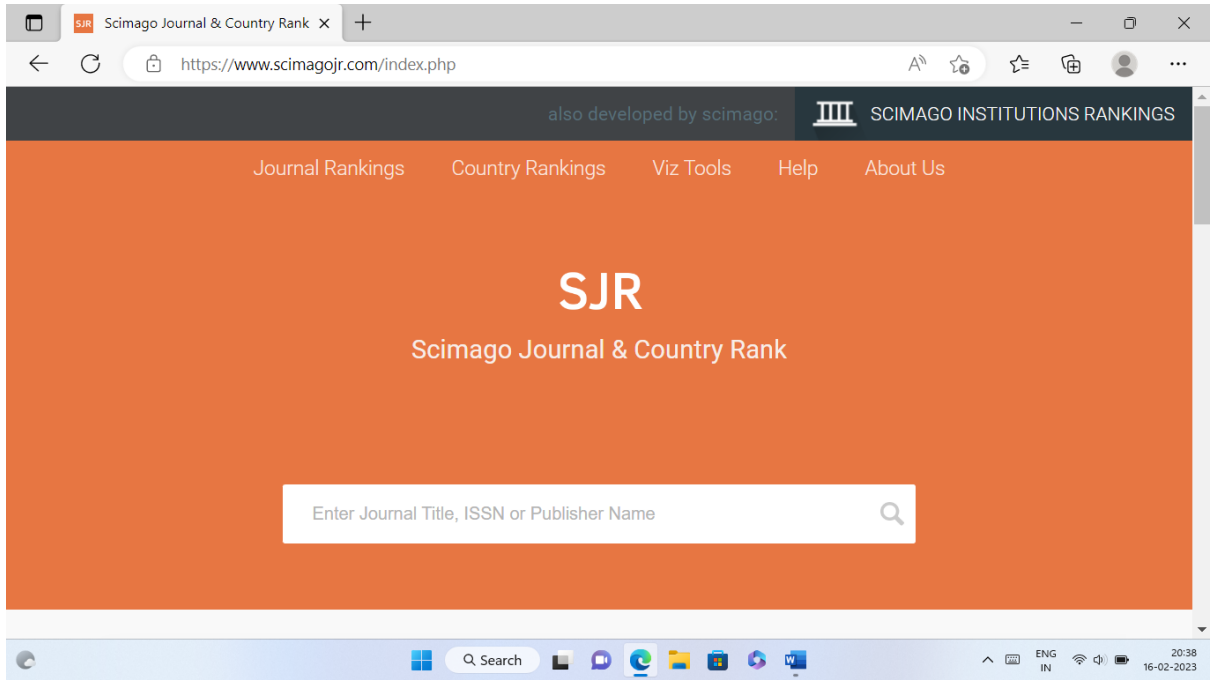
The source normalized impact per publication, calculated as the number of citations given in the present year to publications in the past three years divided by the total number of publications in the past three years.

### **Impact Per Publication (IPP)**

Impact Per Paper (IPP) is the number of current-year citations to papers from the previous 3 years, divided by the total number of papers in those 3 previous years.

### **The SCImago Journal & Country Rank**

It is a publicly available portal that includes the journals and country scientific indicators developed from the information contained in the Scopus® database (Elsevier B.V.). These indicators can be used to assess and analyze scientific domains. Journals can be compared or analysed separately. Country rankings may also be compared or analysed separately. Journals can be grouped by subject area (27 major thematic areas), subject category (309 specific subject categories) or country. Citation data is drawn from over 34,100 titles from more than 5,000 international publishers and country performance metrics from 239 countries worldwide. The SJCR allows you also to embed significant journal metrics into your web as a clickable image widget



## CiteScore

The CiteScore is based on the number of citations to documents (articles, reviews, conference papers, book chapters, and data papers) by a journal over four years, divided by the number of the same document types indexed in Scopus and published in those same four years.

For example, the 2021 CiteScore counts the citations received in 2018-2021 to articles, reviews, conference papers, book chapters, and data papers published in 2018-2021, and divides this by the number of these documents published in 2018-2021.

## Metrics for Authors

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Author-level metrics provide an assessment of the impact that an author makes on the scientific community or field of the study. The various metrics for authors are discussed below:

### **h-index**

It is the metric that quantifies the impact of the researcher's output over the course of his or her career. It was suggested by Professor of physics Jorge E. Hirsch in 2005. H-index is calculated by using the number of articles an author has published to date and the number of citations each article receives. If an author has published 30 articles up to now, and if 10 of those papers have been cited each 10 times, her h-index is 10. If any of the other 20 papers with less than 10 citations receive 11 or more citations in the future, the h-index will increase accordingly.

## i-10 index

The number of publications with at least 10 citations. This very simple measure is only used by Google Scholar and is another way to help gauge the productivity of a scholar.

## G-index

For calculating g-index, articles are ranked in decreasing order of the number of citations. It indicates the largest number such that the top g articles received at least  $g^2$  citations.

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TITLE	CITED BY	YEAR
<a href="#">Perception and usage of e-resources and the internet by Indian academics</a> BT Sampath Kumar, GT Kumar The electronic library 28 (1), 137-156	153	2010
<a href="#">Use of ICT in college libraries in Karnataka, India: a survey</a> BTS Kumar, BS Biradar Program 44 (3), 271-282	120	2010
<a href="#">Precision and relative recall of search engines: A comparative study of Google and Yahoo</a>	69	2009

	All	Since 2018
Citations	1440	744
h-index	19	14
i10-index	44	20

Bar chart showing citation trends from 2016 to 2023:

Year	Citations
2016	~100
2017	~135
2018	~120
2019	~115
2020	~160
2021	~145
2022	~140
2023	~15

## g-index for Professor X

The top g articles received (altogether) at least g squared citations.

Document no. (g)	Citation count	Square of g	Total no. of citations
Document 1	50 cites	1	50
Document 2	18 cites	4	50+18 = 68
Document 3	11 cites	9	68+11 = 79
Document 4	7 cites	16	79+7 = 86
Document 5	4 cites	25	86+4 = 90
Document 6	3 cites	36	90+3 = 93
Document 7	1 cites	49	93+1=94
Document 8	1 cites	64	94+1=95
Document 9	1 cites	81	95+1=96
Document 10	1 cites	100	96+1=97

## References

1. <https://www.bodleian.ox.ac.uk/sites/default/files/bodreader/documents/media/iskills-researchmetrics2-videotranscript.pdf>
2. <https://www.enago.com/academy/what-are-different-research-metrics/>
3. <https://www.kressup.com/i10-index-calculate-i10-index.html>
4. <https://guides.library.cmu.edu/biblio/jrankings#:~:text=IPP%20-%20Impact%20Per%20Publication%3>
5. <https://lib.guides.umd.edu/bibliometrics/SNIP>
6. [https://service.elsevier.com/app/answers/detail/a\\_id/14880/supporthub/scopus/~:how-are-citescore-metrics-used-in-scopus%3F/#:~:text=What%20is%20the%20CiteScore%20methodology,in%20those%20same%20four%20years/](https://service.elsevier.com/app/answers/detail/a_id/14880/supporthub/scopus/~:how-are-citescore-metrics-used-in-scopus%3F/#:~:text=What%20is%20the%20CiteScore%20methodology,in%20those%20same%20four%20years/)

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