ISEE YOUNG WORKSHOP 6

All you ever want to know about writing, publishing and reviewing environmental epidemiology papers

ISEE YOUNG 2024 WORKSHOP 6

- The aim is to provide guidance, and to pay specific attention to questions from the audience related to the practicalities of **getting your work published effectively in journals with a good reputation and a high visibility.**
- Another aim is to encourage young investigators to **become active as reviewers for scientific journals**. Reviewing manuscripts is a great learning experience that, although unpaid and time consuming, is good for your career.
- Further aims are to discuss modern-day (and not so modern day) challenges to scientific publishing such as **plagiarism, predatory publishing, paper mills,** how to do (and get your own papers cited in) narrative and systematic reviews, how to review collections of systematic reviews (so-called umbrella reviews), and how to rate the certainty of the evidence generated by such reviews.

ISEE YOUNG 2024 WORKSHOP 6

- The organizers will bring their experiences as

- Editor-in-chief and editorial assistant of the official ISEE journal **Environmental Epidemiology – *official ISEE journal*** (Bert Brunekreef & Ingrid Dahmen)
- Associate editor of **Environment International** (Hanna Boogaard)
- Deputy Editor of **Environmental Health Perspectives – *affiliate ISEE journal*** (Manolis Kogevinas)
- Editor-in-chief of **Environmental Research** (Payam Dadvand)
- Former editor in chief of the **IJPH Young Researcher Editorials series** (Apolline Saucy)

What is it that you always wanted to know??

- **EXPECTATIONS:**
- Learn how to write better papers/get papers accepted in the ‘right’ journals
- Learn how to review papers for journals
- Learn how to produce reviews of the literature

- **??**

Choosing the right journal
Best practices

- Aim to reach the intended audience for your work
- Choose only one journal, as simultaneous submissions are prohibited
- Supervisor and colleagues can provide good suggestions
- Shortlist a handful of candidate journals, and investigate them:
  - Aims & Scope
  - Accepted types of articles
  - Readership
  - Current hot topics

Articles in your reference list will usually lead you directly to the right journals.

Researcher Academy
On Campus

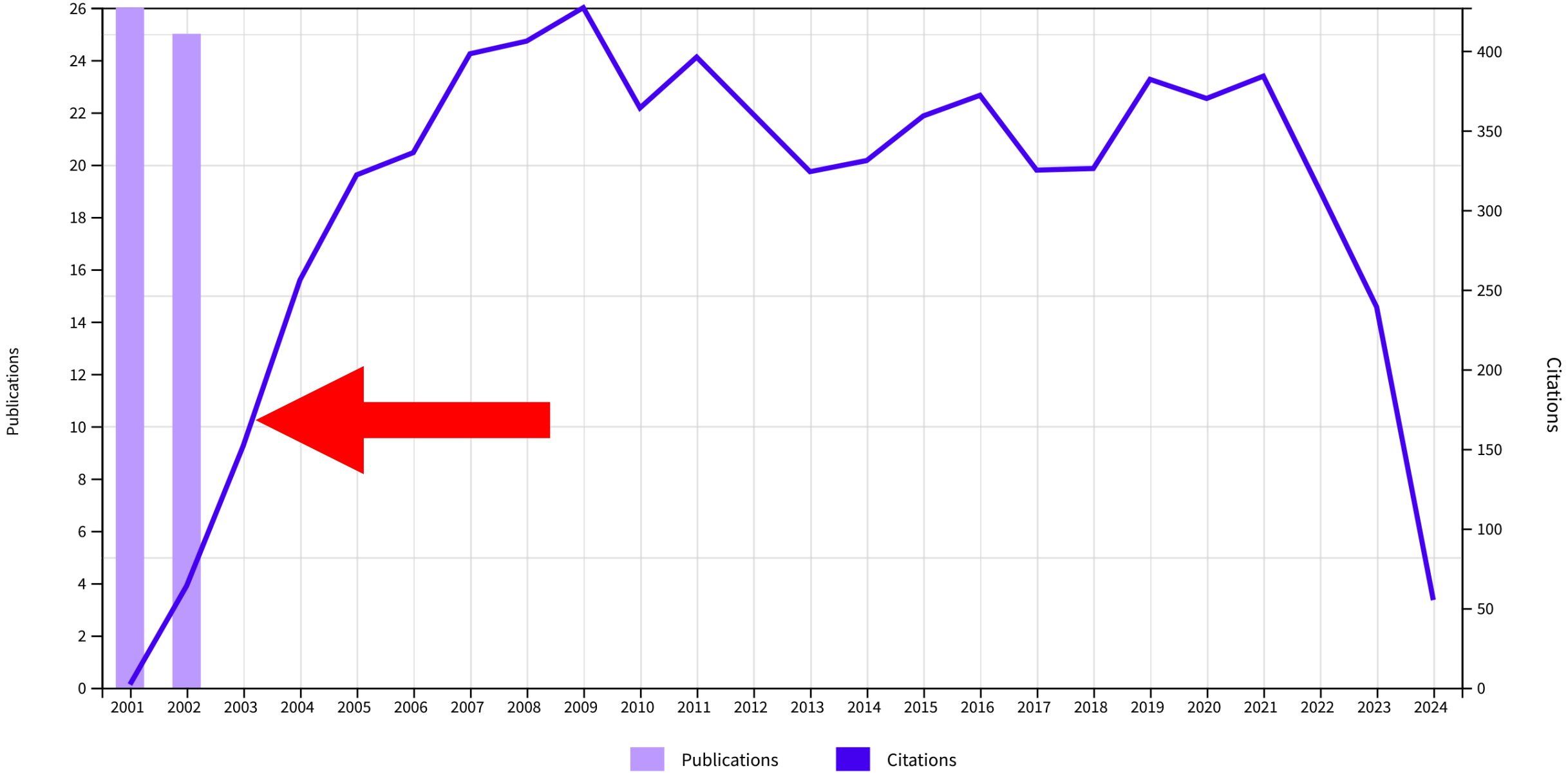
What about the Journal Impact Factor - 1

- How is it calculated?

- Number of citations in year X to papers published in journal in years X-1 and X-2

Times Cited and Publications Over Time

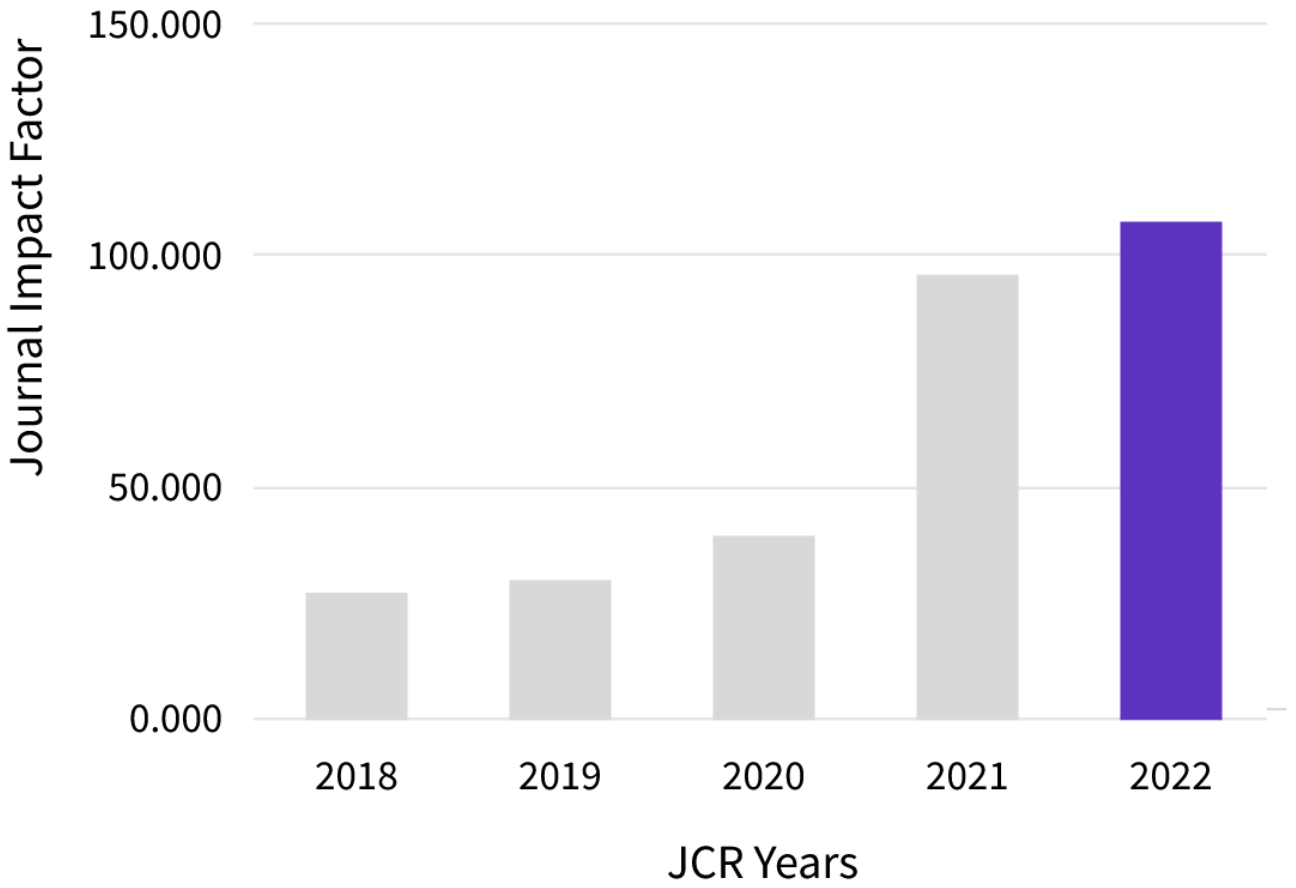
DOWNLOAD

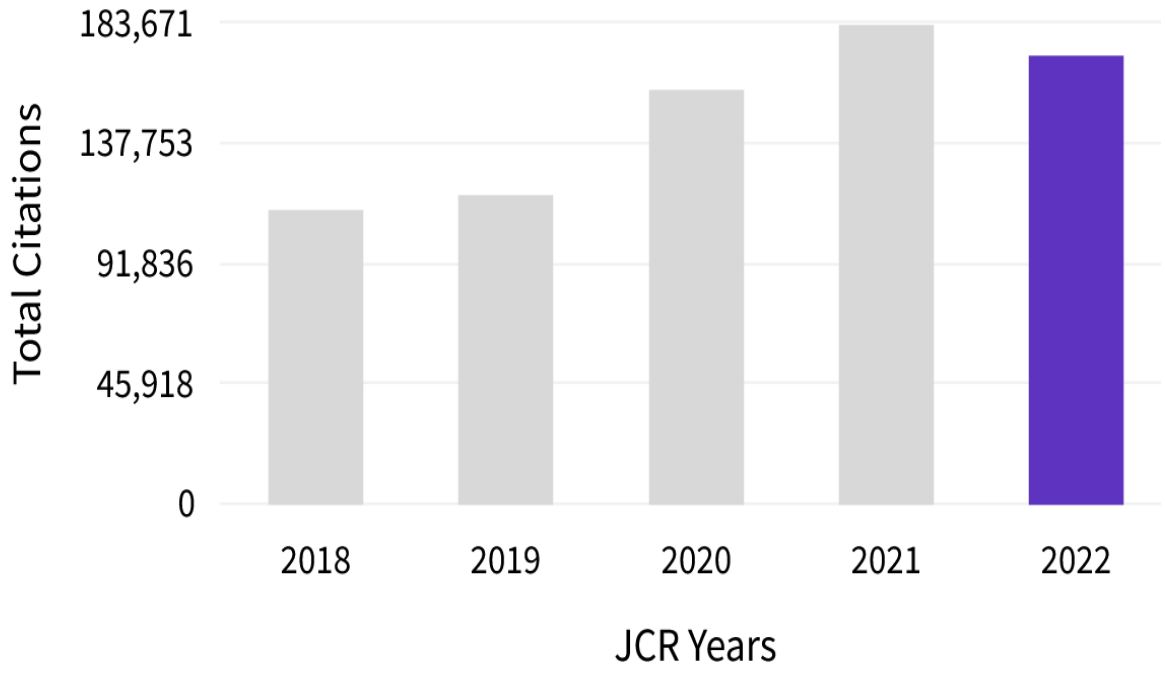


What about the Journal Impact Factor - 2

- The Journal Impact Factor does NOT measure impact but number of citations: **Journal Citation Report**, JCR
- 2 year time window excludes majority of citations to a paper (these are citations more than 2 years after publication)

BMJ IMPACT FACTOR AND N OF CITATIONS





What about the Journal Impact Factor - 3

- The Journal Impact Factor (JIF) is a journal-level metric calculated from data indexed in the Web of Science Core Collection. It should be used with careful attention to the many factors that influence citation rates, such as the volume of publication and citations characteristics of the subject area and type of journal. The Journal Impact Factor can complement expert opinion and informed peer review. In the case of academic evaluation for tenure, it is inappropriate to use a journal-level metric as a proxy measure for individual researchers, institutions, or articles.

Write better papers

- Clear and useful message; simple concise sentences
- A logical manner
- Readers grasp the research
- Authors are responsible for ensuring that the English in the manuscript is of a high enough standard

Editors, reviewers and readers all want to receive well presented manuscripts that fit within the aims and scope of their journal.

ELSEVIER

General structure of a research article

- Title
- Abstract
- Keywords

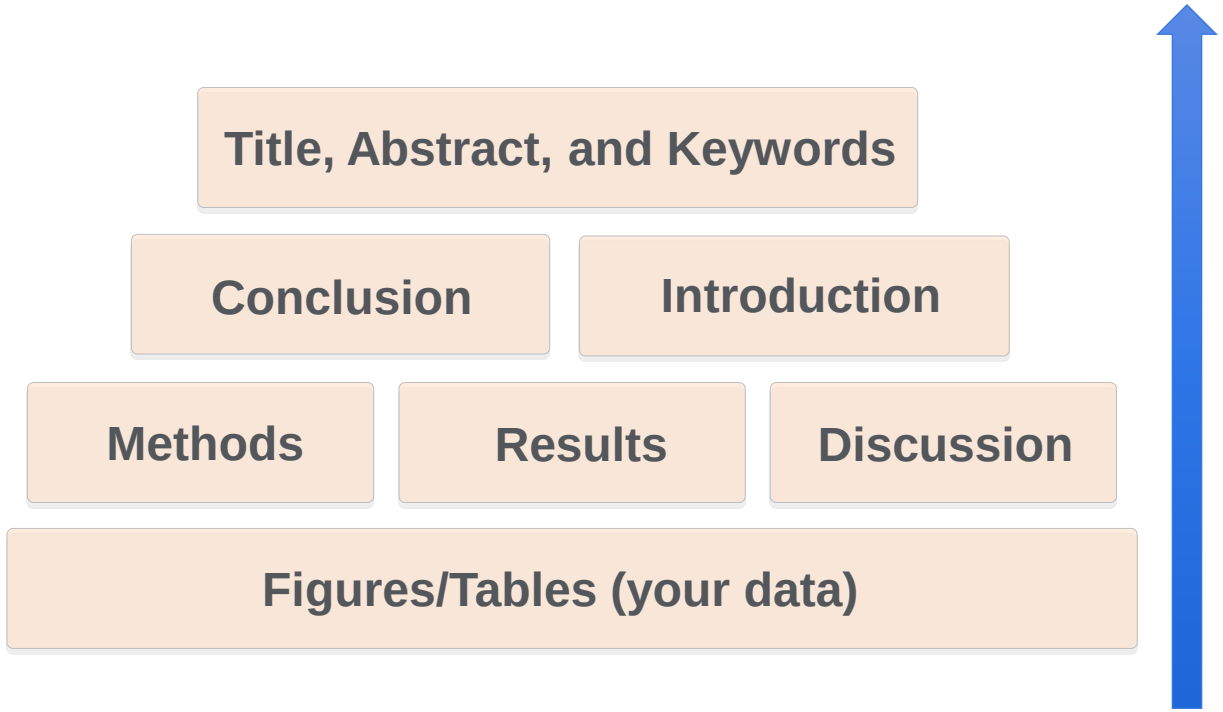
- Introduction
- Methods
- Results and Discussion

- Conclusion
- Acknowledgements
- References
- Supporting Materials

Read the Guide for Authors for the specific criteria of your target journal.

ELSEVIER

The process of writing – building the article



Effective manuscript titles

- Attract reader's attention
- Contain fewest possible words
- Adequately describe content
- Are informative but concise
- Identify main issue
- Do not use technical jargon and rarely-used abbreviations

Abstract

- Summarize the problem, methods, results, and conclusions in a single paragraph
- Make it interesting and understandable
- Make it accurate and specific
  - **A clear abstract will strongly influence whether or not your work is considered**
- Keep it as brief as possible
- Abstracts are often freely available in electronic abstracting and indexing services

Take the time to write the abstract very carefully. Many authors write the abstract last so that it accurately reflects the content of the paper.

Introduction

- Provide a brief context to the readers
- Address the problem
- Identify the solutions and limitations
- Identify what the work is trying to achieve

Write a unique introduction for every article. DO NOT reuse introductions.

Methods

- Describe how the problem was studied
- Include detailed information
- Do not describe previously published procedures
- Identify the equipment and materials used

Results

- Include only data of primary importance
- Use sub-headings to keep results of the same type together
- Be clear and easy to understand
- Highlight the main findings
- Feature unexpected findings
- Provide statistical analysis
- Include illustrations and figures

Discussion

- Interpretation of results
- Most important section
- Make the discussion correspond to the results and complement them
- Compare published results with your own

Be careful not to use the following:

- Statements that go beyond what the results can support
- Speculations on possible interpretations based on imagination

Conclusion

- Be clear
- Provide justification for the work
- Explain how your work advances the present state of knowledge
- Suggest future experiments

References

- Do not use too many references
- Always ensure you have fully absorbed the material you are referencing
- Avoid excessive self citations
- Conform strictly to the style given in the Guide for Authors (if asked)

How do the 4 journals operate?

- ENVIRONMENTAL EPIDEMIOLOGY
- ***Official ISEE journal, open access, APC 1,260 U$***
- ENVIRONMENTAL HEALTH PERSPECTIVES
- ***Affiliate ISEE journal, open access, no APC***
- ENVIRONMENTAL RESEARCH
- ***Hybrid journal, open access APC 3,590 U$***
- ENVIRONMENT INTERNATIONAL
- ***Open access, APC 3,980 U$***

How do the 4 journals operate?

- ENVIRONMENTAL EPIDEMIOLOGY
- ***New journal (2017), low volume < 100 submissions/yr (but sharp increase in 2024), large majority of submissions from HIC, high acceptance rate > 70%, desk rejection within 7 days, first decision within 1-2 months, final decision in 4-6 months, publication in about 4 weeks after final decision***

Instructions for authors

Things to pay attention to……

Where to find the instructions?

- All instructions can be found online.

- The same goes for the License to publish

Author checklist

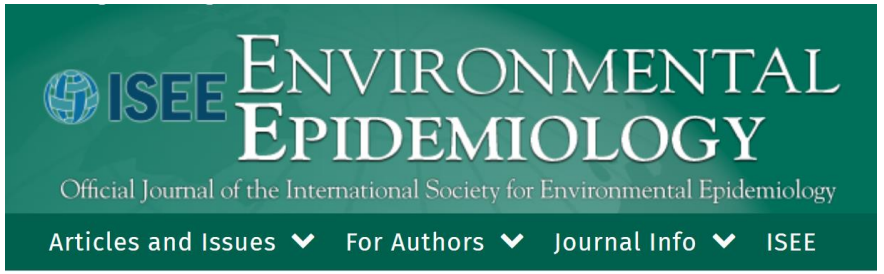
- Cover letter
- Title page
- Abstract
- Main text file
- Authorship Responsibility, Financial Disclosure, and Copyright Transfer forms
- Supplemental Content
- Copies of any related publications

Cover letter

This letter should provide information on:

- Address, phone #, fax # and or e-mail address of corresponding author
- The main contribution of your paper and the main reasons why you submit the paper for consideration by EE (‘What this study adds’)
- Data
- Similar paper(s)
- Conflicts interest
- Closely related papers

Title page



- Type of manuscript
- Manuscript title
- Authors' full names
- Corresponding author's name and mailing address, telephone number, and e-mail address
- Suggestion for a running head
- Description of conflicts of interest, or statement that there is no conflict of interest
- Sources of financial support
- Data and computing code
- Acknowledgements

References

- References sequentially numbered
- Numbers after punctuation
- Authors > 6, list first 3 (!) et al.
- Style
- ENDNOTE template available on website!

Environment International

Open access

22
CiteScore

11.8
Impact Factor

ELSEVIER

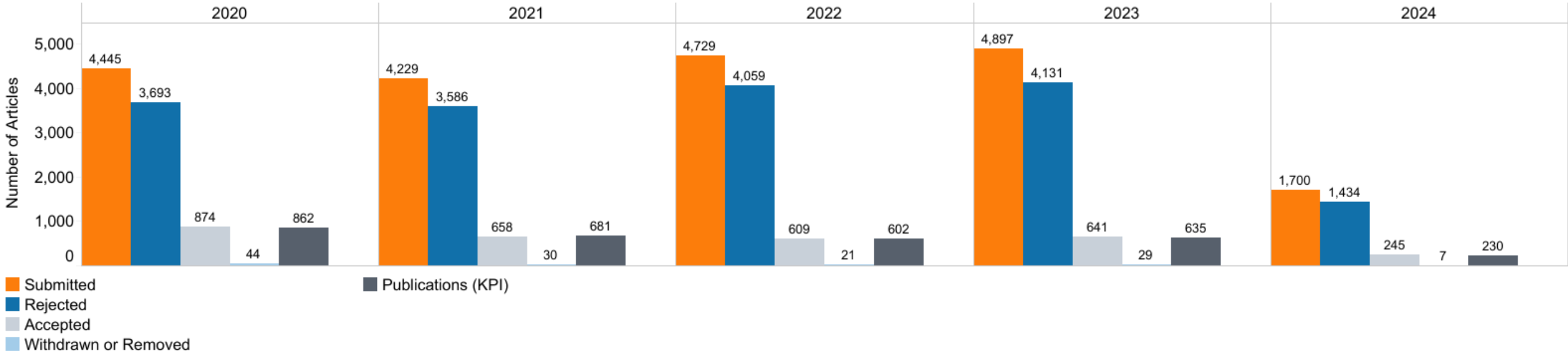
Environment International is a multi-disciplinary, **Open Access** journal publishing high quality and novel information within the broad field of 'Public and Environmental Health Sciences'.

Coverage includes, but is not limited to, the following research topics:

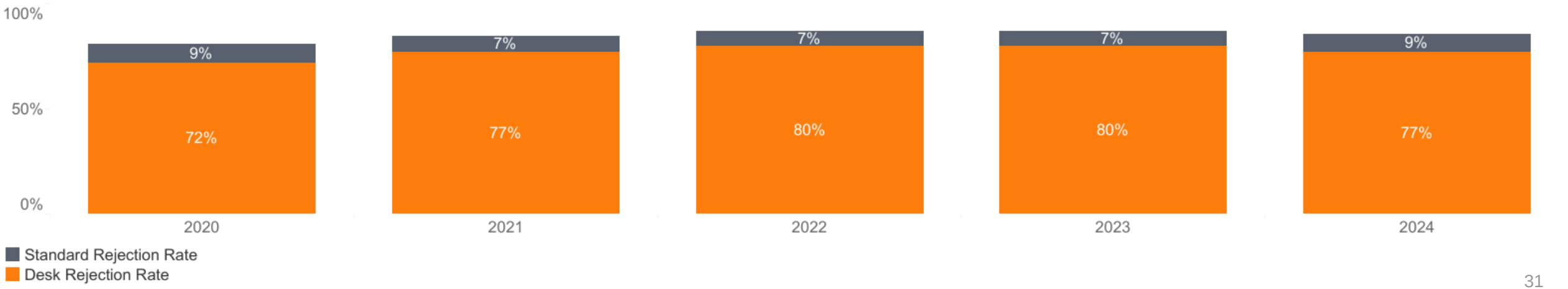
1. Public Health and Health Impact Assessment, Environmental Epidemiology (Prof. Mark Nieuwenhuijsen)
2. Environmental Health and Risk Assessment, Environmental Chemistry (Prof. Adrian Covaci)
3. Environmental Toxicology and Biodiversity, Environmental Processes (Prof. Frederic Coulon)
4. Environmental Technology for Environmental Health Protection (Prof. Thanh Huong (Helen) Nguyen)

We have 4 editors in chief, 2 special issue editors, 17 associate editors and 73 persons on the editorial board.

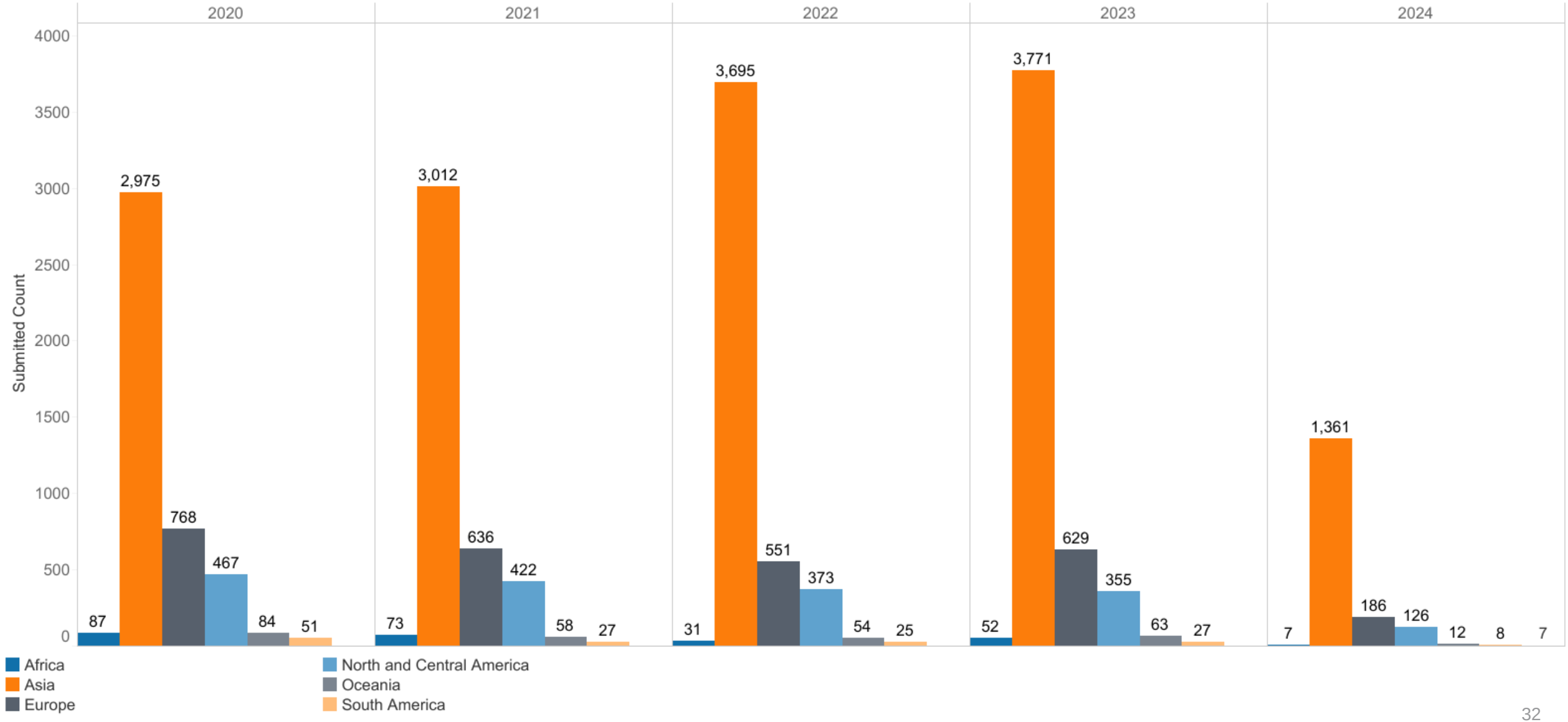
Submissions, Editorial Outcomes and Published Counts



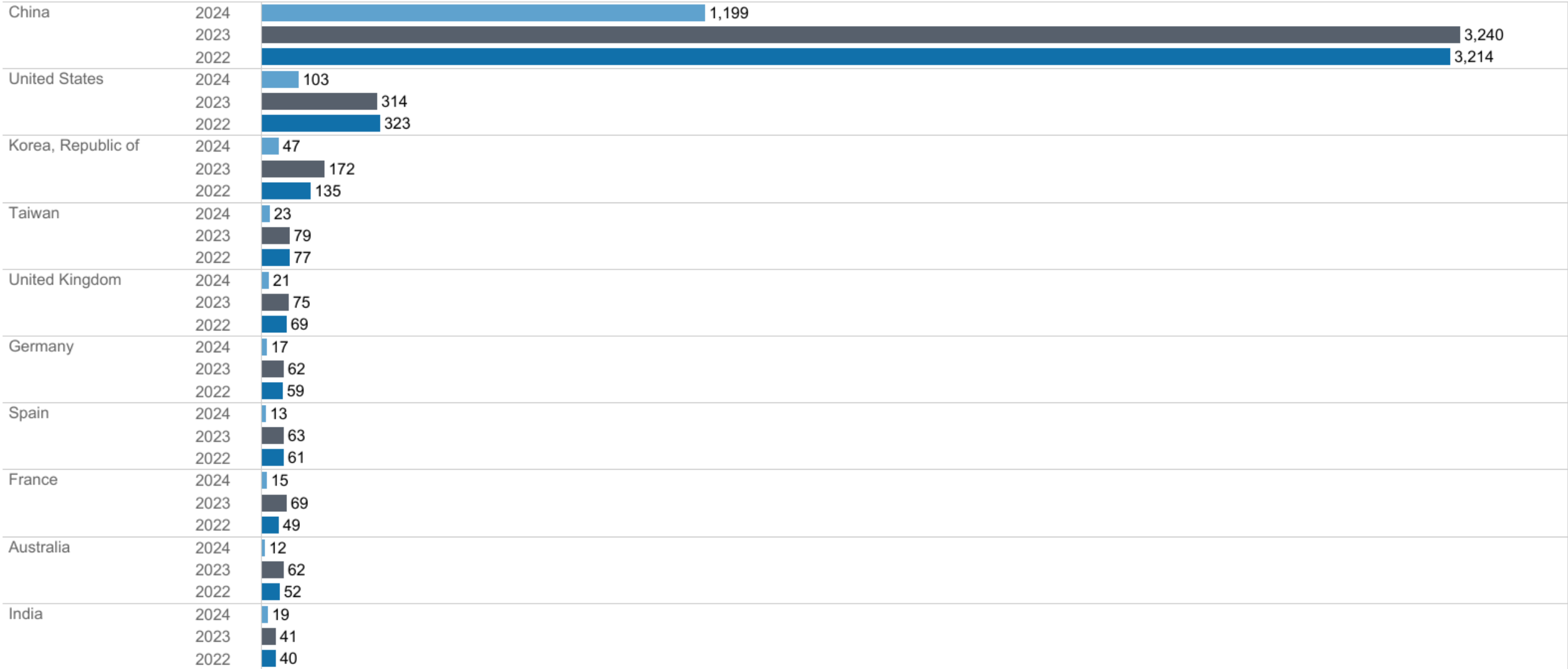
Rejection Rate



Submitted Articles by Continent (Submission Date)



Trend in Top 10 Countries & Regions by Submissions (Submission Date)



Environmental Research

Supports open access

11
CiteScore

8.3
Impact Factor

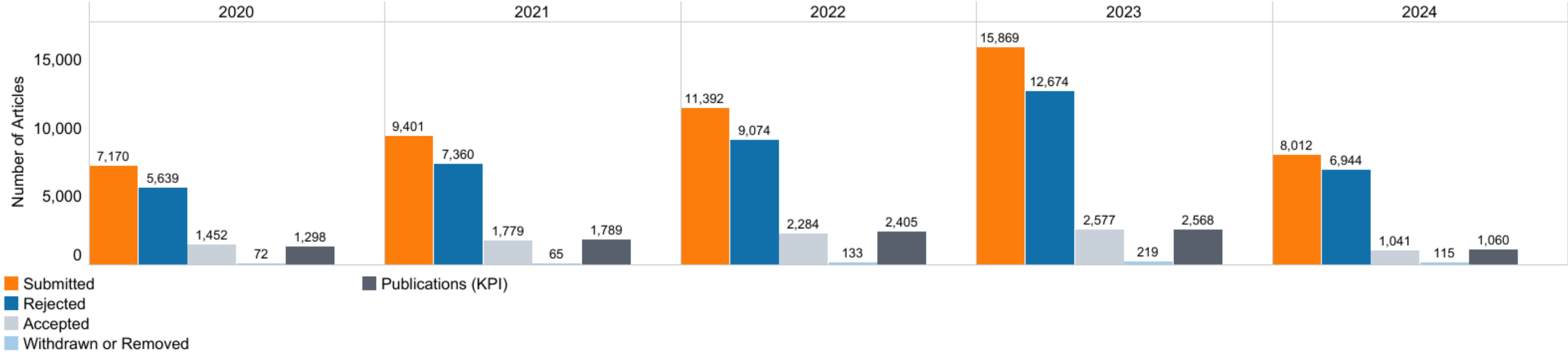
ELSEVIER

Environmental Research is a multi-disciplinary journal publishing high quality and novel information about anthropogenic issues of global relevance and applicability in a wide range of environmental disciplines, and demonstrating environmental application in the real-world context. Coverage includes, but is not limited to, the following research topics:

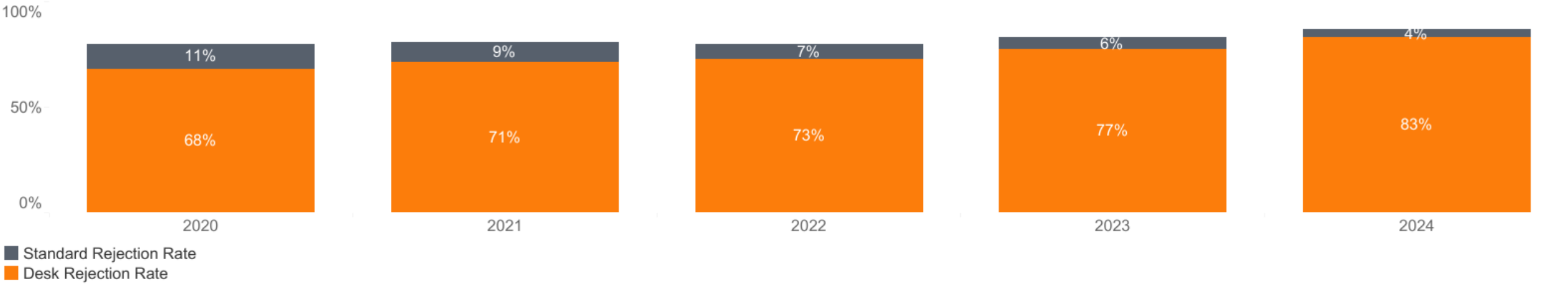
1. Environmental Epidemiology and human health (Dr. Payam Dadvand)
2. Environmental Chemistry and Ecotoxicology (Prof. Robert Letcher)
3. Toxicology (Prof. Johan Øvrevik)
4. Environmental Technology (Prof. Aijie Wang)

We have 4 editors in chief, 1 special issue editors, 19 associate editors, 70 persons on the editorial board, and 16 persons on our early career editorial board.

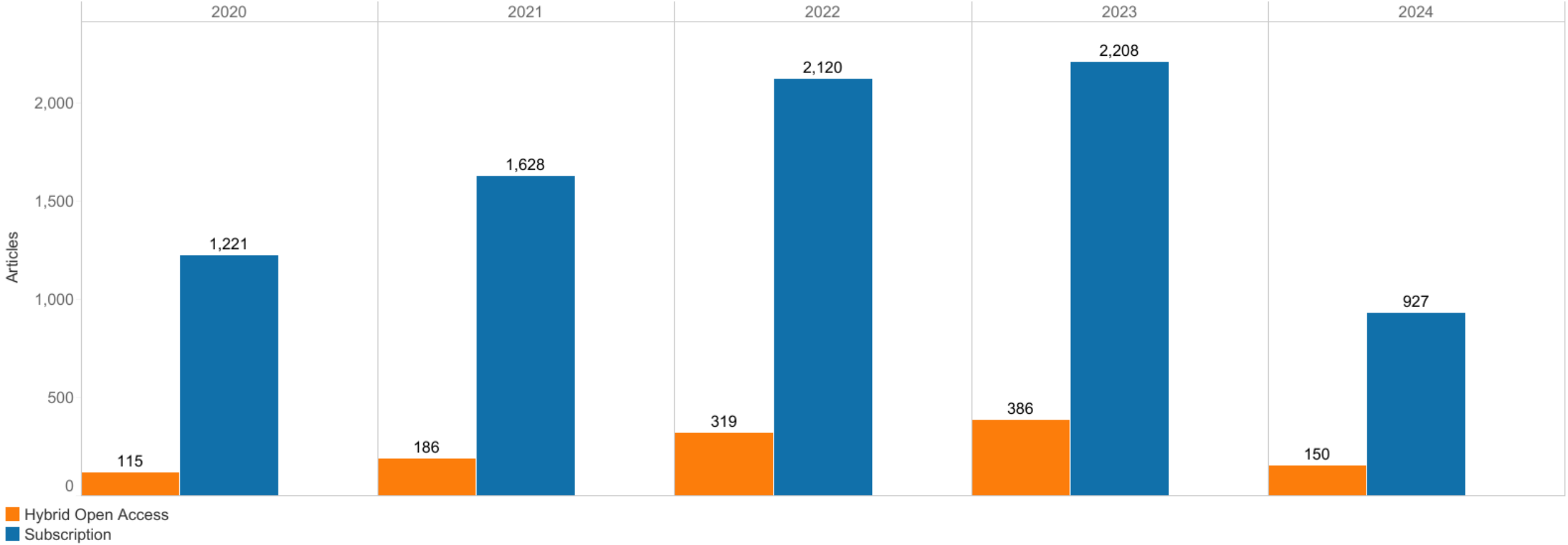
Submissions, Editorial Outcomes and Published Counts



Rejection Rate

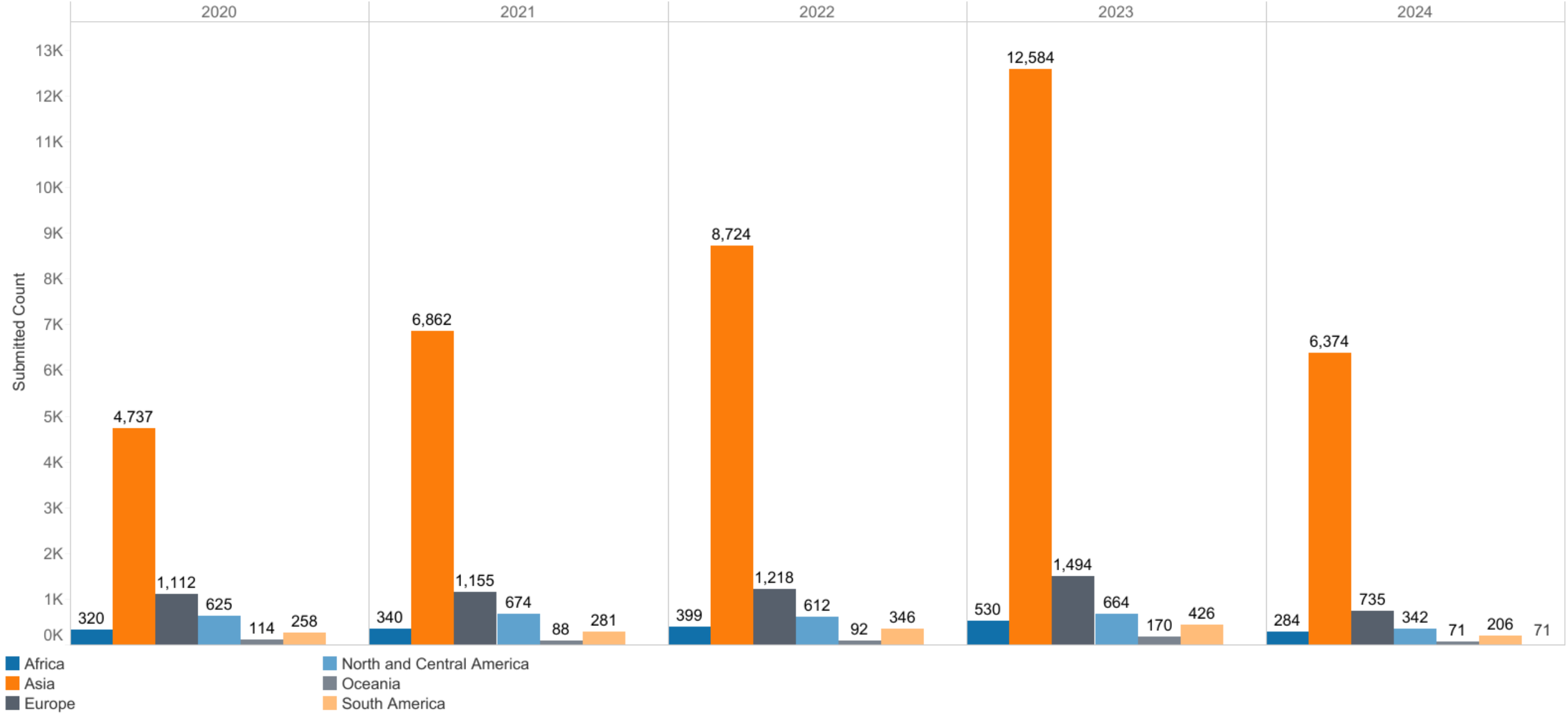


Published Articles by Access Type (VoR Date)

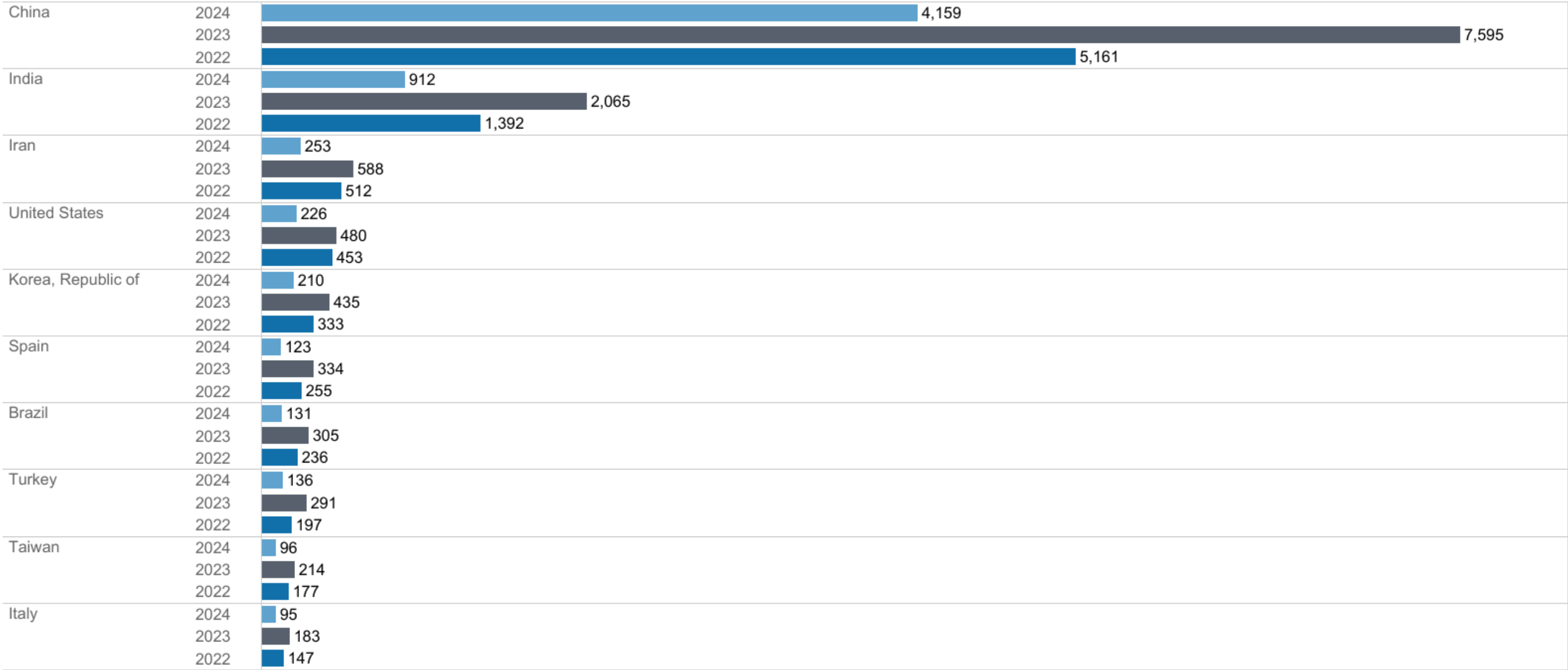


Stmj Article Access Type	2020	2021	2022	2023	2024
Hybrid Open Access	115	186	319	386	150
Subscription	1,221	1,628	2,120	2,208	927

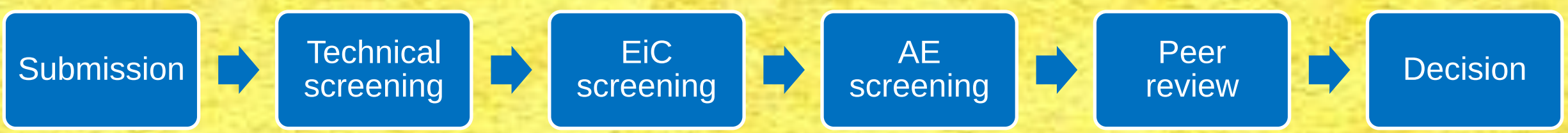
Submitted Articles by Continent (Submission Date)



Trend in Top 10 Countries & Regions by Submissions (Submission Date)



EiC screening



EiC screening

1) Scope
2) Technical screening

View Submission
Evaluate Manuscript
Manuscript Analysis Services
Similarity Check Results (34%)
Duplicate Submission Check (55%)
Details
Initiate Discussion
History
File Inventory
Classifications
Assign Editor
Unassign Editor
Invite Reviewers
Similar Articles in MEDLINE
PubMed - Title
Similar Articles in Scopus
Scopus Corresponding Author Search
Submit Editor's Decision and Comments
Send E-mail

EiC screening

3) Originality

4) Relevance and impact

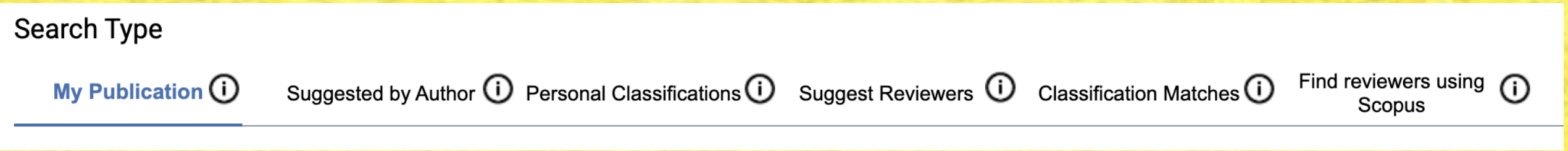
5) Methodology

6) Quality of writing and presentation of the results

Cover letter can play an important role in this phase!

AE handling

1) Screening
2) Reviewer invitation



AE handling

Editorial Board Members

Browse a list of your journal's Editorial Board Members.

Keyword Search

Search on Scopus using your own keywords and queries.

Author Search

Search on Scopus for specific users by name, institution or email address.

Referenced Authors

Browse authors of works referenced in the manuscript.

Interested Reviewers

Select from a list of reviewers who have expressed an interest to review for your journal via Reviewer Hub.

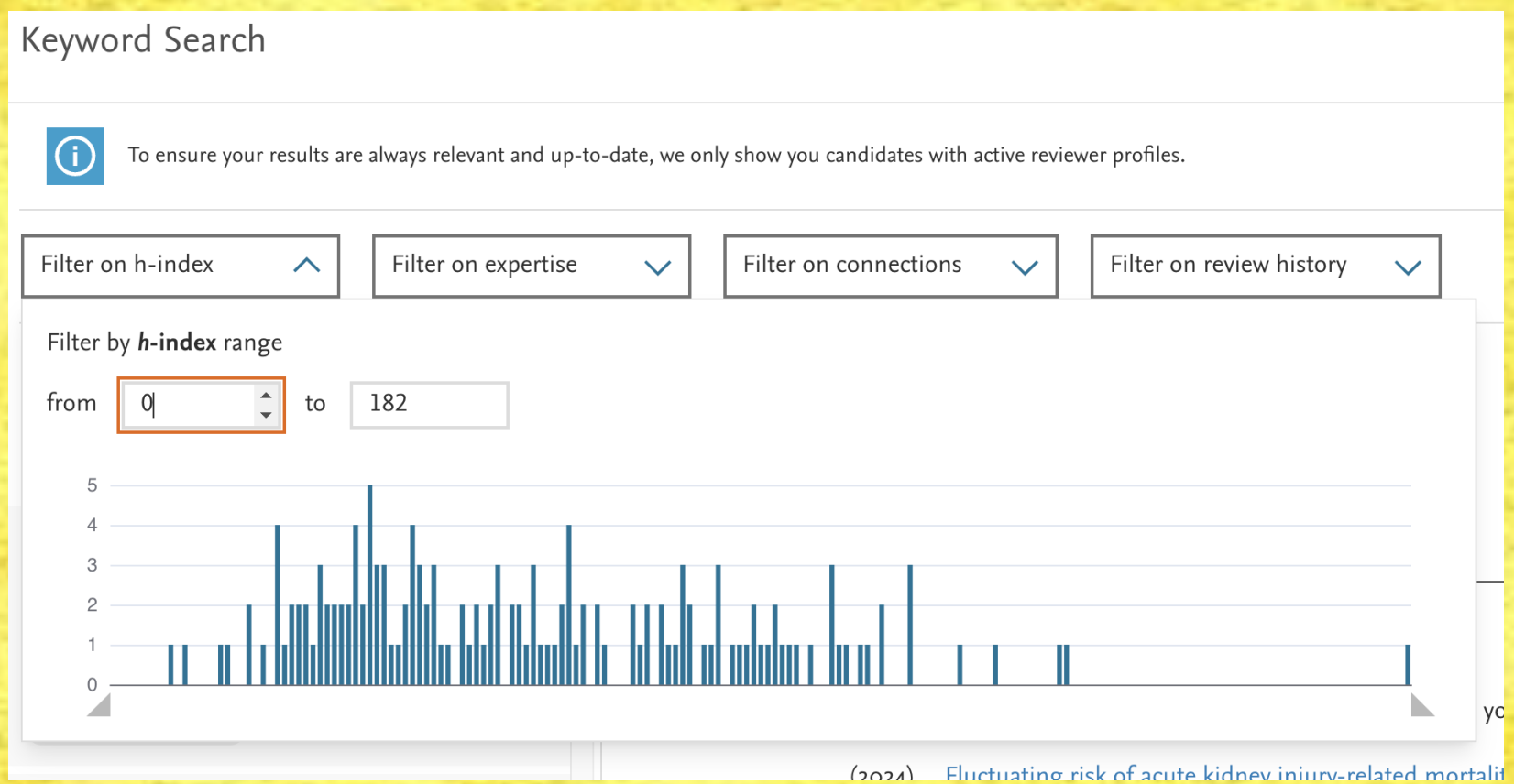
Journal Reviewers

Look for reviewers from your journal.

System Recommendations

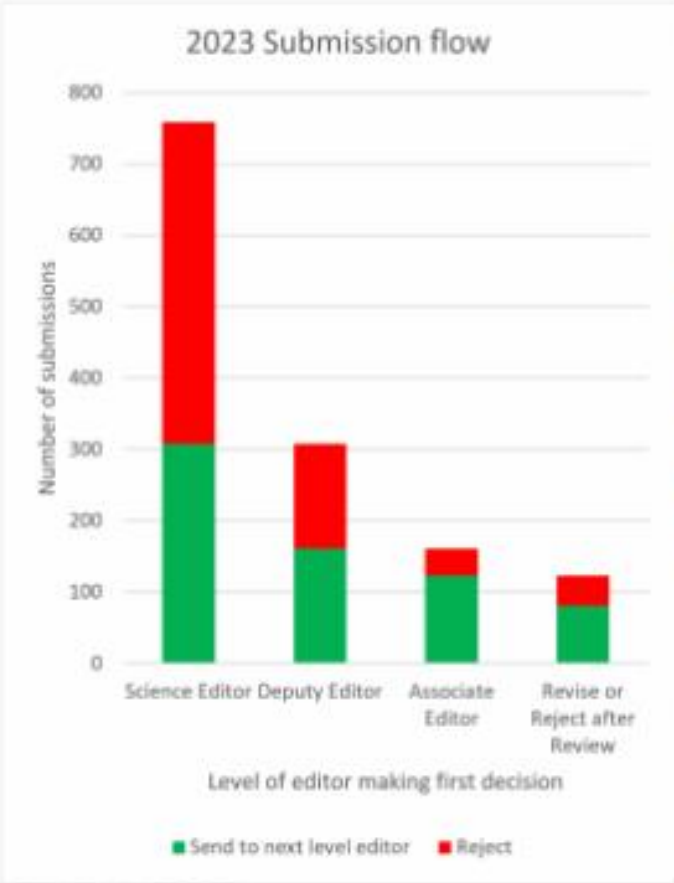
Browse a list of reviewers recommended by Elsevier based on their relevancy and field of research.

AE handling

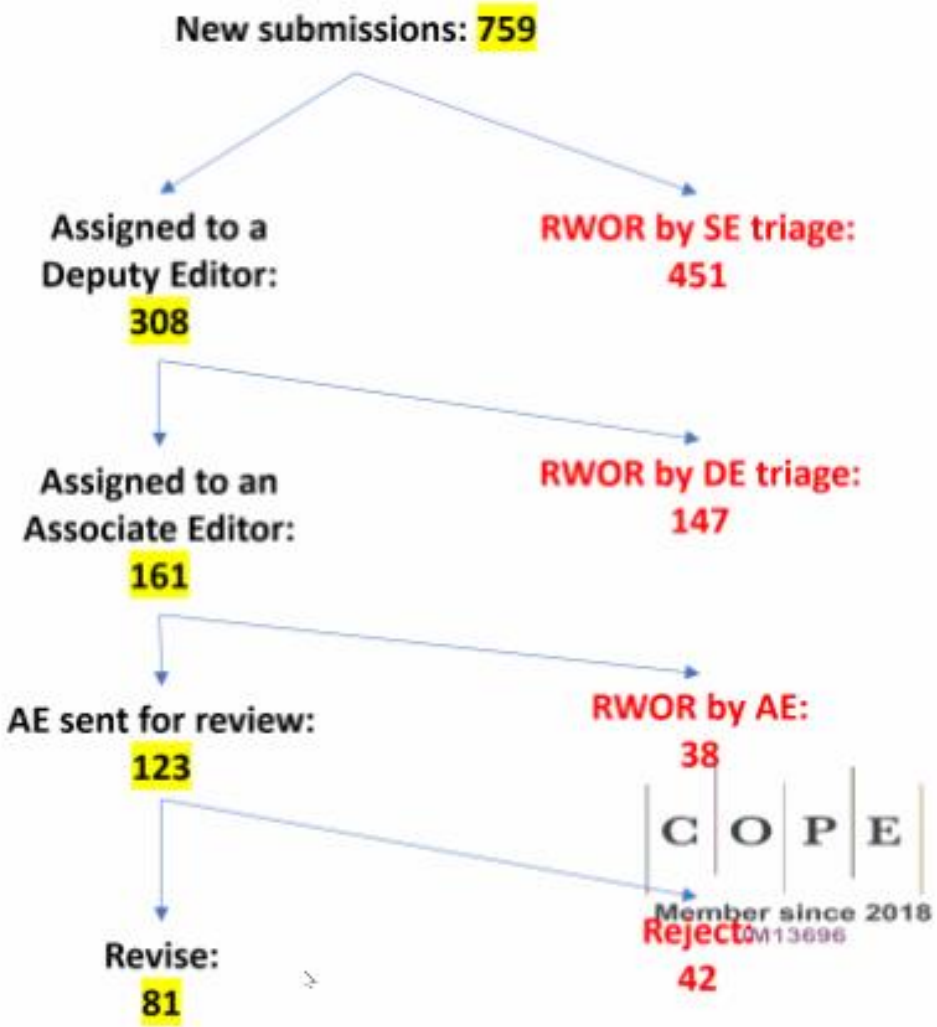

Keyword Search
To ensure your results are always relevant and up-to-date, we only show you candidates with active reviewer profiles.
Filter on h-index
Filter on expertise
Filter on connections
Filter on review history
Filter by h-index range
from
0
to
182
5
4
3
2
1
0

ehp Environmental Health Perspectives

Editorial Review Board: *EHP* Peer Review Overview



January 2023-June 2023 Assignment Workflow



ehp Environmental Health Perspectives

In earlier periods most papers were related to air pollution and to some extent child health. The topics covered by the journal (similar to what is presented in ISEE) has widened considerably including many papers on climate change, urban health, social inequities, policy related issues and PFAS (obviously☺)

The geographic origin is mostly N America, western Europe and China (with a majority of toxicology papers coming from China)

Formats of the papers include: Research Articles (the main type of articles we publish), Research Letters (fully indexed short results articles), Letters to the editor, Commentaries, Reviews, Seminars (emerging issues, novel methods, and fundamental scientific concepts), Invited Perspectives (editorials) and also news articles (science selection)

ehp Environmental Health Perspectives

Early Career Researcher Initiative updates: Structure


- **Education Committee**: Help develop, maintain and promote educational resources and professional development for ECRs


- **ECR Reviewer Committee**: Support the establishment, growth, and maintenance of a quality ECR reviewer database

- **Social Media Committee**: Help develop *EHP* social media content to engage early career researchers and other potential environmental health science contributors.

- **Seminar Committee**: Act as a resource for *EHP*'s review Deputy Editor in developing and encouraging submissions of the new "Seminar" article type.

ehp Environmental Health Perspectives

- **ECR resource for AEs**
  - Names, email, professional URL(s), and 1-2 sentences about reviewer's expertise
- **Reviewer feedback**
  - Improve the quality of EHP reviews
  - Support the training of our ECRs and reviewers
  - Nominate any review for feedback by emailing **ehp_ecri@niehs.nih.gov**
- **Peer Reviewer Partnership Program**
  - Partner less experienced reviewers with ERB members
  - Provide training and support for ECRs and reviewers
  - Expand the pool of EHP reviewers

Want to learn more or get involved? Visit **bit.ly/EHP_ECR**

Questions? Contact **ehp_ecri@niehs.nih.gov**

What is it that you always wanted to know??

- **VISIONS OF THE FUTURE**
- Less emphasis on citations and impact factors, more on social relevance
- More transparency of the review and publication process
- More recognition of replication studies, and ‘negative’ studies which are important for public health
- Pre-print servers
- Artificial intelligence
- **??**

What about **artificially intelligent** papers?

QUOTE FROM A RECENTLY SUBMITTED MANUSCRIPT

12. Declaration of generative AI in scientific writing

During the preparation of this work, XXX used ChatGPT in order to improve readability and language. After using this tool, XXX reviewed and edited the content as needed and takes full responsibility for the content of the publication.

EDITORIAL Open Access

As the world turns: scientific publishing in the digital era

David Ozonoff[1*]

""But papers produced by generative AI platforms like ChatGPT can make up citations, using plausible non-existent titles inferred from what actual authors have previously written [13]. Even when citations exist, they may not say what ChatGPT implies. And computer precision may be wrongly inferred, since repeat queries can give different texts. It's not clear exactly what our unspoken presuppositions are about computer generated texts, but it is almost a certainty generative AI will be used to produce abstracts or whole papers submitted as scientific research.""

Modern times....

- Plagiarism
- Duplicate publication
- Paper mills
- Predatory journals
- Unwanted solicitation of manuscripts

Modern times....

- Plagiarism: we do plagiarism checks but these need to be handled with care!
- Duplicate (or almost duplicate) publications: an extreme example

Risk Factors Associated with Bronchi
School Going Child

: 103-106]

P.K. L

Ast **of Sonapur**

Pokha **NK[1], Pandey RM[2], Erkki K[3]**

Identical text except for location and population size

Kathmandu University Medical Journal (2007), Vol. 5, No. 4, Issue 20, 484-487

Modern times....

- Paper mills
- Predatory journals
- Unwanted solicitation of manuscri

Modern times….

- **Paper mills**

"In scientific publishing, the term paper mill refers to for-profit organisations that engage in the large scale production and sale of papers to researchers, academics, and students who wish to, or have to, publish in peer reviewed journals, both national and international. Many paper mill papers included fabricated data."

BMJ 2022;379:e071517

Modern times....

Predatory journals

RESEARCH PUBLISHING

How to avoid being duped by predatory journals

Some journals capitalise on researchers' and clinicians' need for publications by luring them in with flattering emails, only to subject them to poor editing practices and threatening invoices. The best way to avoid this is to learn to spot the warning signs, writes **Eva Amsen**

BMJ 2024;384:q452

Modern times....

Unwanted solicitation of manuscripts

Submit your Scientific Research on Women Health Care

EH Editor-Women Health Care <norep

Aan Brunekreef, B. (Bert)

Beantwoorden | Allen beantwoorden | Doorsturen

di 26-3-2024 17:

Als er problemen zijn met de weergave van dit bericht, klikt u hier om het in een webbrowser te bekijken.

CAUTION: This email originated from outside of Utrecht University. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Dear Dr. Brunekreef Bert,

Journal of Women Health Care and Reproductive Medicine promotes and publishes the articles for spreading the cutting-edge research in **Women Health Care** and **Reproductive Medicine** .

Recently we have gone through your publications, where we found "**Does the oxidative stress play a role in the associations between outdoor air pollution and persistent asthma in adults? Findings from the EGEA study**" as a pioneering publication. So, we thought it would be the right time to take a chance to invite you for the submission of your article for our upcoming issue.

-Online Submission link You may submit your article/s at the below URL
http://scientificeminencegroup.com/submit-manuscript.php?journal=16

Modern times....

Unwanted solicitation of manuscripts

Review of invitations to publish in predatory scientific journals

Peter C. Gøtzsche

Institute for Scientific Freedom

DK-2970 Hørsholm

Denmark

https://osf.io/preprints/socarxiv/jdgpx

Modern times....

Unwanted solicitation of manuscripts

In March 2024, I received 309 invitations to submit manuscripts to obscure journals, including repeats and reminders. About 30 ‘journals’ claimed to have an impact factor. This could be verified only for 4 MDPI journals

Modern times....

Unwanted solicitation of manuscripts

Identify trusted publishers for your research

https://thinkchecksubmit.org/

Through a range of **tools and practical resources**, this international, cross-sector initiative aims to **educate researchers, promote integrity**, and **build trust in credible research and publications**.

Predatory publications, duplication in research papers, and article retractions

Predatory publisher

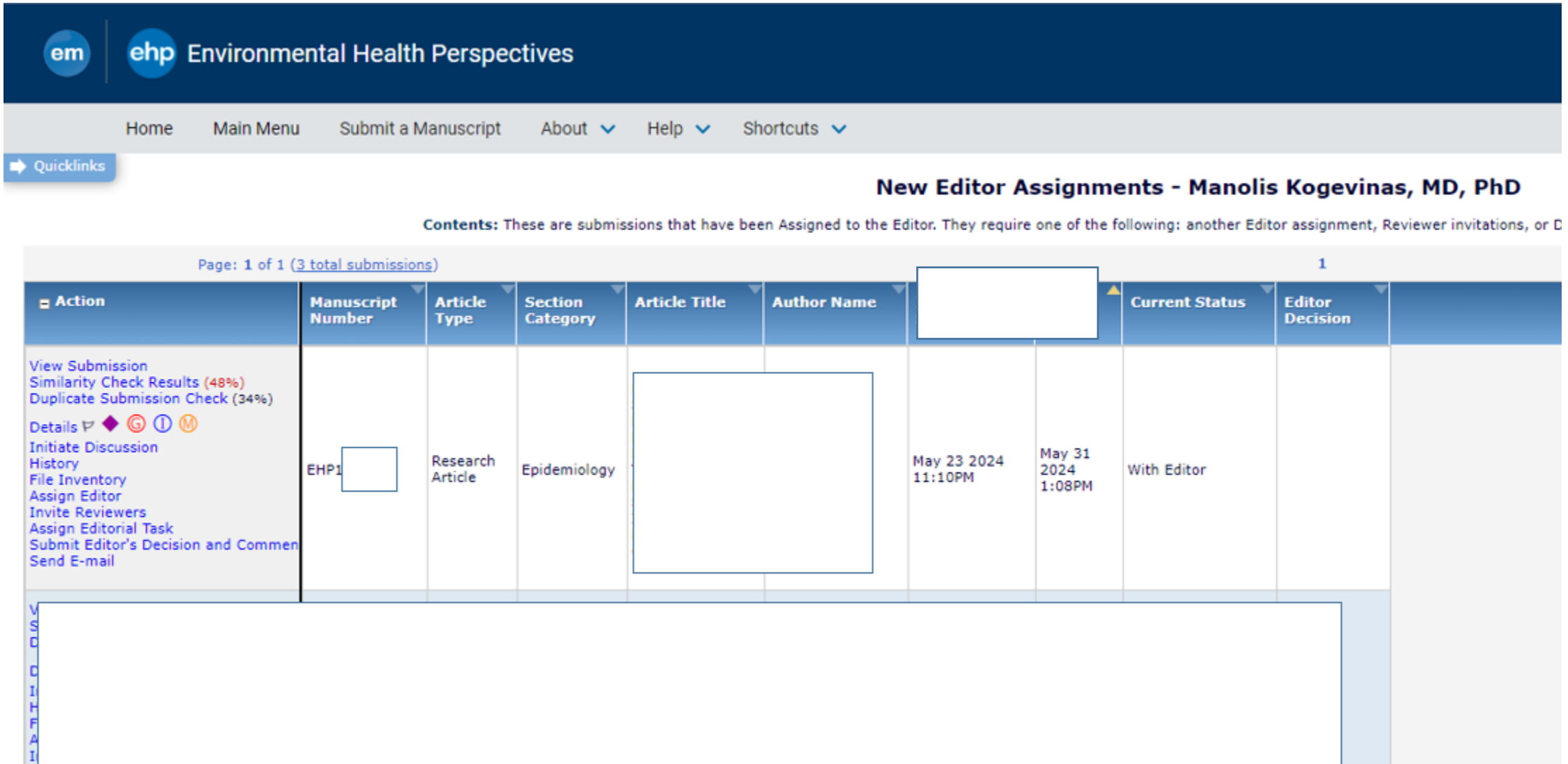
- There is no one standard definition of what constitutes a predatory publisher but generally they are those publishers who charge a fee for the publication of material without providing the publication services an author would expect such as peer review and editing
- Predatory journals exploit the open-access (OA) model but these are not synonymous concepts

Jeffrey Beall, American librarian who drew attention to "predatory open access publishing", a term he coined, and created Beall's list,

Key indicators to distinguish predatory publications

1. Lack of Peer Review Process
2. Aggressive and Unsolicited Solicitation
3. High Publication Fees
4. Editorial Board Composition
5. Scope and Standards
6. Indexing and Impact Factor
7. Transparency and Contact Information
8. Website Quality

Duplication/similarity in research papers



Duplicate Submission Check Results - [redacted] 11:16PM

ubmission [redacted]

esults of a comparison between this submission and previously submitted manuscripts are listed below. A separate similarity score is shown for the Article Title, the list of Authors and the Abstract of a submission. The EM Duplic
Score is the highest weighted average for any of the submissions displayed below.

tial Duplicate Submissions

EM Duplicate Score:

script/Submission er	Initial Date Submitted	Revision	Current Status	Article Title	Authors	Article Title Similarity	Author Similarity	Abstract Similarity
	[redacted]	0	Completed Reject	[redacted]	[redacted]	31%	33%	41%
		0	Completed Reject			35%	0%	40%
	09/25/2021 22:24:55	3	Completed Accept			44%	0%	26%
	11/12/2018 19:21:19	0	Completed Reject			44%	0%	15%
	03/08/2021 15:31:33	0	Completed Reject			38%	0%	22%
	11/11/2021 03:26:20	0	Completed Reject			38%	0%	22%
	10/12/2023 08:45:23	0	Completed Reject			38%	0%	19%
	09/14/2020 00:22:43	0	Completed Reject			31%	0%	27%

Study design and participants

Data was derived fr spective cohort study. Initially, more than were recruited during baseline (and 4 After participant cor ter- assisted interv as well as samplin 7 kin al he at ng ns on ed

Match Overview

1 Crossref 764 words — Same authors

2 Crossref 364 words — Not same authors

3 Internet 297 words
crawled on 05-Aug-2023
www.e-dmj.org

4 Internet 265 words
www.ncbi.nlm.nih.gov

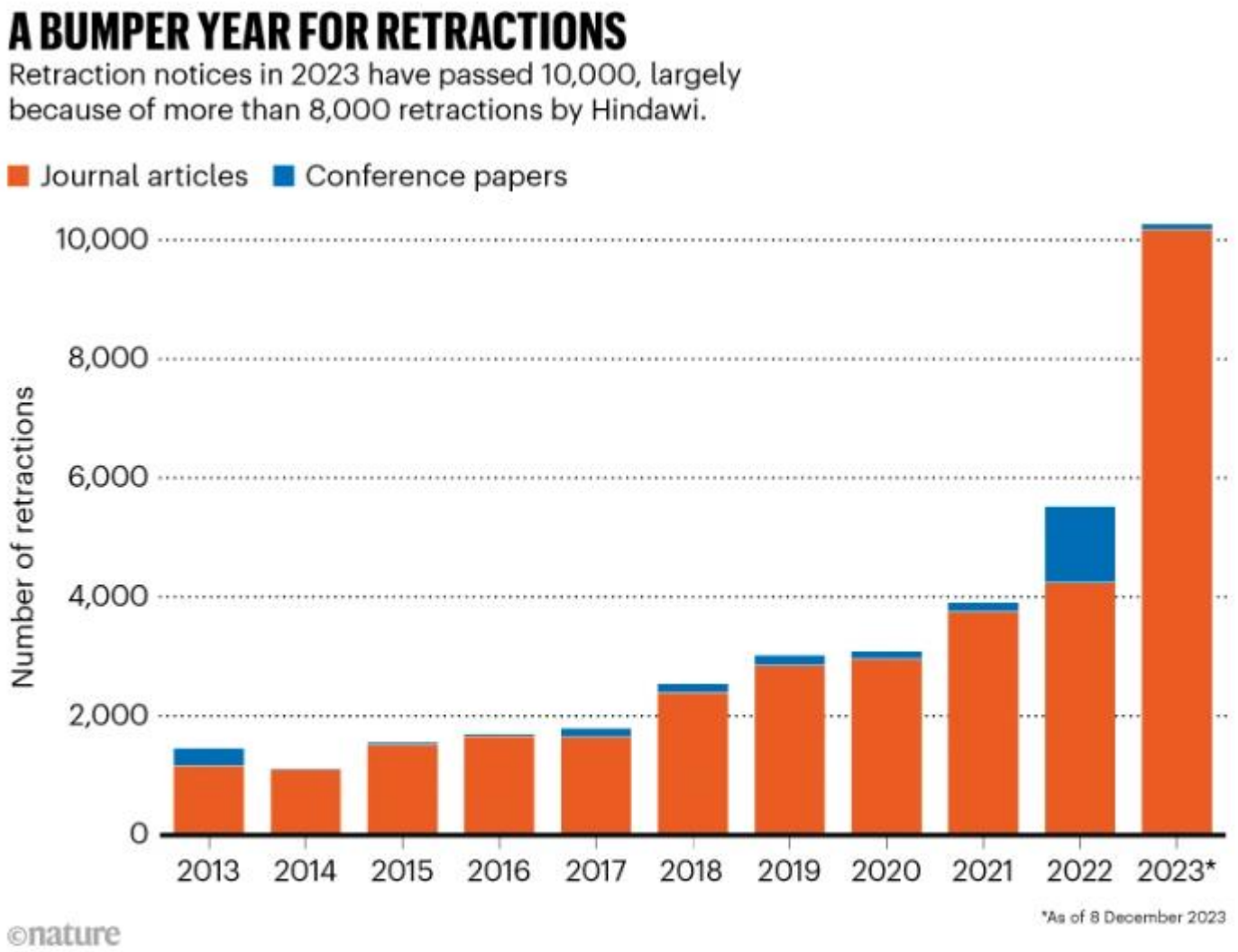
5 Crossref 238 words — Same authors

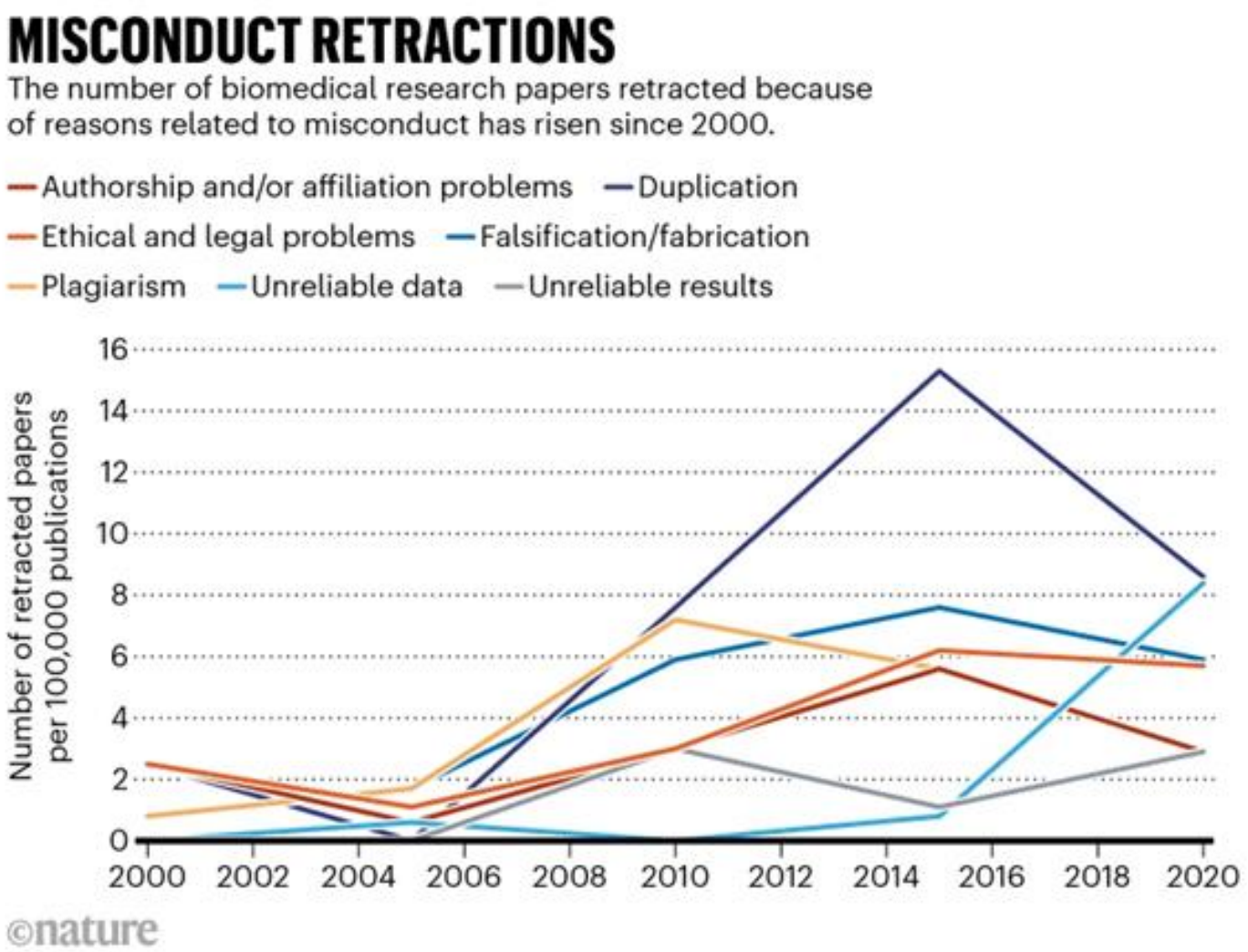
6 Internet 203 words
crawled on 22-Feb-2023
www.researchgate.net

7 Internet 179 words
crawled on 27-Oct-2023
bmcmedicine.biomedcentral.com

8 Crossref 80 words — Same authors

Article retractions





The authors found that overall retraction rates quadrupled during the study period — from around 11 retractions per 100,000 papers in 2000 to almost 45 per 100,000 in 2020. Of all the retracted papers, nearly 67% were withdrawn due to misconduct and around 16% for honest errors. The remaining retractions did not give a reason

Freijedo-Farinas, F., Ruano-Ravina, A., Pérez-Ríos, M., Ross, J. & Candal-Pedreira, C.*Scientometrics* https://doi.org/10.1007/s11192-024-04992-7 (2024).

BREAK

Tips for how to review a manuscript

Goals of Peer Review

- Inform the journal editor of the merits and limitations of the paper
- Help the editorial team decide how the paper should proceed [reject, revise, accept]
- Provide feedback to authors to **help** them **improve** their paper
- Maintain the integrity of published science
- Consider how you feel as an author
- Be kind, constructive and timely

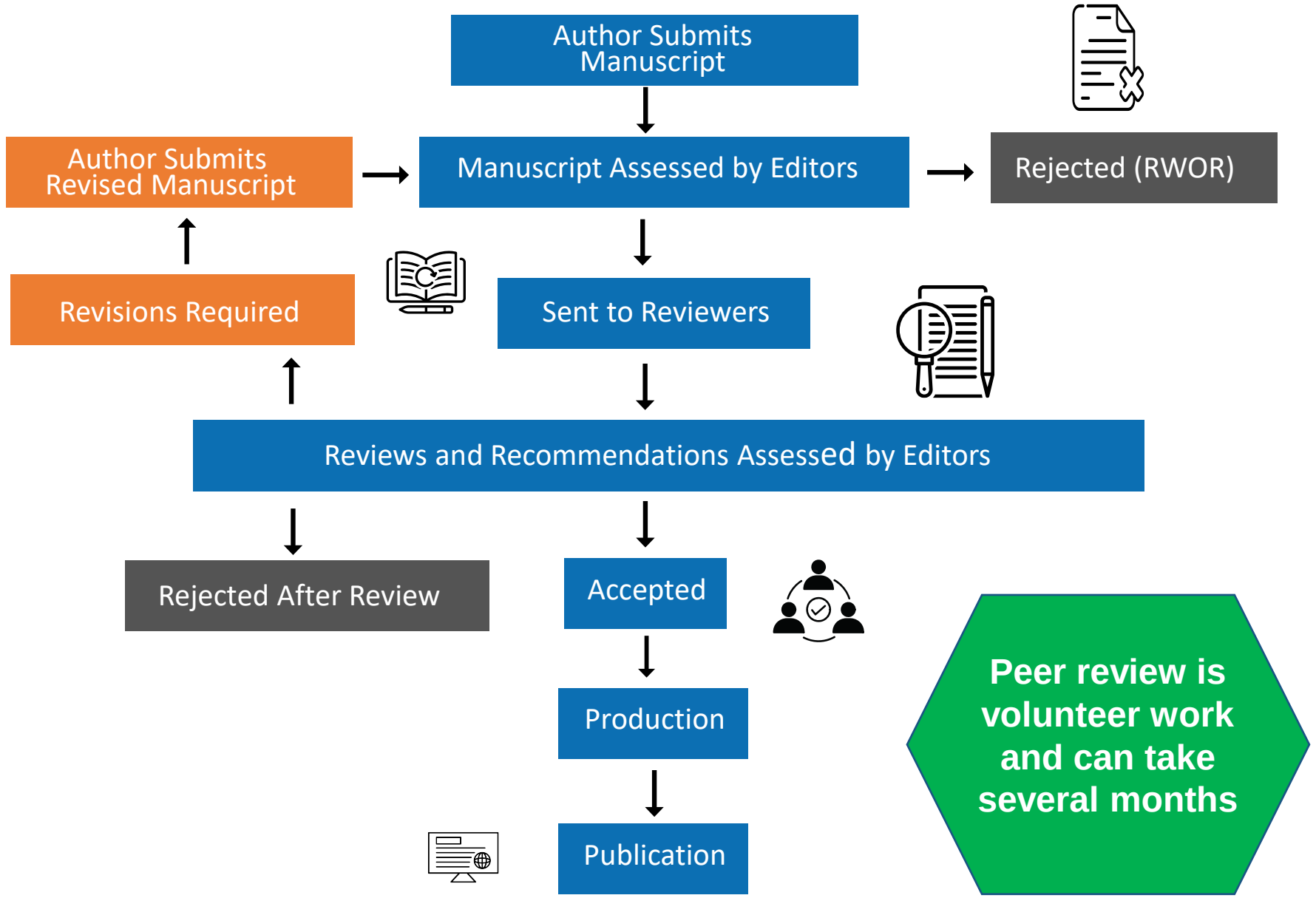
Why be a peer reviewer?

Authors who have benefitted from peer review have a professional responsibility to act as peer reviewers.

Other benefits to you:

- Become a better reviewer and author
- New insights
- You learn about the journal, and the Editor/journal learns about you
- Path to becoming an Associate Editor

Peer Review Process



How do editors select reviewers?

Previous experience with reviewer

- Editorial board of journal

By expertise

- Cited in submitted manuscript
- Literature search
- Suggested by author
- Suggested by another reviewer

Early Career Researchers as Peer Reviewers

Many editors feel new researchers/postdocs do the best reviews.

- Current knowledge
- Conscientious, open-minded (less biased)
- More likely to accept invitations

Some feel new researchers are too critical and likely to make unreasonable demands on authors.

How can you become a reviewer?

Let editors know you are interested

Reach out to editors with expertise in your field.

Assist a mentor with their review

Only with the editor's permission

Only if you are named on the review

Register for manuscript submission databases

Register as a reviewer

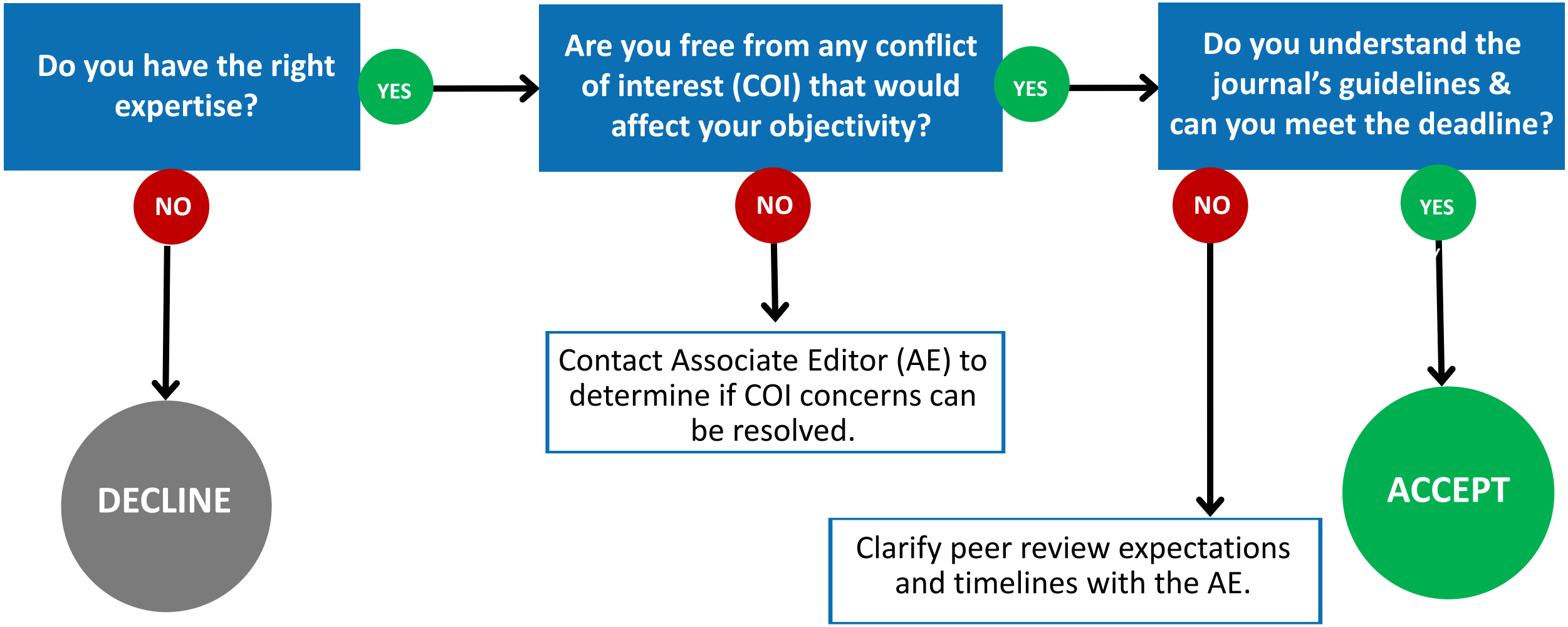
Make sure your classifications are entered and correct

Ask a mentor to recommend you if they decline

Look for other opportunities at journals

ehp Environmental Health Perspectives

Should you Accept an Invitation to Peer Review?



Consider your biases as a reviewer

Implicit bias

- “An implicit attitude, stereotype, motivation, or assumption that can occur without one’s knowledge, control, or intention.”- NIAD

Confirmation bias

- The tendency to interpret new evidence as confirmation of one's existing beliefs or theories.

Do you understand the journal's standards and expectations for manuscripts?

1

Read the journal's website, policies, and any review checklists

2

Check the journal's requirements or author guidelines for the article type you're reviewing

3

Look at recently published papers

Ethical considerations

Confidentiality

- All aspects of the peer review process are confidential, including invitations
- Do not share information on topics, studies, authors, or other details provided in a review invitation

If you want to discuss a manuscript with a colleague, consult with the Associate Editor

- *EHP* encourages mentored peer review, however this must be approved prior to sharing the manuscript. Please acknowledge your colleague in the notes to editor.

Receiving credit or other recognition

- Catalog reviews on Publons
- Public recognition by journal
  - *EHP*: Reviewer awards and annual list of reviewers
  - *Am J Epidemiology*: Ten best reviewers of the year
  - *Epidemiology*: Annual list of reviewers
- If you need formal documentation for a specific purpose (visa, promotion), ask the journal office.

Producing reviews: narrative and systematic reviews, meta-analyses, umbrella reviews, certainty of evidence

ISEE Young 2024, June 2024

Hanna Boogaard, PhD
Principal Scientist
Health Effects Institute

HEI

There are 14 types of review.....

Review Article 2009

A typology of reviews: an analysis of 14 review types and associated methodologies

Maria J. Grant* & Andrew Booth†, *Salford Centre for Nursing, Midwifery and Collaborative Research (SCNMCR), University of Salford, Salford, UK, †School of Health and Related Research (ScHARR), University of Sheffield, Sheffield, UK

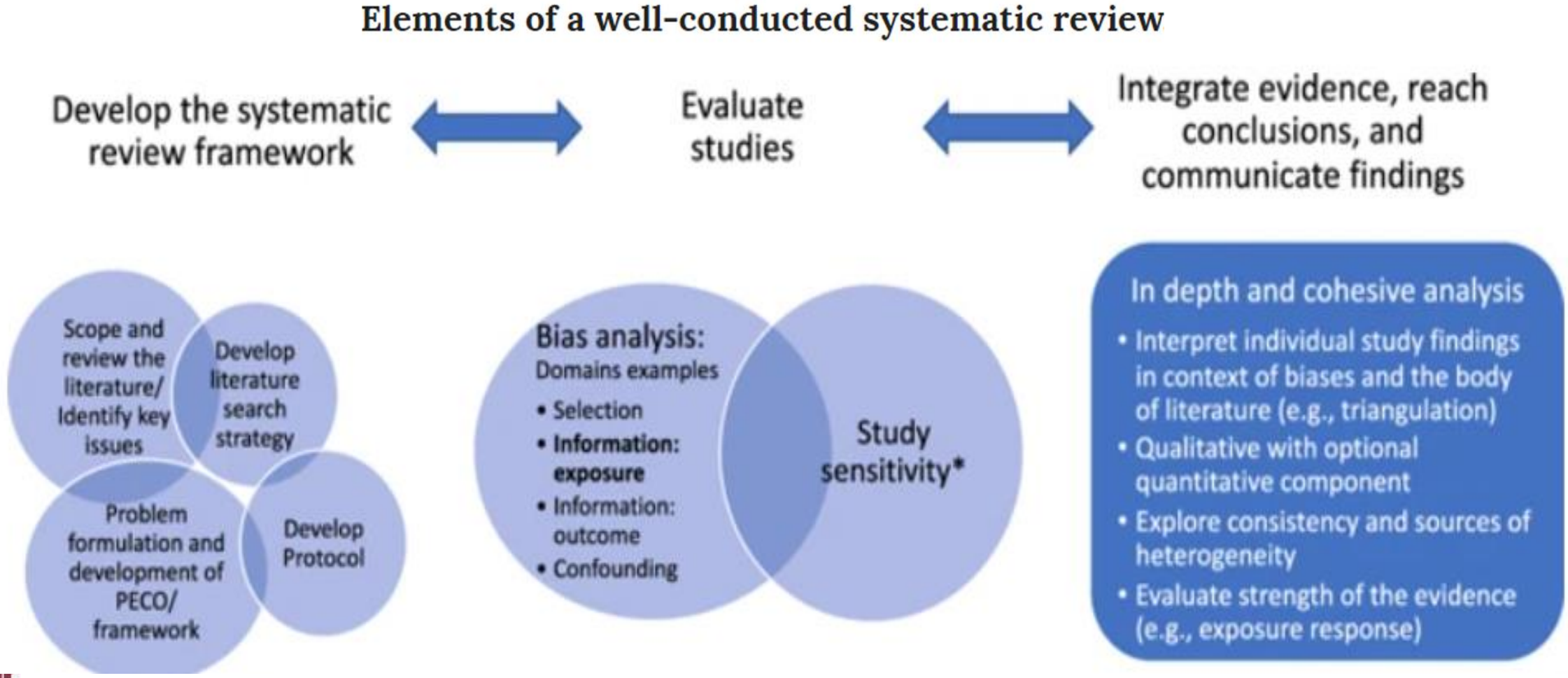
doi.org/10.1111/nae2.12039

Narrative review. A summary of previously published articles on a topic, In general, narrative reviews are informal and do not follow a set structure.

Systematic Review (SR). A comprehensive summary and critical appraisal of existing evidence as it relates to answering a research question, conducted using methods which seek to minimise bias in results and conclusions. A systematic review may include a **meta-analysis**, whereby statistical techniques to pool the results of multiple individual studies into a combined summary result.

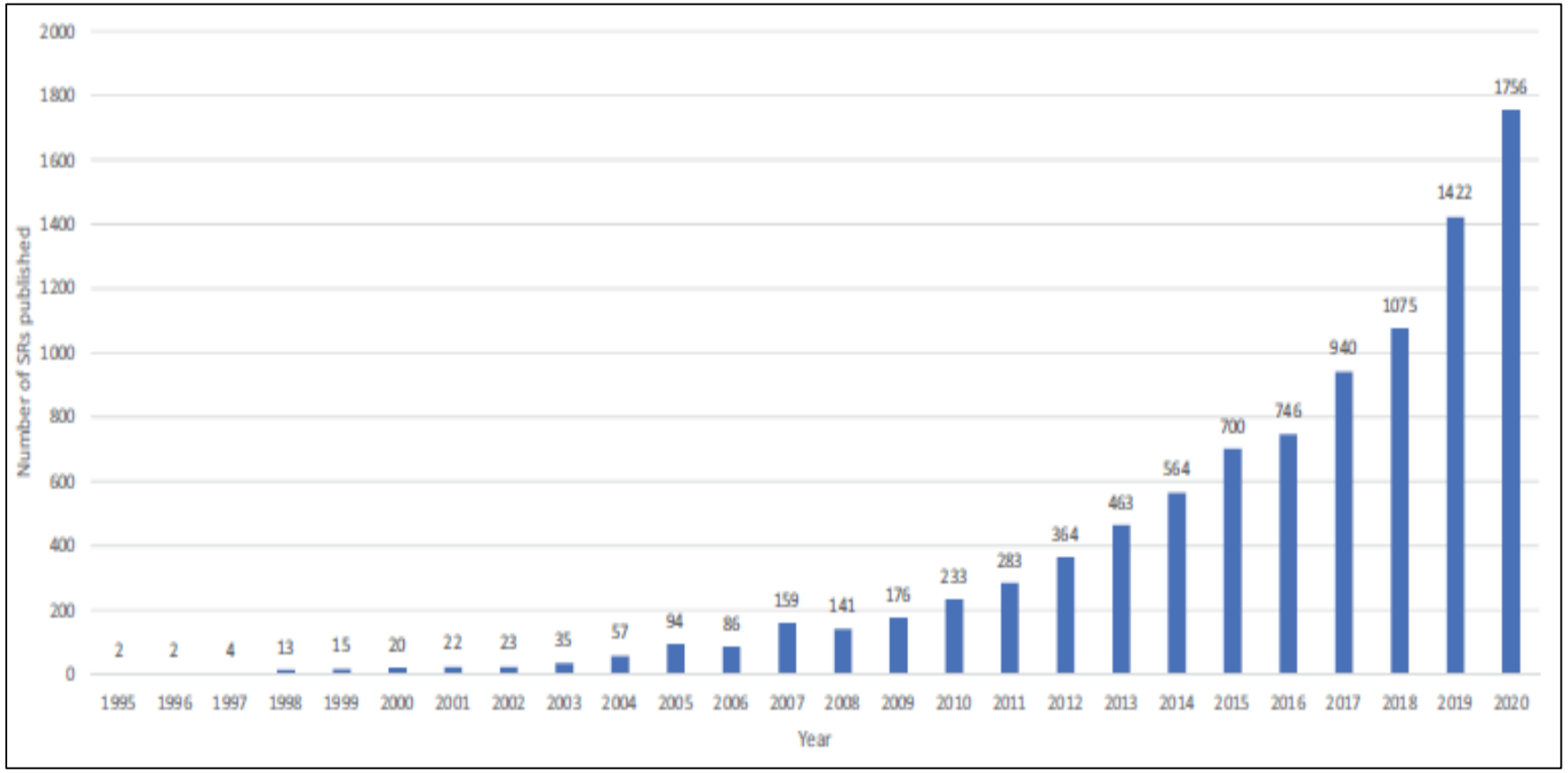
Umbrella review, critical review, scoping review, systematic evidence map, and more….

Systematic Reviews and Meta-analyses are a central part of evidence synthesis



Arroyave et al. 2021

Systematic reviews and meta-analyses have increased dramatically in environmental health

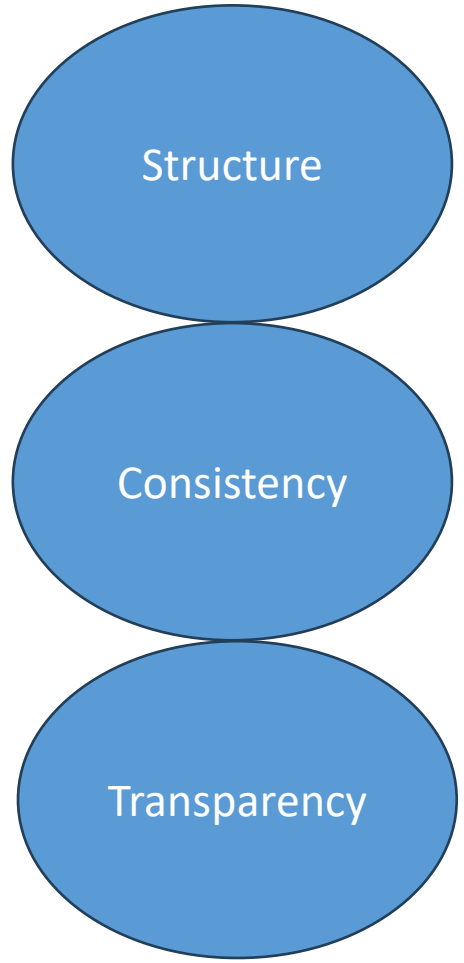


1750 environmental health systematic reviews were published in 2020

Menon et al. 2022

There is a long tradition in environmental health of using frameworks for evidence synthesis and integration

- Four-level hierarchy for classifying the strength of the evidence of the US Surgeon General on smoking and health (1964, 1994, 2004)
- Bradford Hill aspects (Hill et al. 1965)
- Combination of multiple data streams; human, animal, mechanistic from IARC (Samet et al. 2000)
- US EPA weight-of-evidence approach to determine causality in the Integrated Science Assessments (Owens et al. 2017; US EPA Preamble 2015)



Hill's aspects to aid in judging causality in the US EPA weight-of-evidence approach

Aspect	Description
Consistency	An inference of causality is strengthened when a pattern of elevated risks is observed across several independent studies. The reproducibility of findings constitutes one of the strongest arguments for causality. Statistical significance is not the sole criterion by which the presence or absence of an effect is determined. If there are discordant results among investigations, possible reasons such as differences in exposure, confounding factors, and the power of the study are considered.
Coherence	An inference of causality from one line of evidence (e.g., epidemiologic, controlled human exposure, animal, or welfare studies) may be strengthened by other lines of evidence that support a cause-and-effect interpretation of the association. There may be coherence in demonstrating effects from evidence across various fields and/or across multiple study designs or related health endpoints within one scientific line of evidence.
Biological plausibility	An inference of causality is strengthened by results from experimental studies or other sources demonstrating biologically plausible mechanisms. A proposed mechanism, which is based on experimental evidence and which links exposure to an agent to a given effect, is an important source of support for causality.
Biological gradient (exposure-response relationship)	A well-characterized exposure-response relationship (e.g., increasing effects associated with greater exposure) strongly suggests cause and effect, especially when such relationships are also observed for duration of exposure (e.g., increasing effects observed following longer exposure times).
Strength of the observed association	The finding of large, precise risks increases confidence that the association is not likely due to chance, bias, or other factors. However, it is noted that a small magnitude in an effect estimate may or may not represent a substantial effect in a population.
Experimental evidence	Strong evidence for causality can be provided through "natural experiments" when a change in exposure is found to result in a change in occurrence or frequency of health or welfare effects.
Temporality of the observed association	Evidence of a temporal sequence between the introduction of an agent and appearance of the effect constitutes another argument in favor of causality.
Specificity of the observed association	Evidence linking a specific outcome to an exposure can provide a strong argument for causation. However, it must be recognized that rarely, if ever, does exposure to a pollutant invariably predict the occurrence of an outcome, and that a given outcome may have multiple causes.
Analogy	Structure activity relationships and information on the agent's structural analogs can provide insight into whether an association is causal. Similarly, information on mode of action for a chemical, as one of many structural analogs, can inform decisions regarding likely causality.

Source: Table I from U.S. EPA (2015) adapted from Hill (1965)

Five categories:

- Causal
- Likely
- Suggestive
- Inadequate
- Not Likely

Owens et al. 2017

More recent frameworks for evidence synthesis in clinical medicine

GRADE

Grading of Recommendations Assessment, Development and Evaluation

RATING QUALITY OF EVIDENCE AND STRENGTH OF RECOMMENDATIONS

GRADE: an emerging consensus on rating quality of evidence and strength of recommendations

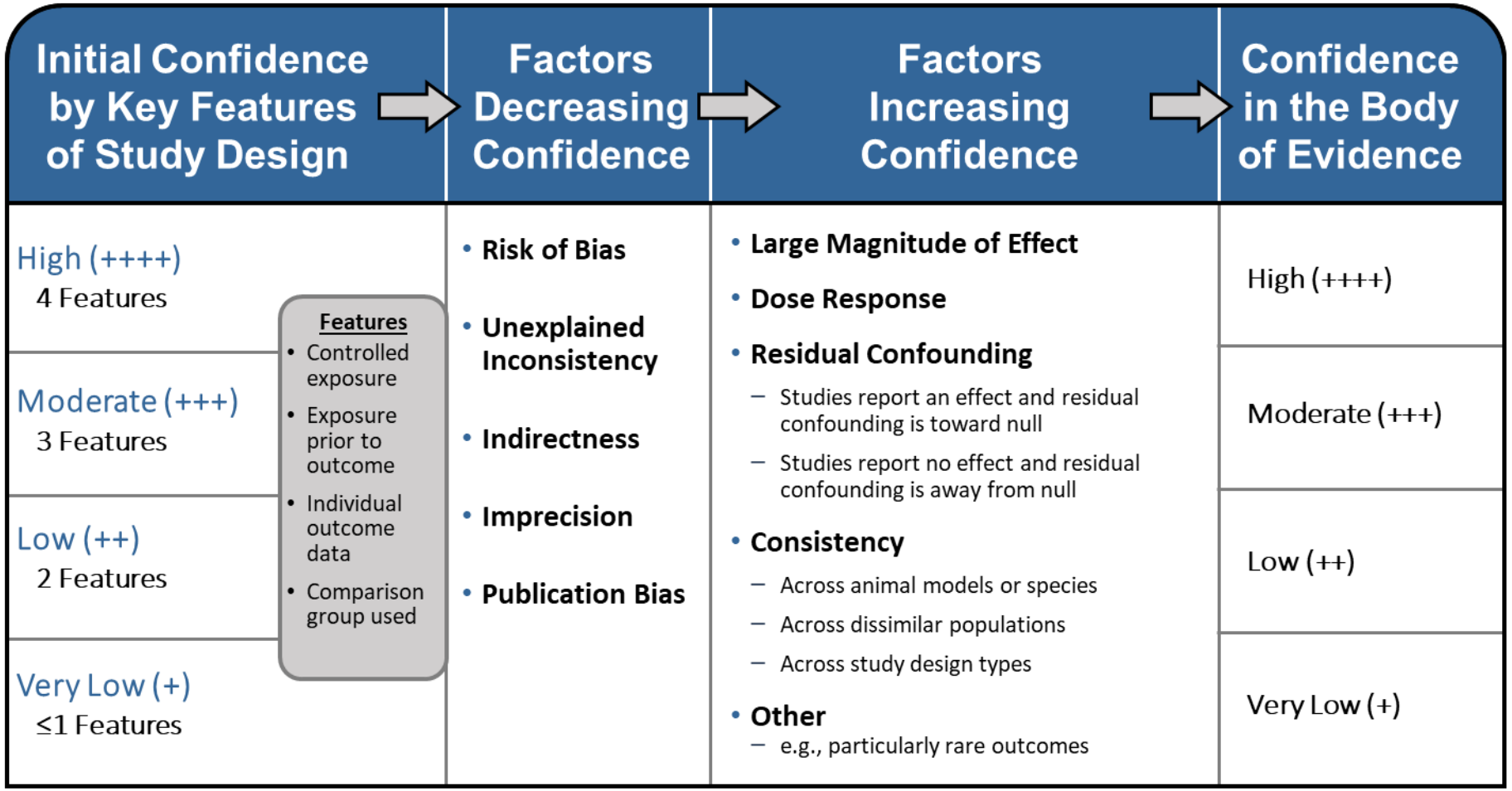
Guidelines are inconsistent in how they rate the quality of evidence and the strength of recommendations. This article explores the advantages of the GRADE system, which is increasingly being adopted by organisations worldwide

Guyatt et al. 2008; GRADE Handbook 2013

- Frameworks were developed for evidence synthesis in medicine (e.g., Cochrane Collaboration, 1993) and clinical guideline development (e.g., GRADE, 2000).
- Other approaches, including the Navigation Guide, and the framework from the Office of Health Assessment and Translation (OHAT) were developed to specifically address environmental health questions.

HEI

Synthesize evidence and rate confidence in body of evidence (OHAT – or GRADE-type approach)



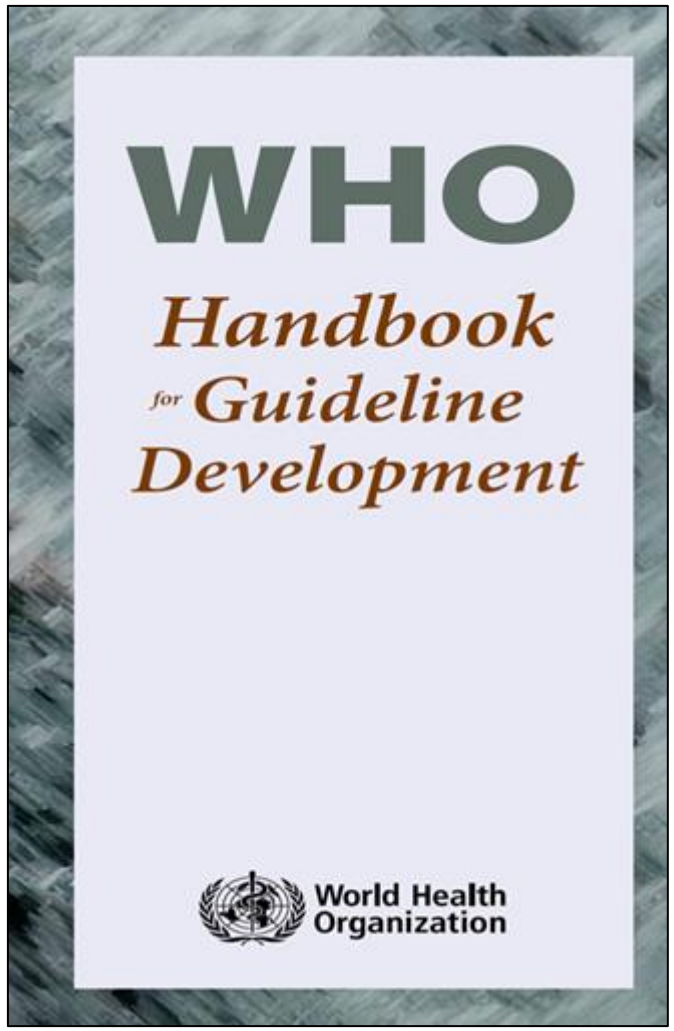
Initial rating based on study design features

Upgrade or downgrade based on certain factors

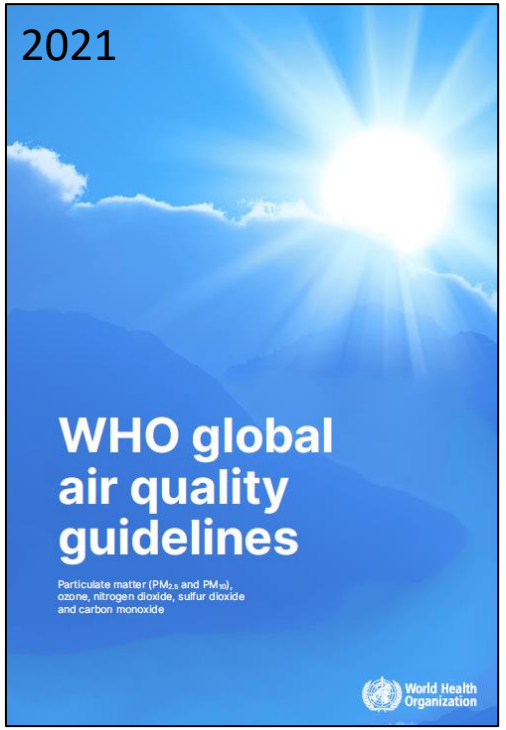
Randomized controlled trials or other experimental studies are considered the gold standard and observational studies receive a lower initial rating

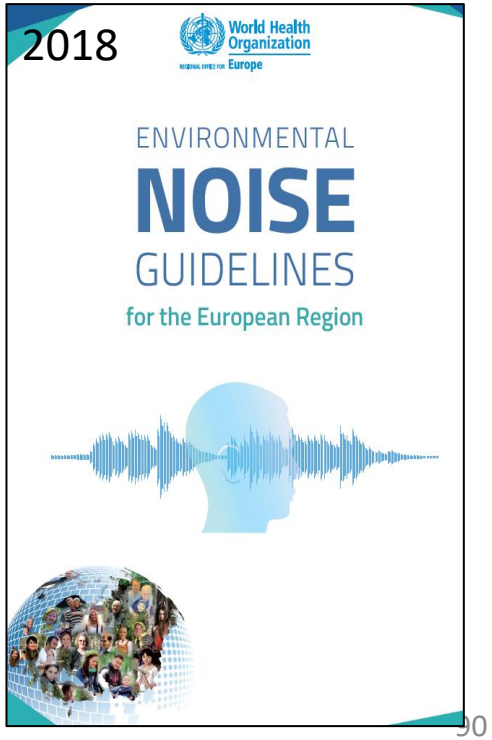
Office of Health Assessment and Translation (OHAT) Handbook 2019

GRADE has been widely applied



GRADE was adopted by the Word Health Organization for guideline development in 2012





The HEI Traffic Review also applied a GRADE-type approach

HEI

SPECIAL REPORT

HEALTH EFFECTS INSTITUTE

Number 23
June 2022

Systematic Review and Meta-analysis of Selected Health Effects of Long-Term Exposure to Traffic-Related Air Pollution

HEI Panel on the Health Effects of Long-Term Exposure to Traffic-Related Air Pollution

https://www.healtheffects.org/publication/systematic-review-and-meta-analysis-selected-health-effects-long-term-exposure-traffic

Commentary

2023

ehp Environmental Health Perspectives

A Section 508–conformant HTML version of this article is available at https://doi.org/10.1289/EHP11532.

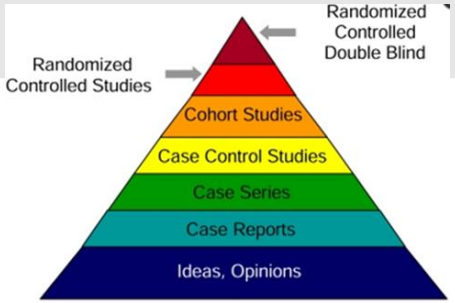
Evidence Synthesis of Observational Studies in Environmental Health: Lessons Learned from a Systematic Review on Traffic-Related Air Pollution

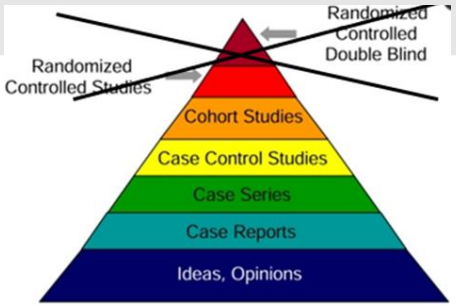
Hanna Boogaard,[1] Richard W. Atkinson,[2] Jeffrey R. Brook,[3] Howard H. Chang,[4] Gerard Hoek,[5] Barbara Hoffmann,[6] Sharon K. Sagiv,[7] Evangelia Samoli,[8] Audrey Smargiassi,[9] Adam A. Szpiro,[10] Danielle Vienneau,[11,12] Jennifer Weuve,[13] Frederick W. Lurmann,[14] and Francesco Forastiere[15]

CONTENTS

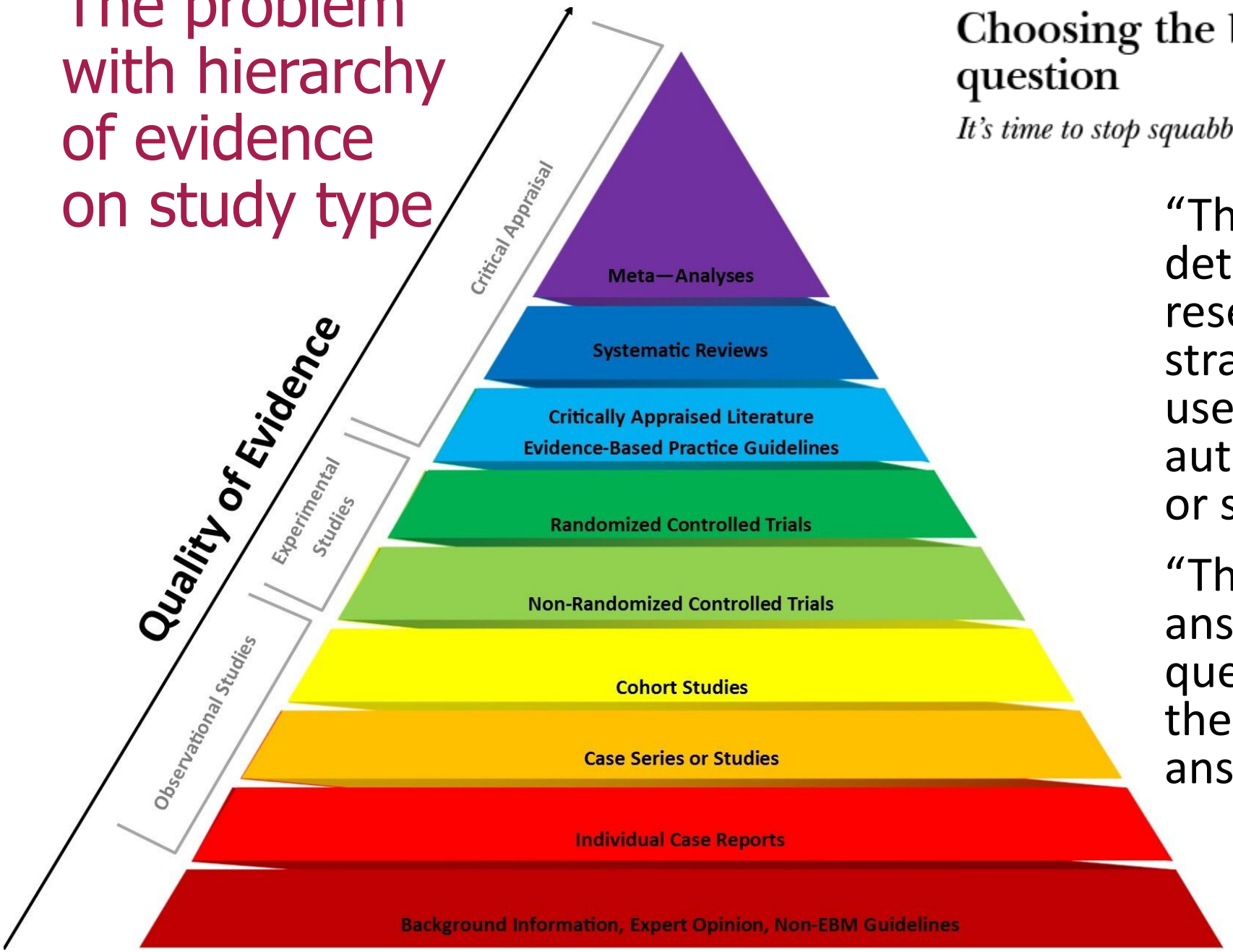
Environmental health and clinical medicine are two different disciplines

Clinical Medicine	Environmental Health
Evaluation of patients' beneficial therapeutic interventions (positive effects)	Evaluation of population potential harms (negative effects)
Exposure is well defined, though limited number of dose levels	Exposure is estimated, though covers a wide spectrum of exposure levels
Short follow-up times, limited sample sizes and limited generalizability	Long follow-up, large sample sizes, and can study the full spread of susceptibility





The problem with hierarchy of evidence on study type



Choosing the best research design for each question

Sackett 1997

It's time to stop squabbling over the "best" methods

"The question being asked determines the appropriate research architecture, strategy and tactics to be used – Not tradition, authority, experts, paradigms, or school of thoughts".

"The issue is which way of answering the specific question before us provides the most valid, useful answer"

Convincing evidence of carcinogenicity in humans was reached for several exposures by a variety of study types

Exposure	Type of study
Tobacco smoke	Cohort studies
Diethylstilbestrol	Case-control study (small)
Bis(chloromethyl)ether	Case series
Benzene	Case reports
Arsenic	Ecological study
Several chemotherapeutic drugs	Controlled randomized trials

[a]Source: [16]. Evidence rated as convincing when corresponding exactly or closely to category 1 or 2A in the current definitions of IARC [3]

Saracci 2017

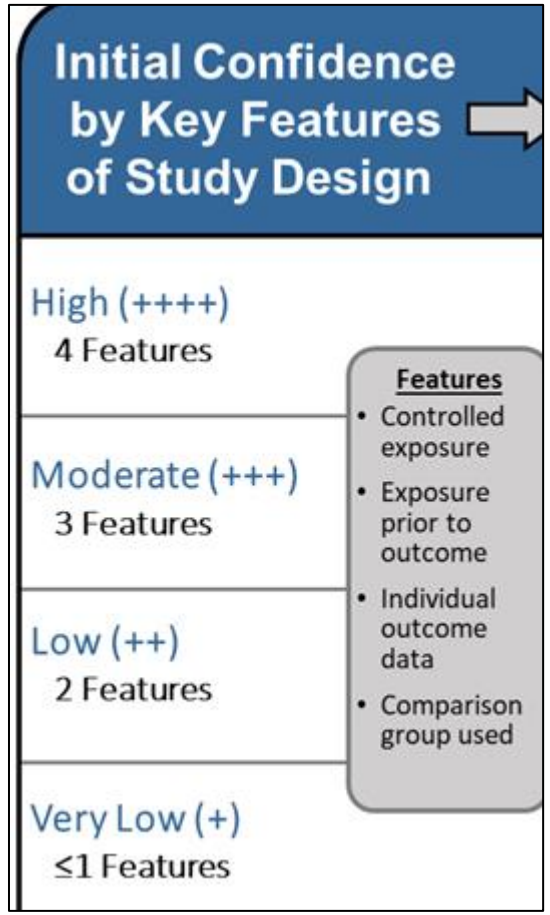
Lesson learned 1: Observational studies can offer high confidence evidence in environmental health

In original GRADE guidance, all observational studies start at *low* confidence.

OHAT decided to assign an initial level of *moderate* to prospective cohort studies.

In the traffic review, all types of cohort studies and case-control studies were given an initial rating of *moderate* because three key study design features were often met.

For future assessments, the Panel recommends that observational studies, especially cohort and case-control studies, start with a *high* confidence rating.

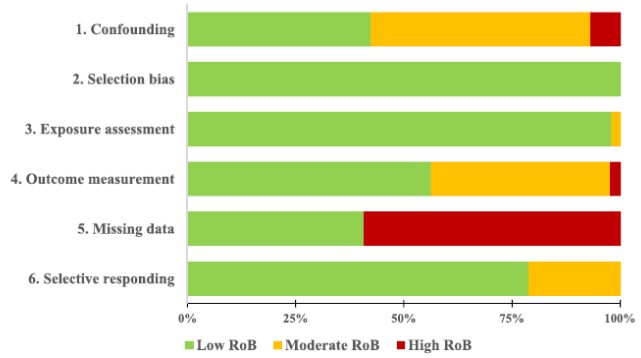


Be cautious of checklist or "mechanistic" approaches (e.g., Risk of Bias tools)

"Checklists tools commonly emphasize the mechanics of the review process"

"Although checklists support the standardization of methodology across reviews, they insufficiently emphasize the underlying science"

Risk of bias indicates the **potential** for bias rather than the direction and magnitude of actual biases.



Arroyave et al. 2021

Lesson learned 2: Assessing the influence of specific sources of potential bias instead of using a risk of bias tool

The bias assessment should focus more on identifying possible key biases, based on methodologic and subject matter expertise.

Such an approach can provide insight into the potential influence of each specific bias, identify a subset of studies likely to best approximate the true association, and suggest features needed to improve future research.

This information should be leveraged via triangulation, sensitivity analyses, stratified meta-analyses and other methods that consider and contrast evidence across studies.


American Journal of Epidemiology
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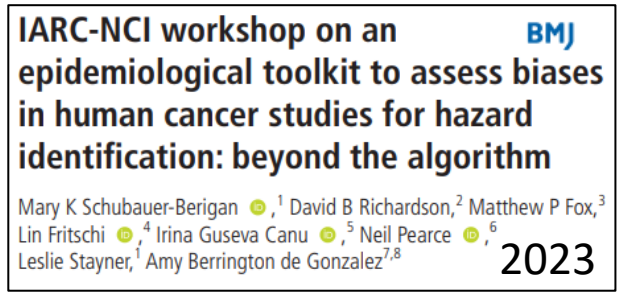
Vol. 188, No. 9
DOI: 10.1093/aje/kwz131
Advance Access publication: May 30, 2019

Special Article

The Problem With Mechanistic Risk of Bias Assessments in Evidence Synthesis of Observational Studies and a Practical Alternative: Assessing the Impact of Specific Sources of Potential Bias

David A. Savitz*, Gregory A. Wellenius, and Thomas A. Trikalinos

2019

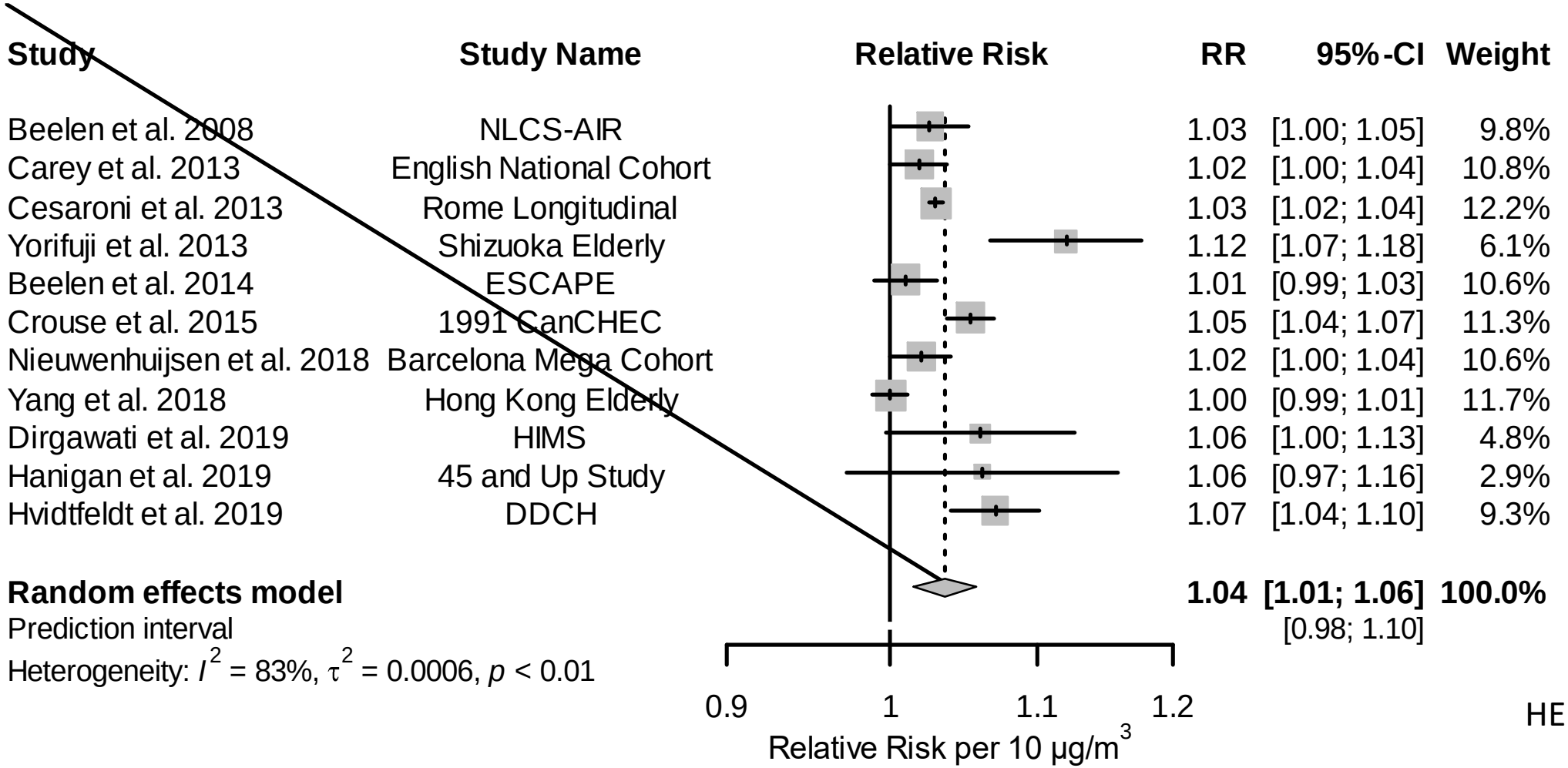

BMJ

IARC-NCI workshop on an epidemiological toolkit to assess biases in human cancer studies for hazard identification: beyond the algorithm

Mary K Schubauer-Berigan ,[1] David B Richardson,[2] Matthew P Fox,[3] Lin Fritschi ,[4] Irina Guseva Canu ,[5] Neil Pearce ,[6] Leslie Stayner,[1] Amy Berrington de Gonzalez[7,8]

2023

Downgrade for inconsistency? Meta-analysis NO_2 – All cause mortality



HEI Special Report 23

Lesson learned 3: Heterogeneity of the magnitude in effect estimates should generally not be used to downgrade confidence

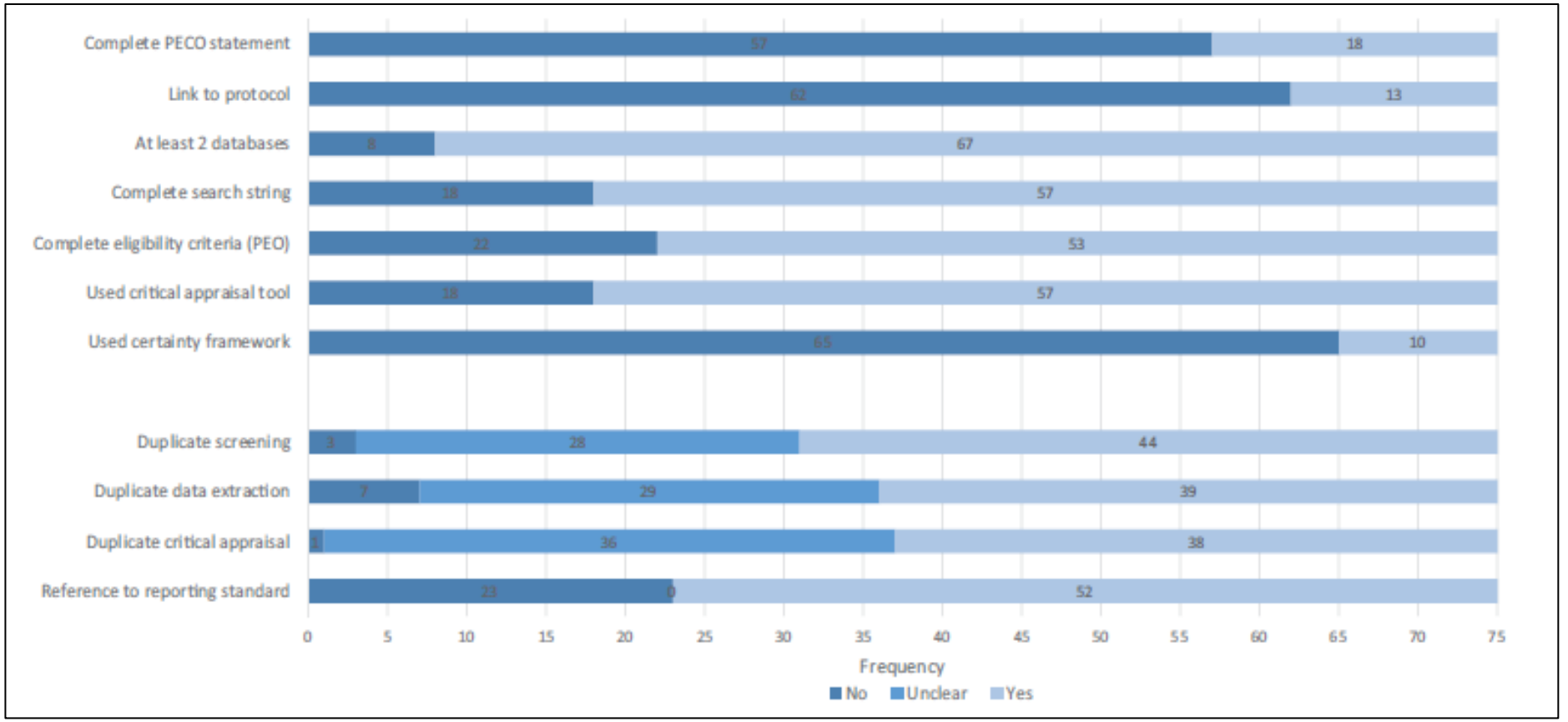
Sources of heterogeneity can strengthen or weaken the confidence in the evidence and should be carefully explored.

No single statistical measure of consistency of findings across studies is ideal, and statistical tests for heterogeneity have well-known limitations.

Some heterogeneity is expected in studies of the health effects of environmental exposures, due to different populations, locations, and study settings.

For downgrading, consider primarily the direction of the effect estimate rather than its magnitude.

The quality and utility of published systematic reviews are variable



Menon et al. 2022

"Our study shows that a large number of systematic reviews on environmental health topics are being published in spite of important shortcomings in methodological rigour"

One example - Ignoring the differing pollutant's increment in a meta-analysis

Environmental Science and Pollution Research (2022) 29:89803–89804
https://doi.org/10.1007/s11356-022-23797-w

LETTER TO THE EDITOR

Comments on "Ambient fine particulate matter of diameter ≤ 2.5 μm and risk of hemorrhagic stroke: a systemic review and meta-analysis of cohort studies," by Yang, Mingfei et al. (doi: 10.1007/s11356-021-13074-7)

Jia Lu Gao[1,2] · Ammanie Abdul-Fatah[2,3] · David M. Stieb[2,4]

Received: 16 May 2022 / Accepted: 17 October 2022 / Published online: 25 October 2022

Dear Editor.

We reviewed the paper by Zhao et al. (2021) as part of an umbrella review on particulate matter of diameter ≤ 2.5 μm ($PM_{2.5}$) and incidence of cardiovascular outcomes. We determined that the authors did not account for the $PM_{2.5}$ increment based upon which primary studies reported their results. For instance, Downward et al. (2018) and Shin et al. (2019) reported hazard ratios (HR) for hemorrhagic stroke incidence of 1.88 (95% CI: 0.66–5.39) per 5 μg/m^3 $PM_{2.5}$ and 1.04 (95% CI: 1.01–1.07) per 4.1 μg/m^3 $PM_{2.5}$, respectively. Zhao et al. simply pooled these and other results "as is," ignoring the differing $PM_{2.5}$ increments, meaning that their pooled estimates are of limited value.

Results from primary studies should be standardized to the same pollutant increment prior to pooling. In our opinion, this could have been detected at the time of peer review since the authors reported their pooled HR "for each 1.4–10 μg/m^3 increase in $PM_{2.5}$."

We have identified this issue in other recent systematic reviews including Liu et al. (2017), Han et al. (2021), Pranata et al. (2020), and Zhang et al. (2017).

Sincerely,

Jia Lu Gao
Department of Population Medicine, University of Guelph (at time of study completion) and Environmental Health Science and Research Bureau, Health Canada

Ammanie Abdul-Fatah
Department of Health Sciences, Carleton University (at time of study completion) and Environmental Health Science and Research Bureau, Health Canada

David M. Stieb
Environmental Health Science and Research Bureau, Health Canada and School of Epidemiology and Public Health, University of Ottawa

Reporting checklists for systematic reviews

PRISMA 2020, generally useful for any health-related systematic review

PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	

Appraisal tools

AMSTAR-2 is designed to help with peer-review, general readers of a systematic review

AMSTAR 2: a critical appraisal tool for systematic reviews that include randomised or non-randomised studies of healthcare interventions, or both

Beverley J Shea,[1,2,3] Barnaby C Reeves,[4] George Wells,[3,5] Micere Thuku1,[2] Candyce Hamel,[1] Julian Moran,[6] David Moher,[1,3] Peter Tugwell1,[2,3,7] Vivian Welch,[2,3] Elizabeth Kristjansson,[8] David A Henry[9,10,

AMSTAR-2 Items

1. PICO components
2. A priori design
3. Explanation of study design inclusion
4. Comprehensive literature search
5. Duplicate study selection
6. Duplicate data extraction
7. List excluded studies
8. Characteristics of included studies
9. Report quality of included studies
10. Report funding of included studies
11. Appropriate meta-analysis method

Emphasis on the mechanics of the review process in the current tools to evaluate systematic reviews, but what about some other issues…

- Mixing incidence and prevalence outcomes
- Mixing different health outcomes
- Mixing short-term and long-term exposure
- Mixing different study designs
- Mixing patient populations with general populations
- Treatment of duplicate studies in same population
- No subject matter expertise in the team of reviewers
- Emphasis of studies entering a meta-analysis

Forastiere et al. 2024, accepted in Environmental Epidemiology (WHO EMAPEC project)

Lesson learned 4: Consider all relevant studies in evidence synthesis

The inclusion of pertinent studies in a systematic review should be comprehensive and all studies should be judged based on their scientific merit.

A systematic review may involve the conduct of meta-analyses. Studies included in a meta-analysis often represent a subset of the available evidence.

The Panel emphasizes that meta-analyses do not automatically increase confidence in the evidence, and studies not fitting into a statistical summary may be equally informative and merit inclusion in evidence synthesis.

Do pooled estimates from meta- analyses of observational epidemiology studies contribute to causal inference?

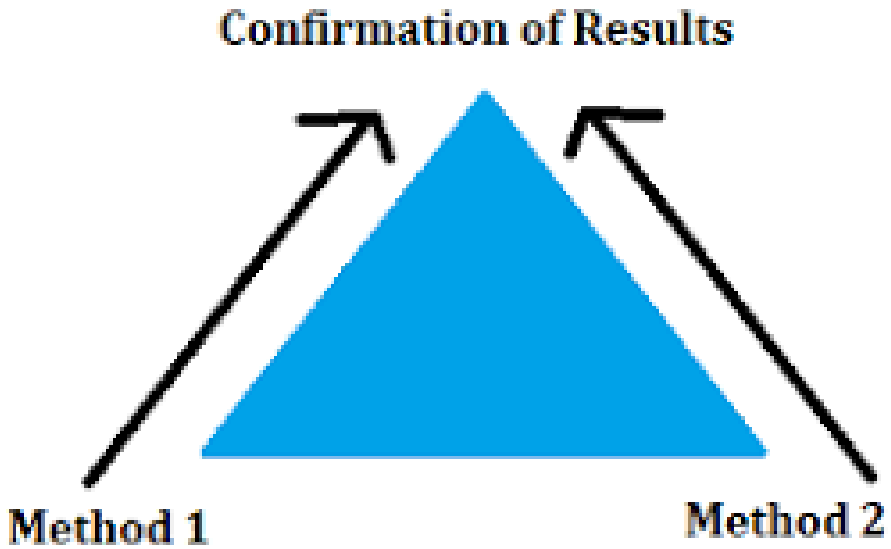
Editorial › Occup Environ Med. 2021 Sep;78(9):621-622. doi: 10.1136/oemed-2021-107702. Epub 2021 Jun 22.

David A Savitz ,[1] Francesco Forastiere[2]

Explore the use of triangulation in evidence synthesis

BOX 1-1
Definition of Triangulation

"The practice of strengthening causal inferences by integrating results from several different approaches, where each approach has different (and assumed to be largely unrelated) key sources of potential bias."
—Lawlor et al. (2016)



"Triangulation integrates data from different methods, designs, and theoretical approaches, as well as data with different and unrelated sources of potential bias, to determine if findings converge on one conclusion"

Arroyave et al. 2021

And finally, lesson learned 5: evidence synthesis needs a broader, "narrative" approach to maximize what can be learned from observational studies in environmental health

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Example "Narrative" assessment for TRAP and mortality: high confidence

- Consistent associations across multiple pollutants
- Sizable number of well-conducted (large) cohort studies
- Most of the results adjusted for major potential confounders
- Positive associations in different locations: confounding less likely as the relationship between TRAP and lifestyle/SES factors differ in direction depending on study area.
- Results robust to adjustment for noise
- Different research groups have conducted the studies
- Support from studies on traffic intensities and distance to roadways
- Support from studies not included in meta-analysis such as in patient populations

Take-home message

- There is a long tradition in environmental health of using frameworks for evidence synthesis and integration
- New experiences with systematic reviews and GRADE-type approaches in environmental health are helpful to address some challenges
- Do not automatically use a published systematic review as starting point for evidence synthesis, or risk- or health impact assessment
- Be cautious of checklist or “mechanistic” approaches for risk of bias and evidence synthesis
- Consider all relevant studies in evidence synthesis

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