

# Bibliometrics: Demonstrating and Visualizing Publication Trends, Collaboration, and Impact

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## Abstract

The NIEHS Library serves the staff of NIEHS and the National Toxicology Program (NTP). In 2017, NIEHS Library began offering customized bibliometric reports and visualizations as a service to our users. These projects have included identifying and tracking topical changes across published literature in a specific field, showing collaborations at author and institutional levels, identifying funding sources, and providing measures of citation impact.

This poster demonstrates types of analyses most appropriate to answer specific research questions and will provide examples of customized reports and visualizations that have been created for NIEHS researchers by library staff.

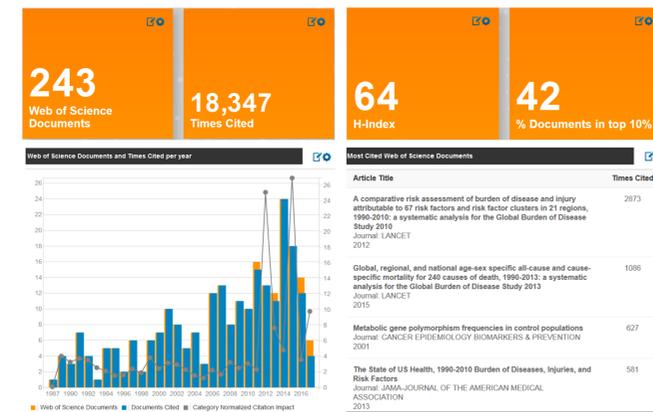
## Tools and Data Sources

The exact processes used for each of these visualizations varies by project. See notes below each graph for additional information about how it was created. Some tools and data sources are listed below.

Data Sources	Data Cleaning	Analysis Tools	Data Visualization
Journal Citation Reports	Microsoft Excel	InCites	Gephi
ORCID	OpenRefine	Microsoft Excel	Google Maps
PubMed/MeSH		Sci2 Tool	InCites
Scopus			Microsoft Excel
Web of Science			RAWGraphs
			WordClouds.com

## Researcher Reports

For reports on individual researchers and researcher groups, NIEHS Library often puts publishing history and research impact in context by using **field-weighted metrics** and **percentile rank**, which compare documents and researchers to others in the same subject.



**InCites Researcher Report**  
InCites reports can be generated for one or several researchers using data from either ResearcherID or ORCID ID.

This report was generated for a researcher at NIEHS using publication information from their ORCID ID.

## ORCID

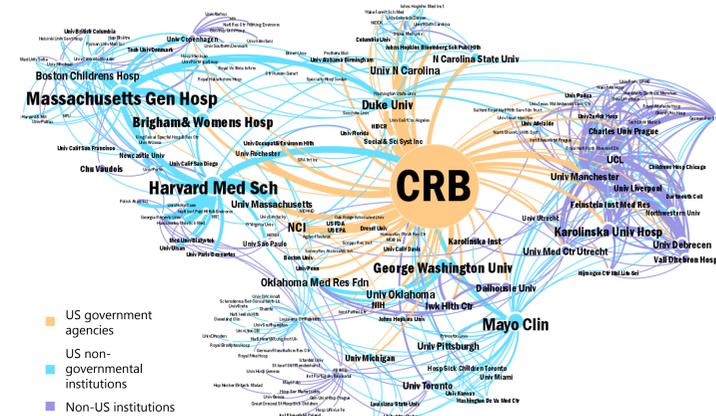
**Original Researcher and Contributor ID (ORCID)** is a unique identifier system for contributors to scholarly works.

Researchers who register for an ORCID ID can link their ID to their publications in the ORCID registry and participating citation databases, making it easier to find their works.

ORCID information can also be exported to many analysis tools, such as **InCites** and **ImpactStory.org**.

## Collaboration

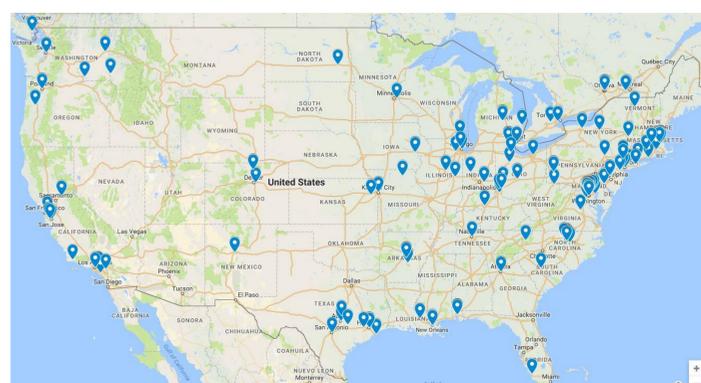
Visualizing collaboration through co-authorship relationships can help demonstrate researchers' variety of scientific partnerships and the global nature of research. These graphs and maps can identify who co-authors are, plot the locations of co-authors' institutions, and illustrate the frequency of collaboration.



### Co-authorship Network Graph

- Show researcher/research group's most frequent collaborators by name or affiliated institution.
- Node size:** represents the number of publications
- Line thickness:** indicates the number of collaborations between institutions.
- Frequent co-authors tend to cluster together.
- Colors** can be customized to present additional information, such as type of institution, location, number of publications, etc.

This visualization was created for the Clinical Research Branch (CRB) at NIEHS.  
**Data from:** Web of Science records for all publications by CRB authors, 2012-2017  
**Tools used:** EndNote (collection), Sci2 Tool (cleaning), Gephi (visualization)



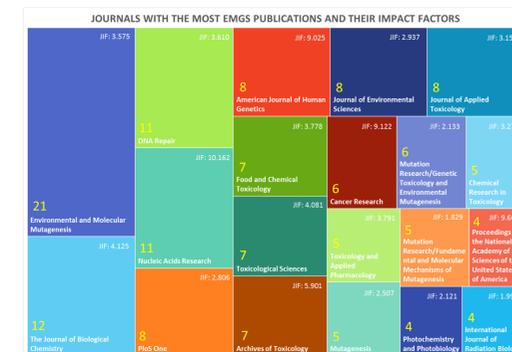
### Geographic Co-authorship Map

- Identifies the physical locations of co-author affiliated institutions with flags marking co-author locations
- Online version allows visitors to click on flags to view institution names and publication counts
- Static density maps can also be created with circles marking the location of co-authors and circle size representing the number of papers co-authored.

This visualization was created for the Clinical Research Branch (CRB) at NIEHS.  
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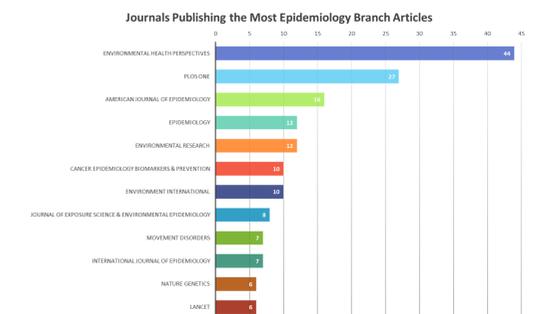
## Journal Reports and Evaluation

Authors may need to provide information not just about what they have published, but also where. Researchers' publication counts and journal metrics can be visualized through graphs, such as those below. The NIEHS Library also provides information on journal impact to NIEHS authors for consideration when choosing a journal.



### Treemap with number of publications by journal, with journal impact factors:

This visualization was created based on data from publications by members of EMGS, January - July 2017.  
**Data from:** PubMed, Journal Citation Reports 2016  
**Tools used:** EndNote (collection), Microsoft Excel (visualization)

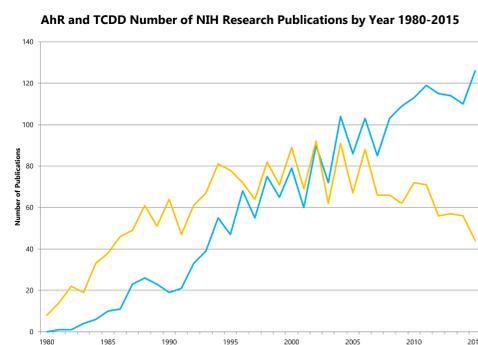


### Bar graph of number of publications

This visualization was created based on data from publications by authors in the NIEHS Epidemiology Branch, 2013-2017  
**Data from:** PubMed, Web of Science, Scopus, Journal Citation Reports 2016  
**Tools used:** EndNote (collection), Microsoft Excel (visualization)

## Topic Analysis

Publications and bibliographic databases provide a curated record of scientific scholarship. Parts of bibliographic records, such as words from titles, abstracts, author provided keywords, subject headings, or grant numbers, can be extracted and analyzed to elucidate trends within fields and topics.



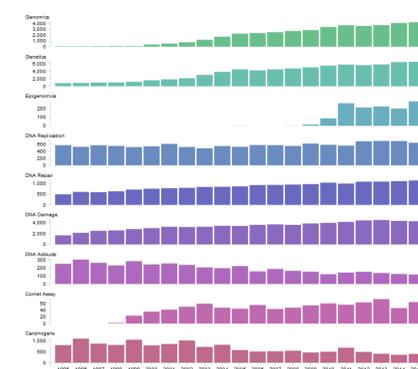
### Multiple Topic Line Chart

Compares the number of articles published on specific topics over time.  
**Data from:** PubMed  
**Tools used:** EndNote (collection), Microsoft Excel (visualization)



### Word Cloud

Identifies the most frequently occurring words from the title, abstract, or keywords of a groups of publications.  
This visualization was created using keyword data from publications by members of the Environmental Mutagenesis and Genomics Society (EMGS).  
**Data from:** PubMed author-submitted keywords and MeSH headings from January to July, 2017.  
**Tools used:** EndNote (collection), WordClouds.com (visualization)



### Field MeSH Heading Bar Graph Series

Identifies Medical Subject Headings (MeSH) in PubMed most relevant to a subject field and tracks the growth or reduction in number of publications over time.  
**Data from:** PubMed  
**Tools used:** RAWGraphs (visualization)

## References

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