

BIBLIOMETRIC ANALYSIS USING R

Tengku Muhammad Hanis Bin Tengku Mokhtar

August 15, 2024

About me



Lead academic trainer at
Jom Research

Background

- PhD (Public Health Epidemiology) from USM, 2024
- MSc (Medical Statistics) from USM, 2019
- MBChB from Al-Azhar University, 2015

Interest:

- Medical statistics, meta-analysis, bibliometrics, scientometrics, text analysis
- Machine learning and deep learning application in medical sciences
- Application of R on health/medical data

Contact me:

- Email: tengkuhanismokhtar@gmail.com
- Website: <https://tengkuhanis.netlify.app/>

Jom Research promotion



*Celebrating
1-year Anniversary*

DISCOUNT

50% 2023 WEBINAR RECORDINGS

2024 WEBINAR RECORDINGS **40%**

07 August 2024 - 27 August 2024

JOM RESEARCH

QR code linking to the promotion

The graphic features a light blue background with a large blue circle in the center. The text 'Celebrating 1-year Anniversary' is written in a black script font above the circle. Inside the circle, the word 'DISCOUNT' is in white capital letters. Below it, '50%' is in large white bold font, followed by '2023 WEBINAR RECORDINGS' in smaller white capital letters. To the right of the circle, '2024 WEBINAR RECORDINGS' is in white capital letters, followed by '40%' in large white bold font. Below the circle, the dates '07 August 2024 - 27 August 2024' are in white capital letters. At the bottom left, the 'JOM RESEARCH' logo is in white capital letters. At the bottom right, there is a QR code with the 'JOM RESEARCH' logo in the center.

Bibliometric analysis

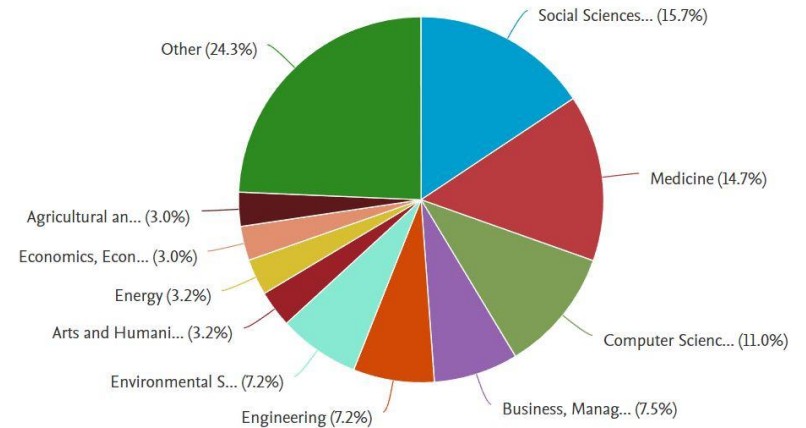
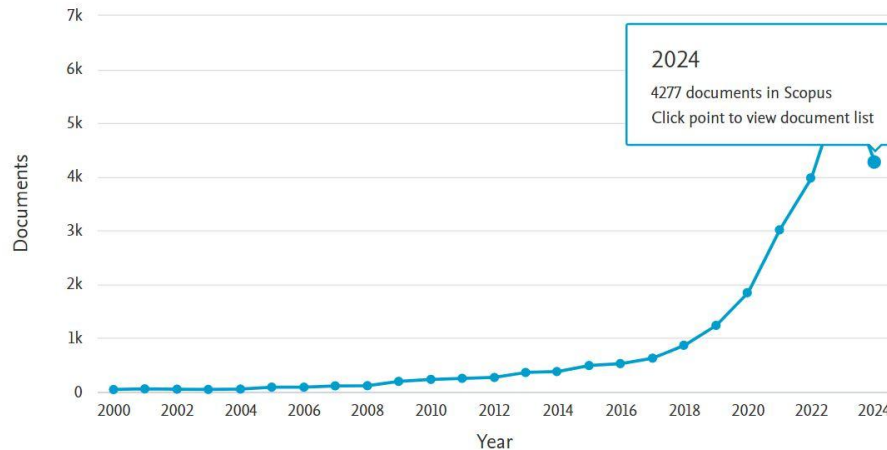
Part 1

Bibliometric analysis

- Not a new analysis
- Not refers to any specific analysis, rather an umbrella term for a set of analyses
- Basically, refers to an analysis of bibliographic information
- Explorative in nature
- What we can do with bibliometric analysis:
 - Evaluate research progress
 - Quantitatively summarise research output
 - “Mapping” research contribution by author, institution, etc
 - Explore research trends - find out about over-research or under-research area
 - Etc

Bibliometric research

- Bibliometric and scientometric papers on Scopus: 25, 437 (Aug 13, 2024)



Scopus data: 2000-2024

Example of bibliometric papers

antibiotics MDPI

Article
A Global Bibliometric Analysis on Antibiotic-Resistant Active Pulmonary Tuberculosis over the Last 25 Years (1996–2020)

Md Asiful Islam ^{1,2,*}, Shoumik Kundu ³, Tengku Muhammad Hanis ⁴, Khalid Hajissa ^{5,6} and Kamarul Imran Musa ^{4,*}

¹ Department of Haematology, School of Medical Sciences, Universiti Sains Malaysia, Kubang Kerian 16150, Kelantan, Malaysia
² Institute of Metabolism and Systems Research, University of Birmingham, Birmingham B15 2TT, UK
³ Department of Biochemistry and Molecular Biology, Jahangirnagar University, Savar, Dhaka 1342, Bangladesh; shoumik33@gmail.com
⁴ Department of Community Medicine, School of Medical Sciences, Universiti Sains Malaysia, Kubang Kerian 16150, Kelantan, Malaysia; tengkuhanismokhtar@gmail.com
⁵ Department of Medical Microbiology & Parasitology, School of Medical Sciences, Universiti Sains Malaysia, Kubang Kerian 16150, Kelantan, Malaysia; khalidhajissa@usm.my
⁶ Department of Zoology, Faculty of Science and Technology, Onduran Islamic University, P.O. Box 382, Onduran 14415, Sudan
 * Correspondence: asiful@usm.my or ayenec70@yahoo.com (M.A.I.); drkamarul@usm.my (K.I.M.)

Abstract: Background: Tuberculosis (TB) is still a leading global cause of mortality and an increasingly crucial problem in fighting TB is antibiotic resistance. We aimed to conduct a bibliometric analysis on the articles of the past 25 years on antibiotic-resistant active pulmonary TB. Methods: Appropriate keywords were combined using the Boolean and wildcard operators and searched in Scopus database for articles published between 1996 and 2020 in English language. For all the bibliometric analyses, the *Bibliometrix* package in RStudio and *Biblioshiny* web apps were used. We identified the publication and citation trends, topmost cited documents, most productive authors, countries and institutions and most influential journals and funding agencies. We constructed collaborative networks of countries and co-citations. In addition, we developed a Three-Fields plot and a Thematic Map to visualize the research trends. Results: A total of 10,000 articles were identified and analyzed. The research trends showed a significant increase in the number of publications over the years. The most productive authors, countries, and institutions were identified. The Thematic Map revealed the research trends in the field of antibiotic-resistant active pulmonary TB. Conclusions: This study provides a comprehensive overview of the research trends in the field of antibiotic-resistant active pulmonary TB over the last 25 years. The findings can be used to guide future research and policy-making in this area.

Keywords: Bibliometrics, breast cancer, machine learning, research trend, research output, research productivity

check for updates

Citation: Islam, M.A.; Kundu, S.; Hanis, T.M.; Hajissa, K.; Musa, K.I.A. A Global Bibliometric Analysis on Antibiotic-Resistant Active Pulmonary Tuberculosis over the Last 25 Years (1996–2020). *Antibiotics* **2021**, *10*, 1234. [https://doi.org/10.3390/antib10081234](#)

Current Medicinal Chemistry, XXXX, XX, XX–XX

REVIEW ARTICLE

Top 100 Most-Cited Publications on Breast Cancer and Machine Learning Research: A Bibliometric Analysis

Tengku Muhammad Hanis¹, Md Asiful Islam^{2,*} and Kamarul Imran Musa^{1*}

¹Department of Community Medicine, School of Medical Sciences, Universiti Sains Malaysia, Kubang Kerian, Kelantan, Malaysia; ²Department of Haematology, School of Medical Sciences, Universiti Sains Malaysia, Kubang Kerian, Kelantan, Malaysia

Abstract: Background: Rapid advancement in computing technology and digital information leads to the possible use of machine learning on breast cancer. Objective: This study aimed to evaluate the research output of the top 100 publications and further identify a research theme of breast cancer and machine-learning studies. Methods: Databases of Scopus and Web of Science were used to extract the top 100 publications. These publications were filtered based on the total citation of each paper. Additionally, a bibliometric analysis was applied to the top 100 publications. Results: The top 100 publications were published between 1993 and 2019. The most productive author was Giger ML, and the top two institutions were the University of Chicago and the National University of Singapore. The most active countries were the USA, Germany, and China. Ten clusters were identified as both basic and specialised themes of breast cancer and machine learning. Conclusion: Various countries demonstrated comparable interest in breast cancer and machine-learning research. A few Asian countries, such as China, India and Singapore, were listed in the top 10 countries based on the total citation. Additionally, the use of deep learning and breast imaging data was trending in the past 10 years in the field of breast cancer and machine-learning research.

Keywords: Bibliometrics, breast cancer, machine learning, research trend, research output, research productivity

check for updates

Citation: Hanis, T.M.; Islam, M.A.; Musa, K.I.A. Top 100 Most-Cited Publications on Breast Cancer and Machine Learning Research: A Bibliometric Analysis. *Current Medicinal Chemistry* **2021**, *XX*, 1234. [https://doi.org/10.3390/CMC2021101234](#)

healthcare MDPI

Article
Bibliometric Analysis of Global Research Activity on Premature Mortality

Wan Shakira Rodlan Hasani ^{1,2,*}, Tengku Muhammad Hanis ¹, Nor Asiah Muhamad ³, Md Asiful Islam ^{4,5}, Chen Xin Wee ⁶ and Kamarul Imran Musa ^{1,*}

¹ Department of Community Medicine, School of Medical Sciences, Universiti Sains Malaysia, Kubang Kerian 16150, Kelantan, Malaysia
² Institute for Public Health, National Institutes of Health, Ministry of Health Malaysia, Setia Alam 40170, Selangor, Malaysia
³ Sector for Evidence-Based Healthcare, National Institutes of Health, Ministry of Health Malaysia, Setia Alam 40170, Selangor, Malaysia
⁴ Department of Haematology, School of Medical Sciences, Universiti Sains Malaysia, Kubang Kerian 16150, Kelantan, Malaysia
⁵ WHO Collaborating Centre for Global Women's Health, Institute of Metabolism and Systems Research, University of Birmingham, Birmingham B15 2TT, UK
⁶ Department of Public Health Medicine, Faculty of Medicine, Sungai Buloh Campus, Universiti Teknologi MARA, Sungai Buloh 47000, Selangor, Malaysia
 * Correspondence: drkamarul@usm.my

Abstract: Premature mortality is defined as death that occurs before the average age of death for a particular population. Although premature mortality is a public health problem globally, the literature indicates no bibliometric studies that have made a holistic evaluation of the publications on this issue. This study aims to explore the characteristics of the publications on premature mortality in terms of the number of publications, citations, countries, collaboration, and the author's productivity and to further identify the trending keyword and relevant research topics. All the articles related to premature mortality data were retrieved from the Web of Science (WOS) database using the search terms "onmature death," "premature mortality," or "years of life loss." The retrieved articles were analyzed using VOSviewer and CiteSpace. The results showed a significant increase in the number of publications over the years. The most productive authors, countries, and institutions were identified. The Thematic Map revealed the research trends in the field of premature mortality. Conclusions: This study provides a comprehensive overview of the research trends in the field of premature mortality over the last 25 years. The findings can be used to guide future research and policy-making in this area.

check for updates

Citation: Hasani, W.S.; Hanis, T.M.; Muhamad, N.A.; Islam, M.A.; Musa, K.I.A. Bibliometric Analysis of Global Research Activity on Premature Mortality. *Healthcare* **2021**, *10*, 1234. [https://doi.org/10.3390/healthcare10081234](#)

Bibliometrics VS other reviews

Comparison of major review methods.

Review type	Goal	When to use	When not to use	Scope	Dataset	Analysis
Bibliometric analysis	<ul style="list-style-type: none"> Summarizes large quantities of bibliometric data to present the state of the intellectual structure and emerging trends of a research topic or field. 	<ul style="list-style-type: none"> When the scope of review is broad. When the dataset is too large for manual review. 	<ul style="list-style-type: none"> When the scope of review is specific. When the dataset is small and manageable enough that its content can be manually reviewed. 	<ul style="list-style-type: none"> Broad 	<ul style="list-style-type: none"> Large 	<ul style="list-style-type: none"> Quantitative (evaluation and interpretation) Qualitative (interpretation only)
Meta-analysis	<ul style="list-style-type: none"> Summarizes the empirical evidence of relationship between variables while uncovering relationships not studied in existing studies. 	<ul style="list-style-type: none"> When the focus of review is to summarize results rather than to engage with content, which may be broad or specific. When studies in the field are homogenous. When the number of homogeneous studies available is sufficiently high. When the number of homogeneous studies remaining after removing low quality studies is sufficiently high. 	<ul style="list-style-type: none"> When studies in the field are heterogeneous. When the number of homogenous studies is relatively low. When the number of high-quality homogeneous studies is relatively low. 	<ul style="list-style-type: none"> Broad Specific 	<ul style="list-style-type: none"> Large Small but adequate 	<ul style="list-style-type: none"> Quantitative (evaluation and interpretation)
Systematic literature review	<ul style="list-style-type: none"> Summarizes and synthesizes the findings of existing literature on a research topic or field. 	<ul style="list-style-type: none"> When the scope of review is specific. When the dataset is small and manageable enough that its content can be manually reviewed. 	<ul style="list-style-type: none"> When the scope of review is broad. When the dataset is too large for manual review. 	<ul style="list-style-type: none"> Specific 	<ul style="list-style-type: none"> Small 	<ul style="list-style-type: none"> Qualitative (evaluation and interpretation)

- So, when to use a bibliometric analysis:
 - Data is large
 - The scope of review is broad

Data sources

Open access

Original research

BMJ Open

Net survival differences of breast cancer between stages at diagnosis and age groups in the east coast region of West Malaysia: a retrospective cohort study

Tengku Muhammad Hanis ¹, Najib Majdi Yaacob, ¹ Suhaily Mohd Hairon, ² Sarimah Abdullah ¹

To cite: Hanis TM, Yaacob NM, Mohd Hairon S, et al. Net survival differences of breast cancer between stages at diagnosis and age groups in the east coast region of West Malaysia: a retrospective cohort study. *BMJ Open* 2020;11:e043642. doi:10.1136/bmjopen-2020-043642

► Publication history for this paper is available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2020-043642>).

Received 10 August 2020
Revised 08 February 2021
Accepted 01 April 2021



© Author(s) (or their employer(s)) 2021. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

¹Unit of Biostatistics and Research Methodology, School of Medical Sciences, Universiti Sains Malaysia - Kampus Kesihatan, Kubang Kerian, Malaysia
²Department of Community Medicine, School of Medical Sciences, Universiti Sains Malaysia - Kampus Kesihatan, Kubang Kerian, Malaysia

Correspondence to: Dr Naji Muzi Yaacob.

ABSTRACT

Objective Estimation of the net survival of breast cancer helps in assessing breast cancer burden at a population level. Thus, this study aims to estimate the net survival of breast cancer at different cancer staging and age at diagnosis in the east coast region of West Malaysia.

Setting Kelantan, Malaysia.

Participants All breast cancer cases diagnosed in 2007 and 2011 identified from Kelantan Cancer Registry.

Design This retrospective cohort study used a relative survival approach to estimate the net survival of patients with breast cancer. Thus, two data were needed: breast cancer data from Kelantan Cancer Registry and general population mortality data for Kelantan population.

Primary and secondary outcome measures Net survival according to stage and age group at diagnosis at 1, 3 and 5 years following diagnosis.

Results The highest net survival was observed among stage I and II breast cancer cases, while the lowest net survival was observed among stage IV breast cancer cases. In term of age at diagnosis, breast cancer cases aged 65 and older had the best net survival compared with the other age groups.

Conclusion The age at diagnosis had a minimal impact on the net survival compared with the stage at diagnosis. The finding of this study is applicable to other populations with similar breast cancer profile.

INTRODUCTION

Breast cancer is the most common cancer and the leading cause of cancer-related death among women globally.¹ In the Asia region, the incidence of breast cancer had increased at least moderately in the Eastern and South-eastern region over the last two decades.² Several studies have suggested that the increased incidences of breast cancer in Asia are due to factors such as economic growth and adoption of a more westernised lifestyle including no breastfeeding, reduced parity and increased animal fat consumption.^{3,4}

However, the risk of developing breast cancer in Malaysia is still lower compared with the

Strengths and limitations of this study

- This population-based study used state cancer registry data to describe the net survival of breast cancer in the east coast region of West Malaysia.
- The use of relative survival approach to estimate the net survival is considered as a standard practice for a population-based study.
- This study expanded an abridged life table of the general population mortality data into a complete life table to estimate the net survival due to unavailability of a complete life table.
- The use of different method to expand the mortality data leading to a lack of standardisation in this research area.
- This study lacked socioeconomic, sociodemographic and clinical information which may further explain our finding.

8, respectively.⁵ In term of breast cancer survival, a 5-year relative survival between 2005 and 2009 in Malaysia was 67.8%, while other Asian countries such as South Korea (82.7%), Indonesia (77.7%) and Thailand (71.3%) had a better survival.⁶ Breast cancer staging and age are important prognostic factors of breast cancer. Early-stage patients with breast cancer are expected to have better survival compared with those diagnosed at a later stage.⁷ Several studies considered age as an important prognostic factor of breast cancer,⁸⁻¹¹ although several Malaysian studies did not find it otherwise.¹²⁻¹⁴ There is a need to provide more information on breast cancer survival, generally in the Asia Pacific region and especially in Malaysia as it will help in planning effective public health management and control of the disease.

Net survival (NS) is a hypothetical measure in which the only possible cause of death is the disease of interest.^{15,16} NS aims to reflect



Open access

the Kelantan general population mortality data from the DOSM was only available in an abridged life table format. Thus, the mortality data were expanded by the researcher in this study. Other studies may use a different method to expand the mortality data leading to a lack of standardisation in this research area. Additionally, the expanded life table remained as an approximation to an actual complete life table. However, the use of different life tables in the relative survival analysis had been shown to have a minor change in the overall estimate of the NS rate.¹⁹ Currently, the approach used in our study may serve as an alternative for populations without a complete life table. In fact, previous cancer studies had used a similar approach to estimate an NS statistic.²⁰⁻²² Also, this study was restricted by the limited information due to the use of secondary data to further explore the finding of this study. Information such as lymph node involvement, degree of metastasis and hormone receptor status was not available in this study.

CONCLUSIONS

This study presents the NS difference of patients with breast cancer according to cancer staging and age at diagnosis in the east-coast region of West Malaysia. The best survival was observed among patients with breast cancer aged 65 and older and those diagnosed at stages I and II. The age at diagnosis appeared to have a minimal impact on the NS compared with the stage at diagnosis. The NS is multifactorial in nature, thus detailed sociodemographic and clinical information on the breast cancer profile in this region is needed to extend this finding to other neighbouring populations.

Acknowledgements The publication of this study was supported by the School of Medical Sciences, Universiti Sains Malaysia. Also, the authors would like to thank the Kelantan State Health Department for providing the data in this study.

Contributors TMH: conceptualisation, methodology, formal analysis, writing original draft, MYM: conceptualisation, methodology, writing-review and editing, validation, SME: methodology, writing-review and editing, validation, SK: validation, supervision.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not required.

Ethics approval This study was carried out in accordance with the Declaration of Helsinki. Ethical approval was obtained from the Human Research Ethics Committee, Universiti Sains Malaysia (USM/JEPHM/18004/20), Medical Research and Ethics Committee, Ministry of Health Malaysia (NMRR-18-2675-4398(R)) and written approval from the Kelantan State Health Department.

Prevalence and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available on reasonable request. Data may be obtained from a third party and are not publicly available. The General population mortality data for Kelantan is available from eStatistik (<https://news.statistics.gov.my/news/portal/epid/epid.htm>). Additionally, the breast cancer data is available from Non-communicable Disease (NCD) unit, Kelantan State Health

Department and Medical Research and Ethics Committee, Ministry of Health Malaysia.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any charges made indicated, and the use is not-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iD

Tengku Muhammad Hanis <http://orcid.org/0000-0003-1466-7765>

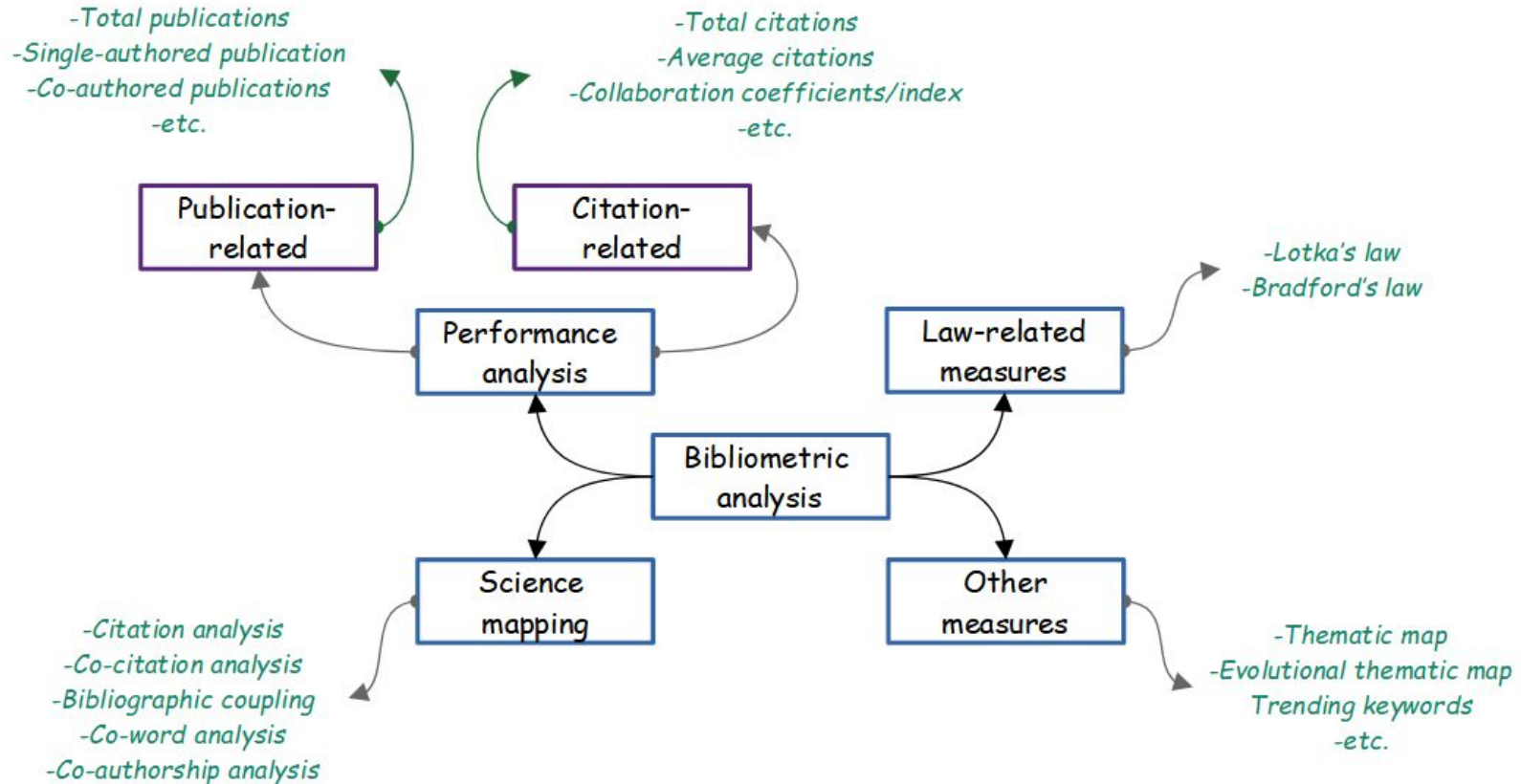
REFERENCES

- Ginsburg O, Bray F, Coleman MP, et al. The global burden of women's cancers: a grand challenge in global health. *Lancet* 2017;389:847-60.
- Youlton LR, Crabb SM, Yip CH, et al. Incidence and mortality of female breast cancer in the Asia-Pacific region. *Cancer Biol Med* 2014;11:101-15.
- Yip CH, Bhuo Pathy N, To SH. A review of breast cancer research in Malaysia. *Med J Malaysia* 2014;69:8-22.
- Fan L, Goss PE, Strasser-Weippl K. Current status and future projections of breast cancer in Asia. *Breast Care* 2015;10:372-8.
- Kirubakaran R, Chee JA, Mahamad Aris N. Awareness of breast cancer among surgical patients in a tertiary hospital in Malaysia. *Asian Pac J Cancer Prev* 2017;18:115-20.
- Allemani C, Wei HK, Carreira H, et al. Global surveillance of cancer survival 1995-2008: analysis of individual data for 25,876,887 patients from 279 population-based registries in 67 countries (CONCORD-2). *Lancet* 2015;385:977-1010.
- Isabel J, Ginsburg O, Rochon PA, et al. Differences in breast cancer stage at diagnosis and cancer-specific survival by race and ethnicity in the United States. *JAMA* 2015;313:765-73.
- Wong FC, Tham MY, Lee WL, et al. Age events a continuous effect in the outcomes of Asian breast cancer patients treated with breast-conserving therapy. *Cancer Commun* 2018;38:59-11.
- Bhargava A, AR RL, Gao F, et al. Patient and tumor characteristics associated with increased mortality in young women (<=40 years) with breast cancer. *J Surg Oncol* 2009;100:548-51.
- Partridge AH, Hughes ME, Warner ET, et al. Subtype-dependent relationship between young age at diagnosis and breast cancer survival. *J Clin Oncol* 2016;34:3308-14.
- Ibrahim NI, Dahli M, Aris EN, et al. Who are the breast cancer survivors in Malaysia? *Asian Pac J Cancer Prev* 2012;12:2213-6.
- Nordin N, Yaacob NM, Abdulrah NI, et al. Survival time and prognostic factors for breast cancer among women in north-east Peninsular Malaysia. *Asian Pac J Cancer Prev* 2018;19:497-502.
- Tan NA, Akma M, Mohamed I. Improvement in survival of breast cancer patients - trends over two time periods in a single institution in an Asia Pacific country, Malaysia. *Asian Pacific J Cancer Prev* 2011;12:245-9.
- Maricic AS, Noor A-M, Howlader N, et al. Cancer survival: an overview of measures, uses, and interpretation. *J Natl Cancer Inst Monogr* 2014;2014:145-86.
- Lambert PC, Dickman PW, Rutherford MJ. Comparison of different approaches to estimating age standardized net survival. *BMC Med Res Methodol* 2015;15:1-13.
- UKACR. Standard operating procedure: guidelines on population based cancer survival analysis. 2016. Available: <http://ukacr.org/publication/guidelines-population-based-cancer-survival-analysis>
- Sartori D, Blakey T, Pearce N. Measuring cancer survival in populations: relative survival vs cancer-specific survival. *Int J Epidemiol* 2010;39:598-610.
- Elioranta S, Adolfsson J, Lambert PC, et al. How can we make cancer survival statistics more useful for patients and clinicians: an illustration using localized prostate cancer in Sweden. *Cancer Causes Control* 2013;24:505-15.
- Schaller R, Racht B, Beitz A, et al. Estimation of net survival for cancer patients: relative survival method more robust to some assumption violations than cause-specific setting, a sensitivity analysis on empirical data. *Eur J Cancer* 2017;72:76-83.
- National Cancer Institute. *Malaysian National Cancer Registry Report* 2007-2011. Putrajaya, 2015. <http://nci.moh.gov.my>

- Bibliometrix compatible databases:

Source	URL	Format	Extension
Web of Science	https://www.webofknowledge.com/	<ul style="list-style-type: none"> ◦ 'BibTeX' ◦ 'plaintext' ◦ 'EndNote Desktop' 	<ul style="list-style-type: none"> ◦ '.bib' ◦ '.txt' ◦ '.ciw'
Scopus	https://www.scopus.com/	<ul style="list-style-type: none"> ◦ 'BibTeX' ◦ 'CSV export' 	<ul style="list-style-type: none"> ◦ '.bib' ◦ '.txt'
Dimensions	https://app.dimensions.ai/	<ul style="list-style-type: none"> ◦ 'Bibliometric mapping' ◦ 'Excel' 	<ul style="list-style-type: none"> ◦ '.csv' ◦ '.xlsx'
The Lens	https://lens.org/	<ul style="list-style-type: none"> ◦ 'CSV export file' 	<ul style="list-style-type: none"> ◦ '.csv'
PubMed	https://pubmed.ncbi.nlm.nih.gov/	<ul style="list-style-type: none"> ◦ 'PubMed export file' 	<ul style="list-style-type: none"> ◦ '.txt'
Cochrane Library	https://www.cochranelibrary.com/	<ul style="list-style-type: none"> ◦ 'plaintext' 	<ul style="list-style-type: none"> ◦ '.txt'

Summary of analysis



Type of analysis

1. Performance analysis - account for contribution in research area
 - Publication-related metrics (proxy of productivity):
 - Total publications
 - Single-authored publications
 - Co-authored publications
 - etc
 - Citation-related metrics (proxy of influence)
 - Total citations
 - Average citations
 - Collaboration index/collaboration coefficient
 - etc

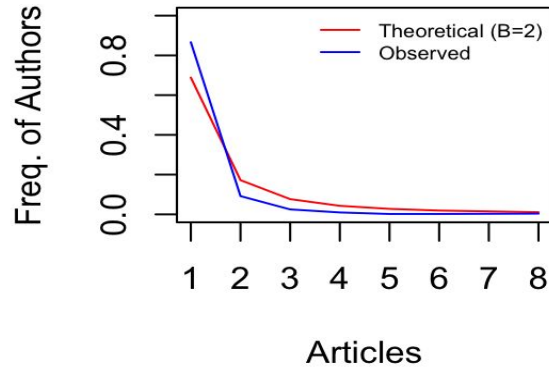
2. Science mapping - assess relationship in research area (author, article, etc)
 - Citation analysis - most influential publications
 - Co-citation analysis
 - Relationship among cited publication (paper 1 and paper 2 cited in paper 3, paper 1 & 2 = co-cited paper)
 - foundation/basic theme (look in the past)
 - Bibliographic coupling
 - Relationship among publications with same references (at least one reference)
 - Latest development

- Co-word analysis
 - Certain words (keywords, title, etc) shared by publications
 - May indicate future trend or support co-citation analysis and bibliographic coupling
- Co-authorship analysis
 - Interaction among researchers
 - Also can be applied to institutions, countries

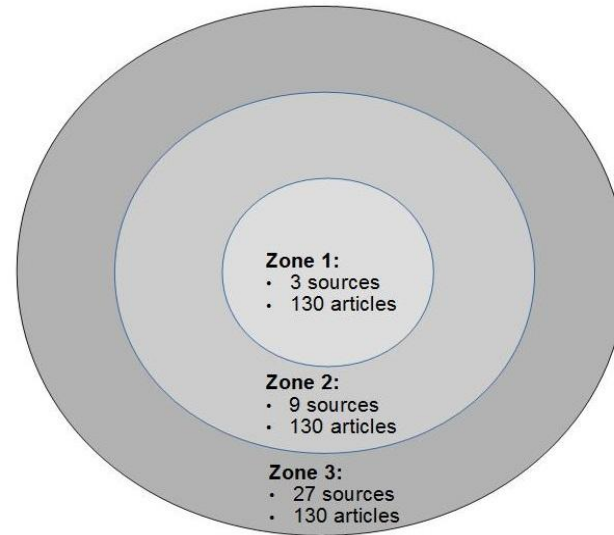
Bibliometric technique taxonomy	Unit of analysis used	Kind of relation
Bibliographic Coupling	<ul style="list-style-type: none"> • Author • Document • Journal 	<ul style="list-style-type: none"> • Common references in authors' oeuvres • Common references in documents • Common references in journals' oeuvres
Co-citation	<ul style="list-style-type: none"> • Author • Reference • Journal 	<ul style="list-style-type: none"> • Co-cited authors • Co-cited documents • Co-cited journals
Co-author	<ul style="list-style-type: none"> • Author • Country from affiliation • Institution from affiliation 	<ul style="list-style-type: none"> • Co-occurrence of authors in the author list of a document • Co-occurrence of countries in the address list of a document • Co-occurrence of institutions in the address list of a document
Co-word	<ul style="list-style-type: none"> • Keyword, or term extracted from title, abstract or document's body 	<ul style="list-style-type: none"> • Co-occurrence of terms in a document

3. Theory/law-related metrics

Scientific Productivity



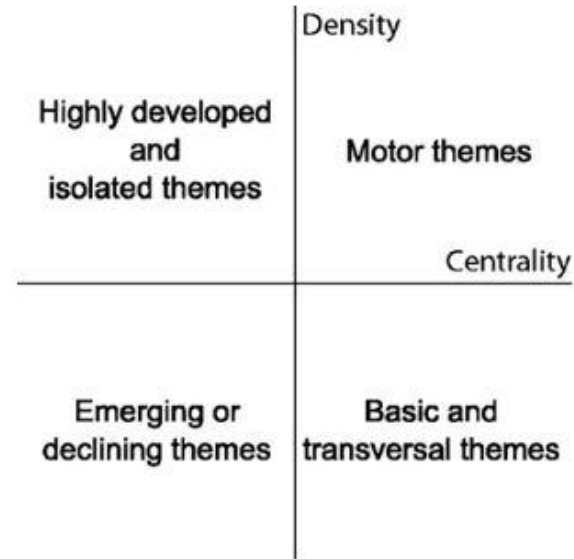
Lotka's law



Bradford's law

4. Other measures

- Thematic map
- Evolutional thematic map
- Trending keywords
- etc



a The strategic diagram.

Thematic map

Extension of bibliometrics

1. Basic textual analysis:
 - TF-IDF (Term Frequency-Inverse Document Frequency)
 - Wordcloud
2. Clustering (general)
 - k-means
 - Hierarchical clustering
 - etc
3. Topic models (more specific to corpus analysis)
 - Latent dirichlet allocation (LDA)
 - Latent semantic analysis (LSA)
 - Correlated topic model (CTM)
4. Network analysis
5. Use R ([bibliometrix](#)) and Python ([pyBibX](#))

Some idea on a bibliometric paper

- General bibliometrics
 - Bibliometric assessment of breast cancer research
- Specific bibliometrics - limited to topics (need to review), number of papers, regions
 - Breast cancer and machine learning
 - Top 100 papers in machine learning
- Bibliometric comparison
 - Between countries, regions, etc

Open Access

Research

BMJ Open Bibliometric analysis of the top-cited gastroenterology and hepatology articles

Samy A Azer,¹ Sarah Azer²

To cite: Azer SA, Azer S. Bibliometric analysis of the top-cited gastroenterology and hepatology articles. *BMJ Open* 2016;8:e005889. doi:10.1136/bmjopen-2015-009889

► Prepublication history and additional material is available. To view please visit the journal (<http://dx.doi.org/10.1136/bmjopen-2015-009889>).

Received 1 September 2015
Accepted 18 December 2015

ABSTRACT

Objective: To identify the top-cited articles in gastroenterology and hepatology, and analyse their characteristics.

Methods: Two searches were conducted in the Science Citation Index Expanded database; a search of 69 journals under the category 'Gastroenterology and Hepatology' (list A) and a keyword search of all journals (list B). The search results were analysed and the inter-rater coefficient of agreement between evaluators was measured using Cohen's κ .

Results: The number of citations varied from 1049 to 2959 in list A and from 1929 to 5500 in list B. In both lists, the majority of articles were research papers. No significant correlations were found between the number of citations and the number of years since publication ($R^2=0.00992$, $p=0.473$ and $R^2=0.00202$,

Strengths and limitations of this study

- Two searches were conducted in the Science Citation Index Expanded database.
- The search was based on journals with high impact factor and only those in the English language.
- Analysis explored a range of parameters in the assessment.

measurement to assess the work of researchers and impact of research,¹ and to rank researchers on the basis of differences in citation indices.^{2–4} Recently, Nicholson and Ioannidis⁵ explored whether there is a link between highly cited research and

BMJ Global Health

Original research

A bibliometric analysis of COVID-19 research in Africa

Fatuma Hassan Guleid,¹ Robinson Oyando,² Evelyn Kabia,² Audrey Mumbi,² Samuel Akech,³ Edwine Barasa^{2,4}

To cite: Guleid FH, Oyando R, Kabia E, et al. A bibliometric analysis of COVID-19 research in Africa. *BMJ Global Health* 2021;8:e005690. doi:10.1136/bmjgh-2021-005690

Handling editor: Saye Abimbola

► Additional supplemental material is published online only. To view, please visit the journal (<http://dx.doi.org/10.1136/bmjgh-2021-005690>).

ABSTRACT

Background: The COVID-19 pandemic has led to an unprecedented global research effort to build a body of knowledge that can inform mitigation strategies. We carried out a bibliometric analysis to describe the COVID-19 research output in Africa in terms of setting, study design, research themes and author affiliation.

Methods: We searched for articles published between 1 December 2019 and 3 January 2021 from various databases including PubMed, African Journals Online, medRxiv, Colabovid, the WHO global research database and Google. All article types and study design were included.

Key questions

What is already known?

- Africa's contribution to global health research is low (1.3%) considering the high burden of infectious disease on the continent.

What are the new findings?

- Africa is contributing to the generation of COVID-19 knowledge by publishing primary and secondary research articles and editorial and commentary-type articles.
- African authors have made significant contributions.

RESEARCH ARTICLE

Open Access

Contribution of Arab countries to breast cancer research: comparison with non-Arab Middle Eastern countries

Waleed M Swieleh¹*, Sa'ed H Zyoud², Samah W Al-Jab² and Ansam F Sawalha¹

Abstract

Background: Breast cancer is one of the most common types of cancers affecting women worldwide. The main objective of this study was to assess and compare research activity in breast cancer in Arab countries with non-Arab Middle Eastern countries.

Methods: Publications about 'breast cancer' as a research topic were retrieved using the ISI Web of Science database. Analysis was confined to original research and review articles. Research productivity was assessed by assessing number of publications and time trend of these publications, names of journals, citation analysis, top 10 active institutions as well as country contribution to breast cancer research. The quantity and quality of publications from Arab countries in addition to 3 other Middle East countries (Turkey, Iran and Israel) were assessed and compared using the h-index tool.

Results: A total of 1658 original research and review articles about 'breast cancer' were published from Arab countries. Research productivity from Arab countries in the field of 'breast cancer' was available but showed a

antioxidants

MDPI

Review

A Bibliometric Review of Publications on Oxidative Stress and Chemobrain: 1990–2019

Taylor McElroy^{1,2,3} and Antiño R. Allen^{1,2,3,*}

¹ Division of Radiation Health, University of Arkansas for Medical Sciences, Little Rock, AR 72205, USA; TMMCELROY@uams.edu

² Department of Pharmaceutical Sciences, University of Arkansas for Medical Sciences, Little Rock, AR 72205, USA

³ Department of Neurobiology & Developmental Sciences, University of Arkansas for Medical Sciences, Little Rock, AR 72205, USA

* Correspondence: aallen@uams.edu; Tel.: +1-501-686-7553

Received: 17 April 2020; Accepted: 15 May 2020; Published: 18 May 2020

Abstract: Oxidative stress is considered one of the possible mechanisms behind chemobrain or the cognitive dysfunction persistent after chemotherapy treatment. Breast cancer patients have reported chemobrain symptoms since the 1990s. In this present bibliometric review, we employed

PLOS ONE

RESEARCH ARTICLE

University-Industry Collaboration in China and the USA: A Bibliometric Comparison

Ping Zhou^{1*}, Robert Tijssen^{2*}, Loet Leydesdorff^{3*}

¹ Department of Information Resources Management, School of Public Affairs, Zhejiang University, Hangzhou, Zhejiang, China, ² Center for Science and Technology Studies (CWTS), Leiden University, Leiden, The Netherlands, ³ Amsterdam School of Communications Research (ASCoR), University of Amsterdam, Amsterdam, The Netherlands

* These authors contributed equally to this work.

* pzhou@zju.edu.cn



CrossMark

Abstract

Open Access

Research

BMJ Open Global research trends in spinal ultrasound: a systematic bibliometric analysis

Xiao Zhai,¹ Jin Cui,^{1,2} Jie Shao,¹ Qijin Wang,³ Xiao Chen,¹ Xianzhao Wei,¹ Xiaoyi Zhou,¹ Ziqiang Chen,¹ Yushu Bai,¹ Ming Li¹

To cite: Zhai X, Cui J, Shao J, et al. Global research trends in spinal ultrasound: a systematic bibliometric analysis. *BMJ Open* 2017;7:e015317. doi:10.1136/bmjopen-2016-015317

► Prepublication history and additional material for this paper are available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2016-015317>).

ABSTRACT

Background: In recent years, there has been increased interest in the use of ultrasound technology in the evaluation of spinal and paraspinal regions.

Objective: This study aimed to investigate trends in spinal ultrasound research from 1994 to 2015 and compare the contributions of such research from different countries and authors.

Study design: Bibliometric analysis.

Setting: Publications related to spinal ultrasound from 1994 to 2015 were retrieved from the Web of Science database.

Strengths and limitations of this study

- This bibliometric study included data on publication number, citation frequency, relative research interest, mean number of citations per paper, and H-index.
- The fitting mathematical model was used to analyse the time trend of the publications by using GraphPad Prism 5.
- VOSviewer, a Java programme, was used to visualise and analyse hotspots, masterpiece clusters, and



Any question?

Bibliometric analysis

Part 2

Steps to do a bibliometric paper (quite similar to systematic review)

1. Develop research questions
2. Define:
 - Scope - limit by country/year/etc
 - Objectives - more specific than RQ
 - Selection criteria - related to RQ and objectives
3. Specify bibliometric techniques (based on objectives)
4. Select databases
5. Develop search terms - always check with the databases whether the terms valid or not
6. Test run your search terms on the databases
7. Search and extract bibliographic data from databases
8. Review downloaded data/abstracts if needed (brief review)

9. Apply selection criteria if needed
10. Screen the papers if needed
11. Run bibliometric analysis and report findings

Develop a plan for bibliometric paper

- The purpose of the plan:
 - To guide you during the analysis and writing of the bibliometric paper
 - To record everything
- The plan should contains:
 - Proposed title
 - Objectives and bibliometric techniques (in a table)
 - Search terms
 - Databases
 - Screening strategy
 - Targeted journal
 - Key/main papers
- [Example of the plan](#)

Choosing a journal

- Some journal quite difficult to publish a bibliometric paper
 - Editor not familiar with a bibliometric paper
 - No reviewer with an expertise to review a bibliometric paper
- Solution:
 - Use [JANE website](#)
 - Make sure the journal has published a bibliometric paper previously

Result presentation

- Not all results of the analysis should be presented
- Make sure the result is aligned with the objectives
- Since we have a lot of results, try to put related result under a heading

while the number of journals increased as the number of zones increased. Bradford's law of scattering was estimated through the bibliometrix package.

Research Trends

Research trends were evaluated using a thematic map and trending keywords analysis. Both analyses were implemented through the bibliometrix package. Thematic map or strategic theme was proposed by Cobo et al. in 2011. The author's keywords which were extracted from the metadata of the database were used to construct the thematic map. Only the top 100 keywords with a minimum appearance of eight were included in the analysis to identify the thematic clusters.

Trending keywords analysis used the author's keywords retrieved from the Scopus database. Keywords with a minimum frequency of two from the publications between 2010 and 2020 were included in the analysis. Only the

top five keywords for each year were displayed in the plot.

RESULTS

DESCRIPTIVE BIBLIOMETRIC RESULT

After removing three publications, there were 340 publications, ranging from 1982 to 2021 included in this study. The publications consisted of 312 research articles, 21 review papers and 7 conference papers. Additionally, Chan (1982) authored the earliest publication related to breast cancer research in Malaysia.

Main Characteristics of the Included Studies

The average citation per document was 15.8, and the range of citations was between 0 and 244. There were 8 single-authored papers, while the remaining 332 publications were multi-authored papers. The annual

percentage of the growth rate of publications was 7.4%. Figure 2 shows a distribution of publications according to the year of publication. About 21.8% of publications were funded and the remaining 78.2% were not funded. Additionally, the number of authors per publication ranged between 1 and 26 and about 57.9% of the publications in this study had 3 to 6 authors.

Distribution of Authors

There were 1,222 authors involved in publications of breast cancer research in Malaysia. Yip CH was the top author with 69 publications related to breast cancer research in Malaysia ranging from 1996 until 2019, followed by Taib NA and Taib NAM with 56 and 21 publications, respectively. Figure 3 presents the top 10 most productive authors over time, taking into account the total citation per year on top of the number of articles published.

Distribution of Journals

Table 1: Core journals in breast cancer research in Malaysia.

Journals	Rank	No. of papers (%)
Asian Pacific Journal of Cancer Prevention	1	67 (19.7)
PLOS One	2	12 (3.5)
World Journal of Surgery	2	12 (3.5)
Medical Journal of Malaysia	4	9 (2.6)
Singapore Medical Journal	4	9 (2.6)
Malaysian Journal of Medical Sciences	6	7 (2.1)

There were 146 journals related to breast cancer research in Malaysia. The six core journals published 34.1% of papers out of total publications in this study. Table 1 showed the list of all core journals involved in related publications, while Table 2 presents a zone of journals according to Bradford's law of scattering.

Institutional collaborations

About 360 institutions were involved in breast cancer research in Malaysia and was summarised in the institutional collaboration plot in Figure 4. However, only the top 20 institutions were displayed in the plot. Additionally, node degree reflected the number of connections each institution had, which is reflected by

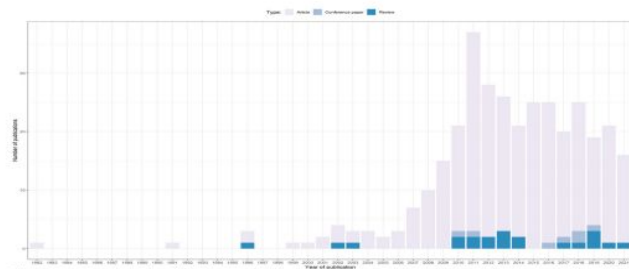


Figure 2: Frequency of publications related to breast cancer research in Malaysia according to the year of publication.

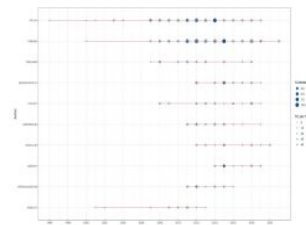


Figure 3: Top 10 most productive authors over time in the publication of breast cancer research in Malaysia.

Table 2: Zones of journals related to breast cancer research in Malaysia.

Zones	No of journals	No of papers
Zone 1 (core journals)	6	116
Zone 2	40	112
Zone 3	112	112

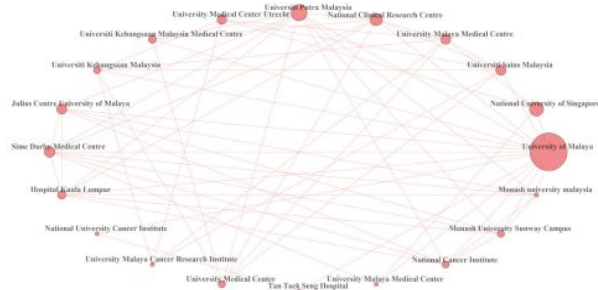


Figure 4: Collaboration among the top 20 institutions related to breast cancer research in Malaysia.

the size of nodes in Figure 4. The most active institution in the research area was the University of Malaya with a node degree of 345, followed by the National University of Singapore (148), Universiti Sains Malaysia (132), Universiti Malaysia Medical Centre (116)

and National Clinical Research Centre (100).

RESEARCH TRENDS

Thematic clusters

Figure 5 presented 11 clusters of breast

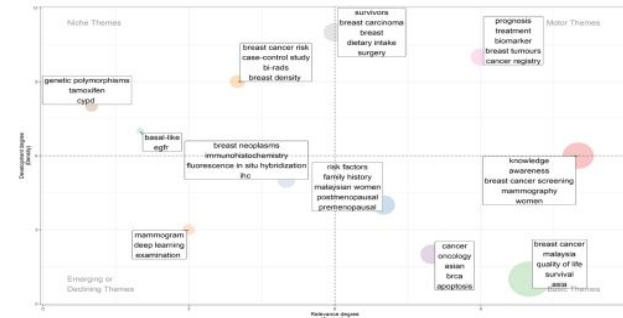


Figure 5: Thematic map of breast cancer research in Malaysia. cypd=cytochrome P450 2D6 or CYP2D6, egfr=epidermal growth factor receptor, bi-rads=breast imaging reporting and data system, ihc= immunohistochemistry, brca=breast cancer gene.

cancer research in Malaysia. The upper-right quadrant represented a motor theme, and the lower-right quadrant represented basic themes. Additionally, the upper-left quadrant reflected niche themes, while the lower-left quadrant represented emerging or declining themes. The most frequent keywords were used to represent each cluster. There was one cluster in the motor themes, three clusters in the basic themes, three clusters in the niche themes and two clusters in emerging themes. Additionally, there were two in-between clusters, one cluster between the motor and basic themes and another one between motor and niche themes.

Breast cancer research related to prognosis, biomarker and cancer registry were the most developed and central research area in Malaysia. However, research areas related to family history, risk factors, quality of life, and survival of breast cancer patients reflected basic themes of breast cancer research in Malaysia. Research clusters in this theme had been studied for a long time and were once a central research area in breast cancer research in Malaysia. As shown in Figure 5, there was one in-between cluster that had become less central in breast cancer research in Malaysia.

The three clusters in the niche themes may indicate a highly developed and isolated research area. However, the clusters in this theme may migrate into a motor theme as one in-between cluster was observed between the niche and motor themes. Thus, the research clusters in niche themes may become a central research area of breast cancer

in Malaysia in future. Additionally, there were two emerging clusters related to breast cancer research in Malaysia. Researches related to deep learning and mammogram rose in popularity, while research related to immunohistochemistry (IHC) and fluorescence in situ hybridisation (FISH) had also showed an emerging trend.

Trending Keywords

Table 3 presents the top author keywords for publications in breast cancer research in Malaysia. Breast cancer research in Malaysia which related to awareness, quality of life, patient's survival and risk factors was starting to increase an established research domain. These keywords coincided with research clusters in basic themes in Figure 5.

Figure 6 illustrates trending keywords in breast cancer research in Malaysia for the last 10 years. The most prevalent keyword was 'immunohistochemistry' and 'breast neoplasm spanned' from

Table 3: Top author keywords for breast cancer research in Malaysia

Author keywords	Frequency
Breast cancer	179
Malaysia	56
Knowledge	15
Quality of life	12
Survival	12
Asia	11
Awareness	10
Chemotherapy	9
Polymorphism	9
Risk factors	8

Tips to write a bibliometric paper

- Make sure your research questions are critical enough
- Know what you can and can't do with the bibliometric analysis
 - Limitation of the software
 - Limitation of your knowledge
- Bibliometric analysis is quite an explorative in nature - thus, be creative!
- Read past related papers - know what else have not been addressed
- Find main paper reference that is close to what you want to do and try to adopt its approach/methods
- Follow [BIBLIO guideline](#) for reporting a bibliometric review/paper

Table 3 The BIBLIO checklist for reporting the bibliometric reviews of the biomedical literature

Section/topic	Item no	Checklist item	Reported on page no
Title			
Identification	1	Identify the report as a bibliometric review in the title	
Issues/topics	2	Indicate the key issues/topics under investigation and coverage of time period	
Abstract			
Structured summary	3	Structured summary including (as applicable): background, methods, results (key findings), and conclusions	
Introduction/background			
Justification/rationale/explanation	4	Present review of existing knowledge and epidemiological information	
Objectives	5	Statement of the objective(s) or question(s)	
Methods			
Search engines (data sources)	6	Describe all information sources (such as electronic databases, contact with study authors, trial registers, or other gray literature sources)	
Search strategy	7	Keywords and systematization criteria (date of search, language, type of document) for the search	
Time period	8	The period that the review covers and the justification	
Eligibility criteria	9	Describe all inclusion and exclusion criteria, languages, study design, type of publication, and time period	
Data refinement (data selection procedure)	10	Remove the irrelevant articles; inspection to eliminate duplicate and unrelated articles (after evaluation of the title, abstract, and content)	
Quality assessment (optional)	11	Assessment of papers by three authors and the use of assessing checklists	
Data synthesis	12	Describe the methods used for summarizing, handling, synthesis, tabulations, or schematic displays. Describe how the data were analyzed	
Results			
Descriptive findings (statistics)	13	- Provide details of the search and selection process in a flow diagram - Number of citations retrieved (number of publication, year of publication, type of documents, country of publication, articles with the highest impact, most impactful authors, most impactful articles, authors with the highest production, top journals, top institutions, ...)	
Schematic map and trend	14	Summarize and/or present the schematic maps and trends using an appropriate software to present citations, journals, authors, top journals, time trends, emerging literature, and any relevant indicators (as applicable) [64–68]	

Table 3 (continued)

Section/topic	Item no	Checklist item	Reported on page no
Tabulation and summarizing the findings	15	<p>General recommendation: Studies under consideration could be summarized and organized by different subtitles and different scenarios. Regardless, results need to be presented in separate tables covering each subtitle. The followings are some options that could help to summarize the findings</p> <p>Option 1:</p> <ul style="list-style-type: none"> - Start the presentation with a historical view [when and who first published on the topic] - Report on review papers. The result should be listed in a separate table. Also, specify the review type (scoping review, narrative review, systematic review, and meta-analysis) - Summarize the findings according to the study designs and main study types <p>Option 2:</p> <ul style="list-style-type: none"> - Start the presentation with a historical view [when and who first published on the topic] - Report on review papers. The result should be listed in a separate table. Also, indicate the review type (scoping review, narrative review, systematic review, and meta-analysis) should be specified - Summarize the findings according to outcome measures or populations. For example, see [63] <p>Option 3:</p> <ul style="list-style-type: none"> - Start the presentation with a historical view [when and who first published on the topic] - Report on review papers. The result should be listed in a separate table. Also, specify the review type (scoping review, narrative review, systematic review, and meta-analysis) - Summarize the findings according to concept [28] <p>Option 4:</p> <ul style="list-style-type: none"> - Start the presentation with a historical view [when and who first published on the topic] - Report on review papers. The result should be listed in a separate table, and also specify the review type (scoping review, narrative review, systematic review, and meta-analysis) - Summarize the findings according to different subtitles relevant to the main topic [26] 	
Synthesis of findings	16	Synthesize the findings as much as possible, find the gap, and propose a model, hypothesis, etc. (if applicable)	
Discussion			
Summary of evidence	17	Summarize the main findings. The findings should be presented in more "general" or "accessible" terms	
Interpretation	18	Include Interpretation consistent with results. Explanations for observed outcomes, similarities, and differences reported would be essential	
Strengths and limitations	19	Discuss the strengths and limitations	
Conclusion(s)	20	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications	



Any question?

Bibliometric analysis

Hands-on in R and biblioshiny

Field tags/column names

Field Tag	Description
AU	Authors
TI	Document Title
SO	Publication Name (or Source)
JI	ISO Source Abbreviation
DT	Document Type
DE	Authors' Keywords
ID	Keywords associated by SCOPUS or ISI database
AB	Abstract
C1	Author Address
RP	Reprint Address
CR	Cited References
TC	Times Cited
PY	Year
SC	Subject Category
UT	Unique Article Identifier
DB	Bibliographic Database

More field tags - https://www.bibliometrix.org/documents/Field_Tags_bibliometrix.pdf³⁶

Biliometrix compatible databases

Source	URL	Format	Extension
Web of Science	https://www.webofknowledge.com/	<ul style="list-style-type: none"> ◦ 'BibTeX' ◦ 'plaintext' ◦ 'EndNote Desktop' 	<ul style="list-style-type: none"> ◦ '.bib' ◦ '.txt' ◦ '.ciw'
Scopus	https://www.scopus.com/	<ul style="list-style-type: none"> ◦ 'BibTeX' ◦ 'CSV export' 	<ul style="list-style-type: none"> ◦ '.bib' ◦ '.txt'
Dimensions	https://app.dimensions.ai/	<ul style="list-style-type: none"> ◦ 'Bibliometric mapping' ◦ 'Excel' 	<ul style="list-style-type: none"> ◦ '.csv' ◦ '.xlsx'
The Lens	https://lens.org/	<ul style="list-style-type: none"> ◦ 'CSV export file' 	<ul style="list-style-type: none"> ◦ '.csv'
PubMed	https://pubmed.ncbi.nlm.nih.gov/	<ul style="list-style-type: none"> ◦ 'PubMed export file' 	<ul style="list-style-type: none"> ◦ '.txt'
Cochrane Library	https://www.cochranelibrary.com/	<ul style="list-style-type: none"> ◦ 'plaintext' 	<ul style="list-style-type: none"> ◦ '.txt'

Hands-on in WOS

- Use advanced search: TITLE("male breast cancer")
- Download either in plaintext or BibTeX format

Hands-on in R - setting Posit Cloud

- Can either use:
 - RStudio IDE in your PC/laptop
 - Posit Cloud - [sign up for a free account](#)

Hands-on in R - bibliometric analysis

1. Go to https://github.com/tengku-hanis/SR_biblio_USM
2. Click `<> Code` → `local` → `Clone` → `HTTPS` → copy the link

tengku-hanis / SR_biblio_USM Public

Notifications Fork 0 Star 0

<> Code Issues Pull requests Actions Projects Security Insights

main 1 Branch 0 Tags

tengku-hanis Initial commit

File	Commit	Time
.gitignore	Initial commit	
1_install_packages.R	Initial commit	
2_biblio_performance.R	Initial commit	
3_biblio_relation.R	Initial commit	
4_biblio_others.R	Initial commit	
5_biblio_theory.R	Initial commit	12 minutes ago
6_biblioshiny.R	Initial commit	12 minutes ago
SR_biblio_USM.Rproj	Initial commit	12 minutes ago
wos.bib	Initial commit	12 minutes ago

Clone

HTTPS GitHub CLI

https://github.com/tengku-hanis/SR_biblio_USM.git

Clone using the web URL

Open with GitHub Desktop

Download ZIP

About

Material for systematic review and bibliometric analysis in USM

Activity

0 stars

1 watching

0 forks

Report repository

Releases

No releases published

Packages

No packages published

Languages

TeX 99.8% R 0.2%

- Log in to Posit Cloud
- Click New Project → New Project from Git Repository → paste the url

Suggested readings/references

- Bibliometrix website - https://www.bibliometrix.org/vignettes/Introduction_to_bibliometrix.html
- Aria, M., & Cuccurullo, C. (2017). bibliometrix : An R-tool for comprehensive science mapping analysis. Journal of Informetrics, 11(4), 959–975. <https://doi.org/10.1016/j.joi.2017.08.007>
- Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. Journal of Business Research, 133, 285–296. <https://doi.org/10.1016/j.ibusres.2021.04.070>
- Grant, M.J. and Booth, A. (2009), A typology of reviews: an analysis of 14 review types and associated methodologies. Health Information & Libraries Journal, 26: 91-108. <https://doi.org/10.1111/j.1471-1842.2009.00848.x>

- Hood, W.W., Wilson, C.S. The Literature of Bibliometrics, Scientometrics, and Informetrics. *Scientometrics* 52, 291 (2001).
<https://doi.org/10.1023/A:1017919924342>
- **Montazeri, A., Mohammadi, S., M.Hesari, P. et al. Preliminary guideline for reporting bibliometric reviews of the biomedical literature (BIBLIO): a minimum requirements. *Syst Rev* 12, 239 (2023).**
<https://doi.org/10.1186/s13643-023-02410-2>



Any question?



tengkuhanismokhtar@gmail.com
jom.research.malaysia@gmail.com

*Please ensure you cite or acknowledge us when using
our material 😊*