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Review

Pre-treatment quality of life and survival in lung cancer: A bibliometric analysis

Zeinep Avizova[1,2], Yerbolat M. Iztleuov[1], Parkhat Utepov[2], Ayan O. Myssayev[3]

[1]Department of Radiology, West Kazakhstan Marat Ospanov Medical University, Aktobe, Kazakhstan; [2]Department of Hygiene and Epidemiology, South Kazakhstan Medical Academy, Shymkent, Kazakhstan; [3]Office of the Vice-Rector for Strategic Development and International Cooperation, Astana Medical University, Astana, Kazakhstan

Abstract. *Background:* Lung cancer, the leading cause of cancer mortality globally, severely impacts survival and quality of life. Pretreatment quality of life is a recognized prognostic factor for survival, yet a comprehensive overview of research trends in this area is lacking. This study aims to perform a bibliometric analysis of literature on pretreatment quality of life and survival in lung cancer from 2015 to 2025, mapping global patterns, key contributors, and thematic shifts to inform future oncology research. *Methods:* Data were sourced from the Web of Science Core Collection using queries targeting lung cancer, quality of life assessment tools (for example, the European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire–Core 30), pretreatment, and survival. English-language original articles from 2015–2025 were included, excluding reviews and non-articles. Following screening according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses, 235 articles were analyzed using RStudio's bibliometrix package for publication trends, citations, collaborations, and keyword frequency. *Results:* Analysis covered 235 studies from 110 sources, with 2497 authors and an average of 22.95 citations per document. Publications grew 4.91% annually, peaking in 2022 (>40 articles), with citations highest in 2016 (>7 per article). Leading journals included Lung Cancer (21 articles) and Journal of Clinical Oncology (623 citations). The United States (455 articles) and China (359) led production, with strong global collaborations. Top keywords were "quality of life" (68 occurrences), "chemotherapy" (66), and "survival" (61), reflecting a shift toward immunotherapy and patient outcomes. *Conclusion:* This study maps the evolving landscape of pretreatment quality of life and survival in lung cancer, highlighting key journals, collaborations, and emerging themes to guide future patient-centered research. (www.actabiomedica.it)

Key words: lung cancer, quality of life, survival, bibliometric analysis, pre-treatment

Introduction

Lung cancer remains the leading cause of cancer-related mortality worldwide, posing a significant global health challenge with its high incidence and poor survival rates (1). Quality of life (QOL) has emerged as a critical endpoint in oncology, extending beyond mere survival metrics to encompass physical, psychological, social, and functional domains that reflect a patient's holistic experience (2). In lung cancer, quality of life is particularly vital due to the disease's debilitating effects, including chronic pain, respiratory distress, and emotional burden, which often exacerbate treatment challenges and influence clinical outcomes (3). Pretreatment or baseline QOL assessments have gained prominence as they provide insights into a patient's initial health status before interventions, serving as a benchmark for monitoring changes and predicting prognosis (4). Pretreatment quality of life is an independent prognostic factor for survival in lung cancer

patients, with higher baseline scores linked to better outcomes, even after adjusting for age, performance status, and tumor stage (5,6). Tools like the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire–Core 30 (EORTC QLQ-C30) can identify at-risk patients early, supporting tailored care and emphasizing the need to integrate quality of life assessments into lung cancer clinical practice and research (7,8). Over the past decade, research on pretreatment quality of life and its link to survival in lung cancer has proliferated, driven by increasing awareness of patient-centered outcomes in oncology (9-11). However, a systematic overview of this evolving field is lacking. Bibliometric analysis offers a robust quantitative approach to map publication trends, identify influential contributors, and uncover thematic shifts, providing valuable guidance for future investigations in oncology. This study conducts a comprehensive bibliometric analysis of the literature from 2015 to 2025, aiming to delineate global research patterns, highlight key journals, authors, institutions, and countries, and explore keyword trends related to pretreatment QOL and survival in lung cancer.

Materials and Methods

Data collection and processing

This study performed a comprehensive bibliometric analysis using the Web of Science Core Collection (WOS-CC), spanning publications from 2015 to 2025. The search was conducted in August 2025 to ensure inclusion of the latest publications. Data collection focused on a targeted search of article titles, abstracts, and keywords. Boolean operators (AND, OR, NOT) and wildcard operators (*) were utilized to capture variations in relevant terms, ensuring a precise and comprehensive search. The specific search terms and query structures are presented (Table 1). The initial search yielded a total of 413 documents.

To enhance the accuracy and relevance of the data, specific inclusion criteria were established. These criteria were: (1) articles published from 2015 to 2025, (2) articles written in English, and (3) exclusion of review articles, conference proceedings, book chapters, and editorial content. A PRISMA flowchart illustrating the data selection process is shown (Figure 1).

Table 1. Query table for bibliometric analysis

Code	Queries
#1	"Neoplasms, Pulmonary" OR "Neoplasm, Pulmonary" OR "Pulmonary Neoplasm" OR "Pulmonary Neoplasms" OR "Neoplasms, Lung" OR "Lung Neoplasm" OR "Neoplasm, Lung" OR "Lung Cancer" OR "Cancer, Lung" OR "Cancers, Lung" OR "Lung Cancers" OR "Cancer of Lung" OR "Pulmonary Cancer" OR "Cancer, Pulmonary" OR "Cancers, Pulmonary" OR "Pulmonary Cancers" OR "Cancer of the Lung" OR "bronchopulmonary neoplasm" OR "bronchial neoplasm" OR "bronchopulmonary cancer" OR "broncho-pulmonary cancer" OR "bronchial cancer" OR "lung carcinoma" OR "pulmonary carcinoma" OR "bronchopulmonary carcinoma" OR "bronchial carcinoma" OR "bronchogenic carcinoma" OR "lung blastoma" OR "pulmonary blastoma" OR "bronchopulmonary blastoma" OR "broncho-pulmonary blastoma" OR "bronchial blastoma" OR "lung tumor" OR "pulmonary tumor" OR "bronchopulmonary tumor" OR "broncho-pulmonary tumor" OR "bronchial tumor"
#2	"Quality of Life" OR "QOL" OR "EORTC QLQ C30" OR "SF-36" OR "FACT-G"
#3	"pretreatment" OR "pretreatment" OR "baseline"
#4	"mortality" OR "survival"
#5	#1 AND #2 AND #3 AND #4

Performance analysis

This study employed performance analysis and science mapping using specialized software tools. RStudio (version 4.3.1) with the bibliometrix R package was used for these analyses. Additionally, Biblioshiny's web-based interface facilitated data analysis. This software is limited to processing a single database at a time. The Web of Science (WOS) database was selected for its comprehensive and detailed citation data, which is essential for robust bibliometric analysis and evaluating research impact. Local publication trends and average citations per article were calculated annually. To identify the most influential journals, publication counts were analyzed, and Bradford's Law was applied to determine core journals that significantly contribute to citations in the field.

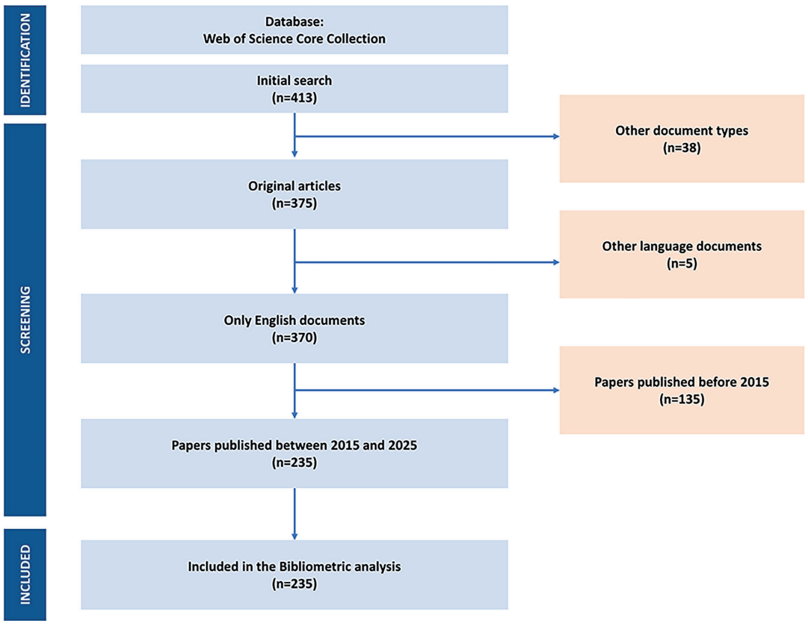

Figure 1. The flow chart of the screening process using PRISMA.

Identification of leading institutions, sources, authors, and collaborating countries

The top 10 institutions and authors were ranked by their share of total publications. Collaboration patterns were visualized to highlight relationships between institutions and authors. For country-level analysis, countries were ranked by their percentage of total articles, with the top 10 countries assessed for multi-country publication shares. A country collaboration network was mapped based on publication volumes per country.

Keyword frequency analysis

A timeline analysis tracked the frequency of specific keywords over time. A TreeMap was generated to display the distribution and prominence of the top 10 most frequent keywords. Thematic analysis identified key trends and topics within the selected articles.

Ethical considerations

This study utilized publicly available bibliographic data from the Web of Science database. No ethical approval was required, as the research did not involve human or animal subjects. All data were anonymized and analyzed in aggregate to ensure compliance with ethical standards.

Results

Summary of the papers

This study comprehensively examined the global research output on pretreatment quality of life and survival in lung cancer, focusing on articles published between 2015 and 2025. A total of 235 studies from 110 sources were reviewed, involving contributions from 2497 authors and achieving an average of 22.95 citations per document over the past decade. Key findings related to pretreatment quality of life and survival in lung cancer are presented (Table 2), highlighting the highest-cited papers. The field demonstrated steady growth, with an Annual Growth Rate of 4.91% during the study period, while the overall body of work included 5807 references and 584 unique author keywords. Notably, collaboration was prominent, with 36.2% of authors engaged in multi-author studies.

Table 2. Top 10 most cited papers for bibliometric analysis of pretreatment quality of life and survival in lung cancer

Ranking	Total citations	Journal Name	Title of the document
1	144	JAMA Oncology	Quality of life analysis of a radiation dose-escalation study of patients with non-small-cell lung cancer a secondary analysis of the radiation therapy oncology group 0617 randomized clinical trial
2	73	Supportive Care in Cancer	Quality of life and survival survey of cancer cachexia in advanced non-small cell lung cancer patients-Japan nutrition and QOL survey in patients with advanced non-small cell lung cancer study
3	49	Journal of Thoracic and Cardiovascular Surgery	Analysis of longitudinal quality-of-life data in high-risk operable patients with lung cancer: Results from the ACOSOG Z4032 (Alliance) multicenter randomized trial
4	44	Nature Medicine	Association between pretreatment emotional distress and immune checkpoint inhibitor response in non-small-cell lung cancer
5	43	Lung Cancer	Depression symptom trends and health domains among lung cancer patients in the CanCORS study
6	36	European Journal of Cancer	Prognostic value of health-related quality of life for overall survival in elderly non-small-cell lung cancer patients
7	25	Journal of Neurosurgery	Predictors of quality of life and survival following Gamma Knife surgery for lung cancer brain metastases: a prospective study
8	21	Journal of Thoracic Oncology	Quality of life analyses from the randomized, open-label, phase III PointBreak study of pemetrexed-carboplatin-bevacizumab followed by maintenance pemetrexed-bevacizumab versus paclitaxel-carboplatin-bevacizumab followed by maintenance bevacizumab in patients with stage IIIB or IV nonsquamous non-small-cell lung cancer
9	18	Clinical Lung Cancer	The impact of baseline edmonton symptom assessment scale scores on treatment and survival in patients with advanced non-small-cell lung cancer
10	15	Scientific Reports	Socio-demographic, clinical, and genetic determinants of quality of life in lung cancer patients

Trend of publication and citation

The data show fluctuations in both publication output and average citation impact over the years. In terms of scientific production, the number of articles rose significantly after 2019, peaking in 2022 with more than 40 publications, followed by a gradual decline in subsequent years (Figure 2A). The lowest number of publications occurred in 2017, with fewer than 10 articles. Regarding average citations per year, the trend displays notable variability. The highest mean citation count was recorded in 2016, with values above 7 citations per article, while the lowest was observed in 2025, with fewer than 1 citation per article (Figure 2B). After the peak in 2016, citation averages generally declined, despite temporary increases in 2019 and 2023. These results highlight that while the volume of publications reached its maximum around 2021–2022, citation impact has not followed the same pattern, with more recent years showing relatively lower citation averages despite higher output.

Bradford's Law analysis (2015–2025) identified twelve core journals as central sources on pretreatment quality of life and survival in lung cancer, with Lung Cancer emerging as the most prolific contributor (21 articles), followed by Clinical Lung Cancer (13 articles), BMC Cancer (10 articles), and Journal of Thoracic Oncology (9 articles) (Figure 3). Other notable outlets such as Cancers, European Journal of Cancer, BMJ Open, and Journal of Clinical Oncology each provided between 6–8 articles. Lung Cancer

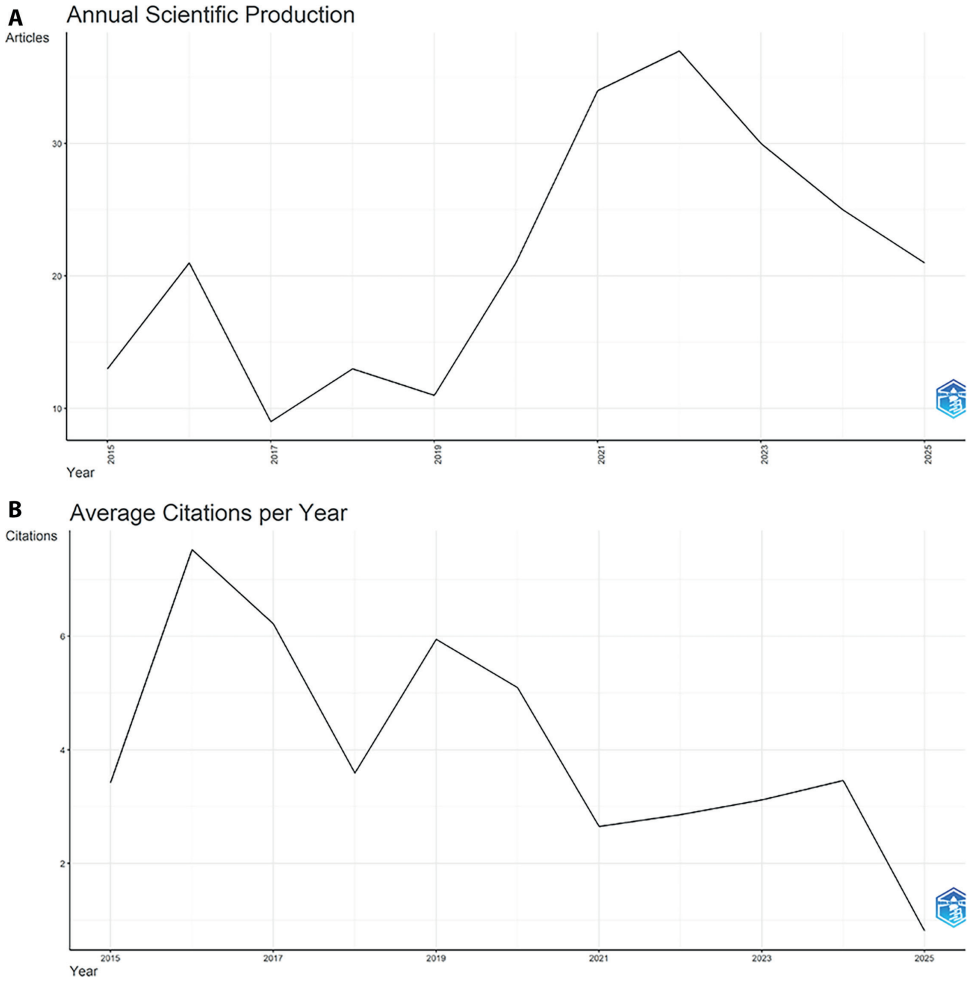

Figure 2. Global annual trend of (A) publication and (B) citation on pretreatment quality of life and survival in lung cancer. Dotted lines show the trendlines for better demonstration of trend of increase of articles number and trend of decrease of citations during the period of time.

also demonstrated the highest scholarly influence with an h-index of 12 and 380 citations, while Journal of Clinical Oncology distinguished itself by accumulating the largest citation count (623) despite only 6 articles, reflecting exceptional influence per publication. Similarly, Journal of Thoracic Oncology (297 citations) and European Journal of Cancer (378 citations) exhibited strong citation performance, underscoring their centrality in the field (Table 3). In contrast, more recent contributors such as Cancers and BMJ Open showed emerging impact with respectable m-index values relative to their later entry years, highlighting their growing role in shaping lung cancer research.

Most productive authors, institutions, countries and their collaboration network

Central South University and Sun Yat-sen University emerged as the most productive institutions, each contributing 19 articles, followed by the University of Sydney with 18 and the University of Texas MD Anderson Cancer Center with 15. Other notable contributors included Odense University Hospital and Shanghai Jiao Tong University with 13 articles each, while Fudan University and Oregon Health and Science University produced 12. Among the authors, Reck M. stood out with the highest sustained output, peaking at four publications in 2019, while Arrieta O.,

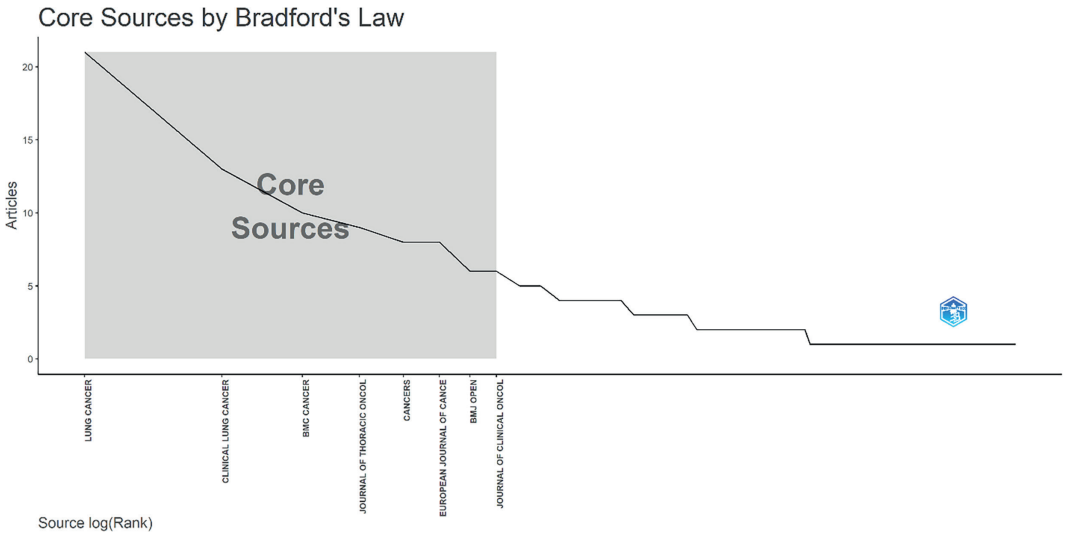

Figure 3. The plot of Bradford's Law identified twelve core journals on pretreatment quality of life and survival in lung cancer.

Table 3. The top 10 most cited journals on pretreatment quality of life and survival in lung cancer

Sources	Articles	IF 2024
Lung Cancer	21	4.4
Clinical Lung Cancer	13	3.3
BMC Cancer	10	3.4
Journal of Thoracic Oncology	9	20.8
Cancers	8	4.4
European Journal of Cancer	8	7.1
BMJ Open	6	2.3
Journal of Clinical Oncology	6	43.4
Frontiers in Oncology	5	3.3
JTO Clinical and Research Reports	5	3.5

Paz-Ares L., Zhang L., and Garon E.B. also made consistent contributions across the past decade, with several of their works receiving more than 20 citations per year (Figure 4). The Three-Fields Plot further illustrates the dynamic connections between highly cited references such as Sung H. (2021, CA Cancer J Clin) and Brahmer J. (2015, NEJM), prolific authors including Reck M. and Paz-Ares L., and recurrent keywords like "chemotherapy," "quality of life," "non-small-cell lung cancer (NSCLC)," "nivolumab," and "pembrolizumab," revealing the tightly interwoven landscape of lung cancer research from 2013 to 2023 (Figure 5).

Over the course of one decade, the United States led the scientific production among countries with 455 articles, followed by China with 359 and Japan with 156. The United Kingdom contributed 129 publications, Germany 118, and Spain 116, while France closely followed with 111. Australia produced 100 articles, ahead of Italy with 88 and Canada with 79 (Table 4). Regarding collaboration dynamics, the United States emerged as a central hub, engaging in widespread partnerships across Europe, Asia, and Oceania. Similarly, European countries demonstrated dense interconnectivity, with a significant share of collaborations spanning both regional and transatlantic partners. In contrast, Latin American and African countries displayed fewer connections, with most collaborations directed toward North America and Europe. Asia and Oceania, particularly China, Japan, and Australia, also exhibited strong outward ties, largely converging with Europe and the United States. Overall, the strength of global collaboration networks was predominantly derived from the United States, Europe, and select Asian countries (Figure 6).

Co-occurrence, hotspots and emerging keywords

The most frequently encountered author keywords were examined using Biblioshiny. The most

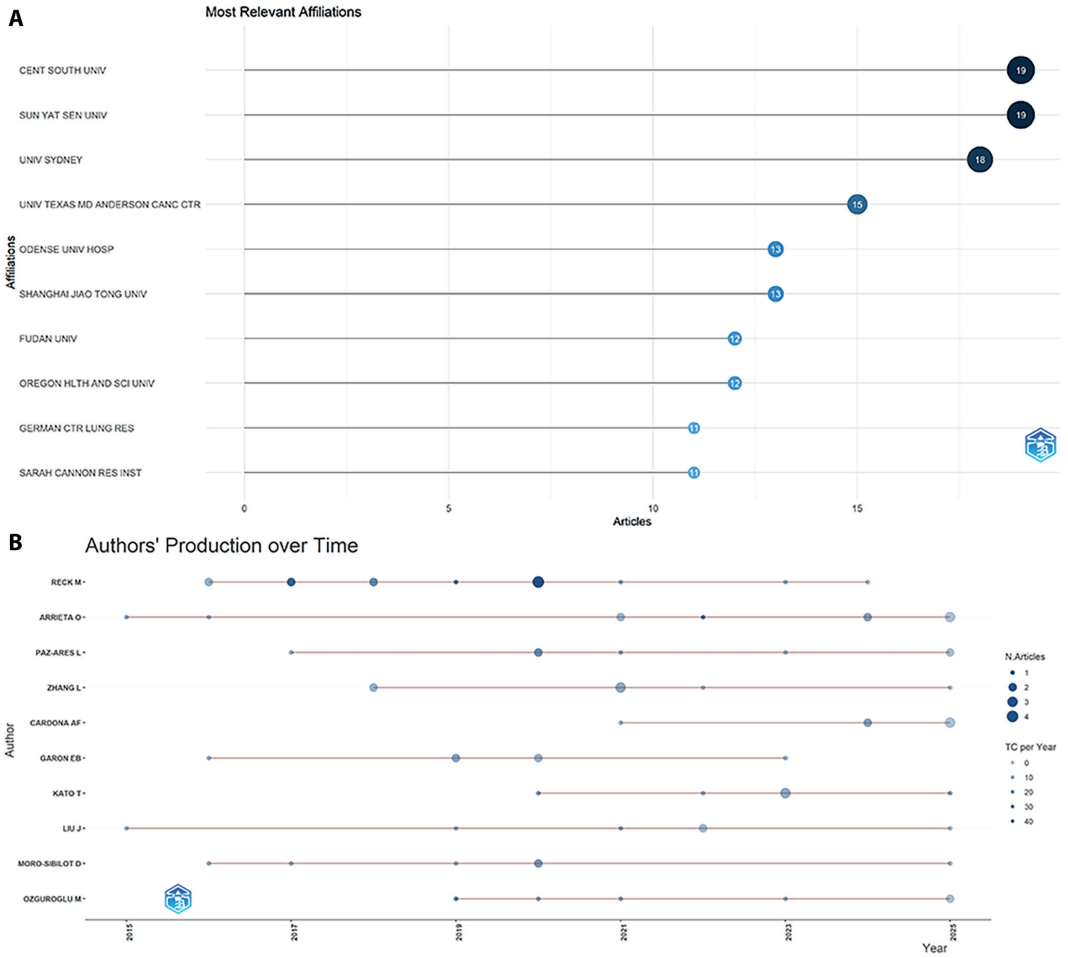

Figure 4. (A) Most productive authors, institutions, countries and their collaboration network. (B) Ten most-contributing authors and their production over time on pretreatment quality of life and survival in lung cancer.

common terms included "quality of life" (68 occurrences, 7%), "chemotherapy" (66 occurrences, 7%), "survival" (61 occurrences, 6%), and "lung cancer" (52 occurrences, 5%). Other recurring keywords such as "quality of life" (52 occurrences, 5%), "QLQ-C30" (33 occurrences, 3%), "cell lung-cancer" (30 occurrences, 3%), and "NSCLC" (30 occurrences, 3%) also appeared prominently, indicating strong attention to both patient outcomes and treatment approaches (Figure 7A). The temporal trend analysis demonstrated a consistent increase in frequency for nearly all major terms from 2015 to 2025, with "quality of life," "chemotherapy," and "lung cancer" showing the steepest growth. Similarly, keywords like "QLQ-C30" and "NSCLC" exhibited steady rises, reflecting the growing importance of standardized assessment tools and disease-specific classifications (Figure 7B). Overall, the results highlight that lung cancer research increasingly emphasizes therapeutic effectiveness while also focusing on patient-centered outcomes, balancing survival endpoints with quality of life considerations.

The timeline analysis of important keywords reveals that "prognostic factors" and "therapy" received early attention in 2016, while terms such as "clinical trials," "questionnaires," and "metastases" gained relevance by 2018. Research focus expanded around 2019–2020 to include "quality of life," "non-small-cell lung cancer," and "guidelines," emphasizing structured clinical approaches and patient-centered

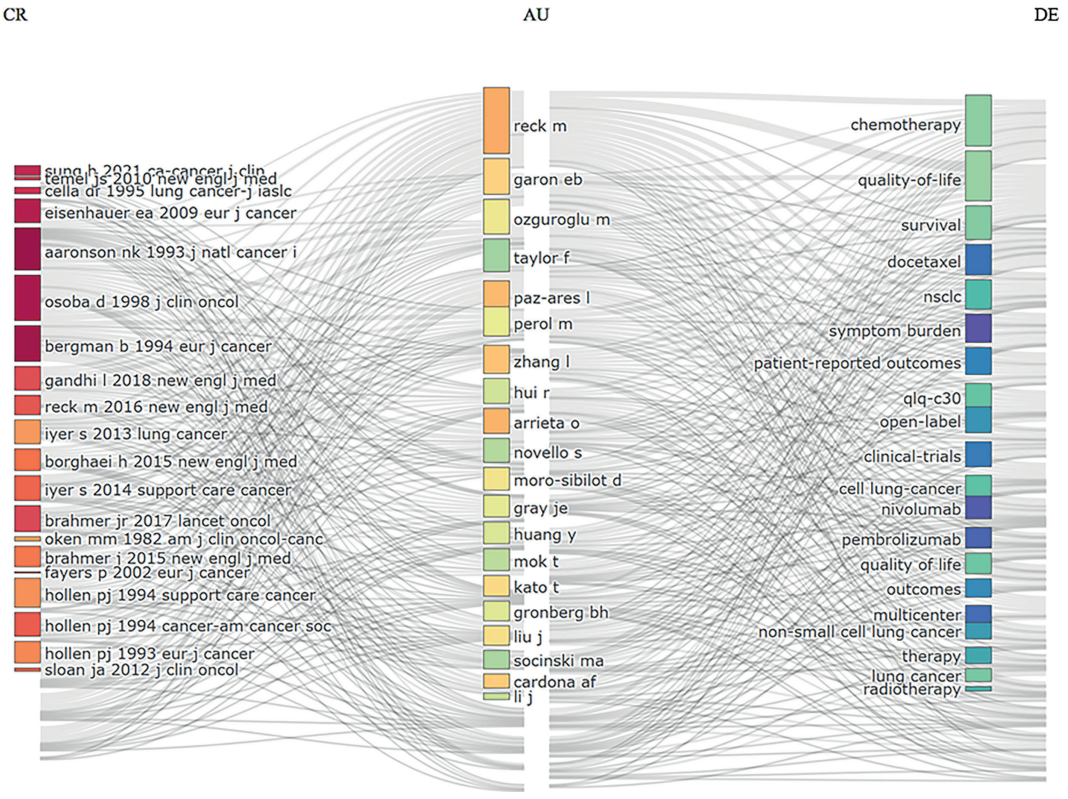

Figure 5. Three-Fields Plot representing the incoming and outgoing flows among cited references, authors and author keywords contributing to pretreatment quality of life and survival in lung cancer. Abbreviations: CR, cited references; AU, authors; and DE, keywords. Explanations of the right columns (DE) from top to bottom: chemotherapy; quality of life; survival; docetaxel; non-small-cell lung cancer; symptom burden; patient-reported outcomes; QLQ-C30; open-label; clinical-trials; cell lung-cancer; nivolumab; pembrolizumab; quality of life; outcomes; multicenter; non-small cell lung cancer; therapy; lung cancer; radiotherapy.

Table 4. Leading publishing countries of pretreatment quality of life and survival in lung cancer

Country	Number of Articles
USA	455
China	359
Japan	156
UK	129
Germany	118
Spain	116
France	111
Australia	100
Italy	88
Canada	79

outcomes. A marked peak occurred in 2020–2021, with "survival," "lung cancer," and "quality of life" emerging as central themes, reflecting the growing emphasis on long-term outcomes and patient well-being. In recent years (2022–2024), keywords such as "immunotherapy," "chemotherapy," "validation," and "outcomes" have gained prominence, demonstrating the shift toward modern treatment modalities and their effectiveness, while "depression," "pain," and "brain metastases" highlight the increasing integration of psychosocial and symptom management in oncology research (Figure 8).

In conclusion, this study provides a comprehensive review of pretreatment quality of life and survival in lung cancer over the past decade, mapping influential journals, highly cited articles, and collaborative networks among institutions, authors, and countries. It also identifies key research themes and emerging keywords, offering valuable insights into the evolving landscape and pointing to promising directions for future investigations.

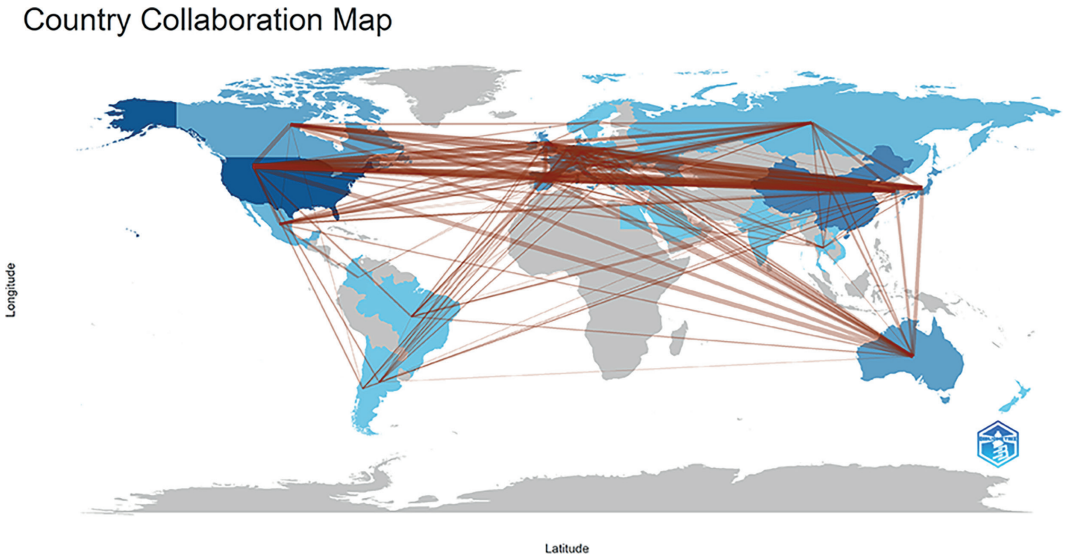

Figure 6. World collaboration map on pretreatment quality of life and survival in lung cancer. The intensity of color saturation corresponds to the increasing number of articles within each country. The collaboration between countries is depicted through the thickness of the connecting arrows.

Discussion

Our bibliometric analysis shows steady growth in research on pretreatment quality of life (QoL) and survival in lung cancer, with a ~4.9% annual increase in publications, peaking in 2021–2022 (over 40 in 2022). Citation impact peaked in 2016 but declined for newer studies, suggesting seminal mid-decade studies had more influence, while recent ones need time to gain citations. This gap between publication volume and citation trends highlights the field's evolution, with new studies' impact likely to emerge later. The analysis identified key journals driving lung cancer QoL research. Per Bradford's Law, Lung Cancer led with 21 articles (2015–2025), followed by Clinical Lung Cancer (13), BMC Cancer (10), and Journal of Thoracic Oncology (9). Despite fewer articles, Journal of Clinical Oncology (6 articles, 623 citations) and others like Journal of Thoracic Oncology (297 citations) and European Journal of Cancer (378 citations) had significant impact. The field employs a dual strategy: specialized journals ensure steady knowledge spread, while high-impact studies in top-tier oncology journals reach broader audiences and gain more citations. Our analysis reveals the global, collaborative nature of research in this domain. A few consistent contributors led with multiple studies, often integrating QoL endpoints into lung cancer trials, with works earning >20 citations yearly. Institutionally, Central South University and Sun Yat-sen University (19 papers each), University of Sydney (18), and MD Anderson Cancer Center (15) led productivity, alongside Odense University Hospital, Shanghai Jiao Tong University (13 each), Fudan University, and Oregon Health & Science University (12 each), showing diverse global leadership. Collaboration was extensive, averaging ~10.6 authors per paper with 36% international coauthorship, the U.S. and Europe as key hubs linking with Asian groups. The U.S. and China led in publication output, aligning with oncology trends (22). The trends observed in our bibliometric analysis of lung cancer QoL research are consistent with findings from similar analyses in related fields, though some distinctions exist. In general, oncology bibliometrics show a global increase in research output with shifting geographic leadership and evolving hot topics, and our study is no exception. For instance, a bibliometric analysis of lung cancer bone metastasis research (Tang et al. 2024) noted a steady annual increase in publications from 2004 to 2023, peaking in 2021 – a trajectory very similar to the growth pattern we found in QoL-focused lung cancer research (23). Our findings

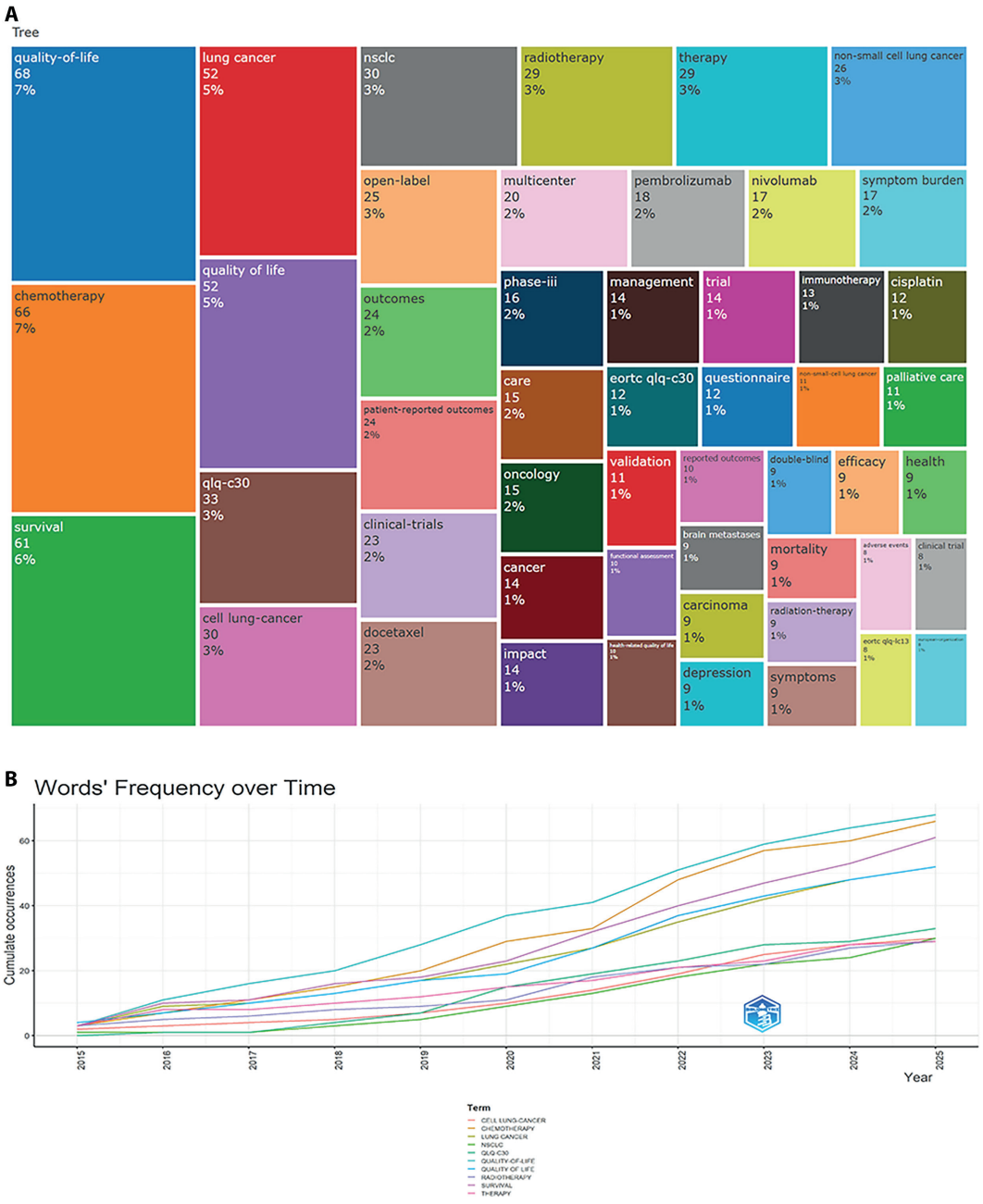

Figure 7. TreeMap (A) and scatter plot (B) of the top ten author keywords in research on pretreatment quality of life and survival in lung cancer.

align with trends in quality of life research in medicine. A bibliometric analysis of global health-related QoL (HRQoL) research from 2000–2019 (24) showed rising publication numbers but declining average citations per article, mirroring our observed pattern of increasing output and plateauing citations. This likely reflects citation dilution as the field grows, with newer studies having less time to accrue citations. Historically dominated by North America and Europe, HRQoL research expanded globally post-2015, with increased contributions from Asia and other regions. Our lung cancer QoL study (2015–2025) confirms this, noting

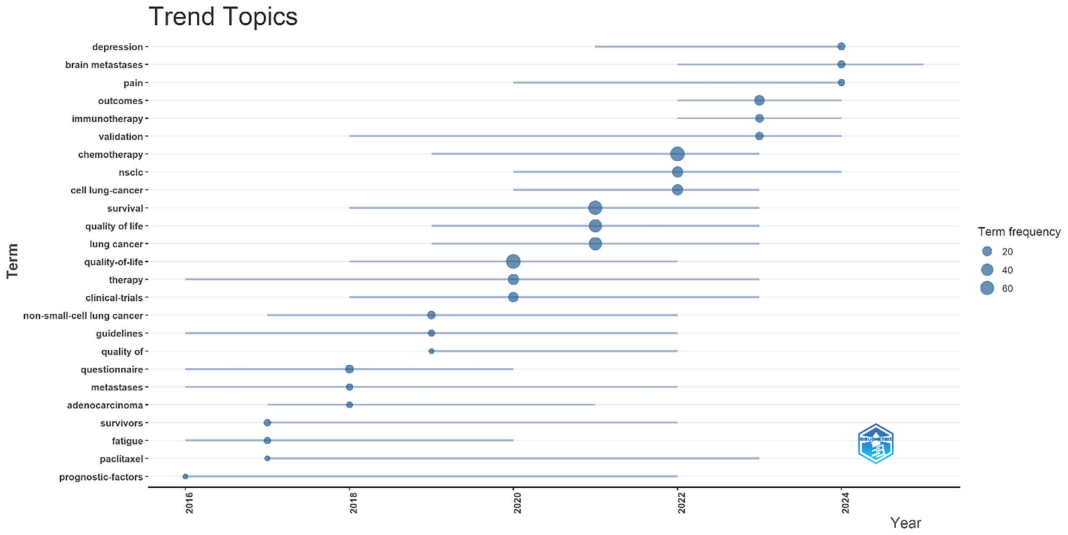

Figure 8. The timeline of the trend topics. Each bubble indicates the peak of frequency used for each, while the line indicates the years it was used.

significant Asia-Pacific contributions (China, Japan, Australia) alongside the U.S. and Europe. The broader HRQoL field includes six thematic clusters, with Oncology as a key pillar, supported by our findings of oncology journals, keywords, and trials driving QoL literature. Multidisciplinary integration, such as psychosocial topics in oncology, is also evident. Global oncology bibliometrics from 2012–2017 show a U.S.–China duopoly, with the U.S. contributing ~32.7% and China ~24.5% of cancer research output, China surpassing the U.S. in 2017. The U.S. remains the main collaboration hub, while Asia's collaboration density is lower. Top organizations are U.S.-based (e.g., University of California, Harvard), with "lung cancer" a frequent keyword. High-impact QoL work appears in both specialty and general oncology outlets, embedded in international networks. These patterns align with our dataset's geography (U.S./Europe as collaboration cores, rapid growth in Asia), explaining why a few highly collaborative papers dominate citations despite growing overall volume (25). Indeed, global oncology research trends show that although China's publication count in oncology is rapidly catching up to (and in some cases surpassing) that of the US, the *citation impact* and breakthroughs often emerge from internationally networked studies (26).

Limitations of this study

This study provides the first bibliometric evaluation of pretreatment quality of life and survival in lung cancer, yet several limitations must be noted. Our analysis was restricted to the Web of Science Core Collection, which, although comprehensive, may not capture publications indexed in other databases such as Scopus or PubMed. Moreover, the study design relied primarily on bibliographic metadata–author details, institutional affiliations, countries, keywords, and citation counts–without examining the full content of the articles. This focus enabled us to map productivity and collaboration patterns but limited the ability to assess the qualitative depth of individual studies. Another limitation involves language and citation bias. Only English-language full-text publications were included, which may have excluded relevant research from non-English journals, even if English abstracts were available. In addition, bibliometric indicators such as citation counts are inherently time-sensitive, often favoring older publications while underestimating the influence of more recent studies. These constraints should be considered when interpreting the scope and generalizability of our findings.

Conclusions

In conclusion, this bibliometric analysis adds value to the field by systematically mapping the knowledge landscape of pretreatment QOL and survival in lung cancer and interpreting its significance for future research and practice. It not only identifies who (authors, institutions, countries) and where (journals) the key contributions are coming from, but also distills what is being studied and how that has changed over time. For researchers, these insights highlight prolific contributors and influential works that can inform literature reviews and identify potential collaborators or research gaps.

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Ethic Approval: Not applicable.

Conflict of Interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

Author Contributions: Z.A., Y.M.I., P.U., A.O.M. conceptualized the study and designed the bibliometric framework. Z.A. collected and validated the data. A.O.M. provided methodological guidance and contributed to the data analysis. Z.A. drafted the original manuscript. All authors reviewed and approved the final version of the manuscript.

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Correspondence:
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Zeinep Avizova, MSc
Department of Radiology,
West Kazakhstan Marat Ospanov Medical University,
Aktobe, Kazakhstan
E-mail: zeinepavizova@gmail.com
ORCID: 0000-0001-5540-0229