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TWO DECADES OF PLANETARY HEALTH AND ENVIRONMENTAL RESEARCH: A GLOBAL BIBLIOMETRIC ANALYSIS (2004–2024)

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Abstract

Objectives: Planetary health, ecohealth, and environmental health have emerged as key research domains that adopt an interdisciplinary approach to global health challenges by addressing the direct and indirect impacts of environmental change on human health. The study aims to evaluate how these concepts have evolved in the academic literature between 2004 and 2024, the main thematic focuses, and the geographical distribution of scientific output.

Materials and Methods: Data were obtained from the Web of Science Core Collection database, and Bibliometrix (R package) and Biblioshiny interface were used in the analysis. The 9347 publications were evaluated. Conceptual clusters and thematic transitions over time were also included in the analysis.

Results: The analysis showed that there has been a significant increase in publications in the literature, especially after 2015. Five main conceptual areas were identified in the thematic analysis: (1) climate change and heat stress, (2) ecosystem health and biodiversity, (3) sustainability and resilience, (4) health systems and risk assessment, (5) zoonotic diseases and public health policies.

Conclusion: The planetary health literature is gaining momentum as a critical field in terms of global health. Our findings suggest significant implications for global health policy design, particularly for strengthening planetary health governance in underrepresented regions.

Keywords: Environmental health, global health, bibliometrics, sustainability, one health.

Introduction

Planetary health offers a public health-driven and interdisciplinary framework to understand and address environmental changes—such as climate change, biodiversity loss, and ecosystem degradation—affecting human health. Closely linked with the One Health and EcoHealth approaches, planetary health highlights the interconnectedness of human, animal, and environmental systems, emphasizing the need for integrated and sustainable public health policies. Since the adoption of the Paris Climate Agreement and the publication of the 2015 Lancet report on planetary health, interest in this field has grown significantly. The COVID-19 pandemic has further accelerated global recognition of the urgent need to incorporate planetary health principles into health systems and policy-making. Despite this momentum, few studies have systematically mapped the evolution of this interdisciplinary field. This bibliometric analysis aims to fill this gap by examining thematic trends, conceptual transitions, and structural dynamics in planetary health, eco-health, and environmental health research over the past two decades. [1–5]

Materials and Methods

This bibliometric study aimed to analyze the structure and evolution of scientific literature related to planetary health, ecohealth, and environmental health. Data were retrieved from the Web of Science Core Collection (WoS-CC) database, covering the years 2004–2024. The search was conducted on May 2, 2025, using the following keywords: *"planetary health," "eco-health," "ecohealth," "ecosystem health," "environmental health,"* and *"health and environment,"* limited to title and abstract fields. Only articles and reviews published in English were included. Conference papers, editorials, letters, book chapters, and non-health-related technical publications were excluded, resulting in a final dataset of 9347 records.

Bibliometric analyses were performed using the Bibliometrix R package and its web-based interface Biblioshiny, which provides robust tools for evaluating scientific output and mapping thematic trends. Key indicators included: annual publication trends, top productive countries and institutions, most cited articles, keyword co-occurrence networks, author collaboration patterns, and thematic evolution. [6,7]

Journal co-citation analysis and author co-citation networks were used to explore disciplinary structures and academic interactions. Conceptual clusters and thematic transitions were visualized through keyword co-occurrence and bibliographic coupling. [6]

This structured approach enabled us to capture both the quantitative growth and the evolving conceptual landscape of planetary health research across disciplines and geographic regions. [6,7]

Results

Annual Increase in Publications and Growth Trends

Between 2004 and 2024, the number of publications related to planetary health, ecohealth, and environmental health increased significantly. Academic interest accelerated particularly after 2015, following the Paris Climate Agreement and the Lancet Commission report. The COVID-19 pandemic period further reinforced the global relevance of the field, with an observable surge in publications post-2020 (Figure 1).

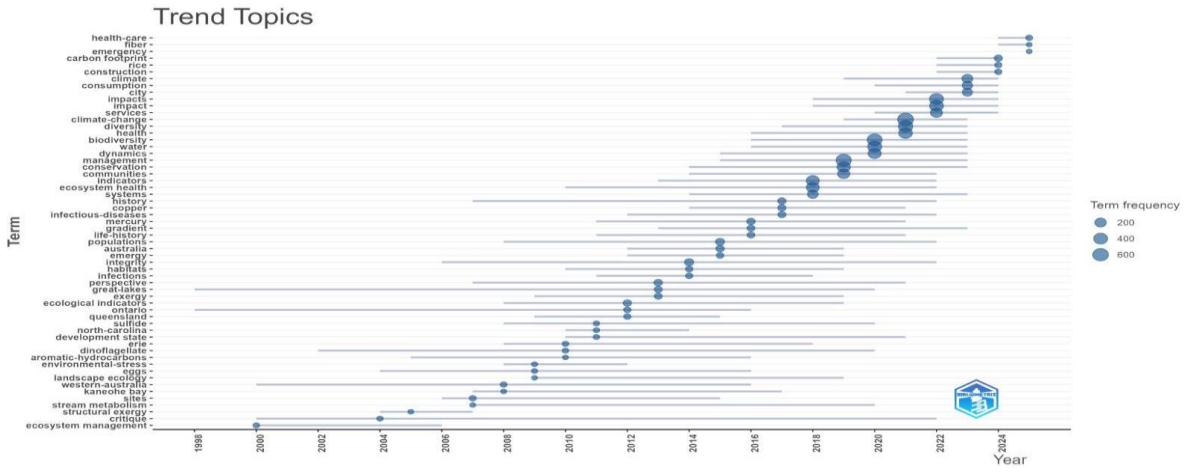

Figure 1. Temporal Evolution of Trending Terms in Planetary and Environmental Health Literature (2000-2024). Horizontal bars represent interquartile ranges, and dot sizes reflect term frequency.

Keyword Co-occurrence Map and Thematic Clusters

Keyword co-occurrence analysis revealed five major thematic clusters in the literature:

1. Climate change and health impacts
2. Ecosystem health and biodiversity
3. Health systems, sustainability, and resilience
4. Zoonotic diseases and One Health-related Public Health policies
5. Environmental justice and governance

This clustering highlights the interdisciplinary structure of planetary health, integrating public health, ecological science, and social dimensions. In the co-occurrence map, climate change and health impacts, together with ecosystem health and biodiversity, appeared as the most central and interconnected clusters, while environmental justice and governance emerged as a relatively smaller yet growing theme. This distribution illustrates both the maturity of certain research areas and the evolving nature of others within planetary health scholarship. (Figure 2).

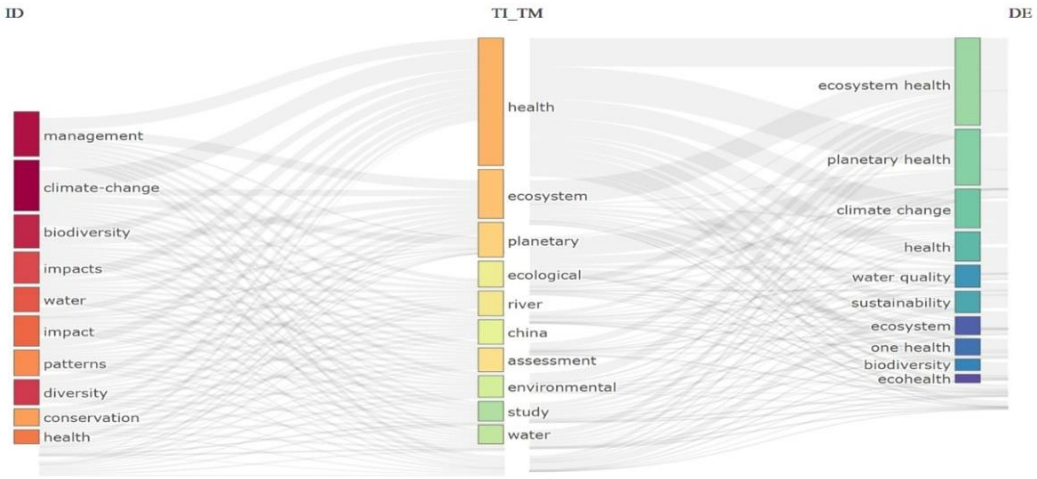

Figure 2. Keyword Co-occurrence Map of Planetary and Environmental Health Literature

Country and Institutional Publishing Performance

The top five contributing countries in terms of publication volume were: the USA, UK, China, Canada, and Germany. Institutions such as Harvard University, the University of Washington, and the London School of Hygiene & Tropical Medicine emerged as leading contributors. While China showed rapid output growth, its international collaboration networks were relatively limited compared to those of the USA and UK.

Influential Authors and Publications

The most highly cited contributors included Costanza et al. (1997) for their foundational work on ecosystem services, Rapport et al. (1998) on ecosystem health, and Whitmee et al. (2015) for the landmark Lancet Commission report on planetary health. These works collectively shaped the conceptual and policy framework of the field. [5,8,9] The Sankey diagram further illustrates the temporal flow of concepts in the literature, showing how earlier streams of ecohealth and ecosystem health progressively converged into planetary health after 2015. It also highlights the increasing integration of climate change and health-related themes into this broader framework, reflecting the field's conceptual consolidation over time (Figure 3).

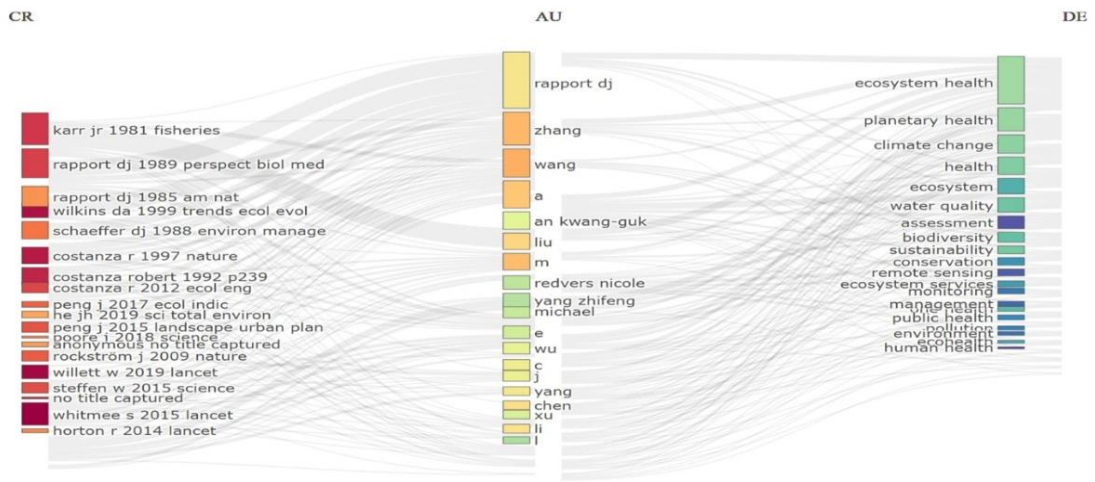

Figure 3. Sankey Diagram of Influential Authors, Cited Publications, and Keywords

Conceptual Transitions and Thematic Evolution

The literature has shown a clear conceptual evolution from earlier frameworks of ecohealth and ecosystem health towards a more comprehensive planetary health paradigm. This transition reflects a growing emphasis on integrated governance models that span sectors such as public health, environment, and socio-political structures. The strategic thematic map provides further insight into this transition, positioning climate change and health system resilience as motor themes at the core of the field, while environmental justice emerges as an evolving but less central area. This distribution illustrates both the maturity of long-established themes and the ongoing development of newer, interdisciplinary domains within planetary health (Figure 4).

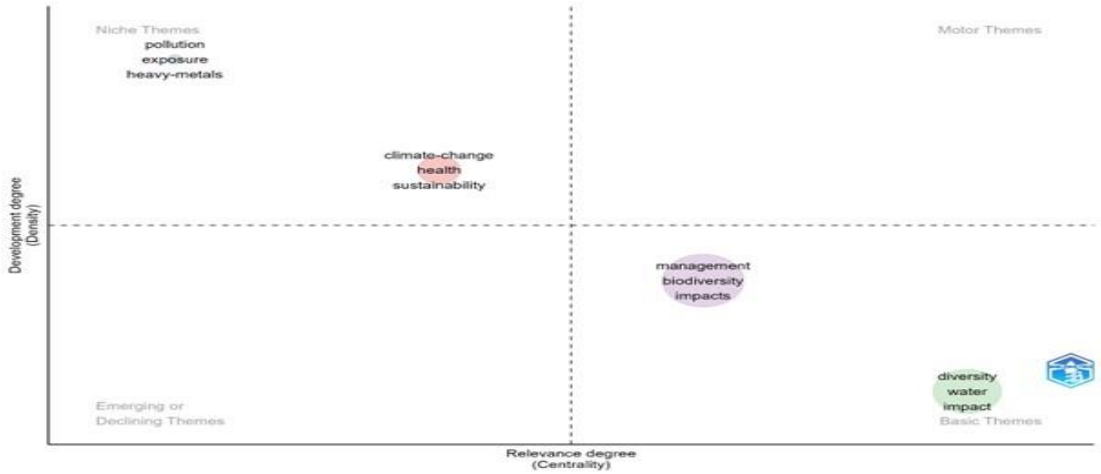

Figure 4. Strategic Thematic Map of Planetary and Environmental Health Research

Data Quality and Limitations

The suitability of Web of Science data for bibliometric analysis is generally adequate; however, there are significant deficiencies in some areas. For example, the 'Science Category' (WC) field was left blank in 100% of the publications. This shows that the current systems are insufficient for the classification of interdisciplinary studies. Furthermore, the 20% missing keywords may have led to the exclusion of some themes in the co-occurrence analysis. This limitation should be carefully considered, particularly regarding the comprehensiveness of content analysis.

Discussion

This study provides a systematic bibliometric overview of the thematic and geographic evolution of planetary health, ecohealth, and environmental health literature over the past two decades. Our analysis demonstrates a significant growth in academic production, particularly following the Paris Climate Agreement and the 2015 Lancet Commission report. The surge in publications post-2020, during the COVID-19 pandemic, reflects a heightened global awareness of the need to integrate planetary health principles into health systems and policies. [1–4,10]

Keyword co-occurrence analysis revealed five key thematic clusters: climate change and health impacts, ecosystem health and biodiversity, health system resilience and sustainability, zoonotic diseases and One Health-based public health policies, and environmental justice and governance. These clusters underscore the interdisciplinary and multi-sectoral nature of planetary health, bridging public health, environmental sciences, and socio-political dimensions.

Our findings also highlight a clear conceptual transition from earlier ecohealth and ecosystem health frameworks towards a more comprehensive planetary health paradigm. This evolution reflects the growing need for integrated governance approaches that address not only biomedical issues but also environmental, social, and structural determinants of health. [2,6,11]

Although our dataset did not allow a systematic quantitative classification of theoretical versus empirical articles, prior bibliometric and scoping reviews have reported similar findings. Several reviews in the field have noted that the majority of planetary health publications tend to be conceptual in nature, with relatively few empirical studies providing original data. This convergence across independent analyses supports our observation that empirical evidence in planetary health research remains limited and underscores the need for more data-driven studies to inform policy and practice. The absence of standardized indicators linking environmental risks with health outcomes presents a barrier to evidence-based policy-making and the operationalization of planetary health concepts at the system level. [11,13]

Geographic disparities in knowledge production also remain evident. While countries such as the USA, UK, Canada, Germany, and Australia lead in both volume and influence, low- and middle-income countries (LMICs) are significantly underrepresented. Although emerging economies such as China and India have increased their output, their international collaboration networks remain limited. This imbalance affects the inclusivity and global relevance of planetary health policies, particularly when the most severe health impacts of climate change and environmental degradation disproportionately affect the Global South. [13–15]

Reducing these disparities requires structural efforts, including:

1. Supporting regional research capacity in LMICs through dedicated funding and training

2. Promoting open-access and subsidized publication opportunities for underrepresented regions

3. Encouraging greater international collaboration and authorship networks

4. Integrating planetary health principles into health professional education curricula

5. Developing cross-sectoral policies to jointly address climate change, biodiversity loss, and zoonotic disease risks

Influential works by Costanza, Rapport, and Whitmee continue to shape the theoretical foundations of planetary health. The Lancet Commission report (2015), in particular, was pivotal in framing planetary health

as a field that transcends environmental health, encompassing broader issues of equity, governance, and sustainability. [1,5]

In summary, planetary health is evolving as both an interdisciplinary academic field and a transformative policy framework. For this potential to be realized, future efforts must prioritize generating robust empirical data, promoting geographic equity in knowledge production, and fostering multi-sectoral, collaborative governance models to support sustainable global health policies.

Strengths And Limitations

In this study, certain limitations related to the quality of bibliographic data from the Web of Science database were identified. The absence of "Science Categories" in 100% of the records reflects the challenges in classifying interdisciplinary fields such as planetary health. Additionally, the use of non-standard or missing keywords in some articles may have impacted the depth of the co-occurrence analyses.

The study was limited to publications from 2004 to 2024, and the search strategy, which focused on title and abstract fields, may have excluded conceptually relevant works expressed in different terminology. Moreover, using only the Web of Science Core Collection (WoS-CC) as a data source may have resulted in the exclusion of literature indexed to other databases such as Scopus or PubMed. This exclusive reliance on WoS-CC also carries the risk of underrepresenting publications from low- and middle-income countries (LMICs), where a significant portion of research is often published in regional or non-indexed journals. [16,17]

Future research should therefore consider broader database inclusion, multilingual sources, and complementary indexing systems (e.g., Scopus, PubMed, regional databases) to achieve a more comprehensive and geographically equitable understanding of the field.

Additionally, missing or non-standardized keywords may have influenced the robustness of the thematic analysis. In particular, inconsistencies in terminology could have led to incomplete clustering or artificial fragmentation of conceptually related themes. As a result, certain areas of research might appear underrepresented, while others may be overemphasized. This limitation emphasizes the importance of adopting standardized vocabularies (e.g., MeSH terms) and incorporating manual validation steps in future bibliometric studies to enhance the accuracy, reproducibility, and comparability of thematic analyses. [6,16,17]

Policy Implications for Advancing Planetary Health

In line with the findings of this study, several policy actions should be prioritized to strengthen planetary health research and practice globally: enhancing regional research capacity in LMICs; promoting open-access and

inclusive publishing opportunities; fostering international collaboration and interdisciplinary networks; integrating planetary health into health professional education; and supporting cross-sectoral governance to jointly address climate change, biodiversity loss, and zoonotic disease risks.

In conclusion, this bibliometric analysis reveals that the themes of planetary health, eco-health, and environmental health have gained prominence in scientific literature with a quantitatively significant acceleration in the last two decades. The results of the analysis revealed that academic production in this field accelerated, especially after the signing of the Paris Climate Agreement in 2015 and the planetary health report published by The Lancet. With the COVID-19 pandemic, it is evident that the weight of these concepts on the scientific and political agenda has further strengthened.

The thematic clusters revealed in the keyword co-occurrence analysis show that the field of planetary health is developing along multidimensional axes such as climate change, ecosystem health and biodiversity, resilience of health systems, community-based interventions, and zoonotic diseases. However, the results of the analysis revealed that publication production is largely concentrated in high-income countries, while low- and middle-income countries remain underrepresented in this literature. Moreover, it is noteworthy that most publications are theoretical or interpretative in nature, while empirical research remains relatively low.

This study makes visible the quantitative growth, conceptual diversity, and interdisciplinary nature of the planetary health literature, while also revealing structural gaps in methodology and global inequalities in representation. While the field of planetary health is maturing conceptually, it is important to increase methodological diversity, to feed it with original empirical data from different geographies, and to build interdisciplinary collaborations in a more systematic way to move forward.

Moreover, the planetary health approach should be considered not only as an academic framework but also as an effective governance model in terms of shaping health policies, restructuring education programs, and ensuring that it is effectively included in community-based practices. Increasing research capacity, especially in low- and middle-income countries, ensuring geographical equity in knowledge production, and promoting inclusive participation in multifactorial global policy-making processes will support the sustainability and equitable development of the field.

Ethical Considerations: This study presented no ethical issues or violations since it utilized publicly accessible data and previously published literature.

Conflict of Interest: The authors declare no conflict of interest.

References

1. Lancet Countdown. 2024 Report [Internet]. 2024; https://lancetcountdown.org/2024-report/. (Accessed: 03.06.2025).
2. Mackenzie JS, Jeggo M. The One Health approach—why is it so important? Trop Med Infect Dis. 2019;4(2):88.
3. Pongsiri MJ, Gatzweiler FW, Bassi AM, Haines A, Demassieux F. The need for a systems approach to planetary health. Lancet Planet Health. 2017;1(7):e257-9.
4. Redvers N. The determinants of planetary health. Lancet Planet Health. 2021;5(3):e111-2.
5. Whitmee S, Haines A, Beyrer C, et al. Safeguarding human health in the Anthropocene epoch: report of the Rockefeller Foundation–Lancet Commission on planetary health. Lancet. 2015;386(10007):1973-2028.
6. Aria M, Cuccurullo C. bibliometrix: an R-tool for comprehensive science mapping analysis. J Informetr. 2017;11(4):959-75.
7. Pranckutė R. Web of Science (WoS) and Scopus: the titans of bibliographic information in today's academic world. Publications. 2021;9(1):12.
8. Costanza R, d'Arge R, de Groot R, et al. The value of the world's ecosystem services and natural capital. Nature. 1997;387(6630):253-60.
9. Rapport DJ, Costanza R, McMichael AJ. Assessing ecosystem health. Trends Ecol Evol. 1998;13(10):397-402.
10. Heat and health [Internet]. 2024; https://www.who.int/news-room/fact-sheets/detail/climate-change-heat-and-health. (Accessed: 03 June 2025).
11. Talukder B, Ganguli N, Choi E, Tofighi M, Vanloon GW, Orbinski J. Exploring the nexus: comparing and aligning Planetary Health, One Health, and EcoHealth. Glob Transit. 2024;6:66-75.
12. Rossa-Roccor V, Acheson ES, Andrade-Rivas F, et al. Scoping review and bibliometric analysis of the term "Planetary Health" in the peer-reviewed literature. Front Public Health. 2020;8:343.
13. Zyoud S, Zyoud AH. Mapping and visualizing global knowledge on planetary health in the climate change context: a comprehensive exploration of insights, trends, and research priorities. Discov Sustain. 2024;5:275.
14. Campostrini S, Guerra R. Can the scientific world positively influence decision makers on planetary health? Lancet. 2018;391:425-6.
15. Chen W. A multi-scale assessment of ecosystem health based on the Pressure-State-Response framework: a case in the Middle Reaches of the Yangtze River Urban Agglomerations, China. Environ Sci Pollut Res Int. 2022;29:29202-19.

16. Donthu N, Kumar S, Mukherjee D, Pandey N, Lim WM. How to conduct a bibliometric analysis: an overview and guidelines. J Bus Res. 2021;133:285-96.
17. Peña-Rocha M, Gómez-Crisóstomo R, Guerrero-Bote VP, Moya-Anegón F de. Bibliometrics effects of a new paper level classification. Front Res Metr Anal. 2025;10:1531758.