

REVIEW ARTICLE

A Review of Innovation in Health Sciences: A Bibliometric Analysis and Future Directions

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ABSTRACT

This study explores innovations in the health sciences through bibliometric and visual analytical methods. It also proposes the following research objectives: quality and impact of research in the health sciences, application of innovative technologies in the health sciences, and future research directions in the field of innovation in the health sciences. By selecting the keywords “health sciences” and “innovation” in the Web of Science database, a total of 217 articles published between 2010 and 2024 were reviewed. Publication source map and keyword co-citation network map were created using the Scimago Graphica and VOSviewer bibliometric tools, followed by a comprehensive bibliometric analysis. Through this analysis, three main conclusions were drawn. Firstly, the quality, impact, and discipline visibility of research in the field of health sciences have been increasing. Secondly, innovative technologies and methods, such as AI, online education, and virtual simulation, are being applied to the field of health sciences. Thirdly, AI and educational innovation are prominent future research directions. Despite potential selection bias from homogeneous data sources, this study underscores AI and online education’s potential to enhance health science education, urges interdisciplinary tech integration for healthcare optimization, and empowers policymakers to drive digital transformation in education and healthcare systems.

Malaysian Journal of Medicine and Health Sciences (2025) 21(SUPP10):175-178. doi:10.47836/mjmhs.21.s10.34

Keywords: Health Sciences, Human Health, Innovation, VOSviewer, Web of Science

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The rest of the study is structured as follows. The second section describes the research data and its sources. The third section describes the visual analysis diagrams created using the tools. The fourth section draws the conclusions of the research in this paper.

INTRODUCTION

While life expectancy has risen significantly in recent years and healthcare services have improved, the global community faces an ever-increasing demand for high-quality healthcare services (1). Research and innovation in the health sciences are essential for driving progress in the knowledge-based healthcare industry (2). There are already innovations in the health sciences, including Artificial Intelligence AI, interdisciplinary collaborations, and medical education (3,4). However, many areas remain to be explored. This study summarizes the latest ideas and findings from recent scholars, providing a valuable reference for future researchers.

RESEARCH METHODS AND DATA SOURCE

The bibliometric analysis method chosen for this study is widely used in different scientific fields as it enables scholars to obtain a detailed overview, identify research gaps in a particular area, and obtain new research ideas (5). Bibliometric analyses utilize co-occurrence networks to uncover research structures and connections, while co-occurrence overlays trace the evolution of key academic trends (6,7). Web of Science (WoS) database was selected as the data source for this study due to its rigorous journal selection criteria, high-quality citation data, and widespread application in bibliometric research (8). Standardized data from WoS ensures

analytical comparability and study reliability (9). The literature data finding strategy for this study followed the following criteria: “innovation” (Topic) and “health sciences” (Topic) and Book Review or Meeting Abstract or Book Chapters or Editorial Material or Review Article or Proceeding Paper (Exclude Document Types) and 2010-2024 (Publication Years) and WoS Core Collection (Database). And 217 articles were selected.

Depicts the growth of publications and citations between 2010 and 2024 (see Fig. 1). The number of publications has grown steadily and rapidly from around 2015 onwards. This indicates a significant increase in research activity and output in recent years. The citation line shows a more significant upward trend, indicating that published work is gaining traction and recognition in the scientific community. This pattern suggests that the quality and impact of ongoing research is increasing, as is the visibility and influence of the field or discipline represented by the data.

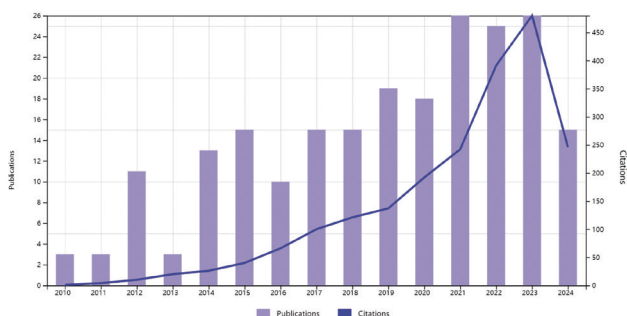


Figure 1 : Publication and Citations Years 2010-2024

The number of research papers published in different countries (see Fig. 2). The United States of America leads the way with a high output of 56 publications. It is followed by Canada with 23, Mexico with 11, China with 9, Australia with 3 and New Zealand with 1. Overall, this map reflects the differential distribution of research productivity across the globe, highlighting the strength of certain major economies in terms of scholarly publication.



Figure 2 : The Publication Countries

RESULTS

In this section, the researcher using all the keywords for co-occurrence analysis, the researchers found a total of 1163 keywords in the field of health science innovation after data screening, and then set the minimum number of keyword occurrences to four, and got 47 keywords from 1163 keywords to meet the criteria. The keyword co-occurrence network in health sciences innovation research with 305 links and 5 clusters (see Fig. 3).

The red cluster is the first cluster and consists of 13 terms such as “collaboration”, “science”, “ implementation”, “systems” and “artificial intelligence”. We should single out the keyword “science”, which was used with a frequency of 12 and a total connection strength of 40 in the research sample, and with this in mind, the cluster could be named “Practices and Applications of AI Systems in Interdisciplinary Collaboration”. For example, AI is widely used in interdisciplinary healthcare collaborations, including machine learning in medical diagnostics, improved precision in radiology, and support for clinical decision-making (10).

The second cluster, green, contains 12 terms, of which the representative terms are “covid-19”, “education”, “educational innovation”, “medical education” and “teaching”. The term “education” is the most representative, with a frequency of 24 and a total connection strength of 39. Based on the above terms, the research focus of this cluster is on “innovation and practice of medical education in the context of the COVID-19 epidemic”. For example, VR-based medical training programs enabled students to practice surgical procedures remotely, ensuring uninterrupted medical education despite physical distancing measures (11).

The third cluster is blue and contains the terms “engagement”, “gamification”, “leadership”, “ performance”, “skills” and “validation”, containing a total of 10 terms. The term “performance” is the most important with a frequency of 8 and a total connection strength of 24. Based on the above terms, the research focus of this phrase is “Teaching innovation based on engagement and experience design in higher education”. For example, platforms like Kahoot! enhance medical education by developing critical thinking and problem-solving skills (12).

The fourth cluster is in yellow colour and contains the terms “care”, “creativity”, “health”, “innovation”, “interprofessional education”, “management” and “university” in total 7 terms. The term “innovation” was the most important, with a frequency of 46 and a total connection strength of 106. Based on these terms, the research direction for this cluster was “innovation management in health under interprofessional collaboration”. For example, interdisciplinary teams have developed AI-powered patient monitoring systems

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