JURNAL KEPERAWATAN KOMPREHENSIF

OPEN ACCESS

Jurnal Keperawatan Komprehensif

(Comprehensive Nursing Journal)

A Journal of Nursing Values, Innovation, Collaboration, and Global Impact

Volume 12, Issue 2, April 2026

Published by STIKep PPNI Jawa Barat

ISSN 2354-8428, e-ISSN 2598-8727

Original Article

Digital Technology Platforms for Community-Based Hypertension Management: A Bibliometric Analysis

Sudarman Sudarman[1,2], Regidor III Dioso[2], Hafizah Che Hassan[1]

[1]Lincoln University College, Selangor, Malaysia
[2]Program Studi Ilmu Keperawatan, Universitas Muslim Indonesia, Makassar Indonesia

OPEN ACCESS

Jurnal Keperawatan Komprehensif (Comprehensive Nursing Journal)

Volume 12 (2), 299-307
https://doi.org/10.33755/jkk.v12i2.1014

Article info

Received : April 09, 2026
Revised : April 24, 2026
Accepted : April 25, 2026
Published : April 30, 2026

Corresponding author

Sudarman*
Program Studi Ilmu Keperawatan, Universitas Muslim Indonesia, Makassar Indonesia
Jl. Urip Sumoharjo Km. 05 Makassar, Kec. Panakukkang, Kota Makassar, Prov. Sulawesi Selatan
Email: sudarman.sudarman@umi.ac.id

Citation
Sudarman, S., Dioso, R. III, & Hassan, H. C. (2026). Digital technology platforms for community-based hypertension management: A bibliometric analysis. *Jurnal Keperawatan Komprehensif (Comprehensive Nursing Journal)*, 12(2), 299–307. https://doi.org/10.33755/jkk.v12i2.1014.

Website
https://journal.stikep-ppnijabar.ac.id/jkk

p-ISSN : 2354 8428
e-ISSN: 2598 8727

Abstract

Background: Hypertension remains a major global health challenge requiring effective and sustainable long-term management. The rapid advancement of digital health technologies has introduced new opportunities to enhance blood pressure control, patient adherence, and community-based care delivery.
Objective: This study aimed to analyze global research trends on digital technology platforms for community-based hypertension management using a bibliometric approach, and to identify key research themes, collaboration patterns, and emerging gaps.
Methods: A bibliometric analysis was conducted using data retrieved from the Dimensions.ai database for publications between 2021 and 2025. Study selection followed PRISMA guidelines with predefined inclusion and exclusion criteria. Data were analyzed using VOSviewer to visualize keyword co-occurrence, collaboration networks, and thematic evolution through network, overlay, and density mapping.
Results: Of 14,455 identified records, 3,371 articles met the inclusion criteria. The analysis identified 161 key items grouped into five thematic clusters, with a total link strength of 19,847. Findings demonstrate a clear shift in research focus from conventional clinical treatment approaches toward the integration of digital health technologies, including telemonitoring, self-management systems, patient engagement tools, and artificial intelligence in community-based hypertension care.
Conclusions: Digital technology platforms are increasingly central to community-based hypertension management, particularly in improving blood pressure control, medication adherence, and healthcare accessibility. However, critical gaps remain regarding long-term effectiveness, interoperability, and data privacy. Future research should prioritize sustainable implementation and integration within health systems to maximize clinical and public health impact.

Keywords: bibliometric analysis; community-based care; digital health; hypertension management; telemonitoring;

INTRODUCTION

Hypertension, or high blood pressure, has become a major global health problem affecting populations worldwide. According to the latest data, an estimated 1.28 billion adults aged 30–79 years globally suffer from hypertension, and more than two-thirds of them live in low- and middle-income countries (1). Hypertension is a major risk factor for heart disease, stroke, and

kidney failure, and is often referred to as a "silent killer" because it frequently presents without clear symptoms until serious complications occur (2).

Community-based hypertension management is crucial, as hypertension is a key risk factor for cardiovascular diseases, which are the leading causes of morbidity and mortality both in China (3) and in low- and middle-income countries (LMICs) (4). In China, the prevalence of hypertension is relatively high; however, only a small proportion of patients receive appropriate treatment and achieve controlled blood pressure levels (5). Similarly, in many LMICs, limited access to healthcare services, low awareness, and insufficient availability of medications further hinder effective hypertension management (4). Therefore, the implementation of community-based strategies is essential to improve early detection, enhance blood pressure control, and support better treatment through routine monitoring and increased public awareness regarding hypertension management (6,7).

Community-based hypertension management programs, such as the National Essential Public Health Services Package (NEPHSP) in China, include medical record systems, health education, routine blood pressure monitoring, pharmacological treatment, and strategies such as health education, self-management, and home-based care. These programs aim to reduce disparities in healthcare access in underserved areas and have been shown to improve treatment rates, blood pressure control, medication adherence, and overall blood pressure reduction, although their coverage remains relatively low (25.6%) (8). Interventions involving community health workers (CHWs), such as home visits and the use of mobile technology, have demonstrated significant improvements in blood pressure control in LMICs (9). Overall, community-based approaches are highly relevant in reducing the burden of hypertension without compromising the quality of care (10,11).

Therefore, digital technology has emerged as a promising solution to enhance hypertension management. Various digital platforms have been developed to support blood pressure monitoring and improve overall health management. For instance, the Noom application enables self-monitoring of blood pressure, provides personalized feedback and education through human coaching, and allows data sharing with physicians for clinical consultation (7). NutelesApp is used to identify factors influencing blood pressure, such as dietary patterns, physical activity, and medication adherence, thereby supporting better clinical decision-making (12,13). In addition, Omada for Hypertension integrates digital blood pressure monitoring devices with mobile applications to track blood pressure, body weight, and physical activity, while also delivering structured health education (14).

Fitbit Plus is another application that monitors health parameters, including blood pressure, physical activity, and body weight, and provides reminders and notifications for blood pressure measurements (15). The eTansiyon application is designed for daily blood pressure recording, medication reminders, and video-based health education to enhance hypertension management (16). Health Mate, integrated with the Withings BPM Connect device, facilitates comprehensive health and blood pressure monitoring via a mobile application (17). Lastly, mHealth applications utilizing wearable devices enable blood pressure monitoring, where data can be accessed by healthcare professionals for further evaluation through telemonitoring (18)). These platforms play an important role in supporting hypertension management through self-monitoring, medication reminders, app-based education, and direct communication with healthcare providers, all of which aim to improve disease control.

The growing trend of digital technology use in hypertension management has significantly improved blood pressure monitoring and disease management through various digital platforms. Some applications enable real-time blood pressure monitoring, provide trend visualization, and offer personalized feedback to users. These features help improve medication adherence and facilitate remote communication between patients and healthcare providers (19). Additionally, mHealth technologies allow patients to measure their blood pressure at home and transmit the data directly to healthcare providers for further evaluation.

Remote monitoring, or telemonitoring, has also become an integral part of digital health trends in hypertension management, enabling patients to transmit their blood pressure data via mobile applications to healthcare providers, thereby allowing faster and more efficient treatment adjustments. Furthermore, other mHealth

applications support hypertension management through features such as blood pressure monitoring, medication reminders, and app-based educational support, empowering patients to manage their condition independently.

However, despite the numerous benefits offered by digital technologies, several research gaps remain. For example, limited studies have specifically examined the long-term impact of digital platforms for hypertension management in broader community settings. In addition, although many applications are available, there is still no clear standard or guideline on how to best integrate digital platforms into existing healthcare systems. Challenges also persist regarding user adherence to applications and devices, as well as issues related to data security and patient privacy.

This study aims to conduct a bibliometric analysis of the existing literature on the use of digital technology platforms in community-based hypertension management. Through this analysis, it is expected to identify current research trends, key contributions from leading institutions and researchers, and existing gaps in the literature. Furthermore, this study seeks to explore the potential impact of digital technologies on hypertension management and provide recommendations for the development of more effective technologies in the context of community-based hypertension care.

METHODS

This study applied a bibliometric analysis to examine research trends on digital technology platforms in community-based hypertension management. This approach allows systematic evaluation of publication growth, collaboration networks, keyword patterns, and research impact, providing a comprehensive overview of the field.

Data Source

Data were retrieved from the Dimension.ai database, following PRISMA guidelines (20) to ensure transparency and rigor. The search included peer-reviewed articles published between 2021 and 2025 across relevant disciplines such as health sciences, public health, clinical sciences, and information technology. Eligible studies focused on digital health platforms (e.g., mHealth, telehealth) applied to hypertension management in community settings and included complete bibliometric metadata. Studies were excluded if they were non-peer-reviewed (e.g., editorials, commentaries, preprints, theses), unrelated to digital health, limited to hospital settings, lacking practical implementation, duplicated, or missing essential metadata.

Data Selection

A systematic screening process was conducted to ensure relevance and quality. Titles, abstracts, and metadata were reviewed to identify studies aligned with the research scope, ensuring consistency with inclusion criteria and minimizing bias.

Data Analysis

Bibliometric mapping was performed using VOSviewer to analyze keyword co-occurrence, collaboration networks, and research trends. The findings were visualized through network, density, and overlay maps, enabling identification of dominant themes, emerging topics, and temporal trends. Results were interpreted in relation to current developments in digital health and community-based hypertension management to highlight research directions and gaps.

Searching Strategies

The PRISMA process consisted of identification, screening, and inclusion stages, as illustrated in Figure 1. In Stage 1 (identification), a total of 14,455 articles were identified based on the main search terms (Digital health platforms OR Mobile health (mHealth) applications OR Telehealth platforms AND Hypertension management AND Community-based interventions), document type “article,” and publications from 2021 to 2025, resulting in 8,270 articles. In Stage 2 (screening), applying filters to article titles and abstracts within the selected subject areas (Health Sciences, Health Services and Systems, Biomedical and Clinical Sciences, Information and Computing Sciences, Public Health, Clinical Sciences, and Nursing) yielded 5,275 articles. The final stage resulted in 3,371 articles included for further consideration.

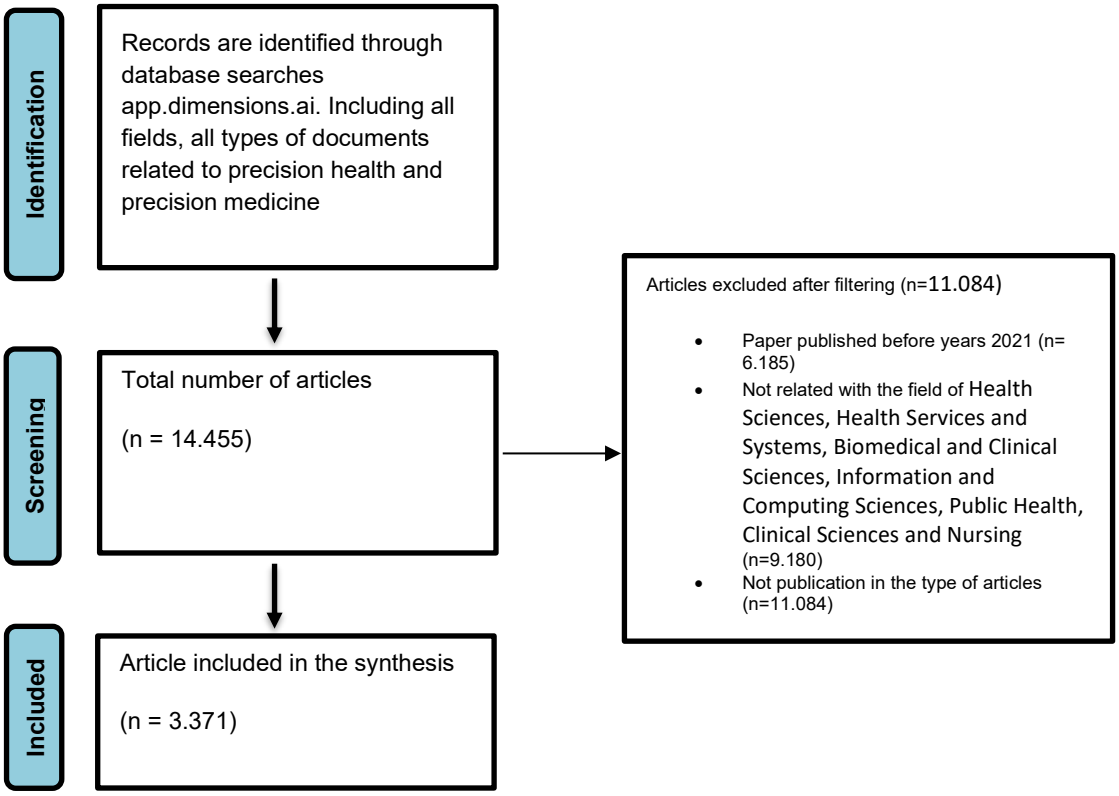

Figure 1. PRISMA Flowchart

RESULT

Based on VOSviewer visualization (Figure 2), 161 items were identified across five clusters with 8,108 links and a total link strength of 19,847, representing research from 2021–2025. The clusters (red, green, blue, light blue, and purple) reflect key thematic areas in community-based hypertension management. The red cluster highlights hypertension's link to chronic disease risks (e.g., stroke, diabetes), emphasizing the role of AI and digital platforms in risk prediction and monitoring. The green cluster focuses on blood pressure control and treatment effectiveness, supported by wearable devices and adherence technologies. The blue cluster represents evidence-based research, including systematic reviews and telemedicine integration. The light blue cluster emphasizes clinical trials, where digital tools facilitate real-time data collection and analysis. The purple cluster reflects collaboration among patients and healthcare providers, supported by telehealth and integrated digital systems.

The overlay visualization (Figure 3) shows a clear evolution in research, shifting from evidence-based approaches to digital technology integration. Earlier studies (blue/purple, 2022–2023) focused on meta-analyses and treatment effectiveness, followed by a transitional phase (green) emphasizing blood pressure control and cost-effectiveness. The most recent trends (yellow) highlight digital solutions such as telemedicine, patient engagement, and system integration to improve monitoring and adherence.

The density visualization (Figure 4) indicates that research is still dominated by clinical treatment and blood pressure control, but is gradually shifting toward more comprehensive and technology-driven approaches. High-density topics focus on therapy and risk factors, while emerging areas include telemedicine, self-care, and patient engagement, reflecting growing interest in digital health despite the need for further validation and integration.

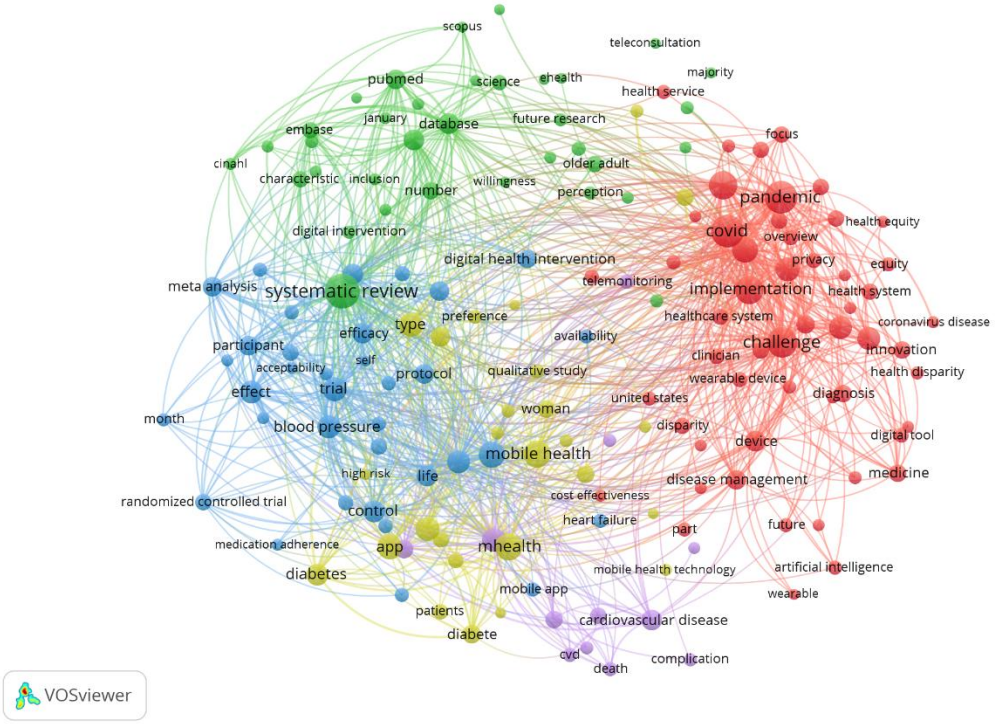

Figure 2: Network Visualization

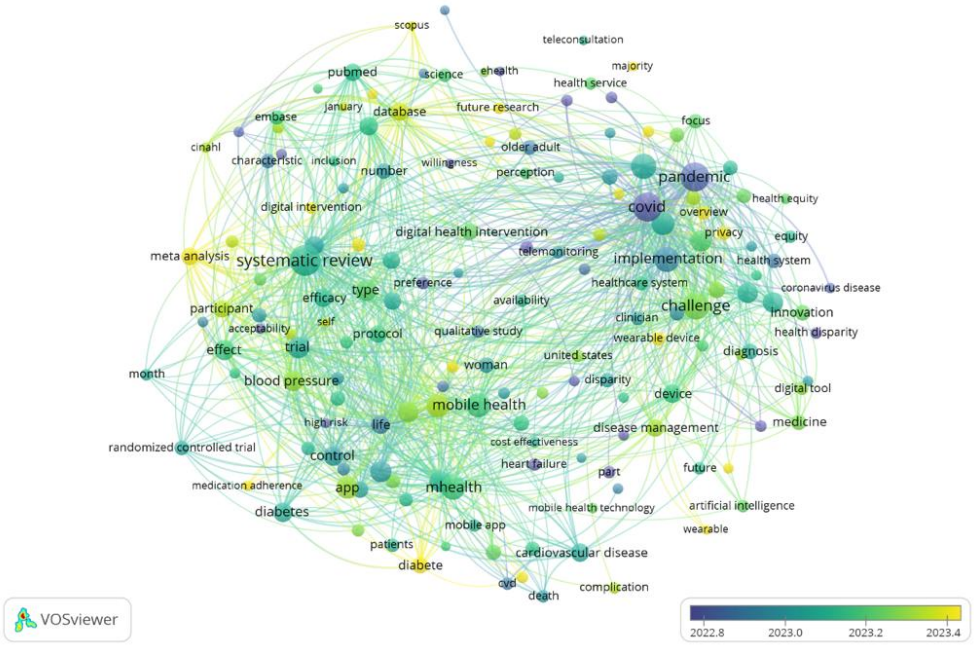

Figure 3: Overlay Visualization

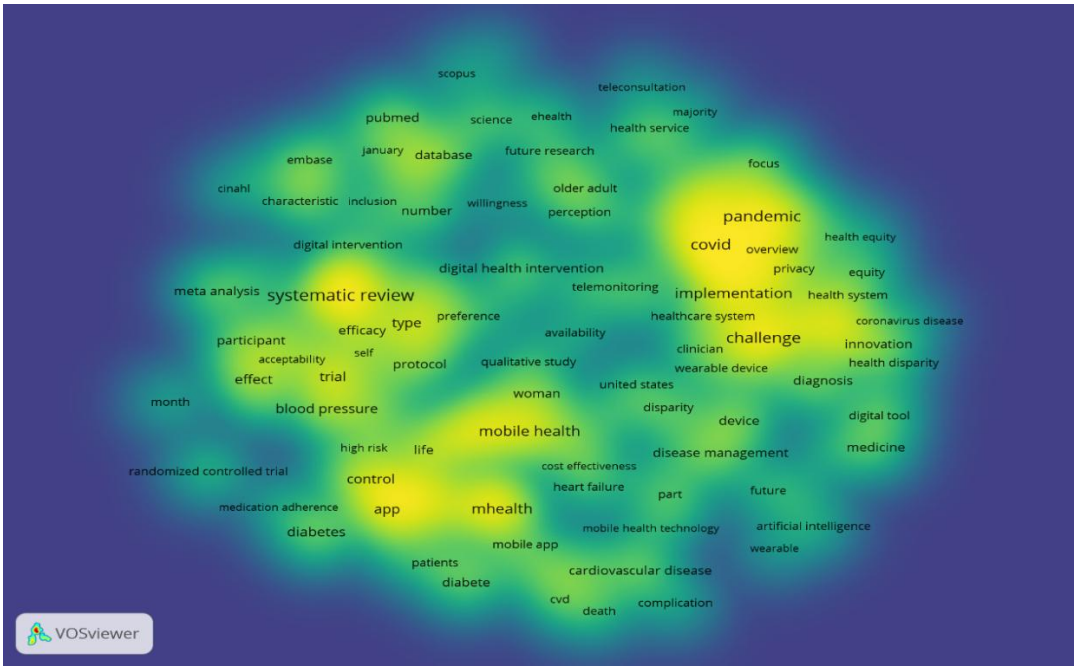

Figure 4: Density Visualization

DISCUSSION

Mobile applications play a central role in hypertension management by enabling non-invasive blood pressure monitoring through devices such as smartphones, smartwatches, and automated monitors. These technologies allow users to record daily measurements, generate trend analyses, and produce periodic health reports, supporting continuous evaluation of patient conditions. Compared to invasive methods used in clinical settings, these approaches are more practical for long-term, community-based monitoring (21,22).

Applications such as Noom and NutelesApp demonstrate how digital platforms support self-monitoring, personalized feedback, and clinical decision-making. These systems integrate multiple health parameters, including blood pressure, weight, diet, and physical activity, enabling comprehensive management of hypertension. Data sharing with healthcare providers further enhances patient–provider collaboration and supports timely medical interventions (23,24).

Technological integration through telemonitoring and cloud-based systems enables real-time data transmission and remote supervision by healthcare professionals. Self-Measured Blood Pressure Monitoring (SMBP) and Home Blood Pressure Monitoring (HBPM) have been shown to improve accuracy and reduce white-coat effects, while facilitating rapid treatment adjustments. These systems also contribute to improved efficiency by prioritizing patients with abnormal readings.

Mobile health (mHealth) applications have demonstrated effectiveness in improving medication adherence, lifestyle behaviors, and clinical outcomes. Features such as reminders, educational modules, and progress tracking enhance patient engagement and self-efficacy. Studies report significant reductions in systolic blood pressure and improvements in physical activity, diet, and quality of life among users of these applications (25,26).

Emerging technologies, including artificial intelligence, wearable sensors, and chatbot-based systems, further expand the potential of digital hypertension management. These tools support data analysis, personalized recommendations, and patient education, improving communication and decision-making. Additionally, platforms such as SMS and telehealth services increase accessibility, particularly in low-resource settings.

Implication

Mobile applications play a key role in hypertension management by enabling non-

invasive, continuous monitoring through smartphones and wearable devices. They support self-monitoring, data tracking, and real-time evaluation, making them suitable for long-term use in community settings. These platforms enhance personalized care and strengthen collaboration between patients and healthcare providers through integrated health data and feedback systems.

Integration with telemonitoring and cloud-based systems allows real-time data transmission and remote supervision. Approaches such as home and self-measured blood pressure monitoring improve accuracy and support timely treatment adjustments. These technologies also improve medication adherence, promote healthy lifestyle behaviors, and contribute to better clinical outcomes, including blood pressure control and quality of life.

Emerging tools such as artificial intelligence, wearable sensors, chatbots, SMS, and telehealth further enhance accessibility, personalization, and patient engagement. Overall, integrating mobile health technologies into healthcare systems can improve efficiency, expand access to care, and support more patient-centered hypertension management.

Limitation

Despite these advantages, several limitations remain, including limited validation of devices, digital literacy barriers, data privacy concerns, and declining long-term engagement. Accessibility issues and infrastructure limitations may also hinder implementation, particularly in rural areas. Furthermore, heterogeneity of application features and study designs reduces comparability across studies. These limitations highlight the need for standardized guidelines, stronger regulatory frameworks, and long-term evaluations to ensure effectiveness and sustainability of digital hypertension interventions.

CONCLUSION

In conclusion, digital health technologies provide effective solutions for improving hypertension management by enhancing patient engagement, medication adherence, and blood pressure control. Accessible tools such as SMS and social media support wider reach, while advanced technologies like AI enable personalized care. However, challenges related to privacy, digital literacy, and equitable access remain. Therefore, successful implementation requires patient-centered design, system integration, and ongoing evaluation to ensure sustainable and effective outcomes.

Acknowledgement

The authors would like to express their sincere gratitude to Lincoln University College, Malaysia, and Universitas Muslim Indonesia, Makassar, Indonesia, for their academic support during the preparation of this study.

Funding Statement

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Author Contributions

S. S. contributed to the study conception, design, data collection, bibliometric analysis, interpretation of findings, and manuscript drafting. R. III D. contributed to conceptualization, methodology development, critical review, and manuscript revision. H. C. H. contributed to supervision, validation of findings, critical intellectual input, and final approval of the manuscript. All authors reviewed and approved the final version of the manuscript.

Conflict of Interest

The authors declare that there is no conflict of interest related to the publication of this article.

Data Availability Statement

The data used in this bibliometric analysis were retrieved from the Dimensions.ai database. The datasets analyzed during the current study are available from the corresponding author upon reasonable request.

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