

Electronic medical record in developing countries: research streams, influential works, and future research paths

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ABSTRACT

The adoption of EMRs in developing countries presents unique challenges and opportunities, influencing healthcare delivery and management. This study aims to identify trends and research mapping of EMRs in developing countries that have been of concern to academics and practitioners. The scope of this research is electronic medical records in developing countries, focusing on reviewing studies published from 2014-2023. The method used in this research is descriptive and exploratory analytics with a literature study approach using bibliometric studies of the Scopus database. The keywords used in this research are “electronic medical record” AND “developing countries.” This study revealed that research on EMRs related to developing countries has exhibited a variable upward trend from 2014 to 2023. The review indicated that the focus of EMR research has shifted from early development stages to contemporary topics on technological transformation, especially those that have not been explored in developing countries. Developed countries have conducted more EMR research than developing countries. In developing countries, the main research areas of EMRs include hospitalization, re-hospitalization, and medical record evaluation, in addition to information medicine education, health workers, and medical systems. This investigation revealed that topics such as health worker attitudes, patient education, and advances in health technology (telemedicine and mHealth) remain largely unexplored, underscoring the need for further research to improve the accessibility and efficiency of healthcare services.

Keywords:

bibliometric analysis; electronic medical record; developing countries; medical record

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INTRODUCTION

In the current era of digitalization, the development of science and technology continues to be the center of attention. Document management using electronic or computer-based systems in the healthcare environment is becoming a global trend. In recent decades, Electronic Health Records (EHR) have been adopted in almost every health system in the US.¹ Although EMRs have been invented for decades, hospitals, doctors, and other healthcare providers still need to catch up in adopting them. Inadequate technology leads to a decrease in service quality. Utilizing modern technology is one of the many ways to improve efficiency and reduce costs in healthcare organizations.

Electronic Medical Records (EMRs) help eliminate missing records and duplication of documents, minimize service costs, save time, and improve coordination.² Since the mid-1990s, there has been substantial investment in the information technology capabilities of primary care systems, particularly in developed regions such as Western Europe, North America, and Australia. However, examples of EMR initiatives are increasingly found in low- and middle-income countries (LMICs), such as Kenya and Brazil. Indeed, by utilizing resources more efficiently, EMR can help address the relative scarcity in LMIC clinical workforce.³ The introduction and adoption of EMRs will reduce healthcare costs, reduce service errors, and improve the quality of care.⁴

EMR systems in developing countries are on the rise due to the need to ensure better quality of healthcare. EMR is essential to manage patient information properly.⁵ EMRs and other electronic health information systems have the potential to improve the quality of care and access to information. Success factors and

problems of implementing new EMRs in resource-constrained environments are increasingly studied, but more needs to be known about mature and sustainable systems.⁶ Healthcare sectors around the world are increasingly adopting Electronic Health Record (EHR) systems driven by advances in Information and Communication Technology (ICT).

EHR systems are digital mechanisms that capture, store, and continuously use patient information, enabling authorized healthcare providers to deliver healthcare services effectively. However, EHR systems in healthcare centers in developing countries are a significant challenge as the adoption and technology depend on a number of factors. For example, technology acceptance at the organizational and individual levels may be affected by factors in the area of EHR implementation.⁷ EMRs are widely used in developed countries to manage patient records and facilitate consultations and treatment follow-ups. This results in a centralized database where various services and clinicians can quickly access patient data to support healthcare delivery. However, the adoption and use of EMRs in developing countries are rare and, in many cases, non-existent. Clinicians rely on patients to keep their records manually without a centralized database to manage and control patients' medical histories.⁸

Some previous studies that have examined EMRs in developing countries include Akwaowo,⁸ which discusses the application of EMRs in developing countries, and a multi-country study of the Nigerian healthcare system. The anticipated usefulness and success factors in facilitating operations in healthcare facilities have a significant influence on the adoption of EMR use. Awareness, training, and education of users regarding the effectiveness of EMR and its usefulness will increase the adoption of this

technology. Then, Gopidasan and Amanullah⁹ discuss EMR and its impact on care delivery, highlighting the health benefits of EMR for patients and healthcare providers, with a focus on efficiency, effectiveness, and quality improvement. This study also discusses the challenges and considerations associated with EMR implementation, such as cost-effectiveness, usability, and workflow integration. Shree¹⁰, in their research, discussed the benefits of electronic medical records, such as improved diagnosis, patient communication, and reduced medical errors. Tshimula¹¹ discussed the redesign of EHR systems to support developing countries, focusing on architectures that encourage inclusion and provide customized solutions for all social classes; it addresses the challenges faced by developing countries in implementing EHR systems and proposes internet-free alternatives for medical transactions and EHR storage in underserved areas.

Although EMRs have great potential to improve the quality of patient care and practice efficiency, EMR adoption is a challenge for physicians. Barriers include the high cost of purchasing and supporting expensive hardware and software¹² while simultaneously allocating sufficient personal and staff time to and staff to train and manage their medical practice.¹³ Efficiency gains from EMRs take time to become apparent as different workflows and procedures must be learned. In addition, choosing the right system can also be challenging. A recent study, which assessed the impact of outpatient EMR on physician productivity after a commercially available outpatient EMR system in a multi-specialty physician population, demonstrated the productive use of EMR. The fear of productivity loss remains a significant concern for practitioners, which hinders system adoption. However, provider productivity improved slightly for physicians who adopted commercially available outpatient EMRs. Productivity

improvements seem to become more apparent after a few months of using the system. These objective data help reassure worried practitioners that EMRs need not jeopardize productivity. Thus, the fear of productivity loss among practitioners and healthcare provider organizations should be looked into, and their concerns should be adequately addressed.¹²

Based on the problems described, a comprehensive bibliometric study on EMR in developing countries still needs to be conducted, creating a significant knowledge gap in the understanding of the development, trends, and challenges faced in the implementation of EMR in these contexts. This research seeks to address the key issues regarding the prevailing trends in EMR research in developing countries between 2014 and 2023, with a particular focus on how the emphasis of EMR studies has evolved. Furthermore, this study examined the specific gaps in current research, particularly in the areas of health worker attitudes, patient education, and the integration of advanced health technologies such as telemedicine and mHealth, which remain underexplored in developing nations. Therefore, the purpose of this study is to analyze the trend of studies on EMRs in developing countries.

METHODS

Study Type

This research used descriptive and explorative analytics with a literature study approach by focusing on bibliometric studies. Bibliometric studies aim to develop and map a particular survey¹³. This methodology is relatively new in capturing the development of EMR studies in developing countries compared to conventional systematic literature reviews. The review was also used. It can be analyzed for scientific production and quantitative evaluation of inter-publication relationships through statistical estimation. Two techniques, relational or evaluative,

are commonly used in bibliometric studies.¹³ In this study, we used evaluative techniques such as the number of articles by year and citations by year, publications by country, and publications per author, which were taken through the top ten authors with highest publication and relevance. Furthermore, relational techniques were used to examine the relationship between concepts and keywords and explore the relationship and dominance of keywords used in a study. Based on the analysis, we provide a crucial agenda for future research on EMR innovation.

Data Source

The data in this study consists of articles published between 2014 and 2023 (the last ten years) in journals published in the Scopus database. The Scopus database

is considered a reliable data source because it is one of the two most important databases and has high-quality articles published in journals.¹⁴ In Figure 1, the authors present the criteria and filters we used in data collection and data analysis techniques.

Data collection technique

In searching for articles for analysis within the scope of the study, we used the keywords "electronic medical record" AND "developing countries." Articles were carefully selected based on predefined inclusion criteria and then subjected to detailed bibliometric analysis to ensure data accuracy. This approach shows four steps to identify and extract data for bibliometric review (Figure 1).

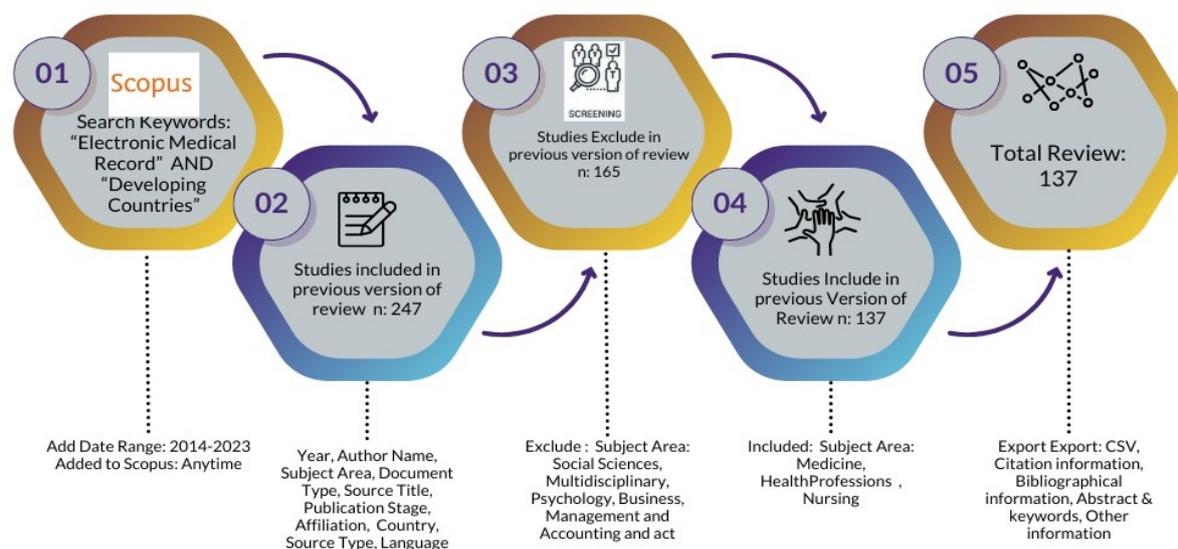


Figure 1. The study flow diagram (Adoption from Işık et al.¹⁵)

Source Figure: Processed by Author 2024

We entered the keywords "Electronic Medical Record" AND "Developing countries" into the data searching section. We searched the data using several steps, including limiting the year, subject area, document type (Article), source type, publication stage (Final), and language (English). The language of the

document publication was English only so that we could understand them better. As a result of this phase, we found 137 documents.

The excluded data include the document types "book, Conference Proceedings, Book Series, Trade Journal, Report, Undefined. As a result of the initial

stage, the authors found 247 articles. This study reviewed articles that had been reduced using the data inclusion method, and the results showed that 165 publications were identified and relevant for analysis. Then, we refined them into 137 articles and 110 publications not related to EMRs and excluded them from the analysis. In the next stage, 110 publications were excluded from the analysis due to being unrelated to EMRs. Thus, a total of 137 articles were included in the study and visualized. Figure 1 shows the steps to identify, screen, include papers, exclude papers, and data collection, data analysis, and data visualization.

Data Analysis Techniques

This research used two specific keywords, 'electronic medical record' AND 'developing countries', to accommodate various articles that are relevant to this research topic and can provide further insight into current terms and trends. Subsequently, the data was analyzed according to Miles and Huberman's theory. The Miles and Huberman model of qualitative data analysis is divided into three stages. The initial stage of this process, data reduction, includes selecting, focusing, abstracting, and transforming the data. In this case, researchers reorganized the results of data obtained from secondary sources and observations to simplify the data set, thus facilitating a more in-depth analysis. Second, the presentation of data for research analysis is intended to facilitate the development of information descriptions, which are then arranged more systematically to ensure a more coherent

and logical writing flow. Third, drawing a conclusion or verifying it is done based on the findings and evidence. The final stage of the research process is the conclusion.

Articles written by experts related to the research topic were identified and included in the analysis to ensure the inclusion of the most relevant and up-to-date information. Data from the available articles were organized into themes relating to 'electronic medical records' AND 'developing countries'. The data were then analyzed to provide field evidence that the theme of electronic medical records in developing countries is indeed a real issue today. Each sub-discussion in this research places the data in context. The findings of the experts are discussed, and the author provides interpretation and analysis of the data. Furthermore, the data were visualized using Vosviewer's tools with the units of analysis, which were network visualization, overlay visualization, and density visualization.

RESULTS

General Information and Annual Publication Output

Figure 2 shows the number of publications per year from 2014 to 2023 for the first set of 137 publications. The number of publications continues to increase significantly, with a sharp rate of increase in recent years. This finding underscores the growing relevance of the theme of EMRs in developing countries. The following is a visualization of the development of EMRs in developing countries in the last five years.

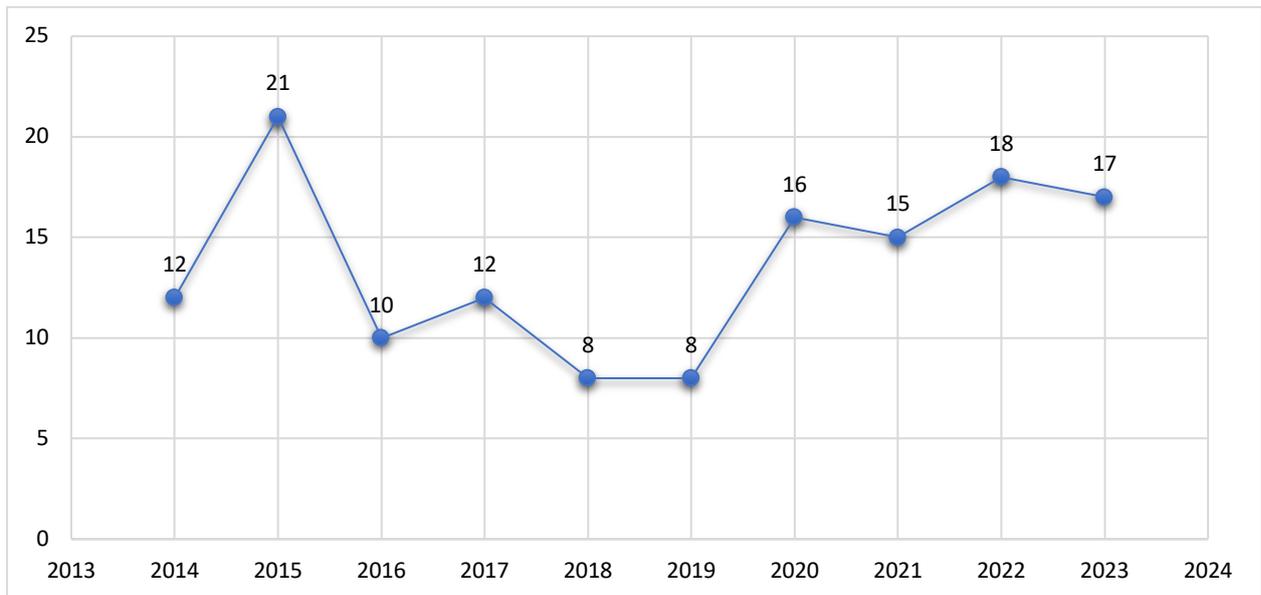


Figure 2. Publications by Year

Figure 2 above shows that 2015 was the year when scholars studied EMRs in the context of developing countries. In that year, many studies were conducted in Ethiopia in terms of EMR system usage and user satisfaction.¹⁶ In addition, it has been observed that numerous governments have taken action in response to the study on electromagnetic radiation in developing

countries. This response examines the primary challenges encountered by healthcare professionals in developing countries, including restricted technological infrastructure, inadequate training, apprehensions over data security, and cultural obstacles impacting electronic medical records (EMR).



Figure 3. Academic Production by Country, from 2013-2023 (Software Mapchart) (<https://www.mapchart.net/world.html>, accessed on 06 March 2024).

Figure 3 above shows the distribution of publications on EMRs in developing countries. Most of the research on EMR in developing countries, as shown in the figure, is actually conducted more in developed countries, especially in the United States. One of the most widely responded studies of health technology

issues is sustainability and future development, as well as the efficiency and effectiveness of health care. This study shows that EMR is very important to improve the efficiency and effectiveness of patient care. In addition, a list of the most referenced or cited articles is available in Table 1.

Table 1. Most Cited Articles

No.	Document title	Authors/Year	Source	Cited by	Quartile
1	Success criteria for electronic medical record implementations in low-resource settings: A systematic review	Fritz , Tilahun and Dugas ¹⁷	Journal of the American Medical Informatics Association	89	Q1
2	Health Professionals' readiness to implement electronic medical record system at three hospitals in Ethiopia: A cross-sectional study	Biruk, Yilma and Andualem ¹⁸	BMC Medical Informatics and Decision-Making	80	Q1
3	Development, implementation, and evaluation of a hybrid electronic medical record system specifically designed for a developing world surgical service	Laing et al. ¹⁹	World Journal of Surgery	57	Q1
4	Modeling antecedents of electronic medical record system implementation success in low-resource setting hospitals Healthcare Information Systems	Tilahun and Fritz ²⁰	BMC Medical Informatics and Decision-Making	55	Q1

No.	Document title	Authors/Year	Source	Cited by	Quartile
5	Comprehensive Evaluation of Electronic Medical Record System Use and User Satisfaction at Five Low-Resource Setting Hospitals in Ethiopia	Tilahun and Fritz ²¹	JMIR Medical Informatics	51	Q1
6	The impact of telemedicine in the postoperative care of the neurosurgery patient in an outpatient clinic: A unique perspective of this valuable resource in the developing world - An experience of more than 3000 teleconsultations	Dadlani et al. ²⁴	World Neurosurgery	45	Q2
7	Empowering village doctors and enhancing rural healthcare using cloud computing in a rural area of mainland China	Lin et al. ²³	BMC Medical Informatics and Decision-Making	28	Q1
8	Intention to use electronic medical record and its predictors among health care providers at referral hospitals, north-West Ethiopia, 2019: Using the unified theory of acceptance and use technology 2(UTAUT2) model	Ahmed et al. ²⁴	International Journal of Medical Informatics	27	Q1
9	The evaluation of the compatibility of electronic patient record (EPR) system	Kahouei, Zadeh, and Roghani ²⁵	International Journal of Medical Informatics	27	Q1

No.	Document title	Authors/Year	Source	Cited by	Quartile
	with nurses' management needs in a developing country.				
10	Using a hybrid electronic medical record system for the surveillance of adverse surgical events and human error in a developing world surgical service	Laing et al. ²⁶	World Journal of Surgery	26	Q1

Table 1 shows that the primary reference for studying EMRs in developing countries is research conducted by Fritz, Tilahun, and Dugas¹⁷, in which they explore the criteria or factors that determine the success of EMR implementation in an environment with limited resources. The research findings explain that EMR application implementation projects in low-resource environments need to be carefully planned and ideally based on best practices to avoid wasting scarce resources. The second most cited article on this theme is by Biruk et al.¹⁸, entitled "Health Professionals' Readiness to Implement EMR System at Three Hospitals in Ethiopia: A cross-sectional study," in which the study explored the level of

readiness of health professionals in three hospitals in Ethiopia in implementing EMR systems. To increase the adoption of EMR systems, increasing the awareness, knowledge, and skills of healthcare professionals prior to system implementation will be crucial.

Network, development trends, and research density

This study displays the network and publication density of research on EMRs in developing countries from 2014-2023. The analysis shows that the network aims to find out which keywords have a strong relationship with the topic of EMRs in developing countries.

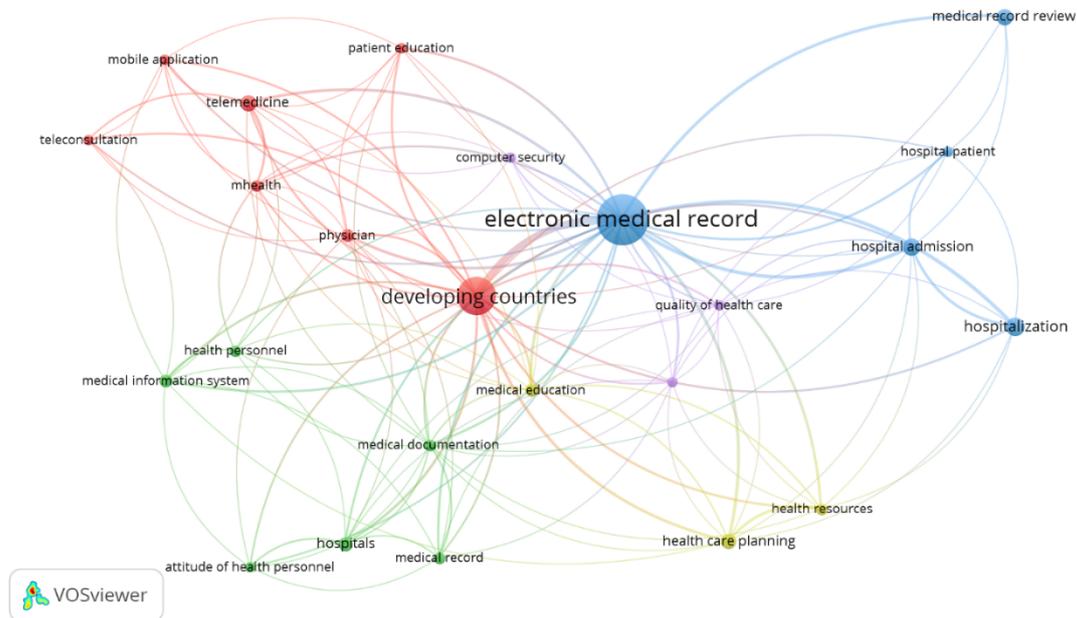


Figure 4. Themes in Electronic Medical Records in Developing Countries

Figure 4 shows a complex network diagram or mind map showing the interrelated relationships between various concepts related to EMR in developing countries. This diagram shows the critical point of EMR in developing countries, which is the main subject of this study.^{27,28} There are nodes of various sizes connected to the central node through lines, which represent the strength level or type of relationship between the concepts.²⁹ Each node in the diagram is labeled with a specific keyword, which is closely related

to EMR in developing countries. Some of the keywords that can be seen in the diagram include electronic medical record, developing countries, medical education, health personnel, patient education, hospital admission, and medical information systems. Each of these keywords provides direction regarding the research focus and relevant conceptual areas. EMR, with its interconnections in developing countries, forms a robust and dynamic network.

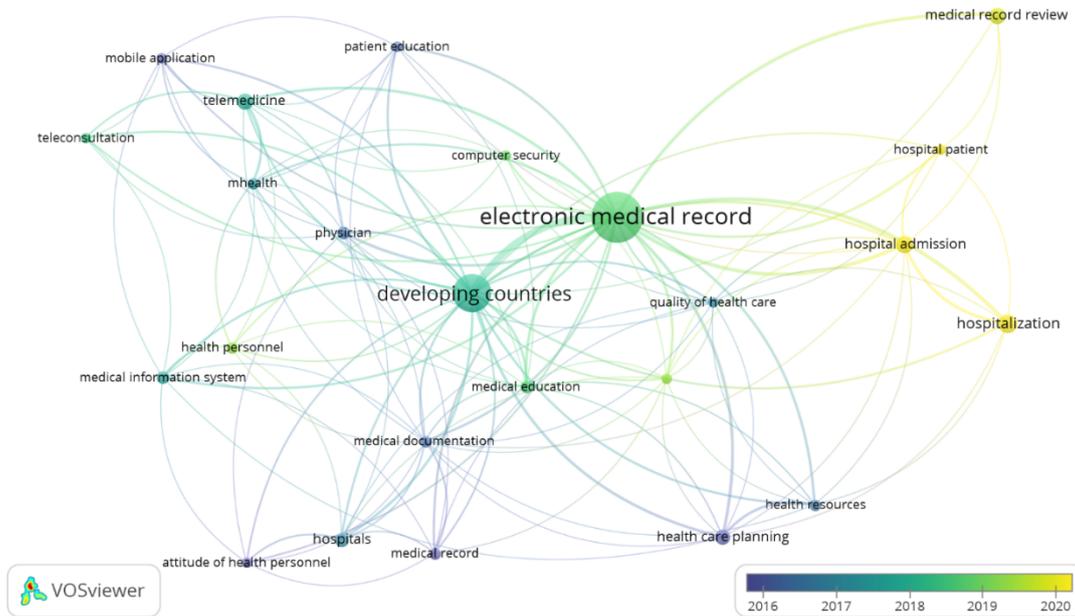


Figure 5. A Snapshot of Electronic Medical Record Development in Developing Countries

Figure 5 shows the research trends in the period 2014-2023 on EMRs in developing countries indexed by Scopus. In 2016, research on EMRs in developing countries mostly took the viewpoint of health care planning, medical records, attitude of health personnel, and patient education. The research stages during the early phases of EMR planning, development, and adoption in developing countries are reflected in this shift in research topics. Then, from 2017-2019,

research on EMRs in developing countries took the viewpoint of medical information systems, telemedicine, teleconsultation, developing countries, hospitals, quality of health care, electronic medical records, computer security, and health personnel. Finally, from 2020-2023, research on EMRs in developing countries shifted to the trend of discussing hospital admission, hospitalization, hospital patients, and medical record reviews.

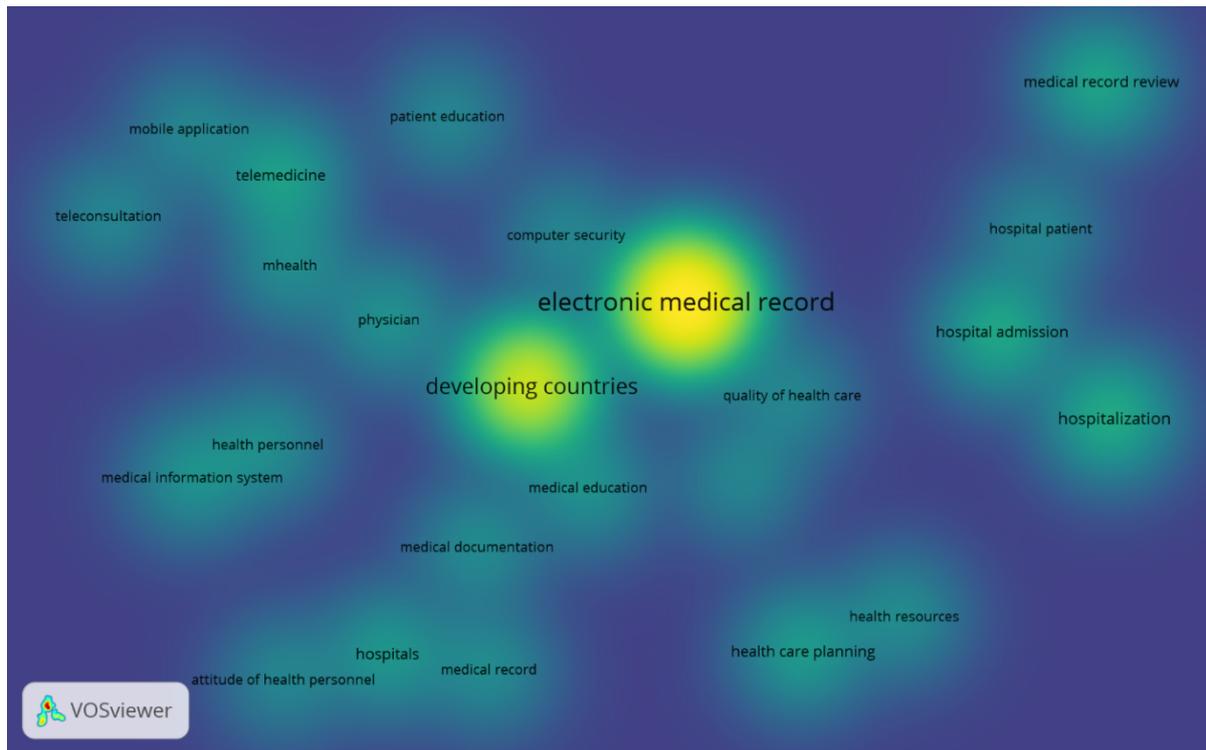


Figure 6. Research Agenda and Future Research in Electronic Medical Records in Developing Countries

Figure 6 displays the density of research topics on EMRs in developing countries based on keywords. Density visualization in Vosviewer can show which keywords have been frequently discussed and which have not. In other words, density is used to search for and find novelty in further research related to EMRs in developing countries. By using density maps in VOSviewers, the yellow color indicates the most frequently discussed topics; the denser the keywords surrounded by yellow, the more research that uses that point of view as a focus is concerned. Conversely, if the yellow color is not too dense around the keyword, then it has yet to be addressed too much in research. Therefore, the keyword can be used as a potential area for further study. Figure 6 shows that EMRs, developing countries, hospital admission, hospitalization, and medical record reviews form a dense group, indicating that these terms are often linked

or discussed together in the literature being analyzed.

Meanwhile, keywords such as medical documentation, medical records, attitudes toward health personnel, patient education, telemedicine, m-health, mobile apps, and medical information systems tend to appear on the outer edges of the visualization, indicating that these terms need to be researched more or have fewer links to the key terms. Specifically, this shows that these areas are still open for further research. Continued research in this area has the potential to open doors to improve healthcare practices and services, enhance patient satisfaction, and promote job satisfaction for healthcare personnel. Therefore, further investigating these terms will improve our understanding of the complex dynamics that occur in the healthcare environment and provide a solid basis for improvement and innovation in the healthcare field.

DISCUSSION

In recent years, research on Electronic Medical Records (EMRs) in developing countries has become increasingly prominent due to the necessity of understanding the impact, challenges, and opportunities presented by information technology innovations in healthcare. From 2014 to 2023, there was a significant upward trend in the number of Scopus-indexed publications on EMRs in developing countries. This trend is clearly illustrated in Figure 2, which indicates that 2015 was a pivotal year for EMR research in these regions. Notably, numerous studies were conducted in Ethiopia during that year, focusing on EMR system usage and user satisfaction.¹⁶ Successful implementation of EMR systems was also reported.³⁰ These findings illustrate that the use of Electronic Medical Records (EMRs) not only enhances the quality of healthcare and user satisfaction but also improves operational efficiency and data accuracy. EMRs have achieved the set objectives while also identifying areas where further improvements can maximize the benefits for health professionals and patients. Later, in 2022, many studies were conducted in Nigeria that examined the implementation of EMRs⁸ and their effects on health professionals.³¹ The subject is progressively evolving with the widespread adoption of EMRs in hospitals, particularly in the field of telemedicine, to enhance hospital services. For instance, in Indonesia, there is a policy mandating the use of EMRs.³⁰

Based on previous results, it can be seen from publication trends by year that there are several main problems faced by health professionals, such as limited technological infrastructure, lack of training, concerns about data security, and cultural barriers that affect the

implementation of EMR. This finding is in line with previous studies^{32,33,34} Furthermore, in 2023, many studies were conducted in Thailand, which were studied in terms of health technology, social and health policy,³⁵ social issues, technology, public health, management and policy, and economics.³⁶ These findings suggest that social and policy elements influence health technology implementation in addition to technical elements. By understanding how these various elements interact with each other, such as economics, management, technology, public health, and social factors, a more comprehensive and integrated approach can be made to develop effective and sustainable health policies. It will also aid in the implementation of more successful and impactful health technologies by ensuring that the solutions created take into account the circumstances in which the technology is used. EMRs in healthcare facilities in developing countries demonstrate how technology can improve efficiency and quality of care.

This research finds that more EMR research is contributed by developed countries than developing countries themselves. The United States is the only country that has made a real and significant contribution to the publication of research findings in the field of EMR development. Although EMR is a relevant topic for research in developing countries, the actual research efforts are more concentrated in developed countries due to better resources and research infrastructure, as well as greater market interest and the need for health technologies such as EMR. The United States is, therefore, the country that has conducted the most studies on EMR in developing countries.¹¹ The studies are directed towards health technology, sustainability and future development, efficiency, and effectiveness of healthcare. These studies show that EMR is essential for improving the efficiency and effectiveness of care. Emphasizing the possibility of combining EMR with

existing health infrastructure can reduce administrative costs, increase accessibility of patient information, and improve care coordination. The review also shows that sustainability in the use of EMR is critical, given the infrastructure issues and the need for trained human resources and long-term financial support.

Furthermore, medical education, health personnel, patient education, hospital admission, and medical information systems are the keywords with the highest occurrence and have the most vital relationship with research on EMRs in developing countries.³⁷ This finding explains that EMR and medical education are interrelated; by having access to EMR, medical students and healthcare professionals can use it as a powerful learning tool. They can see and study live clinical cases, understand best practices in medical documentation, and learn to make evidence-based clinical decisions.³⁸ In addition, the use of EMRs in the medical education curriculum can help students prepare for modern practices that increasingly adopt health information technology.³⁹ Furthermore, EMR and healthcare personnel are interrelated because they can easily access patients' medical histories, test results, and other relevant information to provide more informed and coordinated care.⁴⁰ Then, EMRs and patient education are interrelated because EMRs can be used as an educational tool for patients.⁴¹ Through the patient portal, they can access information about their health conditions, test results, and treatment plans.⁴² This can improve patients' understanding of their health conditions and enable them to participate actively in the management of their disease. Furthermore, EMR and hospital admission are interrelated, as shown by the results of this study. EMR allows quick access to medical data in the hospital admission process. It enables

admission officers to obtain the necessary information quickly and initiate patient care without delay. Therefore, EMR allows patient care to begin immediately, can reduce unnecessary delays in time, and can ultimately improve the efficiency and quality of hospital services. Then finally, EMRs and medical information systems are closely related because EMRs in the medical information system can improve the overall management of health information; this can improve the quality of care, allow various stakeholders in the health system to work together, and help in making better decisions about patient care.⁴³

The findings of this study show that only some topics researched in developing countries are published on Scopus. However, this study highlights the enormous potential of EMRs in improving healthcare in developing countries. Through EMRs, there are a number of benefits seen, such as reduced risk of medical errors, improved care coordination, efficient management of patient data, and increased accessibility to necessary medical information.⁴⁴ This study confirms that EMR is not just an administrative tool but also the basis for a broader transformation in health management.⁴⁵ Taking into account the challenges faced by health systems in developing countries, this study highlights the importance of investing in EMR technology as a step towards a more efficient and effective health system that will, in turn, improve the quality of health services for people in need.

This study underscores the necessity of research on EMR in developing countries, particularly related to the attitudes of healthcare personnel, patient education, and topics related to health technology advancements, such as medical information systems, telemedicine, health, and mobile health apps. These aspects are crucial because, in developed

countries, research has demonstrated that the adoption of EMRs and related technologies significantly improves healthcare delivery by enhancing the efficiency, accessibility, and accuracy of medical records. For example, studies in developed nations have shown that telemedicine and mobile health apps facilitate better patient engagement and improve communication between healthcare providers, leading to more coordinated and effective care. Despite these advancements, such topics remain underexplored in developing countries, where the potential for improvement is substantial. Therefore, further studies and a deeper understanding of these aspects in the context of developing countries are essential to improve knowledge and encourage the progress of EMR implementation. Addressing these gaps will provide the healthcare community with the tools and insights needed to overcome challenges and seize opportunities in EMR adoption, ultimately leading to innovations that can improve the quality and efficiency of healthcare services globally, particularly in resource-limited settings.

This review provides a solid basis to support the development and broader implementation of EMR in developing countries. It has the potential to improve healthcare quality and health outcomes.¹² This is reinforced by research⁴⁶ entitled "Muzima Mobile Electronic Health Record (EHR) System: Development and Implementation at Scale," which explains that greater emphasis should be placed on mHealth applications that powerfully extend the reach of EMR systems in resource-limited settings, compared to isolated mHealth applications. It is particularly important given that the health information exchange infrastructure in many developing countries is still immature. The Muzima app shows how this can be done at scale, as evidenced by its deployment in many countries and across multiple care areas.

The study possesses both strengths and drawbacks that should be taken into account. Utilizing the Scopus database, which comprises reputable journals that have undergone rigorous peer-review processes and implementing bibliometric techniques, a versatile, reasonable, and insightful analysis is provided to promptly acquire an immediate overview of research trends and opportunities for novelty. This research has a theoretical contribution in two ways; first, it provides a comprehensive review of the benefits of EMRs in developing countries, an area that is often under-explored. Second, the findings of this research are supported by empirical data showing improvements in the quality of health services through the implementation of EMR. Finally, this research provides insights to encourage the broader adoption of EMR technology in developing countries. Although this study succeeded in explaining the development map of research on EMR in the context of developing countries, it has limitations in terms of the data sources. The data analyzed is only taken from a single database. Further studies need to use other databases, including Web of Science, Dimension, Connected Papers, Open Knowledge Maps, and PubMed.

CONCLUSION

This study concluded that publications from the 2014-2023 time span indexed by Scopus have fluctuated yearly. Although research trends showed interest in EMRs in developing countries over time, our study revealed that the developed countries were the most significant contributors, providing documents that explored this topic from various perspectives, including in terms of health technology, sustainability and future developments, and efficiency and effectiveness of health care. The visualization mapping showed that topics such as EMRs, developing countries,

hospital admission, hospitalization, and medical record review were the main focus of the research on EMRs in developing countries, indicating the focus on EMR utilization in developing countries. However, there are still some topics, such as attitudes toward health personnel, patient education, and advancements in health technology, such as medical information systems, telemedicine, and mHealth, that are still open to further research.

RECOMMENDATION

This research highlights the need for a more in-depth study of EMRs in developing countries using a variety of databases or more comprehensive review techniques, such as scoping reviews, to provide in-depth insights and comprehensive perspectives. Many areas, such as health worker attitudes, patient education, and advancements in health technology, are open to further research. Future research should investigate health worker attitudes toward EMR adoption, particularly the barriers and factors influencing their acceptance and usage. Additionally, healthcare providers should develop patient education programs to enhance digital health literacy, empowering patients to use EMR portals and telemedicine platforms effectively. Research should also explore the integration of telemedicine and mHealth technologies with EMRs, which can potentially improve healthcare delivery, particularly in remote and underserved areas. Lastly, addressing technological barriers in developing countries is essential to ensure better access to advanced health technologies, ultimately improving healthcare efficiency and quality, especially in rural regions. Therefore, it is imperative to support research and development in this field to enhance the

accessibility, quality, and efficiency of healthcare worldwide.

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CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

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