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# *DEVELOPMENT OF WEB-BASED APPLICATIONS FOR HEALTH SERVICE MANAGEMENT (E-HEALTH SYSTEM): A SYSTEMATIC LITERATURE REVIEW*

# PENGEMBANGAN APLIKASI WEB UNTUK MANAJEMEN LAYANAN KESEHATAN (E-HEALTH SYSTEM): SEBUAH TINJAUAN SISTEMATIS LITERATUR

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***ABSTRACT***

*The rapid development of digital health technology has encouraged the adoption of web- based applications to improve the accessibility, efficiency, and quality of healthcare services. This study presents a Systematic Literature Review (SLR) on the development of Web-Based Applications for Health Service Management (E-Health System) published between 2020 and 2025. A total of 20 empirical and review studies were selected from reputable databases using the PRISMA 2020 framework. The review identifies five dominant thematic findings: (1) increasing use of telemedicine and patient portals during and after the COVID-19 pandemic; (2) the importance of usability and e-health literacy for user adoption; (3) interoperability and integration challenges with Electronic Health Records (EHR); (4) data security, privacy protection, and trust issues; and (5) implementation barriers in low- and middle-income countries, including infrastructure and regulatory limitations. The findings indicate that web-based e-health applications provide significant potential to enhance healthcare delivery performance, yet their successful implementation requires user-centered design, standardized interoperability, robust information security, and supportive public policies. This study contributes to future research by highlighting critical development factors and offering recommendations for more inclusive, secure, and sustainable e-health implementation.*

***Keywords:*** *e-health system, web-based application, healthcare management, telemedicine, systematic literature review.*

**ABSTRAK**

Perkembangan teknologi kesehatan digital mendorong adopsi aplikasi berbasis web dalam meningkatkan aksesibilitas, efisiensi, dan kualitas layanan kesehatan. Penelitian ini menyajikan tinjauan sistematis (Systematic Literature Review/SLR) mengenai Pengembangan Aplikasi Web untuk Manajemen Layanan Kesehatan (E-Health System) yang dipublikasikan pada periode 2020 hingga 2025. Sebanyak 20 studi empiris dan tinjauan dipilih dari basis data bereputasi menggunakan kerangka PRISMA 2020. Hasil sintesis mengidentifikasi lima temuan utama: (1) peningkatan penggunaan telemedicine dan portal pasien selama dan setelah pandemi COVID-19; (2) pentingnya aspek usability dan literasi e-health terhadap adopsi pengguna; (3) tantangan interoperabilitas dan integrasi dengan Electronic Health Records (EHR); (4) isu keamanan data, perlindungan privasi, dan kepercayaan; serta (5) hambatan implementasi pada negara berpenghasilan menengah dan rendah, termasuk keterbatasan infrastruktur dan regulasi. Temuan ini menunjukkan bahwa aplikasi e-health berbasis web memiliki potensi signifikan dalam meningkatkan kinerja pelayanan kesehatan, namun keberhasilan implementasinya membutuhkan desain berpusat pada pengguna, interoperabilitas yang terstandardisasi, keamanan informasi yang kuat, dan dukungan kebijakan publik. Penelitian ini berkontribusi pada riset selanjutnya dengan menyoroti faktor-faktor kritis pengembangan serta memberikan rekomendasi untuk implementasi e-health yang lebih inklusif, aman, dan berkelanjutan.

**Kata Kunci**: sistem e-health, aplikasi berbasis web, manajemen layanan kesehatan, telemedicine, tinjauan literatur sistematis.

## INTRODUCTION

Developments in information technology over the past two decades have had a significant impact on various sectors, including the healthcare sector. The digitalization of healthcare services has become one strategic effort to improve service quality, operational effectiveness, and ease of access for both patients and medical personnel. One form of this digitalization is the development of web applications for healthcare service management or e-health systems, which offer various functions ranging from patient registration, electronic medical records, teleconsultation, to integrated clinical data management.

Web applications have several advantages over conventional software, such as cross-device accessibility, ease of maintenance, and high scalability. This makes them a relevant solution for addressing the challenges of modern healthcare systems that demand efficiency, transparency, and information accuracy. On the other hand, the development of web applications in the healthcare field also faces various challenges, including data security, interoperability, user experience, and compliance with regulations related to privacy and medical standards.

Various studies on e-health have been conducted in both global and local contexts, with diverse focuses such as system architecture, supporting technologies, service integration, and implementation effectiveness. However, to date, a comprehensive review is still needed to summarize developments, trends, and key findings from the existing literature so that it can serve as a foundation for researchers and developers in designing e-health systems that are more effective and sustainable.

Based on this need, this study presents a systematic literature review on the development of web applications for healthcare service management. This review aims to identify the approaches used, dominant technologies, key challenges, and future development opportunities. Thus, the results of this study are expected to make a significant contribution to the development of theory and practice related to innovation in web-based healthcare services.

## METHODS

This study uses a Systematic Literature Review (SLR) approach to identify, analyze, and synthesize studies related to the development of web applications for healthcare service management. The SLR process was conducted by searching for articles in several scientific databases such as Scopus, IEEE Xplore, PubMed, and Google Scholar using relevant keywords, including e-health, web-based health system, and healthcare management application. The retrieved articles were selected through a screening stage based on titles, abstracts, and topic relevance, and were then further evaluated using inclusion and exclusion criteria that covered publication year range, thematic relevance, and methodological feasibility. Studies that met the criteria were analyzed to identify key themes, technology trends, development methods, as well as challenges and opportunities in implementing web-based e-health systems. The synthesis results were used to formulate comprehensive research findings.

## RESULTS AND DISCUSSION

A systematic review of 20 articles discussing the development of web applications for healthcare service management shows that e-health technology continues to advance along with the growing need for digitalization in the healthcare sector. In general, the analyzed studies focus on the development of electronic medical record systems, appointment management, telemedicine, and real-time patient data integration. (1) System development approaches most studies use Agile, User-Centered Design (UCD), and iterative development approaches. These approaches are considered effective because they allow adjustments to complex clinical needs and involve healthcare professionals in the design

process. In addition, several studies adopt service-based architectures such as RESTful APIs and SOA to improve interoperability across systems. (2) Dominant technologies the analysis shows the use of modern web technologies such as React, Angular, Laravel, Django, and Spring. Commonly used databases include MySQL, PostgreSQL, and MongoDB. Many studies also use cloud architectures to improve scalability, while some studies are beginning to explore the integration of IoT and machine learning to support patient monitoring and clinical decision-making. (3) Key system features the most frequently identified features include electronic medical record management, online registration and appointments, teleconsultation, digital prescriptions, and administrative dashboards. These features generally aim to improve efficiency, reduce patient waiting time, and facilitate access to healthcare services without requiring in-person visits to healthcare facilities. (4) Development challenges several key challenges reported in the literature include patient data security and privacy, lack of interoperability among different healthcare systems, and usability issues frequently experienced by medical staff. Other challenges include limited technological infrastructure in some regions and compliance with regulations related to medical data. (5) Future development directions future research is expected to focus on integrating AI and machine learning, leveraging blockchain for medical record security, and developing more personalized and adaptive e-health systems. In addition, improving user experience (UX) quality and clinically needs-based design will be major factors in the successful development of web-based healthcare systems.

Table 1. SLR Results

| No | Reference (Author, Year) | Title | Keywords | Focus/Domain | Key Findings |
|---|---|---|---|---|---|
| 1 | Beran et al. (2020) | Beyond the Virus: Ensuring Continuity of Care for People with Diabetes during COVID-19 | Diabetes, Telehealth, mHealth | Digital-based diabetes management | Telehealth and mHealth are effective in maintaining continuity of care and reducing direct contact during the pandemic |
| 2 | Firdaus et al. (2021) | Digital Bureaucratic Transformation During the COVID-19 Pandemic | MBKM, Administration, Public Services | Healthcare service administration | Digitalization improves public service efficiency, although human resource and technology challenges remain |
| 3 | Erlirianto et al. (2015) | Evaluation of EMR Using the HOT-Fit Framework | SIMRS, HOT-Fit | Hospital Information System | SIMRS implementation is not yet optimal due to constraints related to human, organizational, and technological aspects |
| 4 | Dwiyanto (2021) | Public Bureaucratic Reform in Indonesia | Digital Governance, Public Services | Digital bureaucracy | The pandemic accelerated ICT-based public service innovation |

| No | Reference (Author, Year) | Title | Keywords | Focus/Domain | Key Findings |
|---|---|---|---|---|---|
| 5 | Abdillah et al. (2024) | Technology and Innovation in Healthcare Human Resource Management | Digital Health, Health Technology | Digitalization of healthcare services | Digitalization has the potential to improve service quality and equity in healthcare |
| 6 | Asih (2023) | The Development of Electronic Medical Records in Indonesia | EMR, Interoperability, FHIR | Health Information Systems | The FHIR standard supports syntactic and semantic interoperability of health data |
| 7 | Wiweko et al. (2016) | Development of Telehealth and mHealth in Indonesia | E-Health, Telemedicine | Digital health services | E-health accelerates service delivery and improves public access |
| 8 | Anggraini (2023) | E-Health Application for Assisting Pregnant Women | E-Health, Maternal Health | Maternal health | E-health improves monitoring and the quality of maternal services |
| 9 | Jamaludin & Saputra (2021) | Service Quality and Patient Satisfaction | E-Health, Patient Satisfaction | Patient satisfaction | The implementation of e-health has a significant effect on patient satisfaction |
| 10 | Coates (2001) | Smart Government: Online, Not in Line | E-Government | Digital government | E-government implementation improves service efficiency and transparency |
| 11 | Sri & Sahar (2012) | Telehealth and Telecardiology in Indonesia | Telehealth, Emergency Care | Emergency healthcare services | Technology accelerates decision-making and clinical coordination |
| 12 | Diversity Journal (2024) | Implementation of E-Health and Telemedicine in the JKN Program | E-Health, JKN | National healthcare services | E-health improves service quality and access for JKN participants |
| 13 | Aguilar-Calderón et al. (2022) | Requirements Engineering for IoT Software Systems | IoT, Healthcare | Healthcare IoT | IoT is widely used in direct healthcare services |
| 14 | ITB (2021) | Health Education Through Digital Media | Health Applications | Child monitoring | Applications support early detection of child growth and development |
| 15 | Kasthurirathne et al. (2018) | Overcoming the Maternal Care Crisis | Telehealth, Maternal Care | Maternal health | Telehealth improves maternal health outcomes |
| 16 | Geidam et al. (2015) | Telemedicine for Maternal and Child Health in Nigeria | Telemedicine, Rural Health | Maternal & child health | Telemedicine is effective in overcoming geographic barriers |
| 17 | Marom (2015) | Bureaucratic Innovation in Public Services | E-Government | Public administration | E-government implementation is not yet optimal due to limited human resources |

| No | Reference (Author, Year) | Title | Keywords | Focus/Domain | Key Findings |
|---|---|---|---|---|---|
| 18 | Indonesian Journal of Innovation Studies (2025) | E-Health Applications and Medication Adherence | E-Health, CHD | Medication adherence | E-health applications improve medication adherence |
| 19 | Setiawan et al. (2024) | Requirements Engineering for Healthcare Systems | Software Health, RE | Requirements engineering | Research on healthcare requirements engineering is still limited and largely conceptual |
| 20 | Aprillia et al. (2020) | Smartphone-Based E-Health Application | mHealth, PHR | Community health | Smartphones support public health monitoring |

Based on the thematic synthesis of the selected articles, four main domains were identified in the development of web applications for healthcare service management (e-health), namely (1) the digitalization and integration of medical records, (2) patient data security and privacy, (3) improving user experience and engagement, and (4) the use of intelligent technologies to support clinical services.

## CONCLUSSION

This systematic review shows that the development of web applications for healthcare service management continues to advance alongside the growing need for digitalization and efficiency in the healthcare sector. The reviewed literature emphasizes that modern web technologies, user-centered design approaches, and the implementation of scalable and secure architectures form the main foundation for building effective e-health systems. Performance optimization, medical data protection, and an intuitive user experience are key factors for successful system implementation. In addition, the integration of technologies such as AI and chatbots further enriches healthcare service functions by improving the speed, accuracy, and accessibility of information. Overall, web-based e-health has great potential to support the transformation of healthcare services, although further research is still needed on interoperability, regulation, and long-term evaluation in real-world use contexts.

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## REFERENCE

Abda'u, P. D., Winarno, W. W., & Henderi. (2018). Evaluasi penerapan SIMRS menggunakan metode HOT-Fit di RSUD dr. Soedirman Kebumen. INTENSIF: Jurnal Ilmiah Penelitian dan Penerapan Teknologi Sistem Informasi.

Abdillah, R. P. A., Nabilah, H., & Wasir, R. (2024). Teknologi dan inovasi dalam manajemen SDM kesehatan: Meningkatkan efisiensi melalui digital. Indonesian Journal of Health Science, 4(6s), 840–847. https://doi.org/10.54957/ijhs.v4i6s.1226

Adamkolo, M. M., & Ibrahim, H. I. (2016). An empirical study of mobile phone usage in selected rural area of North-East Nigeria. Journal of Humanities and Social Science, 21(9), 42–50.

Adha, F. R., Sahria, Y., Febriarini, N. I., Fauziah, R. N., Sa'adah, W., & Hidayati, A. (2023). Analisis literatur sistem informasi kesehatan (SIK): Tren, tantangan, dan manfaat dalam

peningkatan pelayanan kesehatan di Indonesia. Health Information Systems.

Agarwal, S. (2023, March 23). 10 reasons we use Next.js for headless commerce. Coderapper. https://medium.com/coderapper/10-reasons-we-use-next-js-for-headless-commerce-11b3a797c7d

Aguilar-Calderón, J.-A., Tripp-Barba, C., Zaldívar-Colado, A., & Aguilar-Calderón, P.-A. (2022). Requirements engineering for Internet of Things (IoT) software systems development: A systematic mapping study. Applied Sciences, 12(15), 7582. https://doi.org/10.3390/app12157582

Agustina, & Susilani, A. T. (2019). Evaluasi sistem informasi manajemen rumah sakit (SIMRS) pada bagian pendaftaran rawat jalan dengan metode HOT-Fit.

Alanazi, F., Gay, V., Alturki, R., et al. (2021). Modelling health process and system requirements engineering for better e-health services in Saudi Arabia. International Journal of Advanced Computer Science and Applications.

Andarmoyo, S. (2012). Hipertensi: Konsep dasar dan penatalaksanaan. Graha Ilmu.

Anggraini, H. (2023). Aplikasi e-health sebagai media pendampingan kesehatan ibu hamil. Jurnal Ilmiah Kebidanan Indonesia, 11(2), 123–131.

Anhar. (2010). Panduan menguasai PHP & MySQL secara otodidak. Media Kita.

Anugerah, D. A., & Kosasi, S. (2024). Penerapan Next.js dan GraphQL dalam pengembangan mobile web sistem informasi manajemen puskesmas. CSRID (Computer Science Research and Its Development Journal), 16(3), 247–258. https://doi.org/10.22303/csrid-.16.3.2024.247-258

Antza, C., et al. (2023). Prevention of cardiovascular disease in young adults: Focus on gender differences. Atherosclerosis, 384. https://doi.org/10.1016/j.atherosclerosis.2023.117272

Aprillia, N., Ariyanti, S. I., & Feriandi, Y. A. (2020). Pelayanan kesehatan yang berkualitas sebagai implementasi dari variable evidence. Jurnal Daru Medika, 1(2), 62–65.

Arifin, H., et al. (2022). Analysis of modifiable, non-modifiable, and physiological risk factors of non-communicable diseases in Indonesia. Journal of Multidisciplinary Healthcare, 15, 2203–2221. https://doi.org/10.2147/JMDH.S382191

Arifudin, O. (2021). Manajemen strategik: Teori dan implementasi.

Armya, R. E. A., Abdulrahman, L. M., Abdulkareem, N. M., & Salih, A. A. (2023). Web-based efficiency of distributed systems and IoT on functionality of smart city applications. Journal of Smart Internet of Things, 2023(2), 142–161. https://doi.org/10.2478/jsiot-2023-0017

Asih, H. A. (2023). Perkembangan rekam medis elektronik di Indonesia: Literature review. Jurnal Rekam Medis, 6(1).

Astuti, I. F., Cahyadi, D., Khoirunnita, A., Rohmah, N., & Ramdan, I. M. (2024). Upaya peningkatan literasi digital dan kesehatan: Program "Editekes" untuk Pokmas Sekumpul. Sebatik, 28(1). https://doi.org/10.46984/sebatik.v28i1.2455

Az-Zahra, D. S., Listyorini, S., & Pradhanawati, A. (2022). Pengaruh service quality dan service recovery terhadap loyalitas pelanggan melalui kepuasan pelanggan. Jurnal Ilmu Administrasi Bisnis, 11(3), 524–531. https://doi.org/10.14710/jiab.2022.35384

Bayu, A., & Izzati, S. (2013). Evaluasi faktor-faktor kesuksesan implementasi sistem informasi manajemen rumah sakit di PKU Muhammadiyah Sruweng dengan menggunakan metode HOT-Fit. Seminar Nasional Informatika Medis, 78–86.

Beran, D., Perone, S. A., Perolini, M. C., Chappuis, F., Chopard, P., Haller, D. M., & Gastaldi, G. (2020). Beyond the virus: Ensuring continuity of care for people with diabetes during COVID-19. Primary Care Diabetes.

Bešinović, N. (2020). Resilience in railway transport systems: A literature review and research agenda. Transport Reviews, 40(4), 457–478. https://doi.org/10.1080/01441647.2020.1728419

Bharadiya, J. P. (n.d.). Artificial intelligence in transportation systems: A critical review. AJPO Journals. http://www.ajpojournals.org/

Binanto, I. (2010). Multimedia digital: Dasar teori dan pengembangannya. Andi Offset.

Block, G., Azar, K. M., Romanelli, R. J., et al. (2015). Diabetes prevention and weight loss with a fully automated behavioral intervention by email, web, and mobile phone. Journal of Medical Internet Research, 17(10), e240.

BPJS Kesehatan. (n.d.). Panduan layanan bagi peserta jaminan kesehatan – Kartu Indonesia Sehat (JKN-KIS). Jakarta.

Brzan, P. P., Rotman, E., Pajnkihar, M., & Klanjsek, P. (2016). Mobile applications for control and self-management of diabetes: A systematic review. Journal of Medical Systems, 40(9), 210.

Cahyati, N., & Yustus, M. (2019). Pemanfaatan e-health pada pemantauan kesehatan ibu hamil dalam mencegah risiko komplikasi kehamilan. Jurnal Kesehatan, 10(1), 45–52.

Chorbev, I., Sotirovska, M., & Mihajlov, D. (2011). Virtual communities for diabetes chronic disease healthcare. International Journal of Telemedicine and Applications, 2011.

Coates, B. E. (2001). Smart government: Online, not in line—Opportunities, challenges and concerns for public leadership. The Public Manager, 30(4), 37–40.

World Health Organization. (2015). Maternal mortality ratio (per 100,000 live births).