**Edelweiss Applied Science and Technology**
*ISSN: 2576-8484*
*Vol. 9, No. 6, 734-741*
*2025*
*Publisher: Learning Gate*
*DOI: 10.55214/25768484.v9i6.7871*


# Digital health solutions for improving healthcare accessibility in Jordanian communities: A literature review

Abdallah Ashour[1], Salam Bani Hani[1*], Anwar Eyadat[1], Mohammad Al-Bsheish[2,3], Adi Alsyouf[4,5,6]
[1]Faculty of Nursing, Nursing Department, Irbid National University, Irbid, Jordan; s.banihani@inu.edu.jo (S.B.H.)
[2]Health Management Department, BBatterjee Medical College, P.O. Box 6231, Jeddah 21442, Saudi Arabia.
[3]Al-Nadeem Governmental Hospital, Ministry of Health, Amman, Jordan.
[4]Department of Managing Health Services & Hospitals, College of Business, Faculty of Business Rabigh, King Abdulaziz University, Jeddah, Saudi Arabia.
[5]Applied Science Research Center, Applied Science Private University, Amman, Jordan.
[6]Jadara University Research Center, Jadara University, Irbid, Jordan.

**Abstract:** With the rapid advancement of technology, digital health tools such as telemedicine, mobile health applications, and electronic health records have emerged as innovative approaches to address healthcare disparities. This review aims to examine the current state of digital health implementation in Jordan, highlighting its impact on underserved populations, particularly in rural and remote areas. The search was conducted utilizing several electronic databases including CINAHL, Google Scholar, ResearchGate, and ScienceDirect. A total of 620 articles were retrieved. After duplicate removal, 540 articles were screened for titles and abstracts. 120 relevant articles underwent full-text screening, of which 75 were found eligible to be included in the review. Key challenges, including technological infrastructure, digital literacy, and regulatory frameworks, are discussed alongside opportunities for improvement. Findings suggest that integrating digital health solutions can significantly enhance healthcare accessibility, reduce costs, and improve health outcomes. The review emphasizes the need for collaboration among policymakers, healthcare providers, and technology developers to overcome barriers and ensure equitable access to digital health services. This study contributes to the growing body of knowledge about leveraging technology to address healthcare challenges in Jordan and offers recommendations for future research and policy development.

***Keywords:*** *Digital Health, Healthcare access, Jordan, Review, Literacy, Technology, Rural areas.*

## 1. Introduction

Digital health is a vast field that encompasses a plethora of digital services, with the capacity to either revolutionize and expand healthcare access or exacerbate a deepening gap in healthcare access opportunities [1]. In the Jordanian context, the latest report has highlighted the necessity of innovative healthcare practices [2]. Almost universally, modern healthcare systems are facing large hurdles, which entail increasingly complex healthcare facilities with poor outputs [3]. However, addressing these challenges is crucial for sustainable development, especially because public health in general significantly influences the status of a healthcare system. On a larger scale, digital health can positively impact Jordanian and other international communities' level of healthcare access [4]. It is the first practical means of providing patients with access to comprehensive healthcare, including top-notch assessments and treatments, irrespective of their financial situation or place of residence [5]. Historically, the entities shaping the healthcare system have included governmental health ministries and political parties, medical professionals, technology creators building modern electronic clinical systems, and health vendors developing modern healthcare systems [6]. Nevertheless, considerably less


**History:** Received: 24 March 2025; Revised: 9 May 2025; Accepted: 13 May 2025; Published: 5 June 2025
* Correspondence: s.banihani@inu.edu.jo

attention and development have been awarded to the development of digital programs intended to help resolve these issues. Since digital services can have a significant impact on healthcare management, the broader trends could be hoped to have indirect influences on the broader outlook and performance of modern healthcare services [7].

In Jordan, the digital health field has not yet been explicitly formalized. Nevertheless, such a domain has already been formed indirectly by the current regularization that deals with basic digital operations in public hospital centers [8]. The main motivation for advocating for it as a recognized medical specialty is the decision made by the close-health systems to plan training and prepare personnel. Nevertheless, e-health is now officially recognized as an educational program in several Middle Eastern nations. Notwithstanding this disjointed organizational perspective about the potential advantages, scholars and editors of policy formation have advocated for more careful consideration when creating novel strategies that incorporate Jordan's rankings of ICT advancement criteria.

## 2. Methods

### *2.1. Literature Search and Methods*

Utilizing several databases including Web of Sciences, CINAHL, PubMed (via MedLine), and the Jordanian Database for Nursing Research, a literature search was carried out to find studies on digital health solutions to improve healthcare accessibility in rural areas of Jordan. Several keyword combinations were used to find research articles on healthcare access, including "healthcare access," "digital health solution, and "Jordanian communities ". Full-text articles, published in English, and incorporated either quantitative or qualitative research were included. Nevertheless, the search was limited to papers that were not published in English, student theses and dissertations, unpublished works, and grey literature.

## 3. Results

A total of 620 articles were retrieved. After duplicate removal, 540 articles were screened for titles and abstracts. 120 relevant articles underwent full-text screening, of which 75 were found eligible to be included in the review. The search strategy and selection of the studies are shown in Figure 1. This section addresses digital health solution approaches for healthcare access in Jordanian communities.

*Edelweiss Applied Science and Technology*
*ISSN: 2576-8484*
*Vol. 9, No. 6: 734-741, 2025*
*DOI: 10.55214/25768484.v9i6.7871*

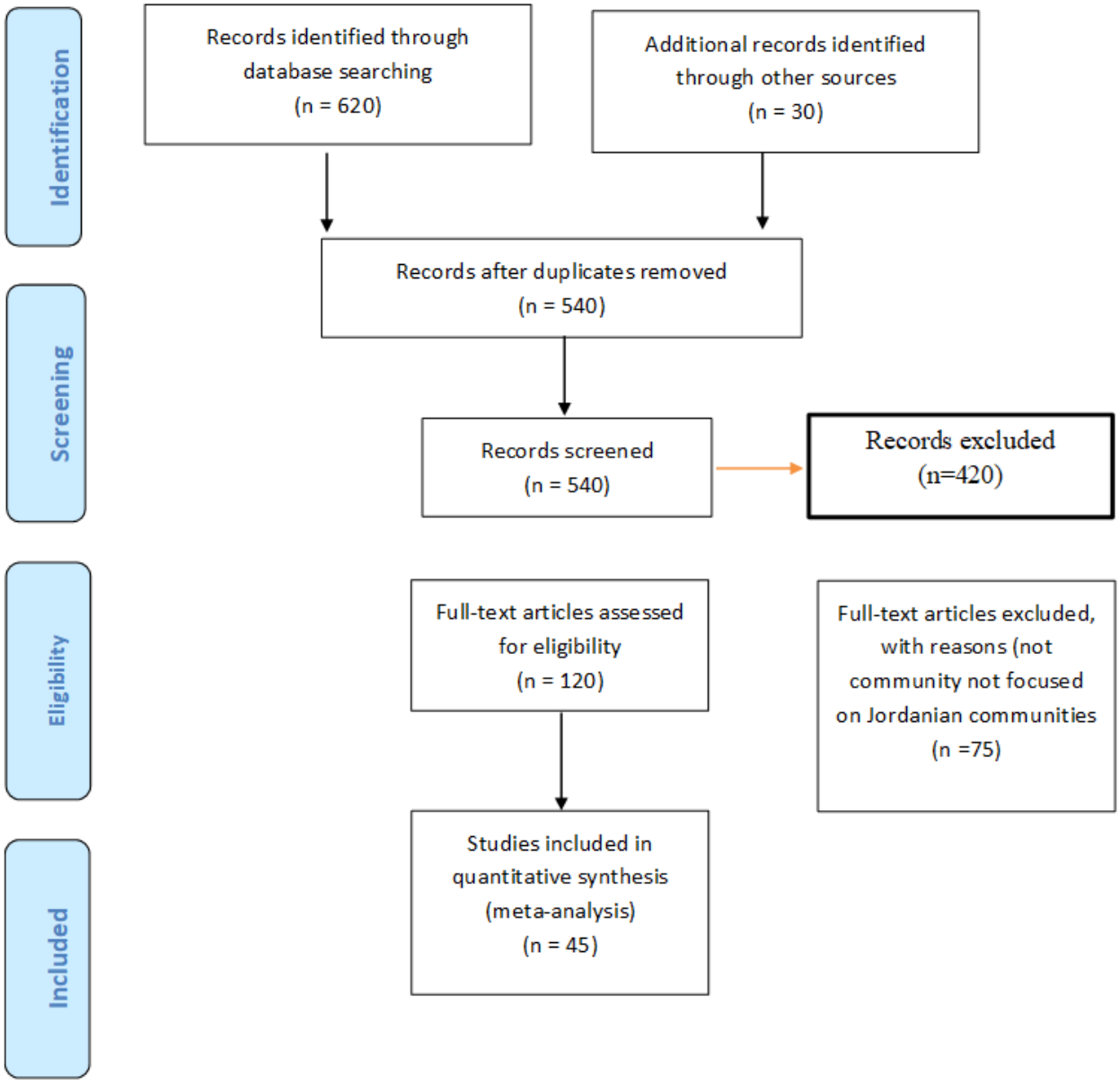


**Figure 1.**
PRISMA flow diagram.

*3.1. Current Healthcare Challenges in Jordan*

The healthcare system in Jordan is overburdened with inefficiencies in service delivery as a result of overcrowded health facilities that provide limited access to specialized care [9]. Jordanian healthcare centers also experience workforce shortages and have inequitable healthcare provision due to the significant disparities between nationalities and socio-economic status. More patients, particularly from Middle Eastern countries across borders, benefit from Jordan's quality healthcare services [10]. Unplanned demand for healthcare services combined with limited resources and population growth puts a heavy burden on the government to respond to public needs [11]. At the same time, complicated health issues, together with lifestyle diseases, and chronic and communicable diseases, put pressure on the existing health system [12]. This has an impact on medical professionals' practice as well as their

*Edelweiss Applied Science and Technology*
*ISSN: 2576-8484*
*Vol. 9, No. 6: 734-741, 2025*
*DOI: 10.55214/25768484.v9i6.7871*

financial resources. The insufficient allocation of healthcare personnel across all essential sectors is another factor contributing to the shortage of health professionals, in addition to the large number of patients.

In Jordan, some patients residing in rural areas are also unaware of the existing healthcare centers or their mechanisms [13]. Approximately 90% of Jordanian citizens aged 18 and older have received health care services at an accessible national health center [14]. Nevertheless, 10% of the population residing in an uncontrolled territory (peri-urban, rural, and Bedouin areas) are not serviced by national health centers [15]. Some are Aqaba residents and farmers who have special government services, including security and health insurance. Aqaba also has 12 kilometers of open border and shares a refugee population of 13,000 [16]. Rural and peri-urban residents of Jordan and illegal immigrants in Jordan do not have adequate healthcare services and obtain a minimal level of acute and chronic medical treatment from charitable and government healthcare clinics [17]. The absence of illegal immigrants in Jordan is not part of the kingdom's healthcare policy. Over the last 10 years, the chaos and public demand for medical facilities have grown significantly with the influx of refugees resulting from the country's security threat [18]. Public health rules and regulations did not cover a significant amount of the health care service's priorities, limitations, and delivery gaps, allowing certain government agencies to continue providing public and consistent access to health services per the Jordanian Standard [19]. Given this situation, e-health initiatives require that communities have staff committed to populating and managing appropriate capabilities to take advantage of the technology. The country's foundation is essential for meeting the associated cultural exchange requirements, developing individual skills, enabling accessibility, and adapting national policies as patient demand increases.

### *3.2. Role of Digital Health Solutions in Addressing Accessibility Issues*

Healthcare providers and accessibility advocacy groups worldwide have long acknowledged electronic and digital solutions as capable mechanisms for overcoming such challenges [20]. Various solutions have been proposed to enhance and remodel healthcare delivery through information and communication technology (ICT), which include services such as telemedicine, electronic health records, mobile health applications, and many others that are available due to rapid technological advancements.

These digital tools provide strategies for healthcare delivery in remote and underprivileged areas and offer excellent potential for the registration and incorporation of services in other healthcare sectors with healthcare professionals. Based on the outlined accessibility problems, the essential role of the aforementioned digital services in addressing those problems is explained. Digital health services play crucial roles in enhancing hospital communication networks, starting from single-site clinics to hospitals and across regional facilities in various locations worldwide. Improving this area facilitates the growth of medical communications, which promotes hospital cooperation and increases physician staff replies to different registration services, particularly when niche and rare disease programs are required [21].

Despite efficiency issues with technology, highly digitalized healthcare sectors demand prompt and effective solutions [22]. One communication method that impacts the timeliness and the number of responses to conveying the message is mobile and email client systems [23]. Moreover, digital tools are also essential for early diagnostics and quick disease management, which will directly improve the patient waitlist in the environment [24]. However, most of Jordan's population lives in urban areas, and for urban populations, the distance to healthcare services is generally not a major constraint [25]. Policymakers need to ensure that when integrating specific e-health solutions into Jordan's healthcare regulations, they avoid neglecting these primary requirements [26]. Telemedicine can bring the service closer to the 14% of the population that used to travel longer distances to access services [27].

Digital health literacy programs can strategically promote e-health practices that empower citizens to gain trust in their systems [28]. Moreover, telemedicine seeks to expedite the sharing of medical data among the entire medical staff [29]. Telemedicine facilitates enhanced monitoring and aids in decisions by various registration experts, including domestic and international service providers [30].

*Edelweiss Applied Science and Technology*
*ISSN: 2576-8484*
*Vol. 9, No. 6: 734-741, 2025*
*DOI: 10.55214/25768484.v9i6.7871*

Monitoring reports can better represent the users of registration services regarding their treatments' real-world performance [31]. The physician might still have the availability of off-site expert opinions in tailoring the clinical observation data registration endpoint to rules [32]. Needed data analysis and technology investments are based on precursor data fully integrated with the patient's health information technology (IT) solutions [33]. Long before the real trial and the recruitment phase begin, clinics with access to ICT tools should start using telemedicine for routine consultations to build a trustworthy atmosphere [34]. Therefore, hiring a patient right away at a virtual clinic site with at least twice as many regular clinic patients and no adequately recorded positive visit history is always regarded as unethical.

### *3.3. Case Studies of Successful Digital Health Implementation in Jordan*

Telemedicine, or telehealth, through digital applications, has been put into practice in Jordan and has provided valuable experience and lessons in the country [35]. One of the main applications in the area is the teleconsultation services available at Jordan's King Hussein Cancer Center (KHCC), Jordan's first and only comprehensive center providing state-of-the-art and multidisciplinary pediatric and adult oncology and radiation therapy care to Jordanians and patients from neighboring countries [36]. Other notable and successful digital health use cases in Jordan include providing telepsychiatry services through telemedicine platforms at the Jordan University Hospital, access to medicines, and Security Health's 'We Care Healthcare Services'—enabling people to get a primary care consultation when needed as well as an initial and, if possible, a complete diagnosis done online remotely via a mobile phone, tablet, or personal computer with an app or website [37]. Additionally, the app gives users round-the-clock access to doctors for family health and lifestyle medical consultations [38]. King Hussein Cancer Center is highlighted in this case study through a health initiative that demonstrates a strategic direction in telehealth through cooperative cooperation between core stakeholders in the public and commercial sectors.

This project utilizes the power of information and communication technologies to improve the quality and accessibility of care for and prevention of cancer by implementing a telemedicine system to complement medical care facilities [39]. Furthermore, KHCC originally implemented its version of a telehealth offering within the KHCC nutritional and cancer preventive section in 2014 [36]. This program included a face-to-face meeting in the medical portion of the clinic for nutritional and cancer preventive education, that provided by a telelactician to communicate with the patients in Ajloun Ra'fat facilities. The program was implemented in a few centers in selected Ministry of Health facilities before expanding. Service has been available to children and adults who signed up for the KHCC/SF Channel Program only. The tele-oncology part of this project has contributed to the center achieving its national accreditation through the Minister of Health in November 2016. Life at the center has become much easier not only for the cancer patient and their family to access the specialist but is also providing an incentive for other regions in the kingdom to encourage their medical teams to similar projects as a means of risk management. Even if the experience at KHCC was technically difficult, it is believed that it introduced important lessons for the successful implementation of such projects and that can advise other hospitals in a unique position.

### *3.4. Future Trends and Opportunities in Digital Health for Jordanian Communities*

Rapid advances in the fields of artificial intelligence, data analytics, and machine learning result in promising technologies [20, 40]. Clinical and operational decision-support systems such as predictive and prescriptive analytics are being developed to drive the mobility and quality of care. Management of health systems can also benefit from these advanced analytics that can estimate patient demand and resource allocation between primary and secondary care services. In addition, the rise of digital health applications and assistive artificial intelligence, such as chatbots and digital coaches, can provide health advice, delay the onset of degenerative disease, and manage chronic conditions, and expensive medications. These virtual medical assistants can be integrated with big technology solutions to offer

*Edelweiss Applied Science and Technology*
*ISSN: 2576-8484*
*Vol. 9, No. 6: 734-741, 2025*
*DOI: 10.55214/25768484.v9i6.7871*

around-the-clock support and a quick triage system by processing personal health data to alert medical professionals of emergencies or crises. Hence, such interventions can empower citizens, reduce formal consultations, and expedite patient flow while pushing more competent data to the health and medical learning systems to learn more about patient care. The advancement of health technology is mainly the result of public-private sector initiatives, with healthcare and technology vendors and investors working together or separately to renovate these solutions.

## 4. Discussion

Decision-makers in Jordan need to reform domestic policy and legal requirements to streamline rigid regulations. One of the priorities for sustainability and innovation is also a pressing need for the introduction of a smart and proactive public health strategy that aims to boost the citizen experience and eventually attract medical tourists by showcasing modern cutting-edge solutions. However, as global digital health trends shape the future, cross-industry collaboration, interdisciplinary healthcare experts, medical professionals, and integrated initiatives are key forces to advocate [41]. These will strengthen knowledge exchange in a competitive private sector, improve physician and patient relationships, and help public health bodies develop preventive and timely interventions. Latest technology trends are placed over existing healthcare facilities and the workforce, reducing productivity and the quality of the already stretched high volumes of patients. To combat this, future healthcare workers and providers will need to be abreast of innovations and more thorough than ever. Manpower strategies should consider continuously training the medical system using cutting-edge tools while integrating the specialist uses of digital technology within their discipline [42]. Such an approach will be needed by the Jordanian health system in perhaps less than five years. From the gaps provided above, a range of prospective opportunities and suggestions for the future are crystallized [43]. A key factor for the success of such new initiatives is the necessity of the foundation in involving community actors in the co-designing of solutions for the 'real' problems.

## 5. Conclusion

In conclusion, digital health solutions have the potential to significantly improve Jordanian communities' access to healthcare. Utilizing telemedicine, mobile health apps, and electronic health records, these technologies can improve health outcomes and treatment delivery by overcoming socioeconomic and geographic constraints. But for implementation to be successful, issues including legislative frameworks, digital literacy, and infrastructure constraints must be resolved. To guarantee a lasting effect on a variety of Jordanian communities, future initiatives should place a high priority on scalable, culturally appropriate solutions, stakeholder participation, and fair access.

## Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.



## References

[1] L. H. Nazer *et al.*, "Bias in artificial intelligence algorithms and recommendations for mitigation," *PLOS Digital Health*, vol. 2, no. 6, p. e0000278, 2023.

[2] B. Noormal *et al.*, "Innovative approaches to improve public health practice in the eastern mediterranean region: Findings from the sixth eastern mediterranean public health network regional conference," *JMIR Public Health and Surveillance*, vol. 5, no. 1, p. e11382, 2019.

[3] B. J. Ali *et al.*, "Impact of service quality on customer satisfaction: Case study at online meeting platforms," *International Journal of Engineering, Business and Management*, vol. 5, no. 2, pp. 65–77, 2021. https://doi.org/10.22161/ijebm.5.2.6
[4] S. Lupieri and L. Frisina Doetter, "Transnational interdependency and healthcare system change: The role of humanitarian and development aid in shaping health policy in Jordan," *Global Social Policy*, vol. 20, no. 2, pp. 192-214, 2020.
[5] M. Safdarian *et al.*, "Global, regional, and national burden of spinal cord injury, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019," *The Lancet Neurology*, vol. 22, no. 11, pp. 1026-1047, 2023.
[6] V. Gbenro, "Exploring the impact and roles strategic government leadership plays in adoption and use of eHealth in low resource countries: A case study of the medical and dental council of Nigeria as a professional health regulatory agency," Doctoral Dissertation, 2018.
[7] K. McCracken and D. R. Phillips, *Global health: An introduction to current and future trends*. UK: Routledge, 2017.
[8] F. Y. Al-Kasassbeh, S. M. Awaisheh, M. A. Odeibat, S. M. A. Awaesheh, L. Al-Khalaileh, and M. Al-Braizat, "Digital human rights in Jordanian legislation and international agreement," *International Journal of Cyber Criminology*, vol. 18, no. 1, pp. 37-57, 2024.
[9] T. A. Saleh, M. Mustaqeem, and M. Khaled, "Water treatment technologies in removing heavy metal ions from wastewater: A review," *Environmental Nanotechnology, Monitoring & Management*, vol. 17, p. 100617, 2022. https://doi.org/10.1016/j.enmm.2021.100617
[10] Y. Abuelhaija *et al.*, "A systematic review on the healthcare system in Jordan: Strengths, weaknesses, and opportunities for improvement," *World Journal of Advanced Research and Reviews*, vol. 18, no. 3, pp. 1393-1396, 2023.
[11] M. Shaw, *Unplanned change and crisis management, Global encyclopedia of public administration, public policy, and governance*. Switzerland: Springer, 2023.
[12] A. K. Laar *et al.*, "Health system challenges to hypertension and related non-communicable diseases prevention and treatment: Perspectives from Ghanaian stakeholders," *BMC Health Services Research*, vol. 19, pp. 1-13, 2019.
[13] J. Brown, S. Guru, K. Williams, R. Florentino, J. Miner, and B. Cagir, "Rural healthcare center preparation and readiness response to threat of COVID-19," *Journal of the American College of Surgeons*, vol. 230, no. 6, pp. 1105-1110, 2020.
[14] World Health Organization (WHO), *World Health Statistics 2021: Monitoring health for the SDGs, sustainable development goals*. Switzerland: World Health Organization, 2021.
[15] S. Abd-Elsalam *et al.*, "Clinical study evaluating the efficacy of ivermectin in COVID-19 treatment: A randomized controlled study," *Journal of Medical Virology*, vol. 93, no. 10, pp. 5833-5838, 2021. https://doi.org/10.1002/jmv.27122
[16] O. M. Bushnaq, I. Zhilin, G. De Masi, E. Natalizio, and I. Akyildiz, "Automatic network slicing for resource allocation in underwater acoustic communication systems," presented at the 2021 International Balkan Conference on Communications and Networking (BalkanCom), IEEE, 2021.
[17] A. G. Meral, M. Langley, and V. Barbelet, "Inclusion and exclusion in urban refugee displacement in Jordan," in "ODI: Think change," Retrieved: https://odi.org/en/publications/inclusion-and-exclusion-in-urban-refugee-displacement-in-jordan/(accessed. [Accessed 23 March 2022], 2022.
[18] S. Al-Gharaibeh, H. A. Hijazi, H. M. Alzoubi, A. A. Abdalla, L. S. Khamash, and N. Y. Kalbouneh, "The impact of e-learning on the feeling of job Alienation among faculty members in Jordanian universities," *ABAC Journal*, vol. 43, no. 4, pp. 303-317, 2023. https://doi.org/10.59865/abacj.2023.50
[19] R. O. Alsawalqa, M. N. Alrawashdeh, Y. A. R. Sa'deh, and A. Abuanzeh, "Exploring Jordanian women's resistance strategies to domestic violence: A scoping review," *Frontiers in Sociology*, vol. 7, p. 1026408, 2022.
[20] M. Ahmada, S. H. B. Hanib, M. A. Sabrac, and O. Almahmoudd, "Big data can help prepare nurses and improve patient outcomes by improving quality, safety, and outcomes," *Institutions*, vol. 3, pp. 1-8, 2023.
[21] T. Kosiol and S. Ufer, "Teachers' self-reported and actual content-related TPACK–new results on their relation and gender differences," *Computers and Education Open*, vol. 7, p. 100205, 2024.
[22] V. S. Osipov and T. V. Skryl, *Impact of digital technologies on the efficiency of healthcare delivery, IoT in healthcare and ambient assisted living*. Switzerland: Springer, 2021, pp. 243-261.
[23] Z. Fan and T. Fujimoto, "Interaction design for Email client: User," in *Proceedings of the 27th International Conference on Systems Engineering, ICSEng 2020, Springer Nature*, 2021, vol. 182, p. 237.
[24] M. Piga *et al.*, "Physician global assessment international standardisation consensus in systemic lupus erythematosus: The PISCOS study," *The Lancet Rheumatology*, vol. 4, no. 6, pp. e441-e449, 2022.
[25] A. A. Gharaibeh, M. N. Alhamad, D. A. Al-Hassan, and N. I. Abumustafa, "The impact of the spatial configuration of socioeconomic services on rural–urban dependencies in Northern Jordan," *GeoJournal*, vol. 87, no. 6, pp. 4475-4490, 2022.
[26] Y. Jalghoum, A. Tahtamouni, S. Khasawneh, and A. Al-Madadha, "Challenges to healthcare information systems development: The case of Jordan," *International Journal of Healthcare Management*, vol. 14, no. 2, pp. 447-455, 2021.
[27] A. Haleem, M. Javaid, R. P. Singh, and R. Suman, "Telemedicine for healthcare: Capabilities, features, barriers, and applications," *Sensors International*, vol. 2, p. 100117, 2021.

*Edelweiss Applied Science and Technology*
*ISSN: 2576-8484*
*Vol. 9, No. 6: 734-741, 2025*
*DOI: 10.55214/25768484.v9i6.7871*

[28] T. Shudayfat, S. B. Hani, E. Shdaifat, K. Al-Mugheed, S. A. Alsenany, and S. M. Farghaly Abdelaliem, "Electronic health literacy and its association with lifestyle behavior among undergraduate students: A cross-sectional survey," *Digital Health*, vol. 9, p. 20552076231185429, 2023. https://doi.org/10.1177/20552076231185429
[29] M. P. Valk-Draad and S. Bohnet-Joschko, "Nursing home-sensitive hospitalizations and the relevance of telemedicine: A scoping review," *International Journal of Environmental Research and Public Health*, vol. 19, no. 19, p. 12944, 2022. https://doi.org/10.3390/ijerph191912944
[30] J.-C. Liu, C.-Y. Cheng, T.-H. Cheng, C.-N. Liu, J.-J. Chen, and W.-R. Hao, "Unveiling the potential: remote monitoring and telemedicine in shaping the future of heart failure management," *Life*, vol. 14, no. 8, p. 936, 2024.
[31] P. Arias *et al.*, "Climate change 2021: The physical science basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change; Technical summary," Retrieved: https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_TS.pdf, 2021.
[32] A. H. Litwin *et al.*, "Perceived barriers related to testing, management and treatment of HCV infection among physicians prescribing opioid agonist therapy: The C-SCOPE Study," *Journal of Viral Hepatitis*, vol. 26, no. 9, pp. 1094-1104, 2019.
[33] H. Wickham, "Data analysis, ggplot2: Elegant graphics for data analysis." Switzerland: Springer, 2016, pp. 189-201.
[34] P. X. Kuan *et al.*, "Efficacy of telemedicine for the management of cardiovascular disease: A systematic review and meta-analysis," *The Lancet Digital Health*, vol. 4, no. 9, pp. e676-e691, 2022.
[35] R. Murshidi *et al.*, "Knowledge, attitudes, and perceptions of Jordanians toward adopting and using telemedicine: national cross-sectional study," *JMIR Human Factors*, vol. 9, no. 4, p. e41499, 2022.
[36] S. Mansour, N. Hasebe, K. Abdelrahman, M. S. Fnais, and A. Tamura, "The Gulf of Suez rifting: implications from low-temperature thermochronology," *International Geology Review*, vol. 67, no. 5, pp. 694-710, 2025.
[37] T. A. Al-Maaitah, A. S. Khalid, A. M. F. Al-Junaidi, Al Daabseh, T. K. I., A. Alnawafleh, N. A. Qatawneh, and D. A. Al-Maaitah, "Strategies for success: A theoretical model for implementing business intelligence systems to enhance organizational performance," *International Journal of Advanced and Applied Sciences*, vol. 11, no. 5, pp. 55–61, 2024. https://doi.org/10.21833/ijaas.2024.05.006
[38] S. A. Wagan, J. Koo, I. F. Siddiqui, M. Attique, D. R. Shin, and N. M. F. Qureshi, "Internet of medical things and trending converged technologies: A comprehensive review on real-time applications," *Journal of King Saud University-Computer and Information Sciences*, vol. 34, no. 10, pp. 9228-9251, 2022. https://doi.org/10.1016/j.jksuci.2022.09.005
[39] Y. A. Yousef *et al.*, "How telemedicine and centralized care changed the natural history of retinoblastoma in a developing country: Analysis of 478 patients," *Ophthalmology*, vol. 128, no. 1, pp. 130-137, 2021. https://doi.org/10.1016/j.ophtha.2020.07.026
[40] S. H. Bani Hani and M. M. Ahmad, "Machine-learning algorithms for ischemic heart disease prediction: A systematic review," *Current Cardiology Reviews*, vol. 19, no. 1, pp. 87-99, 2023.
[41] F. G. Opelka, "Role of advocacy in healthcare transformation," *Diseases of the Colon & Rectum*, vol. 62, no. 5, pp. 519-521, 2019.
[42] A. Khang, B. Jadhav, and M. Sayyed, *Role of cutting-edge technologies and deep learning frameworks in the digital healthcare sector, AI-driven innovations in digital healthcare: Emerging trends, challenges, and applications*. USA: IGI Global Scientific Publishing, 2024, pp. 1-22.
[43] A. Cote *et al.*, "Perspectives on the current state, challenges, and opportunities in pharmaceutical crystallization process development," *Crystal Growth & Design*, vol. 20, no. 12, pp. 7568-7581, 2020.

*Edelweiss Applied Science and Technology*
*ISSN: 2576-8484*
*Vol. 9, No. 6: 734-741, 2025*
*DOI: 10.55214/25768484.v9i6.7871*