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The Impact of Health Information Access on Patient Empowerment and outcome

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ABSTRACT

Aim:-To explore the transition from a traditional paternalistic healthcare model to a patient-centered approach driven by accessible and trustworthy health information, and to evaluate the role of digital health technologies in fostering patient empowerment and improved health outcomes.

Methodology:-A narrative synthesis was conducted based on relevant literature examining historical healthcare practices, the rise of digital health tools, and their influence on patient engagement. Sources included peer-reviewed articles, healthcare policy reports, and recent empirical studies addressing patient empowerment, health literacy, and digital inclusivity. The analysis focused on identifying key drivers of change, the benefits of improved access to health information, and persistent barriers to equitable participation in healthcare decision-making.

Results:-The findings indicate a paradigm shift from shamanistic and paternalistic healthcare decision-making toward a collaborative model where patients actively participate in shaping their health trajectories. Digital health innovations—including telehealth, electronic and personal health records, remote monitoring, and artificial intelligence—have expanded information access, enabling shared decision-making, improved adherence to therapy, and better chronic disease management. Empowered patients demonstrated higher satisfaction, reduced hospital readmissions, and enhanced clinical outcomes. However, significant challenges persist, including the digital divide, economic and cultural disparities, language barriers, and health misinformation.

Conclusion:-Improving access to clear, reliable health information is pivotal in strengthening patient empowerment and advancing health outcomes. Bridging gaps in digital access, enhancing health literacy, and fostering culturally sensitive communication from healthcare professionals are essential strategies for overcoming existing barriers and realizing the full potential of patient-centered care in the digital era.

Keywords:-Patient empowerment, digital health, telehealth, health literacy, shared decision-making, health outcomes, digital divide, healthcare transformation.

INTRODUCTION

Access to relevant health information is the ability to seek, locate, and obtain data. it is fundamental for improving both personal and public health outcomes. When individuals can effectively use this information, they enhance their knowledge, engage more proactively with healthcare services, reduce medical expenses, and adopt healthier behaviors. This process of accessing and applying health information plays a crucial role in informed decision-making that supports the maintenance and improvement of overall health.(1)In the 21st century, healthcare is experiencing a paradigm shift known as digital health. Historically underutilized, patients are now increasingly contributing to their care by sharing information, data, insights, preferences, and knowledge. Advances in information technology have begun to transform the traditional hierarchical doctor-patient relationship into a more balanced partnership, marked by emerging patient autonomy.(2)

The experience of empowerment often begins within a healthcare context that challenges an individual’s identity, integrity, and sense of progress. This leads to an exploration of feelings such as helplessness, vulnerability, and loss of control commonly encountered during illness, pain, or stress. Empowerment is a dynamic process influenced by these experiences, wherein patients gradually gain or sometimes lose a sense of control. Crucially, empowerment is shaped through reflection and self-awareness concerning one’s identity, suffering, and coping abilities. Rather than an endpoint, patient empowerment represents a transformative journey involving continual personal growth.(3) The Impact of Health Information Access on Patient Empowerment and outcome is mentioned below in **Fig-1.**

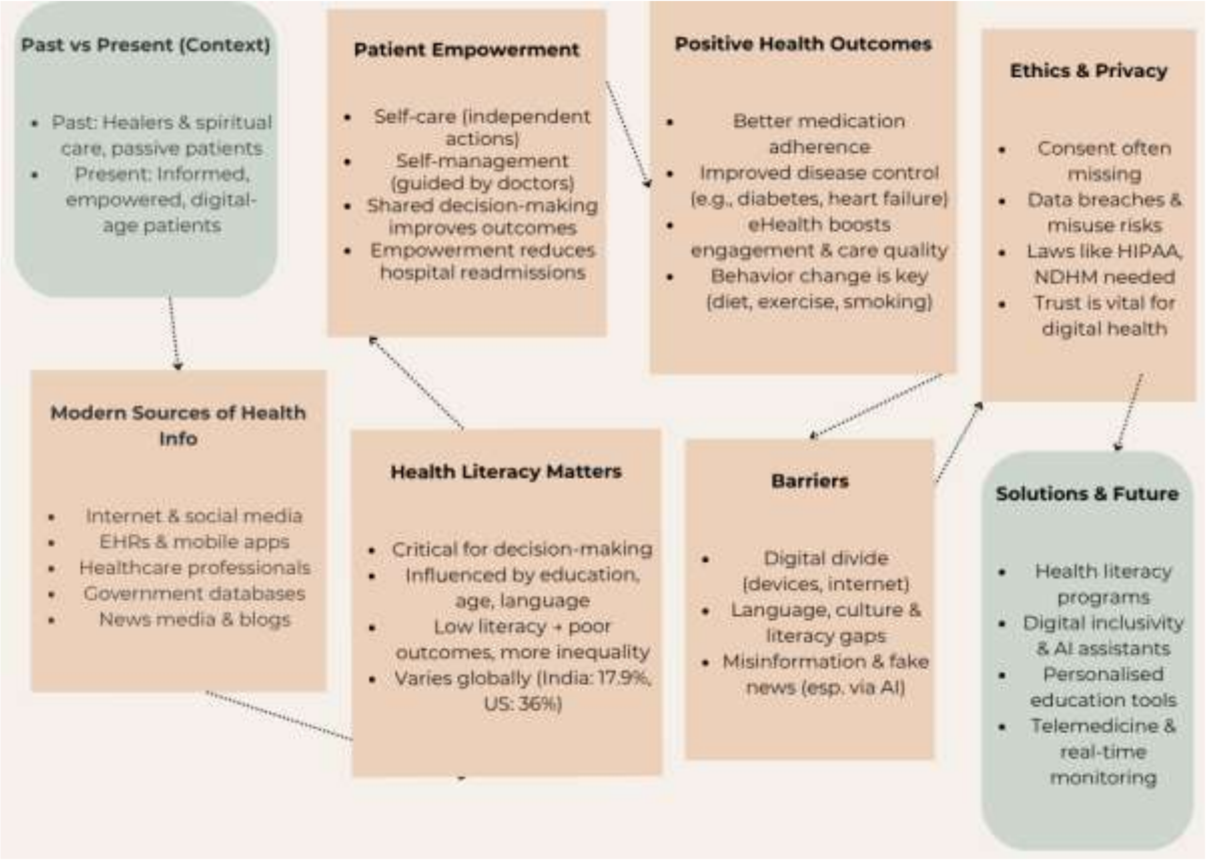

Fig-1The Impact of Health Information Access on Patient Empowerment and outcome.

A meta-analysis has shown that access to and use of health information are linked to improved adherence to medical treatments among patients with both chronic and acute conditions. Another study highlighted a connection between health information access and enhanced self-care behaviors in individuals with heart failure. Additionally, multiple studies indicate that health information access and utilization predict various positive health behaviors, such as attending regular medical checkups and participating in cancer screening programs. This relationship underscores the crucial role that adequate access to and use of health information play in facilitating better health outcomes across different areas.(4) The progression from patient empowerment to patient design reflects a deeper engagement of healthcare systems with the patient's perspective. Initially, empowerment encouraged patients to take an informed and active role in their care. Building on that foundation, the patient design model involves patients as equal collaborators, participating in decision-making at leadership and executive levels. Over the last decade, "patient centricity" has become a core focus for many healthcare organizations, embracing a "patient-first" philosophy. This evolution aligns with the growing democratization of healthcare, where patients increasingly expect access to trustworthy information, user-friendly tools, and comprehensive support services.(2)A major opportunity to enhance patient empowerment lies in initiatives that provide individuals with access to their personal health information (PHI) and facilitate sharing this information across various healthcare settings and systems. Personal health records (PHRs) and the accessibility of data through health information exchanges are regarded as essential elements for delivering efficient and effective healthcare.(5)

2. Sources of Health Information

We are living in a digital era, which has significantly transformed how health information is accessed and shared. It is well known that digital technology shapes many aspects of our lives today. For example, research shows that about one-third of adults in the United States turn to the internet to research or understand health issues. This rise in internet use, coupled with the expanding amount of health information online, is reshaping the way people engage with health knowledge(6)Having a reliable source of health information is critical for building a strong foundation of knowledge about health among the public.(7)Advancements in information technology have generated vast amounts of data and significantly enhanced health communication among users. Various digital sources, including social media platforms and electronic health records (EHRs), provide valuable opportunities to analyze health information and influence public health outcomes. Despite their benefits, these digital sources also present challenges related to access and potential negative health effects that remain inadequately examined. Alongside digital channels, traditional mass media—such as television and radio broadcasts—have long served as important vehicles for disseminating health messages. Before the rise of the internet and social media, these traditional media played a crucial role in public health campaigns aimed at educating and raising awareness within communities, often complementing newer data-driven approaches. Public health events are frequently reported through online news and internet media platforms. Official news agencies, online newspapers, professional and personal blogs, as well as individual websites, have become vital early-warning sources for digital epidemiology. Studies have shown that media reports of minor outbreaks often surface several days before traditional health surveillance systems are alerted. To enhance detection, comprehensive epidemic intelligence (EI) systems have been developed that continuously monitor news worldwide across multiple languages, enabling rapid identification of events such as localized food poisoning incidents.(8) The Various sources of the health information are mentioned below in **Fig-2.**

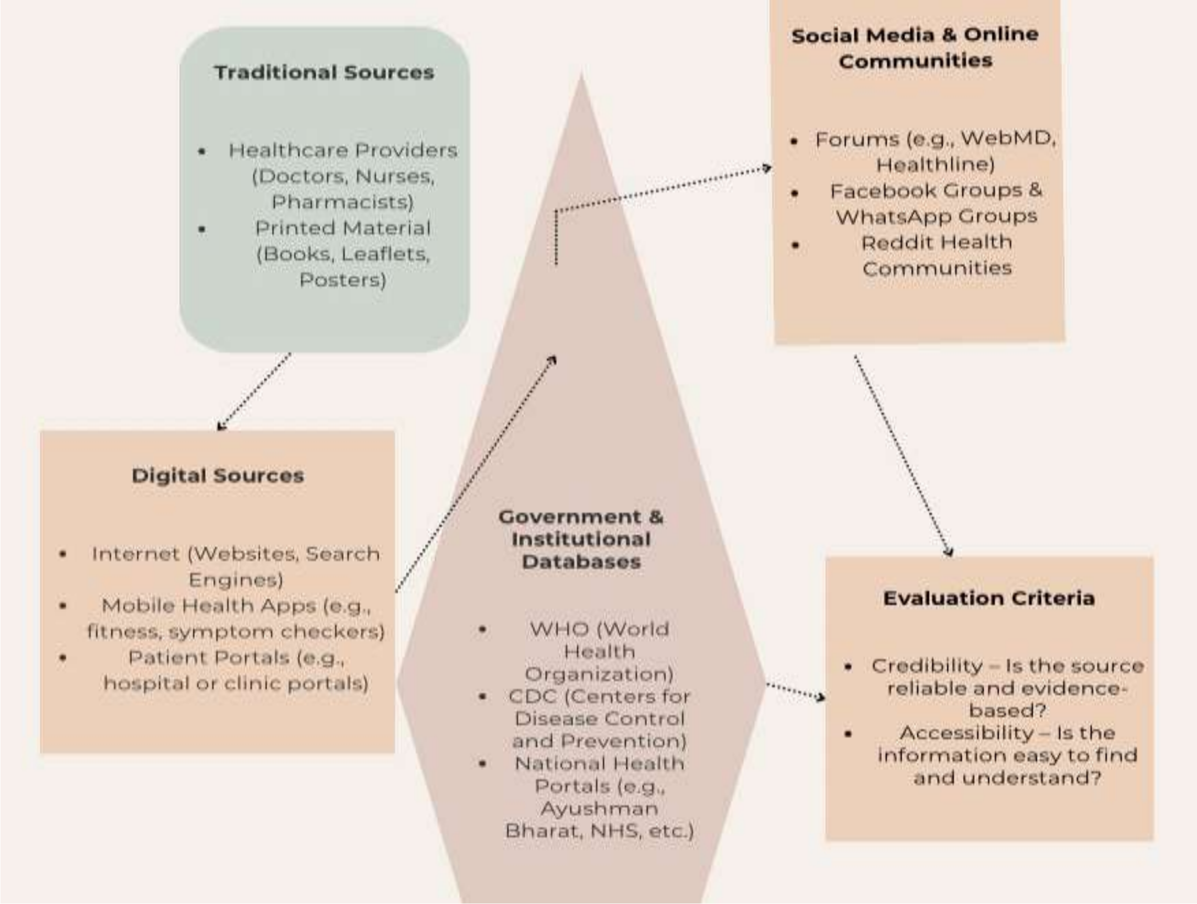

Fig:-2 Various sources of the health information.

3. Health Literacy and Its Role

Digital communication technologies have shown great promise in enhancing health literacy, which in turn contributes to improved health outcomes.(9) Health literacy, first defined in the 1970s, describes an individual's ability to navigate the complex demands of maintaining and promoting health. Over the past two decades, its importance has gained recognition for its impact on both personal and public health and its role in sustaining healthcare systems. This is particularly critical given the growing prevalence and cost of non-communicable diseases, which necessitate greater patient responsibility and efficient use of health services. Low health literacy is associated with poor comprehension of health information, limited disease awareness, and reduced medication adherence, contributing to adverse outcomes, higher mortality risk, underuse or misuse of care, increased costs, and health disparities.

Among the most influential frameworks, the Institute of Medicine (IoM) model outlines four core components: cultural and conceptual knowledge, print literacy, oral literacy, and numeracy. It underscores the skills needed to obtain, interpret, and apply health information effectively, particularly in medical decision-making and care.(10)Patients exhibit varying preferences in their involvement with medical decision-making, a variation not fully explained by existing research. Health literacy is defined as the individual capacity and social resources needed to access, comprehend, and use health information as a key factor influencing these preferences. The growing emphasis on patient participation arises from ethical imperatives and robust evidence linking such involvement to improved outcomes, including enhanced knowledge, greater satisfaction, reduced anxiety, and better adherence to treatment. High-quality care respects and responds to individual patient values, needs, and preferences. While some patients prefer to delegate decisions to their providers, most favor a shared decision-making approach. Preferences are shaped by multiple factors: the type of decision, patient-provider relationships, illness experience, health status, and demographics such as age, gender, and education. Trends show that women, younger individuals, and those with higher education generally seek a more active role. Furthermore, many patients report experiencing their preferred level of involvement in decision-making.(11)

Socially disadvantaged groups tend to have poorer health and lower health literacy than more privileged populations, prompting growing interest from researchers, healthcare providers, and policymakers in the role health literacy may play in these disparities. Vulnerable populations shaped by social, economic, political, structural, geographic, and historical factors face greater health risks and reduced access to care. These groups include older adults, individuals with disabilities, those with lower socioeconomic status or education, racial and ethnic minorities, and people with limited English proficiency. Although low health literacy occurs across all demographic groups, it disproportionately affects these vulnerable populations. Evidence from large-scale studies, such as an analysis of nearly 3,000 adults over age 65 in the National Assessment of Adult Literacy, shows that health literacy can mediate the link between education level and health outcomes, influencing both self-rated health and important measures of healthcare access and use, including vaccinations, cancer screening, and dental care.(12) The global data on health literacy with their development status are listed below in **Table-1.**

Table-1 Global data on health literacy (13)

Sr.No.	Countries	Health literacy %	Development Status
1.	Finland	Developed	32 (high); 51 (medium); 17 (low)%
2.	Sweden	Developed	60%
3.	Norway	Developed	46%
4.	Poland	Developed	65.2%
5.	United States	Developed	12 %
6.	China	Developing	28%
7.	India	Developing	17.9 %
8.	Cameroon	Developing	25.8%
9.	Kazakhstan	Developing	26.7%
10.	Latvia	Developed/Transition	21%

4. Impact on Patient Empowerment

Self-care and self-management are closely related but distinct concepts that play a key role in long-term health management. Self-management refers to health-related behaviours patients carry out with guidance from healthcare professionals. It often involves setting goals, making lifestyle changes, and working with providers on structured action plans. For example, diabetes self-management education (DSME) equips individuals with the skills and knowledge needed to control blood sugar, meet treatment targets, and reduce the risk of complications through shared responsibility. In contrast, self-care is driven mainly by the patient's own initiative. It includes everyday actions like following a healthy diet, exercising regularly, and checking blood glucose levels. While self-management is often structured and collaborative, self-care reflects independent decision-making and the patient's ability to take charge of their health. When improved together, self-care and self-management empower individuals to maintain health, prevent complications, and actively participate in their own care.(14)

Shared decision-making (SDM) is a collaborative process where patients and physicians make healthcare choices together, combining the best available evidence with the patient's values, preferences, and circumstances. It is most often applied to decisions about invasive procedures, and in urgent settings such as emergency departments and ICUs, where discussions may involve life-sustaining treatment.Effective SDM improves treatment outcomes, enhances care quality, and reduces medical errors.While the formal study of SDM in emergency medicine is relatively new, research shows it aligns with patient centered care, cultural considerations, and evolving legal standards. Success depends on open communication, acknowledgment of patient values, and shared responsibility in decision making(15)Shared decision-making is widely recognized for enhancing satisfaction among both healthcare providers and patients, while also contributing to improved treatment results.(16)Behavior change and lifestyle modifications are key to preventing flare-ups of chronic conditions and easing symptoms. They help individuals cut harmful habits like smoking, adopt protective behaviors such as regular exercise, and follow medical advice, including taking medications as prescribed. Although managing chronic diseases often requires addressing several behaviors at once, most well-studied interventions still focus on changing just one habit and its effect on health outcomes. Studying multiple health behavior change (MHBC) is important to identify which habits drive better clinical results. Because unhealthy and healthy behaviors tend to cluster, improving several at the same time can boost disease management and overall health.(17)

A randomized clinical trial involving 120 heart failure patients compared a structured empowerment program with standard care. The intervention group received face-to-face education, printed materials, and ongoing support through the Telegram messaging app, while the control group continued routine care. After six months, participants in the empowerment program showed significant gains in self-care maintenance, management, and confidence, alongside fewer and shorter hospital admissions. No demographic differences were noted between groups. These findings demonstrate the value of empowerment-based interventions in enhancing self-care and reducing hospitalization among heart failure patients.(18)

5. Effect on Health Outcomes

Diabetes has become a major global health concern, with cases rising each year and often leading to serious complications. Effective management requires lifestyle changes such as healthy eating, regular exercise, medication adherence, and tracking health data. This self-monitoring not only helps patients adjust their routines but also supports healthcare professionals in treatment decisions. Digital solutions in clinics can improve diabetes care for all age groups, including older adults, who can benefit from eHealth programs if given proper technical support to maintain engagement and build self-management skills. Mobile phones play a valuable role in long-term self-care, helping with weight control, medication reminders, and physical activity through tailored messages that keep patients motivated and on track. These low-cost tools are especially useful for low-income and rural populations. Strong communication with healthcare providers and social support from family members further enhance disease control.(19)Only about half of patients with chronic illnesses in developed countries take their medicines as prescribed, a problem that persists despite numerous, often complex, interventions. Nonadherence worsens health outcomes and raises healthcare costs.

The Information–Motivation–Behavioural Skills (IMB) model highlights three key drivers of adherence: understanding the treatment, motivation to follow it, and the skills to fit it into daily life. Barriers include low health literacy, limited follow-up, and difficulty interpreting instructions, while adherence improves with clear information, patient motivation, supportive systems, simple regimens, minimal side effects, and ease of administration.(20)Patient engagement means patients take an active role in making decisions and managing their health, which is linked to better outcomes, improved care quality, and lower costs. With the rise of eHealth tools like health apps, telemedicine, and online communities especially accelerated by the COVID-19 pandemic patients now have easier access to information, stronger connections with providers, and greater satisfaction with their care.(21)Heart failure affects around 6.2 million Americans, with a 5-year mortality rate near 42%, and nearly half of discharged patients are readmitted within six months. Recent strategies to lower readmission rates have incorporated remote monitoring, allowing physicians to track patients' health in real time, maintain consistent communication, and actively involve patients in managing their condition improving both health literacy and informed decision-making.

In our program, continuous monitoring of vital signs after discharge reduced hospital readmission and costs while improving outcomes. These interventions strengthened patient-caregiver interaction and promoted self-management. With integration into electronic health records, such scalable digital platforms offer a practical, cost-effective approach for managing chronic conditions like heart failure.(22)

6. Barriers to Accessing Health Information

Telehealth has helped bridge geographic gaps in care, yet access is hindered by the need for reliable devices, internet connectivity, and basic digital literacy resources often lacking in undeserved areas, particularly rural communities. Beyond infrastructure, socioeconomic factors such as income, education, age, and racial or ethnic background strongly influence health outcomes and contribute to persistent disparities. Broadband access itself is emerging as a key social determinant of health. Language and cultural barriers further compound inequities. More than 25 million U.S. residents have limited English proficiency, a number that has risen sharply in recent decades. These patients face significant communication challenges, particularly in complex fields like cancer care, where inadequate implementation of interpreting standards can limit their ability to engage in decision-making. Without addressing technological gaps, socioeconomic inequities, and linguistic or cultural obstacles, efforts to achieve equitable, high-quality care will remain incomplete.(23)

Large language models can produce large volumes of human-like text, which can also be used to spread persuasive misinformation. During the COVID-19 pandemic, false claims from fake cures to conspiracy theories caused significant harm, including illness, deaths, public anxiety, loss of trust in health authorities, and increased stigma and discrimination. With social media accelerating the spread, tackling health misinformation has become vital for both public health and governance. However, manually detecting false information is slow and resource-heavy, making it difficult to keep pace with the volume of content online.(24)

7. Ethical, Legal, and Data Privacy Considerations

The rapid adoption of Digital Health Technologies (DHTs) has intensified global concerns over ethics, patient safety, and data security. Protecting the confidentiality, integrity, and availability of health information is critical, yet the involvement of multiple parties in generating and handling patient data heightens the risk of breaches and unauthorized access. At the core of these ethical issues are patient privacy and consent the right of individuals to control the use of their medical information. Safeguarding this right is essential to maintaining trust, and healthcare professionals have a duty to ensure access is limited to authorized personnel. Any violation not only erodes confidence but can also bring legal consequences. While tools such as Electronic Health Records have improved efficiency and reduced errors, they have also introduced new vulnerabilities. Laws like Ghana's Data Protection Act (2012) and the U.S. HIPAA mandate strict protection of patient data, reinforcing the ethical responsibility to respect autonomy and secure sensitive information in the digital era.(25)

In much of primary care in India, doctors rarely keep records, and even when they do, consent is seldom obtained. Community health workers often gather large amounts of data without explaining its purpose or seeking permission. The NDHM envisions an electronic health record system where patient data is collected with consent. In modern hospitals, consent when taken is usually documented at registration or before a procedure. Telemedicine guidelines state that if a patient initiates a virtual consultation, consent is implied. While consent will remain central to medical data exchange, current practices are flawed. Smarter, well-designed systems are needed to prevent harmful choices and ensure transparency. Laws that demand accountability can build the trust essential for wider digitisation and for creating data commons that drive medical progress and public health.(26)

While the internet is a useful source for health information, a lack of e-health literacy can lead to misinformation, heightened anxiety, and even cyberchondria excessive online health searches that fuel fear of illness. Many people, including a large percentage of university students, turn to the internet for easy, private access to health resources. However, without the skills to find, assess, and interpret reliable information, they may misjudge their health status. For those with health anxiety, repeated online searches for reassurance can backfire intensifying focus on feared diseases, increasing search frequency, and creating a vicious cycle of worry and information seeking. This overreliance on unverified online sources can worsen anxiety and raise the risk of developing cyberchondria.(27)

8. Strategies to Enhance Health Information Access

Healthcare providers, including physicians, pharmacists, and nurses, remain among the most trusted professions, ranking in the top ten in Gallup polls as recently as January 2024. Patients often report greater trust in their individual provider than in the healthcare system as a whole. Many providers acknowledge the value of trust in guiding patient care and access to services(28) Healthcare systems are complex and resource-limited, but artificial intelligence (AI) is reshaping the way care is delivered, offering new ways to boost quality, efficiency, and patient outcomes. AI's integration into clinical practice equips healthcare providers with tools and insights to improve decision-making and personalize care. One key innovation is virtual health assistants that is AI-powered tools that interact with patients, assess symptoms, provide tailored advice, remind them about medications, schedule appointments, monitor vital signs, and send updates to their doctors. By taking over routine tasks, these assistants reduce the workload on healthcare professionals while ensuring patients receive timely support. They are accessible anytime, making care easier to reach, and can even triage patients to determine urgency, as seen in the NHS trial where over a million people now use an AI chatbot instead of calling a helpline. Voice-enabled devices also benefit elderly and chronically ill patients who struggle with apps. Overall, AI-driven health assistants enhance patient engagement, streamline services, and create a more personalized healthcare experience.(29)

9. Future Directions and Research Needs

Digital health is shifting care toward personalized approaches, giving patients greater control and improving diagnostic and treatment capabilities. However, several gaps and challenges remain.

First, digital health literacy is uneven; many patients, especially older ones, are unaware of available tools, lack technical skills, or face language barriers. This can create anxiety, fear of misdiagnosis, and low confidence in using health data.

Second, technical and functional limitations in accessing or using digital tools hinder their effectiveness.

Third, ethical concerns, including privacy, data security, and mistrust over potential misuse or sharing of personal health information, pose significant barriers to adoption.

These gaps highlight the need for research that addresses literacy, usability, and trust to fully realize the benefits of digital health.(30)

Emerging technologies like artificial intelligence (AI) and telemedicine are revolutionizing healthcare, especially in resource-limited settings. Telemedicine has evolved from basic audio consultations to advanced platforms that combine video, data sharing, and AI-powered real-time diagnostics. These AI-driven systems utilize machine learning, natural language processing, and computer vision to improve diagnostic accuracy, deliver personalized treatment plans, and streamline healthcare delivery. By breaking down geographic and financial barriers, such technologies are making healthcare more accessible and efficient worldwide.(31)The rise of online health information resources, including websites, forums, and social media, has changed how people access health knowledge. These platforms provide broad access but vary in reliability, particularly challenging those with limited health literacy. Ensuring the accuracy and usability of online health content is vital to improving public health understanding. Mobile health apps, with features like educational materials, symptom tracking, medication reminders, and peer support, have shown promise in enhancing health literacy and self-management, especially for chronic diseases. With over 300,000 health apps globally, their ability to overcome geographic barriers is key to expanding healthcare access in underserved areas.

However, gaps remain in research on the quality, personalization, and equitable access to these digital tools. Personalized health education platforms tailored to individual needs could address diverse literacy levels and improve engagement. Policy efforts should focus on regulating the quality of digital health content, promoting equitable technology access, and supporting the integration of these tools into healthcare systems to maximize their benefits.(9)

CONCLUSION

Ensuring equitable access to reliable health information is central to improving both individual and public health. When people can easily find, understand, and use health information, they are better equipped to make informed choices, engage actively with their care, and adopt habits that promote long-term well-being. Yet, disparities in digital literacy, technology access, language, and socioeconomic resources continue to limit this potential for many communities.

Addressing these gaps is not only a matter of fairness but also a pathway to stronger patient empowerment. Empowered patients are supported by accurate information, user-friendly tools, and collaborative healthcare relationships are more confident in managing their conditions, more likely to adhere to treatment, and better able to participate in shared decision-making. Continued efforts to expand access, improve the quality of health communication, and tailor resources to diverse needs will be vital. By breaking down barriers and fostering trust, healthcare systems can ensure that the benefits of the digital age translate into better health outcomes for all.

REFERENCES

[1]. Chen X, Orom H, Hay JL, Waters EA, Schofield E, Li Y, et al. Differences in Rural and Urban Health Information Access and Use. Journal of Rural Health. 2019;35(3).
[2]. Mesko B, deBronkart D, Dhunnoo P, Arvai N, Katonai G, Riggare S. The Evolution of Patient Empowerment and Its Impact on Health Care's Future. J Med Internet Res. 2025 May 1;27:e60562.
[3]. Varela AJ, Gallamore MJ, Hansen NR, Martin DC. Patient empowerment: a critical evaluation and prescription for a foundational definition. Front Psychol. 2025 Jan 17;15.
[4]. Lee HY, Jin SW, Henning-Smith C, Lee J, Lee J. Role of Health Literacy in Health-Related Information-Seeking Behavior Online: Cross-sectional Study. J Med Internet Res. 2021 Jan 27;23(1):e14088.
[5]. Ose D, Kunz A, Pohlmann S, Hofmann H, Qreini M, Krisam J, et al. A Personal Electronic Health Record: Study Protocol of a Feasibility Study on Implementation in a Real-World Health Care Setting. JMIR Res Protoc. 2017 Mar 2;6(3):e33.
[6]. Jacobs W, Amuta AO, Jeon KC. Health information seeking in the digital age: An analysis of health information seeking behavior among US adults. Cogent Soc Sci. 2017 Jan 1;3(1):1302785.
[7]. Alduraywish SA, Altamimi LA, Aldhuwayhi RA, AlZamil LR, Alzeghayer LY, Alsaleh FS, et al. Sources of Health Information and Their Impacts on Medical Knowledge Perception Among the Saudi Arabian Population: Cross-Sectional Study. J Med Internet Res. 2020 Mar 19;22(3):e14414.
[8]. Li L, Novillo-Ortiz D, Azzopardi-Muscat N, Kostkova P. Digital Data Sources and Their Impact on People's Health: A Systematic Review of Systematic Reviews. Front Public Health. 2021 May 5;9.
[9]. Fitzpatrick PJ. Improving health literacy using the power of digital communications to achieve better health outcomes for patients and practitioners. Front Digit Health. 2023 Nov 17;5.
[10]. Liu C, Wang D, Liu C, Jiang J, Wang X, Chen H, et al. What is the meaning of health literacy? A systematic review and qualitative synthesis. Fam Med Community Health. 2020 May 14;8(2):e000351.
[11]. Brabers AEM, Rademakers JJDJM, Groenewegen PP, van Dijk L, de Jong JD. What role does health literacy play in patients' involvement in medical decision-making? PLoS One. 2017 Mar 3;12(3):e0173316.
[12]. Schillinger D. Social Determinants, Health Literacy, and Disparities: Intersections and Controversies. HLRP: Health Literacy Research and Practice. 2021 Jul;5(3).
[13]. Opare-Kumi R. Health Literacy and Health Outcomes in developed and developing countries: A correlational database analysis focusing on Sustainable Development Goals (SDGs) 3 and 4 and other correlates. 2024; Available from: www.globalscientificjournal.comwww.globalscientificjournal.com

[14]. Puzhakkal S, Kavanagh S, Conway B, Kow CS, Hasan SS. Self-care and self-management in diabetes: concepts, theories and practices. Int J Clin Pharm. 2025 Jun 9;

[15]. Liang Y, Zhang H, Li S, Ma Q. Shared Decision-Making on Life-Sustaining Treatment: A Survey of Current Barriers in Practice Among Clinicians Across China. Healthcare. 2025 Mar 3;13(5):547.

[16]. Kang JH. Influences of decision preferences and health literacy on temporomandibular disorder treatment outcome. BMC Oral Health. 2022 Sep 5;22(1):385.

[17]. Silva CC, Presseau J, van Allen Z, Schenk PM, Moreto M, Dinsmore J, et al. Effectiveness of Interventions for Changing More Than One Behavior at a Time to Manage Chronic Conditions: A Systematic Review and Meta-analysis. Annals of Behavioral Medicine. 2024 May 23;58(6):432–44.

[18]. Dianati M, Rezaei Asmaroud S, Shafaghi S, Naghashzadeh F. Effects of an Empowerment Program on Self-Care Behaviors and Readmission of Patients with Heart Failure: a Randomized Clinical Trial. Tanaffos. 2020 Dec;19(4):312–21.

[19]. Villalobos N, Vela FS, Hernandez LM. Digital Healthcare Intervention to Improve Self-Management for Patients with Type 2 Diabetes: A Scoping Review. Journal of Scientific Innovation in Medicine. 2020 Aug 11;3(3).

[20]. Kvarnström K, Westerholm A, Airaksinen M, Liira H. Factors Contributing to Medication Adherence in Patients with a Chronic Condition: A Scoping Review of Qualitative Research. Pharmaceutics. 2021 Jul 20;13(7):1100.

[21]. Hou S, Wang X, Zhao Z, Ma Y, Liu J, Zhang Z, et al. A Scale for Measuring Electronic Patient Engagement Behaviors: Development and Validation. Patient Prefer Adherence. 2024 Apr;Volume 18:917–29.

[22]. Park C, Otobo E, Ullman J, Rogers J, Fasihuddin F, Garg S, et al. Impact on Readmission Reduction Among Heart Failure Patients Using Digital Health Monitoring: Feasibility and Adoptability Study. JMIR Med Inform. 2019 Nov 15;7(4):e13353.

[23]. Chen DW, Banerjee M, He X, Miranda L, Watanabe M, Veenstra CM, et al. Hidden Disparities: How Language Influences Patients' Access to Cancer Care. Journal of the National Comprehensive Cancer Network. 2023 Sep;21(9):951-959.e1.

[24]. Zhou J, Zhang Y, Luo Q, Parker AG, De Choudhury M. Synthetic Lies: Understanding AI-Generated Misinformation and Evaluating Algorithmic and Human Solutions. In: Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems. New York, NY, USA: ACM; 2023. p. 1–20.

[25]. Mensah NK, Adzakpah G, Kissi J, Taylor-Abdulai H, Johnson SB, Agbeshie PA, et al. Health Professionals' Ethical, Security, and Patient Safety Concerns Using Digital Health Technologies: A Mixed Method Research Study. Health Serv Insights. 2024 Jan 26;17.

[26]. Saksena N, Matthan R, Bhan A, Balsari S. Rebooting consent in the digital age: a governance framework for health data exchange. BMJ Glob Health. 2021 Jul 22;6(Suppl 5):e005057.

[27]. Pham T. Ethical and legal considerations in healthcare AI: innovation and policy for safe and fair use. R Soc Open Sci. 2025 May 14;12(5).

[28]. Brand D, Giruzzi M, Giruzzi N, Vaitla K, Krebill-Prather R, Dang J, et al. Exploring Patient Trust in Healthcare Provider Influenza Vaccine Information and Recommendations in a Medically Underserved Area of Washington State. Vaccines (Basel). 2025 May 10;13(5):505.

[29]. Alowais SA, Alghamdi SS, Alsuhebany N, Alqahtani T, Alshaya AI, Almohareb SN, et al. Revolutionizing healthcare: the role of artificial intelligence in clinical practice. BMC Med Educ. 2023 Sep 22;23(1):689.

[30]. Livieri G, Mangina E, Protopapadakis ED, Panayiotou AG. The gaps and challenges in digital health technology use as perceived by patients: a scoping review and narrative meta-synthesis. Front Digit Health. 2025 Mar 27;7.

[31]. Oluwagbade E. Bridging the healthcare Gap: The role of AI-Driven Telemedicine in Emerging Economies. International Journal of Research Publication and Reviews. 2025 Jan;6(1):3732–43.