

The Current Situation and Strategies for Cultivating Digital Health Literacy in Chronic Noncommunicable Disease Management: A Mini Review

Xin Zhang, Yan Wang, Jianwen Gao, Juan Ge, Shuzhi Peng*

College of Health Management, Shanghai Jian Qiao University, Shanghai 201306, China

*Corresponding author: Shuzhi Peng, zhangxin1816199@163.com

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: Chronic noncommunicable diseases (NCDs) have become a major burden on global health, posing multifaceted challenges to health systems worldwide. These challenges encompass difficulties in patients' self-management and insufficient medical resources in prevention and treatment. Digital health intervention, which leverages digital technology to deliver personalized medical services, has emerged as a promising solution to improve the efficiency of chronic disease management. However, its effectiveness is significantly influenced by the level of digital health literacy. This mini review synthesizes the current situation of the lack of digital health literacy among patients with chronic diseases, identifying the main factors leading to the deficiency, and proposes effective strategies to address it. Furthermore, by integrating the current landscape with future technological and healthcare trends, this review projects the potential trajectory of digital health literacy in chronic disease management, that is, short-term technology adaptation, medium-term equitable coverage, and long-term educational integration. With the collaborative promotion and joint efforts of all parties, the application of emerging scientific and technological advances will make chronic disease management more efficient. In conclusion, enhancing digital health literacy is the key path to achieving efficient management of chronic diseases and health equity.

Keywords: Chronic disease management; Digital health literacy; Digital health intervention; Health equity; Mini review

Online publication: December 31, 2025

1. Introduction

The World Health Organization defines chronic diseases as noncommunicable diseases (NCDs), characterized by long-duration courses, which are formed due to the combined effects of genetic, physiological, environmental, and behavioral factors. The main types of diseases are cardiovascular diseases (such as heart attacks and strokes), cancer, chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma), and diabetes. In 2021, at least 43 million people worldwide died from chronic diseases, representing 75% of non-pandemic disease-related deaths ^[1]. In China, non-pandemic disease is the leading threat to the health of urban and rural

residents. Notably, the burden of chronic diseases in China has shown a significant upward trend since the year of 1990 [2]. Due to the large number of people suffering from chronic diseases and the limited allocation of resources, this has brought severe challenges to the prevention and treatment of chronic diseases worldwide. The main difficulties in the prevention and rehabilitation management of chronic diseases lie in the fact that patients need to persist in regular physical exercise [3]. At the same time, they also face communication obstacles between professional medical staff and patients, psychological disorders of patients, and even if patients engage in active exercise, the lack of effective and timely monitoring methods makes it impossible to track the progress of their condition management in a timely manner [4].

With the rapid development of emerging technologies, digital health interventions (DHIs), which integrate scientific information technology with healthcare, can provide patients with smarter and more personalized medical services. Digital health intervention refers to digital methods that can improve patients' physical and mental health through smartphone applications, wearable devices, social media, email, text messages, websites, or telemedicine [5].

The correct application of digital health for remote intervention can precisely overcome many difficulties and obstacles in managing chronic diseases, reduce travel costs during the intervention process, improve intervention compliance, save time, and achieve good self-goal setting, self-monitoring, and personalized feedback for patients [6]. However, digital health literacy is a key factor. It refers to the extent to which individuals and organizations utilize digital technologies to improve the health of the population, that is, the ability to obtain health information from electronic sources and apply the acquired knowledge to solve health problems [7]. Its absence may affect individuals' ability to interact with digital health technologies and hinder the progress of digital health equity. Enhancing the public's digital health literacy is an important measure to ensure the smooth advancement of digital health [8]. At present, the digital health literacy of residents is generally insufficient. Relevant research on improving digital health literacy has been carried out both at home and abroad. This article reviews the current situation of the deficiency of digital health literacy and proposes improvement strategies to provide some references for the clinical treatment of medical staff and the self-rehabilitation of patients in the later stage.

2. The main factors for the lack of digital health literacy in chronic disease management

2.1. Technical and service factors

Although the way of managing diseases through digital applications has great potential and patient interest is growing, its practical application still faces limitations [9]. British scholars Lee *et al.* [10] found through a semi-structured interview with 10 diabetic patients that patients' attitude towards digital healthcare was to attach more importance to its technical convenience and service level. The same result was also found in another semi-structured qualitative study of cancer patients in the UK. Adam *et al.* [11] discovered that some patients were unfamiliar with digital technology, felt pressured to interact with it, and were reluctant to integrate it into their lifestyle.

2.2. Patient factors

2.2.1. Age

Many studies at home and abroad have shown that aging is positively correlated with the lack of digital health literacy. A domestic study shows that due to the insufficient ability of the elderly to collect, read, write, and analyze online health information, the electronic health literacy level of patients with chronic diseases over 60 years old is significantly lower than that of patients aged 60 and below [12]. A survey based on the digital health

literacy of nearly 2,000 breast cancer patients revealed that approximately half of adult women aged 65 do not have a smartphone, which makes it impossible for them to complete mobile intervention measures, and the result is a lower digital health literacy^[13]. Iranian scholars Rangraz Jeddi *et al.*^[14] studied the application of smartphone applications in disease management for patients with type 2 diabetes and found that younger participants were more interested in such applications. However, for the elderly, the obstacles to adopting new technologies are multifaceted, including decreased physical function, emotional resistance, or cognitive decline, etc. [15–17]. In a scope review study in the Republic of Korea that included 42 articles, a statistical study was conducted on the digital health literacy of residents over 60 years old in the Republic of Korea. The conclusion was that although the collection usage rate among the elderly over 60 years old in the Republic of Korea reached 90%, they still demonstrated a relatively low level of digital health literacy^[18]. It can be seen from this that being older may further lead to a lack of digital health literacy.

2.2.2. Education and cognitive level

A hospital in Shandong, China, included patients with cardiovascular diseases who visited the cardiology department in a study on digital health literacy. Researchers uniformly distributed 720 questionnaires and retrieved 616 of them. The results showed that, taking high school and below education as the reference group, individuals with cardiovascular diseases and a university education level had a 15.219-fold higher likelihood of achieving adequate digital health literacy than the reference group^[19]. This indicates that a higher level of education can enhance patients' digital health literacy. This result is consistent with that of another study, which states that a higher educational level can enhance information processing and critical thinking skills, and has a strong predictive effect on digital health capabilities^[20]. In addition, in a study in Canada, when Milne *et al.*^[21] conducted a digital Health literacy scale survey among 83 patients with primary lung cancer, they found that the higher the educational level of lung cancer patients, the higher their digital health literacy scores. Interestingly, in Saudi Arabia, a study on diabetes patients revealed that educational attainment is a strong determinant of patients' digital health literacy. Patients with a postgraduate degree have significantly higher digital health literacy than those with a bachelor's degree and those with a high school education or lower^[22], which is highly consistent with the conclusions of the above-mentioned studies. Therefore, it indicates that the educational level of patients is positively correlated with digital health literacy.

2.3. Disease factors

The level of digital health literacy is related to different types of diseases, disease courses, and the number of chronic diseases. Research and investigation show that, both globally and domestically, the digital health literacy level of patients with chronic diseases is generally low. Among patients with chronic diseases, the digital health literacy of those with cardiovascular diseases is lower than that of the general health check-up population, inpatients with chronic kidney disease, inpatients with chronic respiratory diseases, and cancer patients^[19]. According to Li's^[23] research, it was found that patients with chronic diseases who have a shorter course of illness have higher digital health literacy. The reason might be that newly diagnosed patients lack knowledge related to the disease and pay more attention to the sudden occurrence of the disease. Therefore, they are more concerned about the changes in their own condition and will urgently search for disease-related knowledge through various channels. Since it is more convenient and faster to search for information through the Internet, patients with a short course of the disease are more likely to obtain health information through the Internet. However, patients who have been ill for a long time, due to the persistence of their diseases, tend to have a negative and slack attitude towards

them, and are less likely to search for health information on the Internet.

2.4. Social and environmental factors

2.4.1. Regional and cultural differences

According to a survey and research in China, the digital health literacy related to cancer among residents in rural areas of China is generally lower than that in urban areas. The main reason is that, on the one hand, it is constrained by the obstacles in obtaining and operating digital devices, and on the other hand, it is the continuous reliance on village doctors and the cultural avoidance of cancer as an “unknown disease” in rural areas, which weakens the efficiency of transforming digital health literacy into cancer awareness^[24]. In the United States, Kan *et al.*^[25] conducted a survey and research on digital health literacy among parents of children with asthma. They found that digital health literacy was related to the language type chosen by parents for communication. Parents who chose Spanish for communication had lower digital health literacy than those who chose English. The reason is that the proportion of the former with smartphone data plans or high-speed home Internet services is lower than that of the latter. This also reflects the racial and cultural issues abroad. Digital health equity has become an increasingly prominent problem faced by communities of color throughout history.

2.4.2. Family support network

Zhang *et al.*^[26] analyzed the inclusion of 9 studies in a systematic review and found that the support from family and friends can help improve the digital health literacy of cancer patients. Diabetic patients also often seek help from family and friends to obtain online health management information, which emphasizes the importance of information support from relatives and friends^[27]. Especially for the elderly, due to their limited cognitive level and ability to learn new things, and their children may be away from home for a long time, unable to provide timely communication and corresponding channels for obtaining disease knowledge and information, their digital health literacy is at a relatively low level^[28]. Therefore, the lack of attention and support^[28] from family members has weakened patients’ digital health literacy, both in terms of the operation of smart devices and from an emotional perspective.

3. Strategies for addressing the lack of digital health literacy in chronic diseases

Considering that the aforementioned factors may lead to limited digital literacy among patients with chronic diseases, this section will propose targeted response strategies from four key dimensions: policy, technology, personnel, and measurement tools.

3.1. The global strategic guarantee for digital health is gradually advancing

In 2021, the World Health Organization (WHO) officially released the landmark Global Strategy for Digital Health (2020–2025). As the world’s first authoritative guideline on digital health intervention, this strategy clearly defines a shared vision for accelerating the promotion and application of digital health technologies on a global scale, specific strategic goals, and a detailed action framework. Its core objective is to guide and assist member states in integrating digital technologies into their healthcare service systems, thereby optimizing healthcare services and accelerating the implementation of national health strategic goals^[29]. The United States, the United Kingdom, Japan, and other countries have respectively formulated corresponding digital health development plans in light of their national conditions.

In 2016, China put forward the “Healthy China 2030” Planning Outline, clearly stating that China will

strengthen breakthroughs in key technologies such as chronic disease prevention and control, precision medicine, and smart healthcare. By improving relevant laws and regulations and establishing a health and medical big data application system ^[30], the various goals of a Healthy China can be achieved. From the policies of various countries around the world, it can be seen that both at home and abroad, there is a high regard for establishing a digital health system. Due to the long course and complex conditions of chronic diseases, it is essential to enhance patients' digital health literacy for their self-management of the disease. With the support of these policies, medical and health institutions at all levels will gradually promote the establishment of a digital medical system, and patients will also improve their digital health literacy in this process.

3.2. Strengthening the construction of digital healthcare

At present, in light of the characteristics and demands of patients with chronic diseases, it is necessary to strengthen the infrastructure of digital healthcare. A cross-sectional study involving 495 middle-aged people revealed that it is recommended that health autonomy at all levels, mobile health applications, and telemedicine service providers enhance patients' digital health literacy by playing educational advertisements and promoting health information to bridge the impact of the digital divide ^[31]. In addition, relevant research also suggests that digital healthcare providers develop a mobile health education platform integrating dialect sections. By strengthening systematic training and practical guidance for primary care physicians and assisting residents in mastering the usage methods of electronic devices proficiently, the cognitive efficiency and conversion effect of residents on chronic disease-related knowledge can be enhanced ^[32].

3.3. Providing training and humanistic care to medical personnel

A study in the United States investigated the partners of men who were recently diagnosed with prostate cancer. Research has found that when helping patients with low digital health literacy and their partners make treatment decisions, medical personnel should play a corresponding supportive role. According to research, the demands of patients' partners are that clinicians should not only provide information on all treatment options, but also offer alternative, easy-to-read and non-electronic information and support sources (such as books, videos), or specifically guide them on how to effectively use electronic health tools. Nurses also play an important role in this process. They mainly play a key role in providing information and resources as well as educating patients and their families. They need to assess the health literacy levels of newly diagnosed male patients with localized prostate cancer and their partners to optimize the information support they receive in the treatment decision-making process. To assist men with lower health literacy levels and their partners in making informed treatment decisions, nurses should clearly demonstrate the usage of electronic resources or provide educational information and materials in non-electronic forms. In addition, nurses should also encourage patients to invite family members with high digital health literacy to participate in online information retrieval and the use of existing digital health programs together ^[33].

3.4. Selecting appropriate digital health literacy assessment tools

For chronic diseases, there are currently numerous assessments that measure patients' digital health literacy. Among them, the most well-known and widely used one is the eHealth Literacy Scale (eHEALS), which was developed by Norman *et al.* ^[34] based on the Lily model and the concept of eHealth literacy. This table is suitable for measuring an individual's skills in obtaining health information. There are a total of 8 entries, covering 3 dimensions: the application ability, evaluation ability, and decision-making ability of online health information and services. However, the drawback of this table lies in the fact that it was developed in the Web1.0 era and was

more suitable for measuring digital health literacy before the rise of social media and mobile networks. In the Web2.0 and Web3.0 eras of rapid Internet development, the comprehensiveness and accuracy of its measurement have been questioned. Thus, Kayser *et al.* [35] developed the eHealth Literacy Questionnaire (eHLQ) based on the digital health literacy framework. This questionnaire consists of 35 items and includes 7 dimensions: operation skills, navigation skills, information search, reliability evaluation, determine relevance, add self-created content, and protect privacy, which is described in the Lily model. It also covers individuals' experiences and interactions with technology and services, and focuses on the understanding, attitude, and motivation of the recipients of digital health services. The Digital Health Technology Literacy Assessment Questionnaire (DHTL) is more suitable for patients with chronic diseases. It was developed by Yoon *et al.* [36] and consists of 34 items, including 4 dimensions: terminology of information and communication technology, information and communication technology icons, the use of applications, and health assessment of the reliability and relevance of information. Considering that hospitals and institutions are increasingly inclined to have patients use mobile applications to manage their diseases and treatments, this assessment tool has added the measurement of practical skills in operating mobile applications. Also, a scale for patients with chronic diseases, the Saudi e-Health Literacy Scale (SeHL), developed by Zakaria *et al.* [37], consists of 19 items and includes 4 dimensions: health knowledge, acquisition of health information, application of health information, and practice of health behaviors. The comparison of digital health literacy assessment tools is in **Table 1**.

Table 1. Comparison of digital health literacy assessment tools

| Scale name | Number of items | Dimensions | Applicable scenarios | Advantages | Disadvantages |
|--|-----------------|---|---|---|--|
| eHealth Literacy Scale (eHEALS) | 8 | 3 dimensions: the application ability, evaluation ability, and decision-making ability of online health information and services | Individuals seek and online health information evaluation, suitable for various groups such as the elderly, children, and patients with chronic diseases | Available in multiple languages including Italian, Chinese, Japanese, etc. | Not entirely adapted to current digital health technologies |
| eHealth Literacy Questionnaire (eHLQ) | 35 | 7 dimensions: operation skills, navigation skills, information search, reliability evaluation, determine relevance, add self-created content, and protect privacy | Assessing individuals' ability to acquire, understand, apply, and evaluate information in a digital health environment, with application scenarios covering health literacy research on specific populations such as college students and patients with diabetes. | Good discriminant and construct validity, age and gender do not affect the result | The scope of application and language version are limited |
| Digital Health Technology Literacy Assessment Questionnaire (DHTL) | 34 | 4 dimensions: terminology of information and communication technology, information and communication technology icons, the use of applications, and health assessment of the reliability and relevance of information | The elderly and medical practitioners | Structured assessment, multi-dimensional coverage, and operability | Insufficient standardization and limited cultural adaptability |
| Saudi e-Health Literacy Scale (SeHL) | 19 | 4 dimensions: health knowledge, acquisition of health information, application of health information, and practice of health behaviors | Health policy development, evaluation of educational interventions, clinical practice, public health research | Localized adaptation, multi-dimensional coverage, and high construct validity | Criterion validity needs to be improved and technology integration is insufficient |

4. Conclusion and outlook

At present, the development of global digital healthcare is unstoppable. With the application of emerging high-tech means, greater innovative breakthroughs will be achieved in the diagnosis, treatment, and rehabilitation of chronic diseases. To address these challenges, a multi-stakeholder approach is required. Policy support at the global and national levels provides a framework for digital health development, while enhancements to digital healthcare infrastructure address technical barriers. Targeted training for healthcare professionals and the provision of humanistic care ensure that patients receive the support they need to engage with DHIs. Finally, the selection of appropriate digital health literacy assessment tools enables the accurate identification of patients with low literacy and the evaluation of intervention effectiveness.

The future of digital health literacy in chronic disease management is closely related to technological progress and the development of healthcare systems. The following trends may shape this trajectory:

First of all, the integration of emerging technologies such as artificial intelligence, machine learning, and the Internet of Things (IoT) will completely transform digital health tools. For instance, AI chatbots can offer personalized health advice to patients with low digital health literacy, while IoT-enabled wearable devices can automatically track vital signs and send real-time alerts to healthcare providers. These technologies have the potential to reduce the cognitive burden on patients and enhance the accessibility of DHIs. However, they also need new skills (for example, interacting with AI chatbots and explaining health insights generated by AI), which will require an update to the digital health literacy training program.

Second, emphasizing health equity will drive the formulation of more inclusive digital health intervention measures. As awareness of the digital health gap deepens, policymakers and technology developers will prioritize the needs of vulnerable groups such as the elderly, low-income groups, and ethnic minorities. This will include developing culturally and linguistically appropriate digital tools, expanding Internet access in rural areas, and providing targeted training programs for patients with lower digital health literacy. By addressing these differences, the healthcare system can ensure fair sharing of the benefits of DHIs.

Thirdly, the role of community-based intervention measures will become increasingly important. Community health workers are trusted members of local communities. They can play a key role in promoting digital health literacy by providing practical training, addressing cultural issues, and connecting patients with digital health resources. Community-based projects can also promote peer support. In these projects, patients with higher digital health literacy can assist those with lower digital health literacy. This approach has been proven to enhance engagement and enthusiasm.

Finally, incorporating digital health literacy into formal education curricula will lay the foundation for long-term improvement. By teaching digital health skills in schools, the government can ensure that future generations have the ability to use digital tools for health management. In the long run, this proactive approach will reduce the prevalence of low digital health literacy and support the sustainable development of digital healthcare.

Looking ahead, chronic disease management will achieve more precise, efficient, and personalized health services. At the same time, some special groups (such as the elderly and those with low education) deserve attention. It is necessary to enhance the technological adaptation and support for this group to promote the inclusiveness and fairness of digital health services. The multiple efforts of policy support, technological innovation, and humanistic care have made enhancing digital health literacy no longer merely a technical issue, but a key path to achieving the strategic goals of national health and a “Healthy China.”

Disclosure statement

The authors declare no conflict of interest.

References

- [1] World Health Organisation (WHO), 2024, Noncommunicable Diseases, viewed October 10, 2025, <https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases>
- [2] Zhang T, Jiang H, Xu X, et al., 2025, Non-Communicable Disease Burden in China, 1990–2023: Evidence from the Global Burden of Disease Study 2023. *Chin Med J (Engl)*, advanced publication.
- [3] Pedersen BK, Saltin B, 2015, Exercise as Medicine – Evidence for Prescribing Exercise as Therapy in 26 Different Chronic Diseases. *Scandinavian Journal of Medicine & Science in Sports*, 25(S3): 1–72.
- [4] Cavallo M, Morgana G, Dozzani I, et al., 2023, Unraveling Barriers to a Healthy Lifestyle: Understanding Barriers to Diet and Physical Activity in Patients with Chronic Non-Communicable Diseases. *Nutrients*, 15(15): 3473.
- [5] Jenkins C L, Imran S, Mahmood A, et al., 2022, Digital Health Intervention Design and Deployment for Engaging Demographic Groups Likely to Be Affected by the Digital Divide: Protocol for a Systematic Scoping Review. *JMIR Research Protocols*, 11(3): e32538.
- [6] Kardan M, Jung A, Iqbal M, et al., 2024, Efficacy of Digital Interventions on Physical Activity Promotion in Individuals with Noncommunicable Diseases: An Overview of Systematic Reviews. *BMC Digital Health*, 2(40).
- [7] Qiu CS, Lunova T, Greenfield G, et al., 2025, Determinants of Digital Health Literacy: International Cross-Sectional Study. *Journal of Medical Internet Research*, (27): e66631.
- [8] Wamala Andersson S, Gonzalez MP, 2025, Digital Health Literacy—A Key Factor in Realizing the Value of Digital Transformation in Healthcare. *Frontiers in Digital Health*, (7): 1461342.
- [9] Quaosar G, Hoque MR, Bao Y, 2018, Investigating Factors Affecting Elderly’s Intention To Use M-Health Services: An Empirical Study. *Telemed J E Health*, 24(4): 309–314.
- [10] Lee PA, Greenfield G, Pappas Y. 2018, Patients’ Perception of Using Telehealth for Type 2 Diabetes Management: A Phenomenological Study. *BMC Health Serv Res*, 18(1): 549.
- [11] Adam R, de Bruin M, Burton CD, et al., 2017, What Are the Current Challenges of Managing Cancer Pain and Could Digital Technologies Help? *BMJ Support Palliat Care*, 8(2): 204–212.
- [12] Gao Z, 2021, An Exploration of the Relationship between Electronic Health Literacy and Quality of Life of Patients with Chronic Diseases in Tai’an City, thesis, Shandong University.
- [13] Moon Z, Zuchowski M, Moss-Morris R, et al., 2022, Disparities in Access to Mobile Devices and e-Health Literacy among Breast Cancer Survivors. *Support Care Cancer*, 30(1): 117–126.
- [14] Rangraz Jeddi F, Nabovati E, Hamidi R, et al., 2020, Mobile Phone Usage in Patients with Type II Diabetes and Their Intention to Use It for Self-Management: A Cross-Sectional Study in Iran. *BMC Med Inform Decis Mak*, 20(1): 24.
- [15] Chesser A, Burke A, Reyes J, et al., 2016, Navigating the Digital Divide: A Systematic Review of eHealth Literacy in Underserved Populations in the United States. *Inform Health Soc Care*, 41(1): 1–19.
- [16] Kim HJ, Lee JM, 2018, Determinants of Mobile Digital Information Usage Among Senior Consumers: Focusing on Secondary Digital Divide. *Family Environ Res*, 56(6): 493–506.
- [17] Lee M, Kim H, Hong S, 2015, An Empirical Study of the Elderly’s Information Literacy on Their Happiness. *Journal of the Korea Industrial Information Systems Research*, 20(2): 125–131.
- [18] Kang H, Baek J, Chu SH, et al., 2023, Digital Literacy among Korean Older Adults: A Scoping Review of

Quantitative Studies. *Digital Health*, (9): 1–23.

- [19] Wang W, Jiao M, Zhao X, et al., 2025, Assessment of eHealth Literacy Among Cardiovascular Disease Patients and Analysis of Influencing Factors. *Front Public Health*,13: 1587163.
- [20] Wubante SM, Tegegne MD, Melaku MS, et al., 2023, eHealth Literacy and Its Associated Factors in Ethiopia: Systematic Review and Meta-Analysis. *PLoS One*,18: e0282195.
- [21] Milne RA, Puts MT, Papadakos J, et al., 2015, Predictors of High eHealth Literacy in Primary Lung Cancer Survivors. *J Cancer Educ*, 30(4): 685–692.
- [22] AlShehri WS, Khojah YY, 2025, Impact of E-Health Literacy on Diabetes Self-Care Activities Among People With Type 2 Diabetes Attending Primary Healthcare Centers in Makkah City, Saudi Arabia: A Cross-Sectional Study. *Cureus*, 17(7): e87968.
- [23] Li J, 2019, Research on the Current Situation of Electronic Health Literacy in Patients with Coronary Heart Disease and Its Correlation with Quality of Life, thesis, Zhejiang Normal University.
- [24] Zhang H, Zhang X, Ma X, et al., 2025, Association between the e-Healthy Literacy and Cancer Prevention Consciousness in Rural China: Cancer Cognition Acting as a Mediator. *Global Health Research and Policy*, 10(1): 27.
- [25] Kan K, Morales L, Shah A, et al., 2023, Digital Technology Characteristics and Literacy Among Families With Children With Asthma: Cross-Sectional Study. *JMIR Pediatr Parent*, 6: e48822.
- [26] Zhang Y, Xu P, Sun Q, et al., 2023, Factors Influencing the E-Health Literacy in Cancer Patients: A Systematic Review. *Journal of Cancer Survivorship*, 17(2): 425–440.
- [27] Sjöström A, Hajdarevic S, Hörnsten Å, et al., 2021, Experiences of Online COVID-19 Information Acquisition Among Persons with Type 2 Diabetes and Varying eHealth Literacy. *Int J Environ Res Public Health*, 18(24): 13240.
- [28] Li M, Ni P, Zuo T, et al., 2024, Cancer Literacy Differences of Basic Knowledge, Prevention, Early Detection, Treatment and Recovery: A Cross-Sectional Study of Urban and Rural Residents in Northeast China. *Front Public Health*, 12: 1367947.
- [29] World Health Organization, n.d., Global Strategy on Digital Health 2020–2025, viewed October 10, 2025, <https://iris.who.int/handle/10665/344249>
- [30] The Central Committee of the Communist Party of China and The State Council, 2016, Outline of the “Healthy China 2030” Plan, viewed October 10, 2025, <https://www.nhc.gov.cn/guihuaxxs/c100132/201610/e5c594008e8846d0aa401f7f678b8a84.shtml>
- [31] Raza SY, Norin U, Ogadimma EC, et al., 2025, Catenation between mHealth Application Advertisements and Cardiovascular Diseases: Moderation of Artificial Intelligence (AI)-Enabled Internet of Things, Digital Divide, and Individual Trust. *BMC Public Health*, 25(1): 1064.
- [32] Heo J, Chun M, Lee HW, et al., 2018, Social Media Use for Cancer Education at a Community-Based Cancer Center in South Korea. *J Canc Educ*, 33(4): 769–773.
- [33] Song L, Tatum K, Greene G, et al., 2017, eHealth Literacy and Partner Involvement in Treatment Decision Making for Men With Newly Diagnosed Localized Prostate Cancer. *Oncol Nurs Forum*, 44(2): 225–233.
- [34] Norman CD, Skinner HA, 2006, eHEALS: The eHealth Literacy Scale. *J Med Internet Res*, 8(4): e27.
- [35] Kayser L, Karnoe A, Furstrand D, et al., 2018, A Multidimensional Tool Based on the eHealth Literacy Framework: Development and Initial Validity Testing of the eHealth Literacy Questionnaire (eHLQ). *J Med Internet Res*, 20(2): e36.
- [36] Yoon J, Lee M, Ahn JS, et al., 2022, Development and Validation of Digital Health Technology Literacy Assessment Questionnaire. *J Med Syst*, 46(2): 13.

- [37] Zakaria N, Alfakhry O, Matbuli A, et al., 2018, Development of Saudi E-Health Literacy Scale for Chronic Diseases in Saudi Arabia: Using Integrated Health Literacy Dimensions. *Int J Qual Health Care*, 30(4): 321–328.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.