

Consumer Health Information: A Narrative Review

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Abstract

Background: Consumer Health Information (CHI) encompasses the dissemination of information and the cultivation of appropriate attitudes toward healthcare, as well as specific professional skills, aimed at altering behaviors and enhancing the health status of consumers. The aim of this study was to introduce the concept, features, and associated issues of CHI, provide an overview of current research, and examine the information-seeking behavior of health information consumers.

Methods: On February 28, 2025, the keywords "consumer health information," "health literacy," and their related terms were searched in PubMed, Web of Science, Google Scholar, and grey literature sources. Out of 1,058 retrieved records, 55 met the inclusion criteria and were analyzed to extract the relevant characteristics.

Results: The findings of this study indicate that consumer health information (CHI) is a dynamic concept that encompasses the provision of information and the enhancement of skills related to healthcare, with the aim of influencing behavior and improving consumers' health. A review of the existing literature demonstrates that the evaluation components of this concept encompass a range that includes comprehensiveness, credibility, readability, and usefulness. Furthermore, the Internet, social media, and artificial intelligence tools serve as the primary platforms for searching for and accessing such information. The results also suggest that challenges such as misinformation, information overload, and limitations in health literacy significantly influence information-seeking behavior, underscoring the necessity for increased attention to the role of librarians as trusted information intermediaries.

Conclusion: The necessity of disseminating accurate and reliable health information tailored to consumers' needs is underscored by the increasing trend of scientific output in this domain in recent years. It is essential to develop standard guidelines and regulations, as well as to create appropriate infrastructure for CHI at the macro level. Furthermore, conducting economic studies to evaluate the return on investment and utility of CHI can aid policymakers in their decision-making processes.

Keywords: Consumer Health Information, Health Information Literacy, Internet, Narrative Review

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Introduction

In the current era, characterized by significant advancements in knowledge and the increasing production of scientific research, access to scientific outputs and their evaluation has become paramount. Developments in information technology have further facilitated access to information and scientific evidence. The beneficiaries of

this enhanced information access extend beyond the scientific community, prompting the general public to utilize information technology tools such as the Internet and social networks for information retrieval. This trend is particularly evident in health information searches, which have surged, as consumers increasingly seek health-

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↑What is "already known" in this topic:

Previous studies have examined various aspects of consumer health information (CHI), including definitions, Internet access, challenges related to misinformation, health literacy, and digital technologies. However, these insights have remained fragmented, lacking a comprehensive perspective.

→What this article adds:

This narrative review provides an integrated synthesis of CHI and traces its evolution. The study presents a comprehensive framework that includes historical development, technological impacts (social media, apps, artificial intelligence), quality assessment criteria, and the specialized role of librarians. Furthermore, this study offers specific policy recommendations for standardization and interdisciplinary collaboration to enhance public health outcomes.

related information (1, 2). This phenomenon gained particular significance globally following the COVID-19 pandemic, during which access to healthcare services became more challenging, leading many individuals to rely on the Internet and social networks for health information. However, consumers may experience frustration in their search efforts due to the vast volume of information available on the web and social networks, necessitating careful evaluation of its credibility. Consequently, many users often find themselves disappointed and confused when attempting to locate the information they require (2, 3).

The Internet has significantly simplified the search for CHI. A study on Internet users revealed that 80% utilize online resources for health information; however, not all information available on the web is reliable, timely, or accurate (4). Some of this information is published with the intent to deceive—often to mislead individuals into believing falsehoods (Disinformation)—while other content is disseminated without deceptive intent, arising from unintentional and incorrect interpretations (Misinformation). Such information can lead to substantial social consequences, including distrust in social institutions, private organizations, and media; the Internet is rife with misinformation (5). A survey conducted approximately two decades ago regarding patients' use of online health information indicated that physicians estimated 85% of their patients had benefited from online health resources, while an estimated 44% had encountered health issues due to reliance on Internet information (6). Undoubtedly, the rapid expansion of the Internet, social networks, and applications over the past two decades, along with emerging technologies such as artificial intelligence, has exacerbated this issue. The prevalence of unreliable health information online has rendered the experience of searching for health information increasingly negative. Consequently, consumers require assistance in navigating the vast amount of information and in identifying sources that are trustworthy, accurate, and unbiased (2, 7).

Publications in the CHI field have increased significantly in response to the growing demand for information on various health issues, including disease prevention and treatment. CHI empowers populations, particularly underserved groups, to benefit from affordable programs for managing their health (4). Analyses indicate that the majority of publications and citations related to CHI have appeared in the *Journal of Medical Internet Research (JMIR)*, the *Journal of the American Medical Association (JAMA)*, the *British Medical Journal (The BMJ)*, and the *New England Journal of Medicine (NEJM)* (1). An analysis of the countries of origin of authors of CHI articles revealed that scientists from the United States have published the most articles, accounting for 46.3% of all publications, followed by authors from Australia (11.3%) and the United Kingdom (9.32%) (1).

A consumer of health information is defined as anyone who has utilized healthcare services in the past, present, or intends to do so in the future. This definition encompasses family members and caregivers as well. The term "consumer" is preferred over "patient" to indicate that it also includes healthy individuals within the community, there-

by denoting a more active role for individuals in healthcare decision-making (2). Furthermore, the term consumer acknowledges the importance of disease prevention and personal health maintenance. Consumer health is crucial as it directly influences the overall health of individuals and society; when individuals can access the right information at the right time, alongside healthcare services, comprehend health information, make informed health choices, and achieve appropriate health outcomes, the overall health of the population improves (8). Through CHI, consumers learn to evaluate the health information they encounter online to determine its trustworthiness and how to effectively discuss their health concerns with their primary care physician and other health specialists (9). Additionally, consumers are increasingly seeking health information, with three factors being particularly significant to them: ease of use of healthcare services, access to information, and the enhancement of their own and community health. A health-literate consumer actively seeks reliable information, maintains a healthy lifestyle, undergoes appropriate screening tests, and, when illness arises, utilizes professional care for self-management as needed (10).

Information pertaining to CHI encompasses health and medical topics presented at a general level in response to or anticipation of requests from the public, including patients and their families. CHI includes consumer health websites that provide high-quality information (2). It encompasses any information that enables individuals to understand their health and make informed health-related decisions for themselves and their families. This includes information for personal and community health education and promotion, self-care, decision-making, rehabilitation, health education, utilization of healthcare systems, and selection of health insurance or healthcare providers (3). The primary criteria of CHI that collectively provide robust guidelines for evaluation include the credibility of the information's authors, the currency of the information, the comprehensiveness and exclusivity of content, the balance between images and text, supporting references for the information, and the organizations sponsoring the information (11).

Although previous studies have significantly influenced consumers' understanding of health information, they have rarely provided a comprehensive perspective in this field. Consequently, the authors were prompted to conduct this narrative review to examine prior studies and findings, establish a holistic view of CHI, its history, features, the role of the Internet and information technologies, and identify key milestones and growth facilitators of CHI, as well as to describe its applications, potential barriers, and challenges for users.

Methods

The present study is a narrative review aimed at providing a comprehensive examination and synthesis of the literature related to the field of CHI. To achieve this, a literature search was conducted on February 28, 2025, utilizing the keywords "consumer health information," "health literacy," and "Internet," along with related terms.

The databases PubMed, Web of Science, and Google Scholar were searched. Additionally, grey literature—including reports, theses, conference papers, government documents, and organizational materials—was reviewed.

All retrieved records were imported into EndNote software for data management and screening. In the first step, duplicate records were removed based on title matching and author names. Also non-English language materials were also excluded from the study. This was followed by an initial screening of titles and abstracts, during which studies deemed irrelevant in terms of subject matter or document type, such as promotional websites, speeches, and outdated studies, were excluded. In this study, articles from 1998 onwards were reviewed. In the subsequent stage, the full texts of eligible articles were assessed, resulting in the selection of 55 records for final analysis. The screening and selection process was conducted independently by two reviewers; in cases of disagreement, a third reviewer made the final decision.

Following the final selection of studies, the required data were extracted using a checklist that included bibliographic information, language, study type, and country of origin. The main findings related to the various dimensions of consumer health information were then identified and recorded. The dimensions examined included definitions and concepts, historical development, the role of the Internet, the importance of utilizing consumer health information, the impact of emerging technologies, challenges and limitations of use, health information literacy, key characteristics and components of the field, and the role of librarians in promoting consumer health information. Given the heterogeneous nature of the selected records, relevant statements and findings for each dimension were extracted and subsequently interpreted and synthesized narratively in accordance with the study objectives.

The inclusion criteria encompassed all types of review studies, empirical studies, qualitative studies, grey literature, and websites related to the provision of consumer health information, provided that their primary focus was on consumer health information and that they addressed at least one dimension of this field. The exclusion criteria included studies whose main focus was not related to consumer health information, did not address its dimensions, or were purely promotional, journalistic, or non-scholarly in nature. Additionally, commercial and advertising websites, speeches, notes, articles lacking full text, very old studies, duplicate sources, and works that did not meet the required standards in terms of document type or scientific quality were also excluded from the review.

Results

A total of 1,058 records were retrieved and imported into EndNote for data screening. After cleaning and removing duplicates and clearly irrelevant records (based on title, author, and publication date), 675 records were excluded. Subsequent screening of titles and abstracts to eliminate studies unrelated to the topic or document type—including promotional websites, speeches, and outdated studies—reduced the number to 149 records. Finally, full-text assessment resulted in the inclusion of 55 records

(Figure 1). The list of all included studies and their characteristics is presented in the Appendix Table 1.

Through a review of the selected studies, various aspects of CHI and the relevant features were extracted, interpreted, and summarized. Figure 2 presents a visual overview of the features that are discussed in detail in the results.

Definitions of Consumer Health Information

Various definitions of CHI have been presented in the literature by researchers in this field. Zhao and Zhang define CHI as "the information available regarding health, therapeutic, and medical issues that is often provided at the request of patients, their family members, the general public, and even physicians" (3). Aldousari states that this concept "in addition to listing disease symptoms, diagnoses, and treatment stages, contains information about health improvement and wellness, various preventive medications, health determinants, and access to healthcare systems" (1). CHI is intended for potential or current consumers of healthcare or medical services. The distinction between CHI and clinical information lies in its development and dissemination, which consider non-professionals and the general public, thus involving fewer specialized topics and simpler formats. CHI may encompass resources on prevention, self-care, diseases, treatments, medications, and other pertinent topics, ultimately contributing to improved public health outcomes (12, 13). Smith and Duman

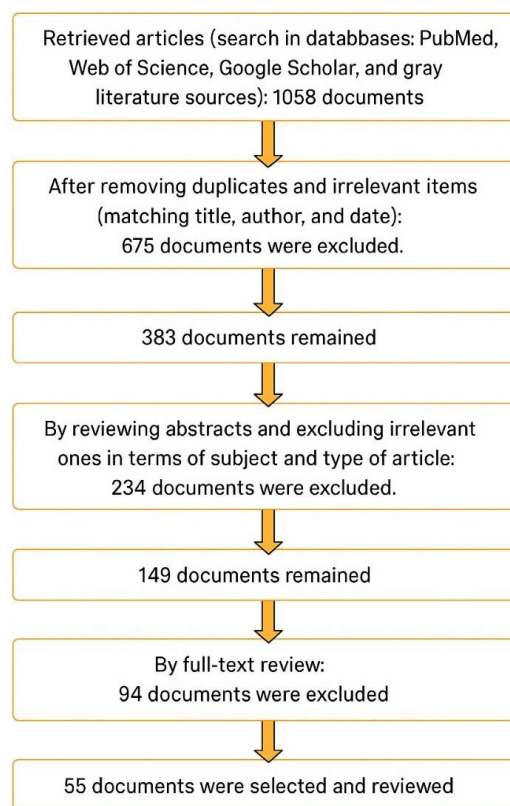


Figure 1. Selection process of the document and article.



Figure 2. Features extracted and examined in the selected articles

found that CHI is utilized to inform and educate audiences and health information consumers on health and medical issues, such as acute symptoms of underlying diseases, and a better understanding of it leads to greater consumer participation in decision-making in self-care situations (14). Lewis et al. noted that the use of health information is not limited to audiences with specific health conditions and their friends and family, but also includes individuals with public health concerns (15). Furthermore, consumer health is crucial because it has a direct connection to the overall health of the public, which is realized when individuals can access healthcare in a timely manner, comprehend health information, make healthy choices, and achieve favorable health outcomes, ultimately enhancing the overall health of the population (16). The goal of CHI is to transfer information and knowledge, foster appropriate attitudes toward healthcare, and impart professional skills so that consumers can modify their behavior and improve their health. Ultimately, the aim of CHI is to provide clear information to consumers about their health and to enhance their overall awareness of health and wellness issues (1, 17).

Based on the definitions provided in various sources (examples of which are mentioned above), CHI can be defined as health and medical information utilized for prevention, self-care, and treatment by the general public—particularly patients and their families. The dissemination of accurate information and the cultivation of appropriate attitudes toward health and healthcare are essential for maintaining and improving the health of consumers, especially non-professionals and the general public (patients and their families).

History and Background of Consumer Health Information

The consumer health movement began in the 1960s when the Medical Library Association (MLA) established a special CHI committee, recognizing that the demand for consumer health information necessitated a specialist to connect information needs with appropriate resources (18). Subsequently, CHI entered a new era by leveraging emerging scientific knowledge and technologies. In recent decades, health information has evolved significantly, particularly with the advancement and proliferation of

innovative digital devices such as smartphones, smartwatches, and AI tools. These devices provide users with instant access to health information at the press of a button; thus, through user-friendly interfaces, immediate access to health data has been facilitated (19). Scientific communications within the field of CHI have increasingly transformed. The number of publications and citations related to CHI has risen significantly over the last several decades (1980 to 2019) (Figure 3). Most journals publishing CHI research are located in North America and Europe (1, 20).

In 2006, a new era of timely and reliable public access to health information commenced with the publication of the first consumer-oriented journal, which presented findings and research from the U.S. National Institutes of Health (NIH) (21). With the expansion of scientific studies in this field, the term "Consumer Health Information" was introduced in MeSH (Medical Subject Headings) in 2008, defined as "information intended for potential users of medical and health services that emphasizes self-care and preventive approaches, as well as information for dissemination and use at the community level" (22, 23). In 2010, the European Parliament and Council enacted a directive on patients' rights in cross-border healthcare—the first harmonization directive on healthcare. This directive mandates that healthcare providers furnish relevant information to assist patients in making informed choices, including details on treatment options, availability of information, quality and safety of healthcare, such as treatment status, clear pricing information, the conditions of healthcare providers, and information on liability resources, all of which must be presented transparently (24). By 2018, over 277 million users had accessed MedlinePlus more than 700 million times. This database now offers comprehensive information on the symptoms, causes, treatment, and prevention of over 1,000 diseases. A 2021 study by Wolters Kluwer indicated that two-thirds of Americans trust the health information found online (21,

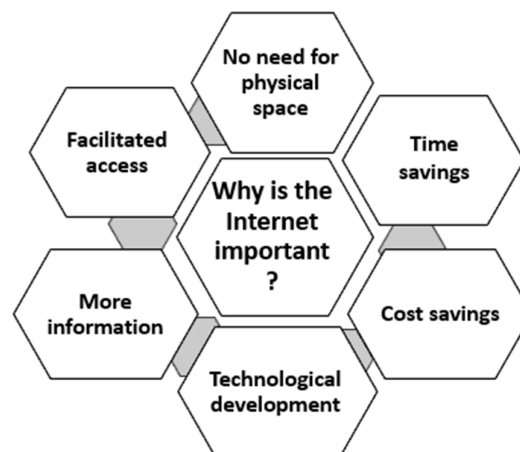


Figure 4. Reasons for the importance of utilizing the Internet in Consumer Health Information

25).

In summary, CHI has evolved from the initial efforts of the Medical Library Association into a comprehensive, technology-driven movement that, by leveraging modern technologies, plays a crucial role in empowering patients and enhancing health literacy.

The Internet and the Importance of Utilizing CHI

Given the rapid growth of knowledge and the increase in scientific output in the current era, the importance of access to CHI and the systematic evaluation of these resources appears both inevitable and essential. Akan and Dindaroğlu found that the use of the Internet for general purposes and access to healthcare information has increased significantly (26). Smith and Duman noted that advantages such as ease of access, patients' desire for more information without visiting specialists, and the potential for saving time and costs have contributed to an

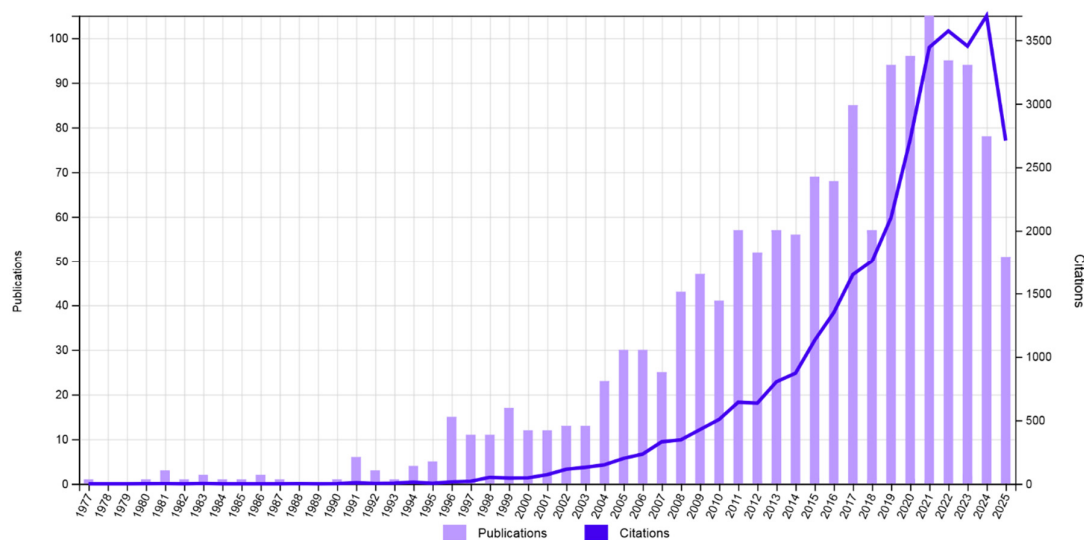


Figure 3. "Consumer Health Information" publications and citations (from Web of Science)

increase in the search for medical information online (14). This trend has become particularly important worldwide, as access to healthcare services has become more challenging, prompting many efforts to seek health information to shift to the Internet and social media. Maintaining up-to-date lists on a wide range of topics in physical form can be both time-consuming and costly in terms of space. Both of these issues are effectively addressed by utilizing web-based resources (27). In a study examining users' engagement with health information on the Internet, Grant found that younger individuals with higher education and income levels were significantly more likely to utilize the Internet for health information (28). Furthermore, the most popular health topics identified by adolescents in his study included nutrition science, diseases, depression, relationships, sex, and alcohol (28). With the aging population leading to increased healthcare information needs, the utilization of online health information by consumers has been on the rise. Moreover, the adoption rate of CHI to enhance interdisciplinary decision-making in healthcare has also increased (29, 30). Stvilia and Mon's study revealed that five types of CHI providers on the Internet include: commercial, non-profit or community, governmental, patient and family, and research; and seven types of web page platforms include: article, blog, directory, fact sheet, tool, home page, and question-and-answer (29). The reasons for the growth of consumers' online health information seeking include (Figure 4):

- The development of participatory healthcare models,
- The exponential growth of health information has made it impossible for any single physician to remain fully up-to-date.
- Cost containment efforts for patients aim to reduce the time spent by physicians.
- Access to the best available care,
- Emphasis on self-care and prevention.
- The increasing needs of an aging population, and
- There is a growing interest in alternative approaches (31).

Dramatic changes in information and communication technologies have fundamentally transformed how users interact with information and significantly influenced the communication of feedback and needs between producers and consumers. Increasing age, patients' desire for more information without the necessity of visiting a specialist, ease of access, and the desire to save time and costs have also considerably impacted this trend.

Impact of Novel Technologies on Consumer Health Information

In the digital age, novel technologies such as social networks and mobile applications play an increasingly prominent role in daily life. The health domain has not been exempt from this trend, as today's consumers have greater access than ever to health information through digital media. This transformation presents both opportunities and challenges. Media platforms, social networks (such as Instagram, Twitter, TikTok, etc.), and health applications introduce a new dimension to healthcare by

providing a medium for the general public, patients, their families, and health professionals to communicate about health issues (e.g., healthy lifestyles, nutrition, diseases, treatments, etc.). Social networks are powerful tools that facilitate broad and rapid collaboration among users. They also provide opportunities for users to share, receive, and comment on multimedia content (32, 33).

Conversely, a significant challenge is the proliferation of false or non-scientific information in these environments. Insufficient oversight can result in misdiagnosis, reluctance to seek medical attention, reliance on experience-based and potentially harmful treatments, and detrimental effects on public health—particularly in critical situations such as pandemics (34, 35). Notable advantages of social media in the CHI domain (Figure 5) include: increased interaction with other users, broad access to health information, easy sharing of health information, social support, enhanced public health monitoring, and influence on health policies (32, 36).

Health applications, such as those for blood pressure monitoring, nutrition, sleep, exercise, or disease management, have multiple impacts on consumers' awareness, behavior, and health management; however, they should be selected and used with care. Ensuring the accuracy of information, protecting privacy, and consulting with health professionals while using these applications is essential (37, 38, 39). In recent years, the number of artificial intelligence (AI) and machine learning (ML) tools in healthcare has increased, leading to a complex and unclear understanding of AI/ML for medical diagnosis among consumers. They exhibit a combination of hesitation and support toward AI/ML. Notably, their opinions regarding the use of AI/ML in medical diagnosis are influenced by their perception of the trustworthiness of healthcare providers utilizing these tools. Consumers acknowledge the potential of AI/ML tools to enhance diagnostic accuracy, efficiency, and access, and they express strong interest in participating in the development and implementation of AI/ML in routine healthcare (40). The integration of AI

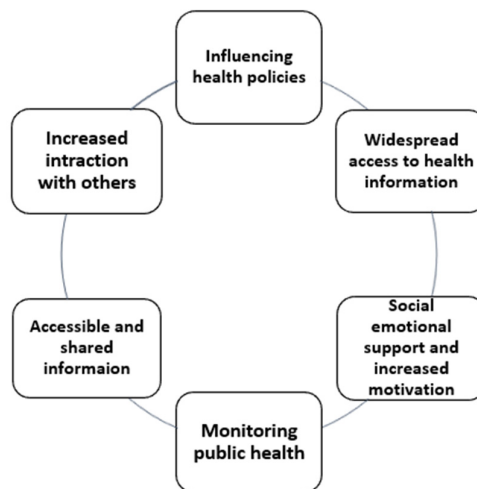


Figure 5. Key advantages of social media in the consumer health information domain (32, 36).

tools into healthcare can bridge communication gaps and improve decision-making, thereby granting patients greater control over their health; it can also provide early warnings about potential health crises (41, 42). Challenges and concerns related to AI in CHI encompass a lack of consumer trust and acceptance, ethical considerations, privacy debates, and the necessity for transparency and explainability (43, 44).

Therefore, it can be stated that the impact of the aforementioned new technologies on CHI has increased dramatically in recent years. These platforms, by providing information, self-management tools, and facilitating social interactions, play a crucial role in enhancing access, awareness, and even health-related behavior change. However, there is a pressing need for digital health literacy education and stringent quality control of information.

Challenges and Limitations of Consumer Health Information

Global efforts are underway to ensure that consumers have adequate information regarding the quality of care they receive and the performance of healthcare provider websites (45). The absence of a control mechanism for the vast amount of information published on the Internet, unlike print sources, may lead to the rapid and uncontrolled dissemination of information, potentially misleading patients or their relatives who are researching health issues and treatment alternatives. Furthermore, navigating through thousands of web pages and encountering contradictory, questionable, and even outright dangerous information can render the search for health information overwhelming. Additionally, a lack of physician awareness regarding patients' potential knowledge about diseases and treatment options may undermine the doctor-patient relationship (12, 26).

The challenge for consumers of health information lies in identifying the most reliable resources to address their inquiries. The impact of online trust-building mechanisms on the overall trustworthiness of a website may differ under various conditions. When the information provider is unknown, third-party certification serves as the most effective method to enhance consumer trust (12, 46). For health information consumers, the online search experience is often negative, as many individuals feel overwhelmed by the vast amount of information available or frustrated by their inability to locate the desired information. User confusion and disillusionment may also stem from the search techniques employed by users themselves. Most online health information seekers initiate their searches on popular search engines rather than on pertinent health websites, and the majority do not consistently verify the source or date of the online health information they encounter (2, 7).

El Sherif et al. identified that the negative outcomes of online CHI may manifest at three levels: internal (e.g., increased consumer anxiety), interpersonal (e.g., tension in the patient-physician relationship), and service-related (e.g., delays in clinical encounters). Suggested strategies to mitigate the occurrence of negative outcomes from the consumer's perspective include:

- Providing reliable online CHI,
- Educating consumers on how to evaluate online CHI websites is essential.
- Assisting consumers in locating CHI online and facilitating discussions with health professionals in their community (47).

In general, the lack of control mechanisms for information published on the Internet, coupled with consumers' unawareness of relevant resources and search strategies, can result in the rapid and uncontrolled dissemination of misinformation, thereby misleading consumers. Furthermore, sifting through thousands of web pages and encountering contradictory and dubious information can render the search for accurate information a daunting task.

Health Information Literacy

The relationship between health information literacy and CHI is both close and vital, as both concepts pertain to individuals' ability to understand, utilize, and make informed decisions regarding health matters. Health literacy is a relatively recent term, having emerged over the past 30 years. This term has evolved significantly from its original meaning—referring to the ability to read and comprehend written health information—to more complex definitions that encompass understanding, decision-making, the application of knowledge, and advocacy for health (48). Evidence indicates that accurate information, when provided to the appropriate individual at the right time, can significantly influence their well-being and health. High-quality health information can empower consumers to engage more actively in decision-making and enhance their overall healthcare experience (49).

In a study on the concept of information quality (IQ), a general definition was provided: "the extent to which information is fit for use." However, the precise definition of "information quality" is dynamic and contingent upon the context of information usage; thus, the same information may be evaluated differently in various situations. As many consumers lack specialized training in health, they often struggle to assess the credibility of information presented on healthcare web pages and must rely on visual indicators or trust markers to evaluate it (29). Interactive health communication is defined as the interaction between a consumer, patient, caregiver, or professional via an electronic device or communication technology to access or transmit health information or to receive guidance and support regarding a health-related topic. The most common and influential function of "interactive health communication" is consumers searching for health information (31). Griffin et al. noted that health information seeking involves deliberate and active efforts to obtain health information, distinguishing it from routine patterns of exposure to information and mere information scanning (50).

Health literacy is defined as "the individual, cognitive, and social skills that determine the ability of individuals to access, understand, and use information to promote and maintain health." It empowers individuals to make informed decisions regarding their health (48, 51). Accord-

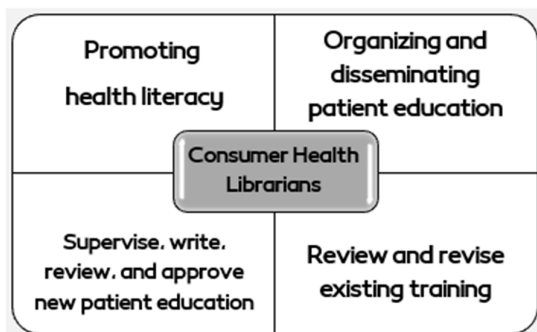


Figure 6. Duties of consumer health librarians (51).

ing to MeSH, health literacy is described as "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions" (52). Regardless of the definition, health literacy is acknowledged as a crucial requirement for maintaining health, as it enables individuals to make informed choices about their health, engage in self-care, access services, and navigate their treatment pathways. Understanding, improving, and developing health literacy should be a fundamental goal for all professionals working in the CHI field. Regardless of education level or social group, consumers require assistance to comprehend and optimally utilize resources when necessary (14). Wagner et al. found that low health literacy is likely more prevalent among ethnic minorities, older adults, lower socio-economic groups, and individuals with long-term health issues and disabilities (53). A conceptual comparison conducted in 2016 between health literacy and information literacy revealed that only two features are not shared between them. In health literacy, the emphasis is on interactive communication, whereas in information literacy, the focus is on discovery methods and search strategies (54).

Based on the definitions provided in various sources (some examples of which are mentioned above), health literacy can be defined as the individual, social, and cognitive skills that enhance consumers' ability to understand health information, make informed decisions regarding health, and access and apply knowledge. This capability leads to greater participation and improved health outcomes. Health literacy is no longer a secondary skill; rather, it is a vital necessity for consumers of health services. In this context, challenges such as information quality, equitable access, and individual differences in health literacy levels can significantly influence the consumer's experience.

Features and Components of Consumer Health Information

Evaluating the quality of consumer health information in digital environments presents a fundamental challenge in the field of health, prompting the development of criteria for accurate and efficient assessment. A study by Najjar on public library websites demonstrated that libraries providing CHI online consider eight key features when

evaluating the quality of this information. These features include the number of resources, ease of discovery, presentation format, source credibility, functionality, annotation, local content, and tips for locating reliable online information (2). Additionally, another study identified accuracy, comprehensiveness, readability, design, disclosure, and references as the most common quality criteria (55). Furthermore, a separate study evaluated five criteria for text quality: the use of published references, a multidisciplinary approach, journal impact, clarity of definitions, and text readability (56).

Overall, consumers typically lack the capacity to conduct a specialized evaluation of health information. Consequently, they often depend on indirect cues, such as the perceived credibility of a website or the reputation of the source, to assess the reliability of the information (29). The CRAAP test offers a set of criteria that can be utilized to evaluate the currency, relevance, accuracy, authority (expertise), and purpose of a website's content (12, 25).

The components for evaluating the quality of consumer health information (CHI) include comprehensiveness, credibility, readability, and usefulness. These indicators serve as a fundamental basis for the informed selection of information and the development of trust in the extensive digital landscape, particularly among non-expert consumers.

Role of Librarians in Promoting Consumer Health Information

Librarians are typically responsible for providing reliable health information and advocating the benefits of utilizing online CHI for informed decision-making. Integrating health librarians into the process of searching for CHI ensures that users find and utilize trustworthy information, which can also enhance users' health literacy and support their informed decision-making. The involvement of librarians may facilitate discussions with physicians, thereby reducing interpersonal tension. Ultimately, librarians can assist consumers in locating online CHI that is pertinent to their circumstances, enabling them to make more appropriate healthcare decisions (47).

The role of librarians encompasses the management of collections, classification, and dissemination of CHI, as well as ensuring that CHI resources are updated to meet current consumer needs (57). Librarians leverage their diverse skills to create, organize, and disseminate patient education (Figure 6). Their audiences may include physicians, patients, or both. Consumer health librarians can operate outside of traditional library settings, within organizations related to healthcare. Librarians in this capacity should be flexible and entrepreneurial to adapt and expand their roles as necessary (51).

Conversely, the Consumer Health Information Specialization (CHIS) certification entails training in delivering health information services to consumers and serves as a validation of the specialized skills acquired in this domain, as provided by the Medical Library Association. This specialization is appropriate for medical librarians, public librarians, librarians working in consumer health libraries, health professionals, information professionals, and any-

one committed to providing accurate and valuable health information to the public (58).

Discussion

This study examined the concept of CHI, along with its developments and challenges. The findings of this narrative review indicate that CHI, as a critical component of modern healthcare, plays an increasingly prominent role in empowering patients, enhancing health literacy, and improving individual decision-making (48, 49, 51). Conversely, the expansion of digital technologies—particularly the Internet, social networks, health apps, and, more recently, artificial intelligence—has provided consumers with access to a wide range of information that was previously available only to health professionals (32, 33, 37). This transformation, while holding great potential for improving health equity and self-care, is accompanied by challenges such as validating sources, inequalities in access, and variations in users' health literacy levels (34, 35).

One of the highlights of this review is the dramatic growth of online health information resources in recent decades and their role in transforming consumer health behaviors. Specifically, the pattern of health information seeking and consumption among individuals has become increasingly digital (27). Although this shift has led to greater patient participation in treatment decision-making, it has simultaneously raised concerns regarding the spread of misinformation, self-medication, and adverse effects on the physician-patient relationship (2, 12, 46). Furthermore, the findings indicate that health applications and AI platforms have facilitated access to health services. However, issues such as algorithm transparency, privacy risks, and the lack of clear ethical frameworks for the development and use of these technologies remain key concerns that policymakers and developers must address (40, 43, 44). Conversely, health literacy—particularly in its digital form—was identified as an effective mediating factor in the appropriate use of health information (48, 51). Individuals with lower health literacy may experience confusion, anxiety, or make erroneous decisions when confronted with a large volume of online information. This underscores the importance of educating individuals in critical thinking skills, media literacy, and the ability to evaluate information sources (14, 53).

In summary, despite the significant potential of CHI to enhance individual and community health outcomes, it is essential to strengthen the infrastructure required to ensure the quality, accuracy, and accessibility of these information resources. Furthermore, developing supportive policies, establishing ethical guidelines for the design of digital tools, and investing in public education are among the measures that can improve the efficiency and effectiveness of CHI in the future.

Conclusion

Scientific output in the CHI domain has significantly increased in recent years due to the expansion of modern technologies and enhanced access to digital resources.

This growth underscores the importance of, and societal need for, disseminating health and medical information with the requisite standards while considering the audience—particularly non-professionals and the general public, including patients and their families. The primary objective is to convey accurate and practical information while fostering appropriate attitudes toward health issues to maintain and improve consumer health. However, challenges such as the proliferation of misinformation, the absence of effective control mechanisms, and low digital health literacy continue to persist, potentially adversely affecting public health. Consequently, it is crucial to develop effective strategies to enhance health literacy, evaluate information quality, and direct consumers toward reliable sources.

Building on the previously discussed points and the expanding future outlook, it is predicted that CHI will serve as a personal information resource and decision-making aid to facilitate health monitoring, prevention, and even treatment for consumers. Enhancing CHI and its requisites will promote continuity of healthcare and bridge clinical care, health behavior change, information management, and decision-making. Ultimately, the future of CHI depends on achieving a balance between technological opportunities and managing the challenges they present—an endeavor that can be realized through collaboration among policymakers, health professionals, technology developers, and consumers. It is recommended that health policymakers, in light of the findings of this study and similar research, take proactive steps toward creating infrastructures and formulating guidelines to standardize the criteria and components considered in CHI, thereby moving closer to the ultimate goal of improving and maintaining community health. Future studies should also evaluate the existence and implementation of CHI in terms of return on investment and usefulness to assess its economic effectiveness.

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Conflict of Interests

The authors declare that they have no competing interests.

Authors' Contributions

Mohammad Javad Dehnavi: Conceptualization, data curation, visualization, writing—review & editing;

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Paria Amiri: Conceptualization, data curation;

Seyed Hojjat Khatamifar: visualization, data curation;

Fatemeh Sheikhshoaei: Supervision, investigation, writing—original draft, writing—review & editing;

Ethical Considerations

This study has been ethically approved by the Ethics

Committee of Tehran University of Medical Sciences with code number: IR.TUMS.SPH.REC.1403.181.

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Data Availability

The data and articles used in the results of this study have been reported as attached files in the article and are also available from the corresponding author upon reasonable request.

AI Use Statement

The authors used artificial intelligence tools, including ChatGPT (OpenAI) and Claude Opus, to enhance the quality of writing and linguistic accuracy of this article. After utilizing these tools, the text was thoroughly reviewed, edited, and approved by the authors to ensure the accuracy of the content and its alignment with the research objectives. The authors take full responsibility for the final published content.

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Appendix Table 1. List of included studies

Row	Author↓, Year	Country	Title	Methodology	Main findings	Components in our research (Research codes)
1	Akan, B. 2020	Turkey	Content and Quality Analysis of Websites as a Patient Resource for Temporomandibular Disorders	Quality assessment of 77 websites using DISCERN, JAMA and GQS tools	The quality and content of Turkish Persian-language websites about TMD (temporomandibular joint disorders) is poor	The Internet and the Importance of Utilizing Consumer Health Information
2	Aldousari, E. 2024	Kuwait	Bibliometric analysis confirms expected trends in consumer health information publications	Bibliometric analysis of 8,953 records from Web of Science and LISA, MEDLINE, ERIC, PreMEDLINE, and Embase databases	Bibliometric analysis shows that CHI publications have grown explosively since the 1980s, with most CHI journals published in North America and Europe	Definitions of Consumer Health Information
3	Arcos, R. 2022	Spain	Responses to digital disinformation as part of hybrid threats: a systematic review on the effects of disinformation and the effectiveness of fact-checking/debunking	A systematic review with the PRISMA protocol	Systematic review of the effects of disinformation (as part of hybrid threats) and the effectiveness of counter-strategies (fact-checking, debunking, inoculation)	Challenges and Limitations of Consumer Health Information
4	Arnott, S. C. 2015	Australia	What is Consumer Health?	Text Analysis and Theoretical Literature Review - Tracing the Evolution of the Concept of "Consumer Health"	Basic definition of Consumer Health	Challenges and Limitations of Consumer Health Information
5	Backus, J. E. B. 2022	USA	Providing Health Information for Patients, Families and the Public	Developing practical guidelines for assessing the quality of health information	NLM's focus shifts from specialists to the general public with the advent of the Internet	Definitions of Consumer Health Information
6	Boyd, Danah M. 2007	USA	Social network sites: Definition, history, and scholarship	Historical-Descriptive Analysis and Theoretical Literature Review	Definition, history, and importance of Social Network Sites (SNS) — the basis for many subsequent CHI studies on social networks	Impact of Novel Technologies on Consumer Health Information
7	Chao, S. M. 2024	Taiwan	Functionality and Usability of mHealth Apps in Patients with Peritoneal Dialysis: A Systematic Review	Systematic review of 11 studies from PubMed/MEDLINE and Web of Science databases	Systematic review of mHealth apps for peritoneal dialysis patients	Impact of Novel Technologies on Consumer Health Information
8	Chou, W. S. 2018	USA	Addressing Health-Related Misinformation on Social Media	Commentary on misinformation on social media	Serious concern about health-related misinformation on social media	Impact of Novel Technologies on Consumer Health Information
9	Cline, R. J. W. 2001	USA	Consumer health information seeking on the Internet: the state of the art	A critical review of the existing literature on health information search on the Internet	A classic review of the state of health information search on the Internet up to 2001	The Internet and the Importance of Utilizing Consumer Health Information
10	Coulter, A. 2006	UK	Assessing the quality of information to support people in making decisions about their health and healthcare	Critical analysis of existing assessment tools and review of research background	Assessing the quality of health information for patient decision-making (framework and criteria)	Health Information Literacy
11	Cravedi, K. 2022	USA	NLM's Revolution in Consumer Health Information to Improve Patient Outcomes	A descriptive-reporting essay (descriptive report)	Expanding MedlinePlus and ClinicalTrials.gov; Expanding Public Access	History and Background of Consumer Health Information
12	Datafied, 2024	USA	The Rise of Consumer Health Information	Trend analysis and review of recent technological advances	Massive volumes of complex data - the need for data interpretation platforms	History and Background of Consumer Health Information

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13	Delnoij, D. 2011	Netherlands	Patient information under the EU patients' rights Directive	Policy and Legal Analysis	Providing standard and understandable information for patients to make informed choices between different healthcare systems in European Union member states	History and Background of Consumer Health Information
14	Demiris, G. 2016	USA	Consumer Health Informatics: Past, Present, and Future of a Rapidly Evolving Domain	Review and analysis of the literature published in the field of Consumer Health Informatics over the last 25 years	The field of consumer health informatics (CHI) has shifted from a simple "information" approach to "active engagement" models	Challenges and Limitations of Consumer Health Information
15	Demiris, G. 2008	USA	Patient-centered applications: use of information technology to promote disease management and wellness. A white paper by the AMIA knowledge in motion working group	Conceptual White Paper on the Applications of Information Technology in Disease Management	Patient-centric platforms should not be just repositories of information.	History and Background of Consumer Health Information
16	El Sherif, R. 2018	Canada	Reducing Negative Outcomes of Online Consumer Health Information: Qualitative Interpretive Study with Clinicians, Librarians, and Consumers	A two-stage interpretive qualitative study with clinicians, librarians, and consumers	Providing authentic OCHI, training in website evaluation and encouraging discussion with experts	Challenges and Limitations of Consumer Health Information
17	Eysenbach, G. 2002	Canada	Empirical studies assessing the quality of health information for consumers on the world wide web: a systematic review	Analysis of quality criteria including accuracy, completeness, readability, and design	No single indicator (such as the author's name or the presence of advertising) alone can guarantee the quality or accuracy of content for the consumer	Features and Components of Consumer Health Information
18	Flaherty, D. 2015	Canada	What is consumer health informatics? A systematic review of published definitions	Systematic search in 5 databases (Embase, Web of Science, MEDLINE, CINAHL, Business Source Complete)	CHI is defined as a bridge between information science and healthcare, with the goal of empowering the patient	Features and Components of Consumer Health Information
19	Freeman, S. 2024	Australia	Health consumers' ethical concerns towards artificial intelligence in Australian emergency departments	Qualitative semi-structured interviews with health consumers	Artificial intelligence should only act as an "assistant tool" for doctors and never replace human judgment and ultimate responsibility	Impact of Novel Technologies on Consumer Health Information
20	Fulda, P. O. 2004	USA	Consumer health information provided by library and hospital Websites in the South Central Region	Descriptive Evaluation & Content Analysis	Paying attention to accessibility and limited resources	Definitions of Consumer Health Information
21	Grant, M. J. 2023	UK	Health literacy and consumer health information	Editorial article about health literacy and consumer health information	Higher share of women and disabled people in search - lower satisfaction with findings	The Internet and the Importance of Utilizing Consumer Health Information
22	Griffin, R. J. 1999	USA	Proposed model of the relationship of risk information seeking and processing to the development of preventive behaviors	Developing a theoretical model for risk information seeking and preventive behavior	Presentation of the RISP model (Risk Information Search and Processing Model)	Health Information Literacy

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23	Huh, J. 2018	USA	Consumer health informatics adoption among underserved populations: thinking beyond the digital divide	Challenges in deprived communities and a critique of the traditional "digital divide" approach	To increase technology adoption among the underprivileged, we need to think "beyond the digital divide" (access to hardware)	The Internet and the Importance of Utilizing Consumer Health Information
24	Kao, C. K. 2017	USA	Consumer Mobile Health Apps: Current State, Barriers, and Future Directions	Descriptive review of the current state of mobile health applications	The future of this field depends on moving towards applications that are supported by scientific evidence and directly linked to healthcare systems	Impact of Novel Technologies on Consumer Health Information
25	Kauttonen, J. 2025	Finland	Trust and Acceptance Challenges in the Adoption of AI Applications in Health Care: Quantitative Survey Analysis	Online questionnaire from Finnish participants presenting 8 AI application scenarios in healthcare	Data privacy concerns remain a serious barrier to full adoption of this technology	Impact of Novel Technologies on Consumer Health Information
26	Keselman, A. 2008	USA	Consumer health information seeking as hypothesis testing	Interview with 20 participants about their understanding of a hypothetical scenario related to stable angina	The search for health information by ordinary people often follows a psychological pattern called "hypothesis confirmation."	Definitions of Consumer Health Information
27	Khan, Sh. 2015	China	An empirical study of perceived factors affecting customer satisfaction to repurchase intention in online stores in China	Literature review of health information sources on the Internet	"Customer service" and "transaction security" are the most critical factors in shaping Chinese customer satisfaction	Challenges and Limitations of Consumer Health Information
28	Kiley, R. 1998	UK	Consumer health information on the Internet	Examining emerging internet platforms in the late 1990s and observing user behavior	The Internet has enormous potential to "democratize" medical knowledge and can transform the traditional doctor-patient relationship by empowering the patient	The Internet and the Importance of Utilizing Consumer Health Information
29	Lawless, J. 2016	USA	Health literacy and information literacy: a concept comparison	Comparative analysis of concepts	Having information literacy does not necessarily mean the ability to understand and apply complex medical information in critical situations (health literacy)	Health Information Literacy
30	Lewis, D. 2005	USA	Consumer health informatics	Narrative Review & Synthesis	Paradigm shift in care - Infrastructure challenges	Definitions of Consumer Health Information
31	MeSH. 2008	USA	Consumer Health Information	MeSH thesaurus	"Consumer health information" is a separate scientific category from "medical information for professionals" and requires different standards in design and presentation	History and Background of Consumer Health Information
32	MeSH. 2010	USA	Health Literacy	MeSH thesaurus	Finalizing and establishing an operational definition of this term for standardizing global research	Health Information Literacy
33	MLA. 2001	USA	Consumer Health Information Specialization	MLA specialized document	Launching and developing the "Consumer Health Information Specialization" (CHIS) program	Role of Librarians in Promoting Consumer Health Information

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Row	Author(s), Year	Country	Title	Methodology	Main findings	Components in our research (Research codes)
34	Moorhead, S. A. 2013	UK	A new dimension of health care: systematic review of the uses, benefits, and limitations of social media for health communication	A systematic review of the uses, benefits, and limitations of social media for health communication	Social media has added a new dimension to healthcare.	Impact of Novel Technologies on Consumer Health Information
35	Najjar, L. 2023	USA	Consumer Health Information on Public Library Websites: Availability and Characteristics	Assessing the quality and availability of health information on public library websites	The volume of resources on half of these sites is very small, and the size of the library has no impact on the quality or quantity of these services	Challenges and Limitations of Consumer Health Information
36	Noh, Y. 2013	South Korea	The development and performance measurements of educational programs to improve consumer health information (CHI) literacy	Mixed Methods	Users have the least skills in "assessing the credibility of online information" and are in dire need of structured training	Role of Librarians in Promoting Consumer Health Information
37	Nutbeam, D. 2000	UK	Health literacy as a public health goal: a challenge for contemporary health education and communication strategies into the 21st century	Conceptual Framework Analysis	Introducing the Triple Health Literacy Model	Health Information Literacy
38	Ozan, M. 2020	USA	An unconventional role for librarians: consumer health librarian and health literacy consultant	Case Study / Experience Report	Redefining the identity of the medical librarian as an "active health intervener"	Health Information Literacy
39	Payne, H. E. 2015	USA	Behavioral functionality of mobile apps in health interventions: a systematic review of the literature	Literature review in September 2014 using key keywords in several scientific journal databases	Most health apps on the market, despite their high potential, make poor use of psychological theoretical foundations (theories of behavior change)	Impact of Novel Technologies on Consumer Health Information
40	Pian, W. 2020	Singapore	Consumer health information needs: A systematic review of measures	Systematic review of consumer health information needs assessment tools	Definitions were largely cognitive and one-dimensional, and the need for operationalization was raised as informational issues	The Internet and the Importance of Utilizing Consumer Health Information
41	Pluye, P. 2019	USA	Health outcomes of online consumer health information: A systematic mixed studies review with framework synthesis	Mixed Studies Review with a synthesis framework - focus on health outcomes	Providing a classification of health outcomes resulting from online information searches	Definitions of Consumer Health Information
42	Portillo, I. A. 2021	USA	Quality Evaluation of Consumer Health Information Websites Found on Google Using DISCERN, CRAAP, and HONcode	Assessing the quality of health information websites found on Google using DISCERN, CRAAP, and HONcode tools	MedlinePlus Most Trusted Website - Most Popular Websites Lacked a Trustworthiness Certificate	History and Background of Consumer Health Information
43	Potts, H. W. 2002	UK	Survey of doctors' experience of patients using the Internet	Online questionnaire to 800 physicians	Most doctors did not have a negative attitude towards patients' use of the Internet	History and Background of Consumer Health Information
44	Ramsay, I. 2017	Australia	Consumer health information needs and preferences: a rapid evidence review	Rapid Evidence Review	A quick overview of the needs and preferences of health information consumers	Definitions of Consumer Health Information
45	Shapiro, Robert M. 2010	USA	Health literacy: A bibliometric and citation analysis	Bibliometric analysis and citation analysis	Drawing a scientific map of the field of health literacy and identifying its milestones	History and Background of Consumer Health Information

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Row	Author(s), Year	Country	Title	Methodology	Main findings	Components in our research (Research codes)
46	Smith, S. 2009	UK	The state of consumer health information: an overview	A review article focusing on consumer health information in the UK policy context	CHI and its growing importance in health policies; the key role of doctor-patient communication and libraries in promoting CHI	Definitions of Consumer Health Information
47	St. Jean, B. 2017	USA	Factors motivating, demotivating, or impeding information seeking and use by people with type 2 diabetes: a call to work toward preventing, identifying, and addressing incognizance	This is a qualitative study conducted through semi-structured and periodic interviews (over a year) with people with type 2 diabetes	Motivational/inhibitory factors for information seeking in type 2 diabetes patients → concept of incognizance (unawareness of ignorance)	History and Background of Consumer Health Information
48	Staccini, P. 2024	Australia	Precision in Prevention and Health Surveillance: How Artificial Intelligence May Improve the Time of Identification of Health Concerns through Social Media Content Analysis	Comprehensive literature search in PubMed focusing on articles related to Consumer Health Informatics, Precision Prevention	Artificial intelligence and social media content analysis lead to improved precision prevention and early identification of health concerns (suicide, mental health, vaping, etc.)	Impact of Novel Technologies on Consumer Health Information
49	Stephens, J. H. 2025	Australia	Consumer opinion on the use of machine learning in healthcare settings: A qualitative systematic review	Qualitative systematic review using standard methods from Ovid MEDLINE, Ovid Embase, Scopus, and Web of Science databases	A qualitative review of consumer opinions about machine learning in medical diagnosis	Impact of Novel Technologies on Consumer Health Information
50	Stvilia, B. 2009	USA	A model for online consumer health information quality	Mixed Methods and a Multifaceted Approach	Proposed model for assessing the quality of online consumer health information	The Internet and the Importance of Utilizing Consumer Health Information
51	Von Wagner, C. 2007	UK	Functional health literacy and health-promoting behaviour in a national sample of British adults	A secondary analysis of a national survey in the UK	Functional (basic) health literacy is tied to socioeconomic status and directly influences some key health behaviors	Health Information Literacy
52	Wang, Y. 2019	UK	Systematic Literature Review on the Spread of Health-related Misinformation on Social Media	Systematic literature review of 57 studies from PubMed/MEDLINE and Web of Science	Systematic review of the spread of health misinformation on social media	Impact of Novel Technologies on Consumer Health Information
53	Zeza, M. 2025	USA	The promise of AI in healthcare: transforming communication and decision-making for patients	Theoretical-analytical paper using advances in interoperability, price transparency, and user-centered design	The potential of AI health assistant apps to improve health system navigation, cost transparency, and patient decision-making	Impact of Novel Technologies on Consumer Health Information
54	Zhao, Y. 2017	USA	Consumer health information seeking in social media: a literature review	Searching the Web of Science Core Collection for existing literature on consumer health information seeking on social media	Topics range from specific diseases to public health; information needs vary depending on the topic	Definitions of Consumer Health Information
55	Zheng, H. 2024	Spain	Understanding user engagement in mobile health applications from a privacy management perspective	An online questionnaire in China for empirical validation of the moderated mediation model	Social privacy costs and reduced user engagement in mHealth apps	Impact of Novel Technologies on Consumer Health Information