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Mapping the terrain: A comprehensive exploration of health literacy among youth

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Abstract

Health literacy is identified as a crucial public health concept that demands the attention of policymakers due to its profound impact on population health. This comprehensive review explores the landscape of health literacy among youth, examining current circumstances, relevant policies, available resources, tools, and effective strategies. We aimed to comprehensively map and synthesize the existing literature on the current state of health literacy among young individuals. Employing a data-centric methodology, the review meticulously analyzes existing literature and research in the domain of youth health literacy. We displayed the results of the analysis, distributing them into appropriate blocks. The review emphasizes the need for deeper research to assess health literacy gaps among youth and select appropriate assessment tools. It also highlights the imperative to enhance the health literacy of young individuals, which presents a significant global challenge. Developed nations' governments show considerable interest in this issue, with potential legislative measures to foster competencies from early personal development. The review notes that multiple factors such as socioeconomic status, health risk behaviors, health status, gender, and age interplay with health literacy, requiring attention to disparities among at-risk populations. Despite numerous tools available for assessing general health literacy, the lack of a standardized international tool remains a concern for public health professionals. Addressing health literacy necessitates a multifaceted approach that considers diverse influences on health education, communication, and behavior, especially among youth. Tailored interventions designed for specific populations can bridge literacy gaps and enhance overall well-being.

Keywords: health literacy, young population, health promotion

Introduction

Over the past decades, health literacy (HL) has gained significant attention from researchers, activists, and health policymakers, reflecting its evolving importance in healthcare understanding and outcomes [1]. Sorensen et al defined health literacy as individual skills and institutional frameworks, along with the available resources and dedication, collectively empower individuals to attain, comprehend, evaluate, and apply information and services effectively, maintaining and promoting their well-being [2]. In a simplified approach, health literacy describes an individual's ability to manage their health and navigate the healthcare system. In this context, health literacy is not static, it develops throughout a person's life (for example, through schooling), and is influenced by individual, situational and social factors. As a result, it can be regarded as a dynamic and situation-dependent concept at the individual level [3].

Health literacy, however, is something more than just being able to read brochures and successfully schedule an appointment with a doctor. Health literacy is critical for population empowerment because it improves people's access to health information and their capacity to use it effectively [4]. The concept of health literacy goes beyond the idea of personal resource. A higher level of health literacy benefits whole society, for example, by mobilizing communities to influence various factors that affect health. This understanding justifies growing calls for the perception of health as the joint responsibility of both individuals and public policy-makers and health

systems [5]. In this sense, health literacy extends beyond the narrow concept of health education and communication centered on individual behavior to include environmental, political, and societal issues that influence health.

Children and adolescents are the key target population for scientific research on health literacy since basic cognitive, physical, and emotional development, as well as the creation of health-related behaviors and abilities, take place during childhood and adolescence [6]. However, there is a lack of expertise and scientific consensus on what abilities and knowledge children and adolescents require to make informed medical decisions. Health literacy of children and adolescents is described in the literature as a collection of interconnected abilities, skills, obligations, and knowledge that allow access to medical information and make informed and effective decisions to enhance health [7].

The European Consortium on HL put forth the subsequent HL definition for the broader populace: “HL involves literacy and includes individuals' comprehension, drive, and ability to access, grasp, evaluate, and apply medical information for decisions about healthcare, disease prevention, and well-being, with the goal of maintaining or improving quality of life throughout life's stages” [8]. Nevertheless, in no single country can there be an explicit application of the concept of HL in childhood and adolescence [9].

The aim of our scoping review is to comprehensively map and synthesize the existing literature on the current state of HL among young individuals. This review seeks to explore and analyze the prevailing situation, key issues, relevant policies, available tools, and effective interventions pertaining to HL among the youth (Figure 1). By conducting this scoping review, our objective is to provide a comprehensive overview of the landscape of HL among young people, identify gaps in research and practice, and offer insights that can inform future research directions, policy formulation, and the development of targeted interventions to enhance HL in this critical demographic group.

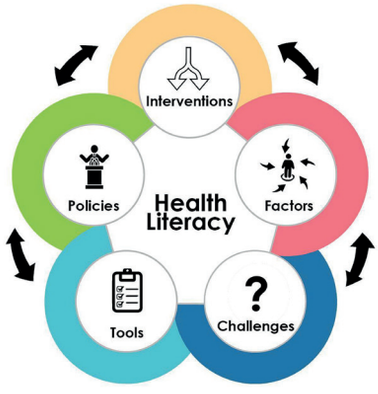

Figure 1 - Mapping the Health Literacy terrain

Material and methods

The authors analyzed publications in the field of HL among young people, the development of the subject, research trends, and displayed the results of the analysis, intuitively distributing them into appropriate blocks. A search of open access publications yielded a total of 5159 articles retrieved from the core Pubmed, Web of Science, Scopus databases using the keywords "health literacy and students", "health literacy and youth", and "health literacy and children". The authors of this review analyzed the abstracts and main conclusions of these publications for compliance with the stated aim, with the subsequent inclusion of relevant publications in the review.

Based on the results of a literature search, the authors included in this review 114 researches and disclosed the following aspects of youth HL:

- Existing problems in the field of HL among young people and their dimensions.
- Legislation and regulation of the problem of HL among the young population
- Factors that affect HL levels in the young population
- HL Assessment Tools
- Available interventions to improve HL levels.

Health literacy levels overview

Health literacy of general population

It was shown that low HL was associated with various negative consequences at the individual and society levels, such as deterioration in health indicators and a lower level of use of medical services [10].

Studies among general population revealed various levels of HL. Thus, according to a European HL survey conducted among eight European countries at least one in every ten (12%) respondents had insufficient HL, and nearly one in every two (47%) had insufficient or problematic levels. Nevertheless, the distribution of these levels exhibited significant variations across different countries (29–62%). Higher percentages of people with low HL were discovered in demographic subgroups defined by economic disadvantage, low social status, lack of education, old age, implying the existence of a social gradient [11].

In a comprehensive nationwide cross-sectional study encompassing 15,728 Danish individuals aged ≥25 years, almost four in ten respondents’ encountered challenges when it came to accessing, comprehending, assessing, and applying health-related information. Remarkably, 8.18% displayed inadequate HL, while 30.94% exhibited problematic HL. It's worth noting that insufficient HL closely correlates with lower socio-economic status, compromised health, sedentary lifestyle, and overweight conditions. However, its connection to positive health behaviors, such as abstaining from smoking and excessive alcohol consumption, is comparatively weaker [12].

The study's findings on HL in Portugal suggest that 7 out of 10 people in Portugal (mainland) have high HL levels. Additionally, the findings imply that "navigation in the health system" tasks are the hardest in terms of particular health literacies [13].

Scientific research on HL has also been conducted in Kazakhstan. Thus, in 2013-2014, as part of a population-based cross-sectional study with the participation of six countries of the Asian region (including Kazakhstan), the study of HL was conducted using a comprehensive tool - the HLS-EU-Q47 questionnaire developed for the European HL Survey. This questionnaire is focused on the measurement of GVH not only in clinical settings, but also among the general population. The study validated the HCS-EU 47 questionnaire, translated into seven languages, in several Asian countries [14].

Aringazina et al. studied the distribution of HL levels among the population of five cities of Kazakhstan by the ability to search, understand, evaluate, and use information for health promotion. The study showed that the majority of respondents freely handle information in the field of health, regardless of gender, and the ability to manipulate information is expressed almost equally in each category of the assessment tool [15].

Health literacy of students and youth

Rababah et al. discovered that the field of study, health-related vs. others, had a substantial impact on all HLQ scales. On all scales, students in health-related faculties scored much higher

than students in other faculties. Other characteristics influencing students' HL included age, gender, smoking status, and year of study, with field of study having the greatest impact on the degree of HL among college students [16].

The research carried out by Vozikis and colleagues revealed that the HL of the college students in the study demonstrated a moderate to elevated range with their well-being being notably favorable at the same time. Furthermore, various elements including economic and demographic aspects like household earnings, sex, and health-related habits such as alcohol consumption, smoking, and physical activity were found to correlate with the participants' HL level and overall health condition [17].

In the study conducted by Patil et al, which explored HL and digital HL among college students in the US, more than half of the sample (51%, N=130) reported low HL. Students with low HL were, on average, 2.3 years older than those with adequate HL ($p<0.001$). Students who identified as female or gender variant were roughly twice as likely to have adequate HL as students identifying as male ($p<0.001$). No significant differences between HL levels were found across ethnic or racial groups. There was no significant association between HL level and political affiliation [18].

Younger individuals demonstrate lower levels of HL. About 25.5% of the research subjects in a cross-sectional survey of junior middle school pupils (ages 12 to 15) were found to have poor HL. Higher HL among students was connected with better quality of life (QOL) ($P<0.01$) [19].

Legislation and regulation of the problem of health literacy among the young population

Attention is being paid to HL at the legislative level. Thus, there is an established HL Council in the District of Columbia, US, that shall advise the Mayor and the Council on promoting HL for residents of the District and helping residents develop a working knowledge of mental health [20].

In order to improve HL, particularly among young people, the National Academy of Sciences, Engineering, and Medicine in Washington, US, regularly hosts round tables on the topic. These gatherings bring together leaders from academia, business, government, foundations, and associations, as well as advocates for patients' and consumers' interests. The Roundtable's mission is to educate, motivate, and engage a wide range of stakeholders in order to encourage the development, implementation, dissemination of evidence-based HL practices and policies with the aim to enhance everyone's health and wellbeing [21].

The National Action Plan initiated by the U.S. Department of Health and Human Services strives to engage a diverse range of stakeholders in a cohesive, cross-sector initiative aimed at enhancing health literacy. Seven goals that will increase HL are included in the action plan, along with methods for attaining them [22].

In addition, International HL organizations have been established in other countries: namely, the Asian HL Association, the Health Literacy Center of the Canadian Public Health Association, the Global Literacy Working Group in New Zealand; Health Literacy in the United Kingdom; Health Literacy in the United Kingdom; the Irish National Adult Literacy Agency; Shanghai Declaration on Health Promotion [23].

Our country is no exception. Chapter 12 of the Constitution of the Republic of Kazakhstan enshrines the constitutional rights and obligations of citizens of our country in the field of healthcare. According to Article 80 of the Constitution, citizens of the Republic of Kazakhstan, first of all, are obliged to take care of the preservation of their health, bear joint responsibility for the maintaining and enhancement of personal and public well-being. [24, 25].

The problem of forming a healthy lifestyle has received the priority status of state policy: in the Development Strategy of Kazakhstan until 2030, one of the most important long-term priorities is defined as "Health, education and well-being of citizens of Kazakhstan", which emphasizes the political, economic, socio–medical importance of a healthy lifestyle. In this regard, the comprehensive use by the healthcare system of a powerful social component, such as the participation of citizens in the preservation and strengthening of public health, in the formation of a healthy lifestyle, is of particular importance, especially for the younger generation, since it determines the future of the country, its scientific and economic potential. The observed deterioration in the health of adolescents on the threshold of entering working age and reproductive age makes it necessary to study social factors that ensure the preservation and improvement of their health [26].

In order to increase the HL of the population and strengthen the promotion of a healthy lifestyle in Kazakhstan, a Roadmap for 2023-2025 has been developed and is being implemented, the Ministry of Health of the Republic of Kazakhstan reports. As a result of the implementation of the Roadmap measures, it is expected to reduce the consumption of tobacco products, alcoholic beverages and surfactants; improve mental and reproductive health; reduce injuries. It is expected that one of the main objectives of the roadmap implementation will lead to an increase in the proportion of citizens of Kazakhstan leading a healthy lifestyle to 30% by 2025; Reduction in the prevalence of tobacco smoking among the population of Kazakhstan aged 15 years to 19% by 2025; Reduction in the incidence of obesity among children (0-14 years) to 90 per 100 thousand population by 2025 [27].

Factors that affect health literacy levels in the young population

Socio-demographic factors

Several studies have examined the relationship between HL and demographic factors, providing insights into how they can impact HL levels.

One study conducted in Greece assessed the functional HL among university students and found no significant association between age and HL [17]. The study by Vamos et al. (2016) investigated HL profiles of Texas university students and revealed that, in relation to "Appraisal of health information," younger students aged "15-24 years" exhibited lower HL levels compared to their colleagues aged "25 years or older" [28]. These findings suggest that age may not be a significant determinant of HL among young people.

However, other studies have shown that age can influence HL levels in specific populations of young people. For example, a study in Malaysia and Sri Lanka found that younger students had lower HL levels compared to older students [29]. Similarly, a study in Germany found that HL levels among adolescents declined with age [30]. These findings indicate that age can have an impact on HL levels in certain contexts.

Rababah's study uncovered that freshmen, sophomores, and juniors displayed diminished HL levels across measured dimensions, including "Feeling understood and supported by healthcare providers," "Appraisal of health information," and "Understanding health information." Additionally, the research identified associations between health literacy and gender. Rababah et al.'s investigation highlighted those female students demonstrated elevated HL levels compared to male counterparts in specific domains, such as "Social support for health,"

"Navigating the healthcare system," "Ability to find good health information," and "Understanding health information." [16].

The study by Vamos et al. (2016) uncovered a notable gender-related finding, indicating that women reported higher levels of HL in aspects such as " Adequate comprehension of health information to make informed decisions" and " Evaluation of health information" compared to men, emphasizing gender disparities in health information comprehension and decision-making [28].

The study investigated the connections between the study variables and HL domains. Notably, a correlation was established between gender and general HL, with females exhibiting notably higher HL scores across all health domains [31]. However, other studies have shown mixed results regarding gender differences in HL. When comparing Korean males and females, it was found that the latter were less likely to know how to read and fill out medical forms ($\chi2=6.594$, df=2, p=.037), to have trouble reading the directions on medicine bottles ($\chi2=7.515$, df=2, p=.023) and to understand written information from a doctor, nurse, or nurse practitioner ($\chi2=9.975$, df=2, p=.007) [32]. Some studies have found that women have higher HL levels, while others have not found significant gender differences [33-36].

Furthermore, the study conducted in China found notable geographic variation in HL levels, with the proportion of respondents with adequate HL varying across different regions. Similarly, another study in China found regional heterogeneities in HL levels among the Chinese population [37]. These findings suggest that HL levels can vary based on the geographic location within a country.

Additionally, the study conducted by Bánfai-Csonka et al. found that nationality was an influencing factor in HL among university health science students. The study reported a significant correlation between nationality and HL levels [38].

Lifestyle factors

Svendsen et. al. identified notable links between HL and physical activity, with sedentary behavior linked to higher odds of lower HL scores, while moderate exercise was associated with reduced odds of inadequate and problematic HL. Moreover, this group of authors found the significant relationships between HL and the long-term health risk indicator BMI, indicating that obesity (BMI>30) was linked to lower HL scores, while higher HL scores were associated with normal BMI and demonstrated associations with overweight (BMI>25). Furthermore, HL demonstrated associations with alcohol consumption, consistent drinking habits, and issues related to alcohol consumption [39].

Evans et.al. found that students who rated their health as not satisfactory were twice as likely to have limited HL as those who rated their health as satisfactory [40].

Rababah's findings indicate that the smoking status of college students is a significant predictor of HL. Nonsmokers had higher scores of HL on seven of the nine HLQ scales compared to smokers [16].

In the study conducted among Danish students, it was defined that the health-related experiences of the students tended to influence their HL as well. In four of the nine domains, students who had prior contact with hospitals as inpatients or outpatients scored higher than those who had not [41].

Socio-economic factors

It is argued that the HL level is associated with the direction of education. For example, research suggests that high levels of HL are associated with education in medicine and health sciences, in particular, Public Health [16, 41-44]. At the same time, conflicting data are indicating that students of health professions have a low level of HL, and there are also difficulties in interacting with e-health [45-47].

Other important socio-economic determinants of HL that are positively correlated with it are the socio-economic status of families and parents' education. This is attributed to the fact that caregivers with a higher education and socioeconomic status contribute to a better orientation of their children in health knowledge and behavior. Such families have a higher income, allowing them to provide children with better access to information and services and the best schools [48-50]. Moreover, a low level of HL is found among those students who report insufficient financial situations and low social status compared to older classmates [51].

Marital status is also noted as one of the socio-economic factors of HL among students. For example, living alone is a predictor of lower HL [52, 53].

Health-related factors

Frequent access to health services was associated with higher HL. Frequent health check-ups, whether due to illness or as a preventive measure, lead to frequent contact with healthcare professionals, thus contributing to higher HL among university students. Also, higher levels of HL are observed among students with less anxiety about their health (Figure 2) [49, 54].

Figure 2 - Traits of a person with high Health Literacy level

Health literacy assessment tools

Given the importance of HL, it is prudent to develop comparable and reliable measurement tools to assess HL in the population. Based on the role of interested parties in improving HL we believe that research institutions should develop and improve tools for assessing HL. To date, there are various systems or scales for assessing and measuring HL based on different subjects, both general HL, a specific disease or condition, health care, and tools that target different age groups and nationalities.

A systematic review conducted by Mahmoud Tavousi et al. highlighted that the initial tools for assessing HL emerged in the early 1990s and continue to be relevant in contemporary research. Over the period between 1993 and 2021, a total of 39 tools aimed at measuring general HL were identified [55].

Among the historically prominent tools for general health assessment, the following instruments have been frequently employed:

1. Rapid Estimate of Adult Literacy in Medicine (REALM) (1993), designed to evaluate reading proficiency and pronunciation skills [56].

2. Test of Functional HL in Adults (TOFHLA) (1995), aimed at assessing reading comprehension and numeracy abilities [57].

3. Newest Vital Sign (NVS) (2005), a concise clinical screening tool targeting reading comprehension and numeracy proficiency [58].

Despite their wide usage, these tools have faced criticism for several reasons. Some critiques include their limited coverage of various facets of HL, their inappropriateness for use in intervention-based studies, or their failure to encompass a health promotion perspective. Moreover, it's worth noting that the majority of these measurement scales were initially developed and predominantly used in clinical settings [59].

The advancement of tools for studying medical literacy has led to the proliferation of various versions of existing instruments. These adaptations have been tailored to different languages and diverse population groups. Some notable instances include:

- Rapid Estimate of Adult Literacy in Medicine (REALM) and its 16 iterations.
- Test of Functional Health Literacy in Adults (TOFHLA), which has seen the development of 6 versions, including its abbreviated form S-TOFHLA with 13 versions.
- Newest Vital Sign (NVS) has undergone 15 variations.

During the last decade two well-constructed instruments have emerged as noteworthy additions:

1. The Health Literacy Questionnaire (HLQ) (2013): This instrument stands out for its departure from established theories in the initial development stages. Emphasis was placed on comprehensively grasping the insights and expertise of health practitioners, community members, and peers. The HLQ comprises nine scales, each capturing a unique facet of the multidimensional construct of HL. Robust psychometric properties are evident across all scales. A significant recommendation stemming from this study is the endorsement of the HLQ's usage to identify disparities between the perspectives of clinicians and patients.

2. The Health Literacy Survey Questionnaire (HLS-EU-Q) (2013): Alongside its subsequent iterations, this questionnaire has made a notable contribution to the field. The questionnaire encompasses a total of 47 items that evaluate 12 distinct subdomains of HL. These subdomains are constructed around four fundamental information-processing abilities possessed by individuals, namely accessing, comprehending, evaluating, and applying information. Additionally, these abilities are explored within the context of health promotion and disease prevention.

These refined tools signify a substantial stride in the evolution of medical literacy assessment methods, offering a more comprehensive understanding of individuals' HL experiences [60-62]. The HLS-EU-Q tool has also been used in studies in Asian countries, including Kazakhstan [63], the variety of language versions of this questionnaire makes it one of the most widely used in the world.

In a systematic review conducted by Soares V.L. et al. of 31 instruments, none of their psychometric properties were rated as "very good" according to the COSMIN Risk of Bias checklist. The authors noted that the use of reliable tools for the development and evaluation of interventions in families with diabetes is important for improving HL, namely critical literacy and the effectiveness of diabetes treatment [64].

Among infectious diseases, HIV is the leader in the development of HL research tools. During the coronavirus pandemic and after, tools for studying medical literacy in this area began to be actively developed. Knowledge about the symptoms and transmission of infection, worry about infection, and practices related to mask usage and hand hygiene were most frequently evaluated [65]. A diverse array of specific content measures gained prominence, encompassing various dimensions such as parental and maternal health, insurance literacy, occupational health, dietary preferences, personal weight perception and concerns, awareness of alternative medicine, interactions with healthcare providers, and various other aspects [55].

The increasing emphasis on cultivating HL among children and adolescents has led to the exclusive incorporation of HL promotion in early childhood within the policy brief of the World Health Organization's agenda for investing in HL within the European Region. Additionally, this focus has found its place in the recently published Shanghai declaration on health promotion [66].

A systematic review by Okan O et al. spanning the years 1990 to 2015 identified a total of 15 tools designed for measuring HL among children and adolescents. Scholars, in alignment with insights from developmental research, assert that the foundation for effective HL is laid during early childhood. Within the spectrum of identified tools, ten novel instruments were devised specifically for children and/or adolescents, encompassing the age group of 15 and older, which also extended to encompass adult age groups [67]. Among these, REALM-teen stands out as the pioneer HL tool for adolescents. This tool represents a teenage adaptation of the Rapid Assessment of Adolescent Literacy in the Field of Medicine (REALM-teen), an English word recognition test intended for use as a concise literacy assessment tool within medical institutions [68]. Additionally, a teenage version of the Adult Functional Medical Literacy Test (TOFHLAd) [69] and the Newest Vital Sign (NVS), employed for gauging children's literacy in health-related matters [70], have been presented. In Austria, a study utilized the HL tool HLS-EU-Q47, originally devised and validated for adults aged 15 and above, which was subsequently modified into a condensed version tailored for adolescents [11].

Improving health literacy: A multifaceted approach

Effective management of HL levels requires consideration of various aspects and approaches tailored to different types of HL and target populations. When addressing specific health conditions resulting from health choices, beliefs, or life circumstances such as immigration or natural disasters, a customized strategy for improving HL is essential. This spectrum of HL factors, if incorporated into the formulation of HL improvement policies from the outset, could have a transformative impact.

Despite the significance of HL, its distinct impact on health education and communication methodologies is not yet adequately reflected in many interventions. Progress in supporting national policies, implementing programs, and providing intervention tools for community practitioners has been slower than anticipated [71]. While numerous interventions have been reported in clinical settings, these primarily focus on functional HL in terms of task-oriented skills [72]. Nonetheless, interventions targeting HL have demonstrated the potential to enhance HL levels and subsequently induce changes in health behaviours. This presents a promising avenue to alleviate health inequalities among populations at the greatest risk [73]. In developing nations, healthcare systems face substantial challenges in addressing the needs of vulnerable communities. Factors such as lack of medication compliance, shortage of health educators, and barriers arising from language, socio-political, economic, and cultural factors hinder HL advancement. Research underscores that these challenges contribute to higher mortality and morbidity rates within vulnerable populations [74]. Effective HL requires a foundation of mutual understanding and communication between patients, families, and healthcare providers.

Promising interventions targeting HL embrace distinctive features that contribute to their effectiveness. Firstly, these interventions are tailored to the needs of participants with low

HL, addressing their specific requirements. Secondly, they emphasize interactive and critical skills rather than focusing solely on knowledge acquisition. Lastly, these interventions present information in an easily digestible manner, avoiding complexity and utilizing animated spoken text [75]. Such interventions have exhibited improvements in motivation, knowledge, empowerment, and self-confidence, indicating their potential for broader application [76]. In a study conducted in Turkey higher HL levels were observed among women who had prior exposure to information regarding Breast Self-Exams, Clinical Breast Exams, mammography, and mammary ultrasonography. Notably, improved HL in women corresponded to an enhanced interest in seeking out screening techniques crucial for the early identification of breast cancer [77].

A strategic initiative for enhancing citizens' HL is health education. Notably, China has established professional health organizations (PHOs) that offer comprehensive health education and promotion services [78]. In the United States, the "OPtimising HEalth LIterAcy and Access" (Ophelia) project comprises three key phases: assessment, intervention development, and continuous improvement. This multifaceted approach seeks to bolster HL by enhancing service delivery, refining processes, and evaluating outcomes [79].

Categorizing interventions into distinct categories reveals the diverse methodologies employed. These categories include traditional HL interventions, art-based approaches, active learning strategies, and technology-based interventions [80]. Traditional methods encompass lectures, passive lessons, and distribution of pamphlets, while art-based interventions engage creative approaches like drama and storytelling. Interactive learning interventions, such as group discussions, promote active participation, and technology-based interventions leverage digital platforms for knowledge dissemination [81]. Digital tools such as eHealth and mHealth technologies hold promise for direct-to-consumer HL interventions. Particularly, mHealth applications cater to smartphone users and can offer accessible solutions for HL improvement. However, concerns regarding privacy, security, and usability remain barriers to widespread adoption [82]. Evaluating the efficacy of these tools is essential, especially considering the potential impact of social media on HL and the dissemination of health-related information [83].

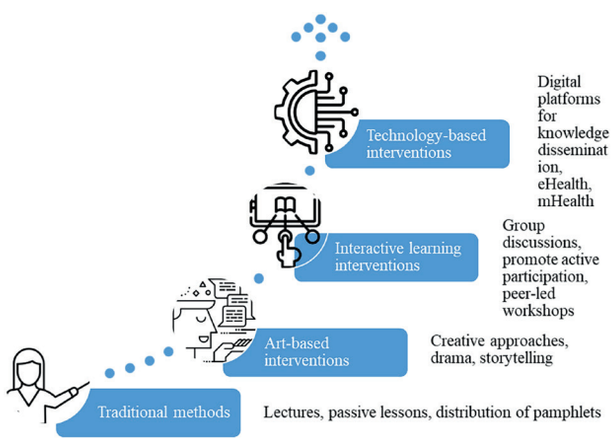

Figure 3 - Core Health Literacy interventions

In the realm of health professions education, the importance of HL is increasingly recognized. Effective communication and assessment skills, especially within real-world patient interactions, prove essential for health professionals to bridge the HL gap [84]. Current evidence highlights the need for more comprehensive training programs in evidence-based medicine and HL for both healthcare providers and patients [85].

Interventions designed to improve HL extend beyond clinical settings, encompassing diverse domains like nutrition, physical activity, and immigrant populations. In the realm of nutrition, interventions targeting individuals with low HL seek to simplify information and reduce reliance on medical jargon [86]. Similarly, interventions focusing on physical activity emphasize the importance of creating opportunities for public engagement, promoting active lifestyles, and improving road safety [87, 88]. The unique challenges faced by immigrant populations necessitate culturally sensitive interventions. Effective strategies include using native languages, involving participants in program development, and collaborating with community members who share similar experiences [89]. Nurses play a vital role in these interventions, bridging the gap between healthcare providers and culturally diverse populations [90].

Moreover, interventions have explored HL's connection with specific health domains such as calcium intake and mental health awareness [91]. Recognizing the pivotal role of healthcare practitioners, particularly registered dietitian nutritionists, in addressing HL gaps can lead to improved dietary choices and overall health outcomes [92]. Implementing evidence-based interventions and strategies to tailor care to individuals' needs and goals is crucial in achieving positive outcomes [93].

All of the interventions and measures mentioned above are applicable for young generation, the key point of these is the tailored approach based on research outcomes, not just general understanding or experts' opinions. It is essential for young people to make informed decisions about their health, such as choosing healthy foods, getting regular exercise, and avoiding risky behaviors. There are a number of interventions that have been shown to improve HL among young people. These interventions can be delivered in a variety of settings, including schools, community centers, and health clinics. We tried to delve into the array of measures and interventions geared towards improving HL among this population group, with insights drawn from a diverse selection of credible sources.

The role of families is pivotal in shaping health behaviors. Educational programs that engage parents and guardians in discussions about health topics and effective communication strategies create a supportive ecosystem for young people to make informed decisions [71, 94]. Collaborative efforts between educational institutions, healthcare providers, and community organizations facilitate HL improvement. Workshops, health fairs, and community-based events bring together various resources to disseminate accurate health information and provide opportunities for hands-on learning [95, 96].

Schools serve as crucial platforms for HL interventions [97, 98]. Typically, the basic literacy challenges that arise during the school years tend to endure into an individual's adolescence and beyond, and usually connected to broader health concerns [99]. Comprehensive health education programs that encompass topics such as nutrition, sexual health, mental well-being, and substance abuse prevention can equip young individuals with essential knowledge to navigate their health effectively [100-102]. It's important to emphasize the significance of teacher HL as a provider in the National Health Education Standards [103]. Incorporating interactive teaching methods, real-world scenarios, and peer-led initiatives enhances engagement and relevance. Achievements, quizzes, and challenges not only enhance knowledge retention but also motivate continuous learning. [104, 105]. Even medical students' have different issues regarding HL. For instance, in a study from the US more than 60% of students struggled to identify HL as an important determinant [106]. Embedding HL components within existing curricula, such as science or social studies, ensures that health-

related topics are not treated as standalone subjects but are seamlessly integrated into broader educational goals. This approach emphasizes the practical relevance of HL in daily life [107-109].

Gamification utilizes game elements to engage and educate users. Health-related mobile apps and online platforms can employ gamification techniques to deliver health information in an interactive and engaging manner [110,111]. Given the digital era's prevalence, digital HL is paramount. Online platforms, health-related apps, and social media channels can either empower or misinform young people [112,113]. Educational programs that teach critical evaluation of online health information, privacy protection, and reliable resource identification are essential to develop digital HL skills [114].

Peers exert considerable influence during adolescence and early adulthood. Peer-led workshops, discussion groups, and awareness campaigns enable relatable information sharing and discussions on health topics, e.g. vaccine hesitance and confidence. This approach fosters a comfortable environment for open dialogue, making health information more accessible and relatable.

So, addressing HL demands a comprehensive, multifaceted approach that considers the diverse aspects influencing health education, communication, and behavior, especially when managing it among young people. Targeted interventions, tailored to the unique needs of specific populations, have the potential to bridge HL gaps and enhance overall well-being. HL initiatives can encompass a wide range of domains, from traditional interventions to technology-driven approaches, and are essential for promoting better health outcomes and reducing health disparities (Figure 2).

Conclusion

This review delves into the analysis of prevailing HL among youth, examining issues, policies, tools, and interventions. The study highlights the significance of HL in shaping habits and attitudes among children and youth. Bridging gaps in HL, particularly among at-risk populations, is imperative due to its ties to demographics, socioeconomic status, and health behaviors. Further research is needed to measure HL accurately. Governments show a growing interest in legislating HL promotion. A standardized international tool for assessment is desired. A comprehensive approach is crucial, including tailored interventions and technology-driven initiatives, to enhance well-being and reduce disparities.

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