

# Health Information Literacy of Senior Citizens – A Review

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**Abstract.** The objective of this paper is to analyze the available literature on health information literacy of senior citizens from around the world and outline the major findings from this literature. A systematic review of literature from 2004 to 2014 was conducted using nine relevant databases, which yielded 42 quantitative studies, which were analyzed. The analysis revealed that information seeking behavior varied by age, gender, health status, education, socio-economic status and technology literacy. Over time, there has been a gradual increase in the use of the Internet by senior citizens seeking health information. Also, there has been a corresponding increase in a number of intervention studies in e-health literacy for senior citizens. Shortcomings in the literature include compromised methodological issues of inadequately powered sample size, absence of longitudinal and theory-based studies, and dearth of research on relevant outcomes. The article ends with a discussion of the relevance of the findings to IL researchers and practitioners, and suggestions for further research.

**Keywords:** Senior citizens, health information behavior, health information seeking, e-health literacy, health information literacy.

## 1 Introduction

Health information is very important for senior citizens because health-related issues tend to increase with age [1]. Current trends in seniors' patient care reveal that practitioners have moved away from a provider-dependent [paternalistic] model to one where patients are involved in various aspects of health decision-making [2-3]. Critical to senior citizens' effective participation in health decision-making is health information literacy (HIL). In this study we adopt Zarcadoolas, Pleasant et al.'s definition of HIL as the "wide range of skills, and competencies that people develop to seek out, comprehend, evaluate and use health information and concepts to make informed choices, reduce health risks and increase quality of life" [4, p. 196]. The goal of this review is to identify the major strands of research on HIL of senior citizens and report the important findings from this body of research. Recent findings suggest that HIL plays an important role in enabling seniors to manage their health

[5], and in making health related decisions [6]. Given the importance of HIL in health decision-making and the trend towards patient's increasing involvement in managing their health, a review of the literature on senior citizen's HIL is both important and timely.

## 2 Methodology

A systematic review of literature from 2004 to 2014 was conducted by combining the search term “*health information*” with “old”, “older”, and “senior/s” and “senior citizens” in different iterations across nine databases: *PsycINFO*, *Library Literature & Information Science*, *Web of Knowledge*, *Medline*, *CINHAL*, *ERIC*, *Mass Media Complete*, *Science Direct*, and *Scopus*, to scan the literature published in peer reviewed journals. We also included studies focusing on populations outside North America and other English speaking regions, which was a limitation in previous literature reviews [7-8]. Using Zarcadoolas, Pleasant et al.'s definition of HIL as basis we included research articles that focused on different components of health information literacy including, health information seeking, comprehension of health information, e-health, and studies that document health outcomes that can be attributed to information seeking. Our search yielded 94 articles that focused on various aspects of health information literacy among senior citizens. These included 32 qualitative and 46 quantitative articles, and 16 review and commentary pieces. For this review we included the 42 quantitative articles in the final analysis. This decision was based on the fact that though findings from qualitative articles provide very interesting insights, they are not easily generalizable, as opposed to results from quantitative studies. A coding method used in an earlier study was modified and adapted for this study [8]. The analysis revealed that broadly, three research strands currently exist within this literature. The first strand focuses on documenting how demographic factors influence health information seeking and use. The second strand focuses on comprehension of health information by senior citizens. The third strand of research focuses on the impact of e-health literacy interventions and their influence on health information seeking on the Internet.

## 3 Predisposing Characteristics and Health Information Seeking

Scholars pursuing this line of research conceptualize health information seeking as an active and purposeful goal-oriented activity. The basic model of health information seeking as outlined in these studies suggests that predisposing demographic characteristics of a senior citizen in turn influences that individual's engagement in health information seeking behaviors, which then predict the relevant outcomes. This model of information seeking behavior is similar to the one proposed in earlier studies [8-9]. Findings suggest that senior citizens are not one monolith group, and disparities exist in patterns of health information seeking and use. In general, research revealed that health information seekers were predominantly females [10-12]. Exceptions to this were a Taiwanese study [13] which found no differences among men and women, and an Australian study which found that women were less likely to have access to

Internet and were less willing to receive health information from the Internet. Findings from the later study may be attributed to participants being predominantly rural, and so other factors may be at play [14]. For both genders, talking to a general medical practitioner increased the odds of using Internet for health information. However, talking to a medical specialist was significantly associated with Internet use only for older women, while seeing a mental health professional only marginally increased the odds of Internet use for health information only for older men [15]. Gender-based differences were also evident in health literacy scales. Men in general scored better on both general numeracy (3-item scale) and health context numeracy scores (8-item scale), and scored lower on math anxiety score. However, there were no significant gender based differences on the combined scores of Short Test of Functional Health Literacy in Adults (STOFHLA) (numeracy+prose), or on STOFHLA prose scores, and scores from the numeracy component of STOFHLA [16].

Age was another important factor. Health information seekers were often younger senior citizens in the age range of 50-70, compared those in the higher age bracket. These findings were consistent across populations in other countries including Australia, Canada, Finland, Sweden, Taiwan, Philippines, e.g. see [10], [12], [17-19] and specific immigrant communities, ex. Korean Americans [11]. However, the studies did not find any differences between older and younger Veterans in terms of health literacy, objective numeracy and graphic literacy [20]. A Canadian study found an inverse relationship between age and STOFHLA scores for patients between 80-90 years [16] which was in conjunction with other studies [21]. It was also found that scores on STOFHLA prose decreased with increase in age, and age did not influence the numeracy scores. However, results were quite different for the other two numeracy scales administered in the study where age negatively correlated with the scores. This led the authors to conclude that the high functional literacy scores on STOFHLA may be attributed to their prose skills rather than numeracy. And the numeracy skills used in answering numeric questions in STOFHLA emphasize basic number recognition and not the utilization of strategies and skills associated with numeracy skills and strategies that are known to reduce with age [16]. Source preferences also differed by age. Results showed that older senior citizens preferred to receive their health information from human sources, primarily professional sources (doctors, nurses, pharmacists, American Indian Health Service workers, and tribal health clinic staff), interpersonal sources (friends/relatives) and television [13], [22], and ethnic language media (health segments in newspapers and television) [11] to other sources (e.g. Internet, radio) in that order. Human sources were most favored over other sources as it allowed them to communicate and clarify their doubts and ask relevant questions [17], [22-24]. Race was another important factor that influenced various aspects of HIL. Studies showed that Caucasians typically scored higher on a number of health literacy measures [20], [25-26], were more likely to look for health information online, reported better health status, expressed greater confidence in taking medicines, had better knowledge about their chronic health conditions, and were less likely to report that they would be judged negatively for asking health related questions [27]. In terms of numeracy and graph literacy, one study found that African Americans had lower levels of graph literacy than their older White counterparts. However, older African Americans and Whites did not differ in levels of

health literacy, subjective and objective numeracy [20]. A US-based study also found that preference and trust for sources also varied across races as follows: Blacks (TV), Hispanics (family members), and Whites (health care providers) [22]. Socioeconomic status and education levels were also strong predictors of health information behavior, where the more affluent and well-educated were more likely to seek health information compared to those with less education and those who belong to a lower socio-economic status [28-30].

In modeling health information behaviors, scholars have documented a number of psychosocial characteristics that influence the nuances of the search process. Studies in general have identified technology related factors (e.g. computer self-efficacy, prior experience with Internet use, behavioral intention to use, perceived ease of use) [28], [31-33], and e--health literacy [34-36] as factors influencing health information seeking. In addition, perceived usefulness, ability to enjoy Internet use, were all factors that positively correlated with health information seeking [31]. Non--technological factors such as psychological capital (e.g. anxiety, depression) were negatively associated with Internet use for health, whereas social capital (social contact, participation in social activities) was positively associated with Internet use for health [37]. Lastly, other predictors of information seeking include number of chronic conditions or serious illness, irrespective of the race and gender of the subjects [13], [18], [29], [31], [37], being married, and having private insurance, increased the likelihood of seeking information online [29].

### **3.1 Characteristics of Health Information Seeking Behavior**

Information behaviors varied across different age groups of senior citizens. These consumers could be broadly categorized into Internet and non-Internet users. Members of both these groups were most likely to be happy with their preferred choice of information channels (Internet or other), and make decisions based on information from their preferred channels [33], [38]. Among these, one study found that those who obtain health information from non-Internet sources are more likely to make health related decisions compared to Internet information seekers [38]. Two studies found a strong association between trust in Internet health sources and frequency and confidence with Internet use [24], [33]. Senior citizens in general had poor website quality and credibility assessment skills, and often relied on previous knowledge to assess the quality of information online. They rated health websites as credible if they answered a wide range of questions or specific questions, or if the information was “concise”, “clear”, “organized”, and was “presented in an orderly fashion” [17]. A Filipino study found that senior patients preferred full disclosure from doctors, and gravitated to doctors who were experienced and were willing to fully disclose information about the health problem and its outcomes [10].

### **3.2 Health Related Outcomes**

There were only two studies that focused on health outcomes. These studies found that senior citizens with low numeracy skills in general scored less on risk comprehension [26], and those with low overall health literacy scores were less willing to take part in decision making about their health, and placed greater trust in their physicians for making their decisions [20].

## 4 Comprehension of Health Information

Comprehension of health information is a critical aspect of health information literacy and plays a key role in health decision making. Scholars pursuing this line of inquiry have documented reading skills, numeracy and graphic literacy skills of senior citizens in health context. Donelle, et al. measured numeracy skills in a population of Canadian senior citizens using three different scales: The STOFHLA, a three item General Context Numeracy Assessment Scale (GCNAS) [39], and an 8-item Health Context Numeracy Scale [39]. Results showed that subjects' numeracy scores were contingent upon the numeracy instruments used. Respondents scored lowest in the GCNA scale, followed by the health context numeracy scale, and STOFHLA, in which they scored the highest [16]. This gradient reflects a range of numeracy skill levels as described in previous research [40-41]. These differences in numeracy scores led the authors to conclude that the independent use of these three measures may not accurately represent the numeracy scores of Canadian senior citizens [16]. The results from this study also shed light on the relationship between age and functional health context numeracy in Canadian seniors. Results showed that a significant number of Canadian senior citizens scored well on STOFHLA ( $n=127$ , 91% gained adequate health literacy scores). Additionally, most participants ( $n=110/140$ , 78.6%) achieved perfect scores on STOFHLA's numeracy component. However this study suffered from an important limitation. Subjects in this study were highly functional individuals, which may have reduced representation of individuals with a wide range of numeracy and prose skills. This may in turn portray senior Canadians as having disproportionately higher health literacy skills as measured by STOFHLA.

Donelle, Hoffman-Goetz, Gatobu, et al. found that the format of presenting health risk information (text only, graphics only, and a combination of text and graphics) did not have an impact on risk information cognition. Their study also showed that older adults had a tendency to overestimate their numeracy skills when in fact they scored significantly less on numeracy assessment scales in both the health and non-health contexts.<sup>1</sup> Though this study had subjects with a wide range of education and numeracy skill levels, it suffered from a small sample size and therefore its findings may only be generalizable to a limited extent [16]. There are two other studies that merit an in-depth look, each of which have focused on senior citizens belonging to two distinct minority groups: American Veterans, and American Indian and Alaskan Natives. Rodriguez et al. investigated the levels of numeracy and graphic literacy and its influence on various health behaviors in 502 American war Veterans. The study found that older Veterans had inadequate health literacy, scored low on subjective and objective numeracy scales, had higher body mass indexes, took more medications and had more co-morbidities and mental disorders compared to their younger cohorts. Compared to younger veterans, older veterans demonstrated higher subjective numeracy [20]. The second study by LaVallie and Wolf et al. investigated the relationship between health numeracy and risk comprehension in 90 Senior American Indians and Alaska Natives. Numeracy was measured by testing participants' ability

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<sup>1</sup> Participants were tested for general context numeracy (3-item scale) general context numeracy (8-item scale), and prose and numeric ability in health context.

to answer three math questions with various levels of difficulty: assessing basic probability, converting a percentage to a proportion, and converting a proportion to a percentage. Risk comprehension was measured by the participants' ability to perceive the level of risk from each of the treatments described in vignettes that were framed in three different formats: relative risk, absolute risk, and number needed to treat. The study found that in general, the numeracy skills of this group of seniors were relatively low. Of the respondents, 25% of them were able to answer basic probability question, 23% converted a percentage to proportion and only 7% correctly converted a proportion to percentage. In terms of presentation format, information that was framed as a relative risk elicited the highest percentage of correct answers (74%), compared to questions framed as absolute risk (60%), and the actual number needed to treat the condition (58%) [26].

The influence of health literacy on various health behaviors and outcomes is another line of research pursued by scholars. For example a study by Ussher, Ibrahim, Reid et al. found that adequate to high Health Literacy scores as measured by Rapid Estimate of Adult literacy in Medicine (REALM) [42] in coronary heart disease patients, positively correlated with adherence to exercise regimes, receiving social support, confidence in interacting with medical professionals, taking part in discussions with doctors and nurses, ability to read and understand medical literature, and understanding heart problems [27].

## 5 Intervention Studies in E-health Literacy

Studies in this line of research measured the influence of e-health literacy interventions on health information seeking online. These interventions often imparted basic computer and Internet browsing skills, and skills for evaluating the quality and accuracy of health information websites and content to the participants. Post intervention data was collected immediately after the intervention in some instances [6], [43] or was collected several weeks after the intervention [44]. In one instance data was collected after six months [45], and after a year after the intervention in another instance [46], in order to understand the long-term impact of such educational programs. However, this particular study suffered from a high attrition rate, which limited the generalizability of its findings. These studies in general found that e-health literacy interventions increased senior citizens' use of online health resources, self-reported e-health self-efficacy, actual e-health literacy skills, and perceived usefulness of e-health literacy skills [6], [43-45], [47-51]. Along similar lines, other studies found that e-health literacy interventions increased subjects' perceived locus of control of health outcomes, desire for health information, value they attributed to their health and well-being, and desire to take part in health decisions [45-46]. In three studies, pre-and post-intervention measures showed that participants experienced reduced computer anxiety, developed positive attitudes towards computer use and online health information seeking, and increased computer self-efficacy [6], [43], [47-48], [51]. Xie's (2011) study also found that learning methods (collaborative, individualistic) and presentation mode of intervention (visual only, visual plus audio) did not have any influence on e-health literacy gains and other learning outcomes. Leung, Ko et. al. (2007) report that an e-health literacy

intervention informed by principals of geragogy, and which incorporated Chinese culture specific dietary, and disease attributes to educate Hong Kong Chinese senior citizens, improved their e-health literacy skills. Data collected one month after the intervention also showed that 82.1% ( $n=54$ ,  $N=88$ ) of participants reported independently browsing the Internet for health information following the intervention. Furthermore, 75.9% ( $n=60$ ) reported browsing the Internet for health information more than once. Participants also reported using other sources of health information including books, seminars and specific health education workshops that are regularly conducted in retirement homes across Hong Kong.

## 6 Implications for Health Literacy Scholars

The rigor of our sampling method leads us to assert with a certain level of confidence that it is representative of the research that has been published in this area. Our analysis reveals that research until now has provided very important initial insights into various aspects of health information literacy among senior citizens. However, several shortcomings remain. First, is that the current literature is very fragmented, with very few studies published on different aspects (e.g. health information seeking, cognition of health information, e-health) of HIL. This limits our ability to confidently draw empirically grounded conclusions that can be generalizable to the entire demographic segment. Second, several studies in the sample suffered from inadequately powered sample size, or relied on convenience samples, and opt-in panels of online-participants, which further limits the generalizability of their findings. Third, many of these studies are not theoretically grounded, which limits our ability to explain causality among the different correlating variables. Fourth, a significant number of articles have studied the influence of psychosocial factors that may influence engagement in health information behavior, and types of information sought and channels used, with very little focus on understanding the relevant outcomes associated with the search process, or factors that can influence the translation/non-translation of the information retrieved into meaningful health decisions or actions. Fifth, there has been no effort to understand how ongoing disease or chronic conditions influences different aspects of HIL and how this changes with the disease trajectory. Sixth, research has shown that social support has a significant impact on health outcomes [53-54]. This is more relevant in senior citizens' context because their diminishing cognitive capacities can have an impact on their health literacy [55] and increase their dependency on caregivers for receiving different forms of health-related assistance [56]. It follows that in theory social support received by senior citizens from their caregivers, and care giver's health information literacy can have important outcomes for their health. Though there is some research that has explored the relationship between health literacy of caregivers and its impact on caregiving and health outcomes [56], there is very little research that has examined the relationship between different forms of social support, health information literacy and health outcomes. This is an important gap that future research must address. Last, there is a need for more naturalistic interventions/observational or longitudinal methods in studying health information literacy, which, while they face challenges such as high attrition rates or difficulty in accessing such senior citizen populations, may also dramatically improve the ecological validity and generalizability of these studies.

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