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Research article

General health literacy scale for Thais and comparison between age groups

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ABSTRACT

Background: Health literacy (HL) has captured the world's interest since it was first defined by WHO in 1998. In Thailand, a number of HL scales for risk groups have been developed but none for the general population. Therefore, this research aimed to develop a general health literacy (GHL) scale for Thais and compare HL levels between groups, i.e. students, youth, adults, and older.

Methods: In this mixed-methods study, a focus group was conducted with 20 health policy-makers. Data were collected from 4,000 participants from all regions of Thailand through questionnaires between 2018 and 2019. The participants were divided into 4 age groups: aged 7–14, 15–24, 25–59, and 60–75. All of them were selected using stratified random sampling. Data analysis was performed using CFA and ANOVA.

Results: 1) The GHL Scale for Thais comprised 47 items, covering 5 domains i.e. access to health information and services, understanding of health information and service leading to practice, health information and service appraisal, communication and social support, and health self-management. The scale had high Cronbach's alpha values for all participants and different age groups (Cronbach's alpha = 0.95–0.97) and factor loadings ranging from 0.45 to 0.77. 2) Most Thai people (58.9%) had a fair level of HL, followed by high HL (24.3%) and low HL (16.8%). 3) The comparison of HL among age groups had different mean scores ($P < .05$) and low HL was found in adults (25.00%), older (18.60%), youth (12.60%), and students (11.40%), respectively.

Conclusion: The GHL Scale for Thais can be used to screen people of all ages for potential health problems and develop strategies for promoting health resilience and preventing disease in each age group.

1. Introduction

Health literacy (HL) is the capacity of individuals to access, understand, and use health information and services to improve and maintain good health for themselves, their families, and their communities [1]. It plays a significant role in enhancing individuals' health. The Department of Health, Ministry of Public Health, Thailand [2] has defined HL as the ability to consider, evaluate, and make appropriate decisions regarding behavior change and health services and products. It has also introduced a national strategic plan, aiming to drive all communities towards health literate societies by 2035. HL is an indicator of Thai people's health status, relating to risk behaviors and mortality rates. According to previous research, people with low HL have increased risks of hospitalization and mortality and higher medical expenses due to their poor ability to understand, communicate with health professionals, and access healthcare services [3]. HL is a major contributor to a person's health skills, behaviors, and health outcomes (e.g., disease incidence, prevalence, morbidity, and mortality) Therefore, HL programs for people should include skills-based HL measurement by self-report that can be used in all age groups [4].

Popular overseas HL assessments include the Rapid Estimate of Adult Literacy in Medicine (REALM) [5], The eHealth Literacy Scale (eHEALS) [6], Functional Communication and Critical Health Literacy Scales (FCCHL) [7], Test of Functional Health Literacy in Adults (TOFHLA) [8], and The HLS-EU-Q47 by Sørensen et al. [9] which is a HL survey in Europe. The HLS-EU-Q47 measures 4 dimensions of HL: access, understanding, appraisal, and application of health information in 3 different domains: cure of disease, disease prevention, and health promotion. The survey consists of 47 items. Another popular HL assessment tool is the Health Literacy Questionnaire (HLQ), a HL survey for Australians of all ages. The HLQ assesses HL needs and the outcomes of both individual and group HL interventions. The disagree/agree Likert scale comprises 44 items [3].

The development of Thailand's HL scales started with an ABCDE- HL scale for Thai adults with NCDs risks [10] which had three levels and was

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based on Nutbeam's [11] and Manganello et al. [12], consisted of functional HL, which refers to the ability to obtain and interpret health information. Interactive HL is communicable skills in extracting information and applying new information to changing conditions. Critical HL may be utilized to critically examine the information and use that information to exert greater influence over life events including media literacy. The full version consists of 36 items while the short one consists of 19 items. The next developed scale is a HL scale developed according to the National Health Recommendations for students aged 7–14 years. The full version consists of 58 items, and the short one consists of 30 items [13]. The next one is the HL Scale for Thai Childhood Overweight, consisting of 35-item [14]. This was followed by the HL Scale for Unwanted Pregnancy Prevention of Thai Female Adolescents, consisting of 38 items [15], and a 5-point HL scale for Thai adult patients with diabetes, consisting of 30 items [16]. In addition, HL surveys in 2014 found that 95.50% of total 2,001 young Thai females aged 15–21 years participants had low HL regarding teenage pregnancy prevention, and 60.40% of 2,000 Thai children and adolescents with obesity aged 7–14 years had low HL regarding obesity prevention. A HL survey in 2016 also revealed that most of the 15,156 Thai students aged 7–14 years across the country had fair levels of HL according to the National Health Commandments (63.20%), followed by high HL levels (31.80%) and low levels (3.80%). Another HL survey was conducted among 15,278 Thai people aged 15–59 years who were at risk of NCDs. The results showed that most of the participants had low levels of HL (49.00%), followed by fair levels (45.50%) and high levels (5.50%) [17]. In addition, the results of the invariance analysis of HL measurement models showed no difference between male and female adults. However, the mean comparison of HL and positive attitudes towards the health of adults in urban was lower than in rural communities [18]. The evidence from a government survey indicated that Thai people had low to flair HL. These results demonstrated that health promotion or intervention for increasing HL is crucial for the health system. Although, the material for evaluating patients' HL was different by age group. However, there were no standard tools for assessment in the general healthy population before. The researchers filled such a gap of knowledge by developing a General HL assessment tool for Thai people.

A HL promotion plan was formulated by the Health Service Support, Ministry of Public Health, aimed at developing HL knowledge and assessment tools for the Thai general population and risks groups and improving Thai people's HL levels by 20%. This prospective study focusses the importance of the development of HL scales for Thai people of all ages and thus intended to 1) develop domains for HL measurement, 2) measure HL in entire and separate groups, and 3) compare HL levels between students, youth, adults, and older adults.

2. Methods

In this mixed-methods study, the researchers followed the principles for participant protection and obtained a certificate of approval for research involving human subjects No. SWUEC-099/2017 from the university's ethics committee. The major steps of the research process are detailed below. This research aimed to develop HL domains and scale items for the general population by analyzing and comparing domains of HL scales based on WHO's [19] definition of HL and studies by Nutbeam [20], Sørensen et al. [9], and Osborn [3], all of which focused on the general population with no context of health problems or diseases. The present research chose to study general healthy people because HL scales of WHO focus on general healthy populations, not at risk of chronic diseases or any health problems. A focus group was conducted with 20 public health technical officers who are responsible for formulating the Ministry of Public Health's policies on health promotion and disease prevention. The researchers and the officers examined item consistency, classified items to determine domains based on the definition of HL, and decided on a Likert self-report scale in which respondents assess their ability, cognitive, and social skills. To improve the quality of the scale, the content validity was examined by 5 experts in assessment and health research. The researchers selected items with IOC values ranging from 0.80 to 1.00, and tried out the scale on 4 groups (120 people in total) with similar characteristics to the research sample: 1) public school students, 2) students in vocational colleges, public universities, and private universities, 3) workers in the public and private sectors, and 4) older adults in urban and rural communities. The reliability of the scale was explored using a correlation coefficient at a significance level of 0.05 and a Cronbach's alpha coefficient of 0.70 and above.

The sample size was determined according to the sample size guidelines for factor analysis suggesting a sample of 500 as very good and 1,000 as excellent [21]. The participants in this study consisted of 4 age groups (1,000 people per group). All were obtained using multistage sampling. In the first stage, the researchers used cluster random sampling to divide the population into 4 groups according to four regional health centers in Thailand: the northern center, the northeastern center, the central center, and the southern center. In the second stage, the researchers used stratified random sampling to partition the population into 4 subgroups according to age. 250 samples were randomly selected for each subgroup, totaling 1,000 samples per region. The total sample size was 4,000. However, the sampling methods had the limitation of infinity and heterogeneous population, the researchers used quota sampling together for distribution of participants including the public and private school/university students, adults working in public and private sectors, and people living in the community. Data were collected by locally trained researchers, received a response questionnaire consisting of 1,028 students aged 7–14 years, 980 youth aged 15–24 years, 1,001 adults aged 25–59 years, and 991 older adults aged 60–75 years, totaling 4,000 participants.

Data were analyzed using descriptive statistics (i.e. frequencies, percentages, and means), correlational analysis, and confirmatory factor analysis (CFA) using LISREL. The measurement model was found to be consistent with the empirical data at an acceptable level (Chi-Square = 1470.99, df = 784, P-value <0.05, RMSEA = 0.05, NFI = 0.98, CFI = 0.99, and SRMR = 0.08).

3. Results

Five domains of the GHL Scale for Thais were developed: 1) access to health information and services, 2) understanding of health information and services leading to practice, 3) health information and service appraisal, 4) communication and social support, and 5) health self-management. The scale comprised 47 items with a 5-point Likert scale ranging from 1 (lowest) to 5 (highest). HL scores were interpreted and classified in terms of percentage of individuals with limited HL (below 60 %), moderate HL (no less than 60 to below 80 %), and proficient HL (at least 80 %). The overall Cronbach's alpha value of the scale was high: 0.97 for all participants and 0.96, 0.95, 0.96, and 0.97 for students, youth, adults, and older adults, respectively. According to the CFA results, the factor loadings for items ranged between 0.45 and 0.77, as presented in Table 1.

The results of a HL study among Thai people revealed that: 1) participant demographics; the majority of the participants (55.50%) lived in suburban areas, were female (58.90%), reported their highest level of education as grade 1–6 (38.10%), were single (59.80%t), were farmers (34.70%), had a fair level of economic status with some savings (46.40%), and had no medical conditions (78.20%); 2) Thai people overall had fair HL (58.90%), followed by high (24.30%) and low HL (16.80%), respectively; and 3) youth had the highest mean score of HL (176.74), followed by older adults (166.32), students (166.29), and adults (159.17), respectively as following in Figure 1. In addition, the average score on HL of Thai people is classified by age group in Table 2.

The results of the comparison of HL between age groups indicated that Thai people of different ages had different levels of HL ($F = 70.01$, $p < 0.05$), and different age groups had different scores on all of the HL domains: Domain 1 = $F = 43.11$, $p < 0.05$; Domain 2 = $F = 47.57$, $p <$

Table 1. Results of quality assessment of the HL scale.

Domains of Thai people's HL	Item-total correlation	Factor loading
1. Access to health information and services (Cronbach's Alpha = 0.81)		
1.1 I can look for health information by myself to solve my health problems.	0.59	0.60
1.2 I can look for accurate health information through different sources such as experts and media.	0.60	0.57
1.3 I'm always open to new health information because I want to be healthy.	0.58	0.64
1.4 I can look for health information by myself.	0.52	0.52
1.5 I can look for healthcare providers that will treat my health problems.	0.57	0.45
1.6 I can go to the doctor's or visit healthcare providers whenever I want.	0.46	0.47
1.7 I'm confident that the healthcare providers I selected to suit my needs.	0.57	0.50
1.8 I can look for healthcare providers that suit my problems and my family's problems.	0.56	0.56
2. Understanding of health information and services (Cronbach's Alpha = 0.85)		
2.1 I can fill in health forms given by healthcare providers correctly.	0.61	0.68
2.2 I can follow the instructions provided in manuals or documents related to self-care.	0.59	0.74
2.3 I can explain health information obtained from media such as printed materials, brochures, posters, medical prescriptions, applications, Facebook, Line, and YouTube.	0.57	0.67
2.4 I know and understand health information presented by TV, radio, and online media.	0.56	0.60
2.5 I know and understand healthcare providers' explanations.	0.56	0.72
3. Health information and service appraisal (Cronbach's Alpha = 0.85)		
3.1 Before choosing a healthcare provider, I will ask myself what I really want and ask my family about what they want.	0.58	0.62
3.2 I often compare the health information received before deciding to believe or follow that information.	0.59	0.62
3.3 When I receive new health information, I will check the reliability of the source before deciding to believe or follow that information.	0.64	0.65
3.4 I compare health information between different sources to verify my understanding before sharing the information with others.	0.66	0.63
3.5 I know where I can obtain accurate health information for verifying the information received before believing and following that information.	0.64	0.68
3.6 I often seek advice from healthcare providers regarding health instructions before following the information received.	0.63	0.64
4. Communication and social support (Cronbach's Alpha = 0.94)		
4.1 I have at least 1 healthcare provider that can give me accurate advice.	0.61	0.56
4.2 I have at least 1 healthcare provider that can give me health information.	0.64	0.64
4.3 I have at least 1 healthcare provider that I can turn to for advice when I have health problems.	0.64	0.68
4.4 I have at least 1 healthcare provider that I can trust to give me health advice.	0.64	0.53
4.5 I have at least 1 healthcare provider that always encourages me in my self-care.	0.63	0.47
4.6 I can contact and communicate with those who have health knowledge.	0.61	0.73
4.7 I have enough people who can help me when I get sick.	0.65	0.67
4.8 I have family members or friends who are ready to help me.	0.66	0.66
4.9 I have at least 1 person that supports me in my self-care.	0.65	0.65
4.10 I have strong supporters who always give me moral support.	0.67	0.56
4.11 I'm confident that healthcare providers will understand me when we communicate.	0.66	0.71
4.12 I can ask healthcare providers about what concerns me or what I want to know.	0.63	0.76
4.13 I can discuss and exchange knowledge about self-care guidelines with healthcare providers.	0.66	0.75
4.14 I ask healthcare providers about my health so I can take better care of myself.	0.68	0.77
4.15 I can contact healthcare providers for health information to relieve my doubts.	0.66	0.66
4.16 I often exchange information with healthcare providers.	0.62	0.61
4.17 I can explain health information to others clearly.	0.61	0.64
5. Health self-management (Cronbach's Alpha = 0.90)		
5.1 I have good health knowledge and information for managing my health.	0.62	0.61
5.2 I have enough health information for taking care of myself when I'm sick.	0.61	0.75
5.3 I have enough health information for preventing my sickness.	0.65	0.64
5.4 I have enough health information necessary for taking care of my health.	0.65	0.65
5.5 I spend a lot of my time on self-care activities.	0.64	0.62
5.6 I plan to do activities necessary for achieving good health.	0.63	0.62
5.7 Even though I'm busy, I still make time for taking care of my health.	0.63	0.69
5.8 I set exercise and self-care goals and intend to achieve them.	0.62	0.54
5.9 I regularly observe my physical and mental changes to take better care of myself.	0.66	0.56
5.10 I improve the surrounding environment to ensure that I live in an environment that promotes good health.	0.61	0.57
5.11 I participate in health activities with healthcare providers.	0.60	0.55

0.05; Domain 3 = F = 57.41, $p < 0.05$; Domain 4 = F = 72.04, $p < 0.05$; and Domain 5 = F = 49.65, $p < 0.05$. The comparison of differences in mean HL scores between pairs of groups found that all pairs had different mean HL scores at a significance level of 0.05, except for students and older adults, as presented in Table 3.

4. Discussion

The General HL Scale for Thais was developed based on the principles of the development of the HLQ by Osborn et al. [3] which is a psychometric test with a Likert scale that assesses attitudes, capabilities, and

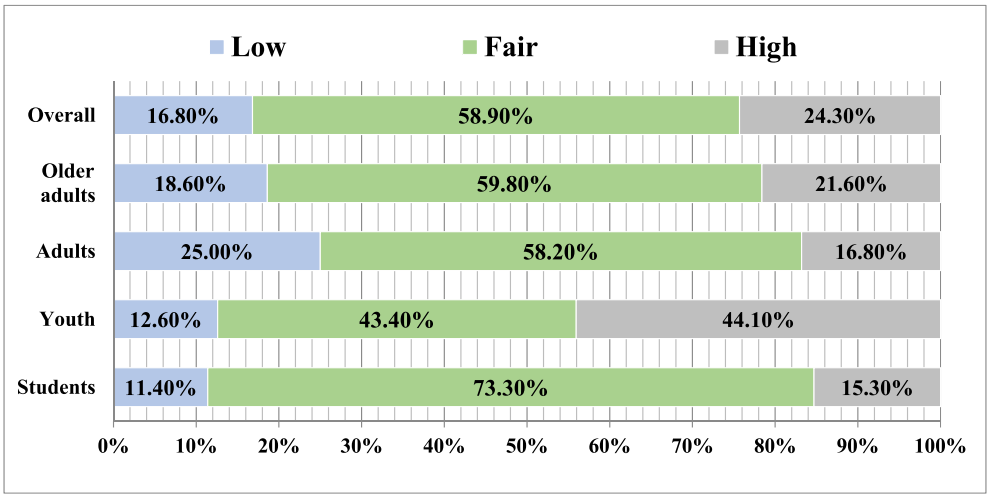

Figure 1. The HL measurement among Thai people separated groups.

Table 2. The mean scores on HL of Thai people classified by age group and overall.

Domains of Thai people's HL	Mean scores				
	Students	Youth	Adults	Older adults	Overall
1. Access to health information and services	27.72	29.81	27.37	28.35	28.30
2. Understanding of health information and services	17.25	18.98	17.45	17.77	17.85
3. Health information and service appraisal	21.37	22.82	20.42	21.25	21.46
4. Communication and social support	61.46	64.18	56.88	60.44	60.73
5. Health self-management	38.50	40.85	37.04	38.51	38.71
Thai people's HL	166.29	176.64	159.17	166.32	167.05

Table 3. The comparison of HL differences in mean scores between pairs of groups.

Age groups	Mean, SD	Students	Youth	Adults	Older adults
		(166.29, 0.84)	(176.64, 0.86)	(159.17, 0.85)	(166.32, 0.85)
Students	(166.29, 0.84)	-			
Youth	(176.64, 0.86)	10.35*	-		
Adults	(159.17, 0.85)	-7.12*	-17.47*	-	
Older adults	(166.32, 0.85)	0.03	-10.32*	7.15*	-

(*$p < 0.05$).

behavior. It applied WHO's [19] definition of HL that encourages individuals to develop cognitive and social skills which will lead to their motivation and ability to access, understand, and use health information and services to enhance and maintain good health. The scale also included the two levels of HL: interactive HL and critical HL based on Nutbeam's concept [11]. In terms of benefits, this scale can be used to classify the characteristics of people in all age groups who do not necessarily risk groups or patients and classify people before organizing training activities to ensure that the activities adjust or reinforce certain behaviors with regard to a specific domain or item.

With reference to instrument quality, the scale was tested for both construct validity and content validity. For the scale's test-retest reliability, the scores obtained from both times were similarly high. In order to be considered acceptable, a newly developed instrument should have a reliability coefficient of 0.70 or higher [22, 23]. The scale also had discriminating power ranging from 0.46 to 0.68, consistent with the minimum acceptable total-item correlation of 0.30 [24], and an acceptable level of construct validity. Judging by the statistically significant factor loadings of over 0.45, this HL scale was highly reliable and could be used to measure Thai people's HL across 4 age groups.

The HL assessment found that most Thai people had fair HL (58.90%) and low HL (16.80%) on all of the five domains. The results are consistent with a study on health literacy and health behavior among Thai people by the Health Service Support Department, Ministry of Public Health [13]. The study revealed that most children and adolescents aged 7–14 years and working people aged 15–59 years had medium levels of HL (63.80% and 47.40%, respectively). The assessment results are also in agreement with the HL survey among 17,530 Thai people aged over 15 by the Health Systems Research Institute [25]. According to the survey, 65% of Thai people had medium HL while 19% (approximately 10 million people) had low HL in terms of the ability to use health information and knowledge as well as basic health services to take care of their health. Considering each age group separately, the youth had high HL on all domains and a higher mean score than other age groups, which indicates that young people can access and understand health information and services well enough to practice, can check health information and services, have communication skills and social support, and can manage their health well. This may be explained by the fact that youth develop more healthcare decision-making processes, can analyze and understand new things quickly, have interests, and abilities to communicate and use mobile technology to seek health information and are likely to be triggered by different stimuli in online sources of health information [26]. Young people in the 21st century have more knowledge and understanding of health management and can access health services online better than other age groups [27] because they use technology to communicate and access information in their daily lives more than adults [28, 29] and most of the health services today are also available on the internet [30]. This is consistent with a study by Manganello [31] which suggested that adolescents had media literacy and skills needed to seek health information and frequently used mass media and technology to access health information and services. Media literacy is thus an important factor contributing to good HL [32, 33, 34]. A previous study showed that most Thai university students had high levels of HL, especially in terms of access to health information and services, health communication skills, capability to make decisions that promote health, and media literacy [35]. The results are consistent with foreign research that found that young people had HL and rated their own health good or tended to evaluate it in a more positive way. A study by Ghaddar et al. [33]

indicated that most students in a secondary school in the United States had high HL (52%) and that young people's HL was positively associated with their perceived self-efficacy and seeking for health information online. Some studies, however, found that adolescents had HL and rated their health medium [12, 36, 37, 38]. Youth with high HL can assist other groups of people in obtaining self-care knowledge from different sources and help explain health information and services to other people.

The developed scale in this study has a limitation due to its situation-based questions. Respondents' scores may differ according to their different experiences. The scale should be used to assess and compare HL among people who have similar backgrounds or are in similar situations. It is also recommended that the scale be used to assess each age group's HL before and after organizing a learning or training activity. Different activities should be conducted for different age groups due to their different interests and learning abilities based on the child learning theory (pedagogy) in which children learn for their future and careers and the adult learning theory (andragogy) in which adults tend to be interested in learning subjects that are relevant to their experience or problems considered as important life lessons [39].

Research recommendations. 1) Public health personnel are recommended to use the GHL Scale for Thais to assess their target group's needs and use the results to design content and activities for their HL development program to change or adjust certain behaviors that need to be addressed by considering age groups and domains or items separately. 2) The HL measurement should be provided in medical or clinical services for improving the quality of care, health promotion and prevention. 3) This scale assesses perceptions, feelings, and abilities or skills regarding one's health. Uncontrollable extraneous variables that can affect respondents' perception and feelings while they complete the scale should be considered such as respondents' feelings and emotions at the moment, and physical environments such as weather and haste. Researchers shouldn't force subjects to answer the scale questions and should have subjects complete the scale in 10–20 min without pause. 4) It is recommended that Bloom's [40] three criterion levels be used in HL assessment to avoid rating errors caused by response bias because most respondents tend to rate themselves higher than the truth. The scoring intervals according to Boom's criteria were divided into three categories: below 60%, more than 60% but less than 80%, and at least 80% imply low, moderate, and high levels, respectively. In other scales, respondents with a score of less than 50 were considered to have low HL. In this scale, respondents who received a score of less than 60 were considered not having enough HL for taking care of their health in both the present and future. To be considered having high HL, respondents must achieve a score of greater than 80. Users of the scale are thus recommended to apply the same criteria. 5) To extend the use of the scale, the scale may be used with other groups of people that are different from the participants in this study, such as groups at risk of diseases and underprivileged groups. The scale may be also used with minorities, foreign workers, marginal groups, and people from neighboring or ASEAN countries by being translated into specific languages used by specific groups.

5. Conclusion

The results showed that the GHL scale is an effective instrument for measuring health literacy in general people of all ages. Therefore, health care providers can use this GHL scale to screen people of all ages for their own health problems and develop strategies to promote health resilience and disease prevention in each age group.

Declarations

Author contribution statement

All authors listed have significantly contributed to the development and the writing of this article.

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Data availability statement

Data associated with this study has been deposited at http://bsris.swu.ac.th/upload/283350.pdf.

Declaration of interests statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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