

# Instruments to Measure Health Literacy among Children: A Scoping Review

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## ABSTRACT

**Background:** Research related to health literacy among children is limited due to the lack of appropriate measurement tools for this population. The measurement tools used to measure health literacy among children are usually adapted from the adult versions. Researches related to instruments measuring health literacy that can be used for children in school environments are inadequate. This study aimed to synthesize research on the instruments that measure health literacy among children in the community setting.

**Method:** We carried out a scoping review to synthesize research on the instruments measuring health literacy among children in the community setting. The article searching process was targeted to collect articles with corresponding populations, concepts, and contexts. The search was conducted through PubMed, ProQuest, ScienceDirect, and Sage Journals databases published between 2010-2020. The selection process was done using Preferred Reporting Items for Systematic Reviews and Meta-Analyses methods (PRISMA). The following critical appraisal used The Joanna Briggs Institute checklist.

**Results:** Out of 328 studies, six articles were selected for this review. Consensus showed that health literacy needs to be applied in various situations. Improving the health literacy of children in the early stages is crucial for children's development and personal health. Several instruments can be applied to measure health literacy in school-age children, such as Health Literacy Measures for Adolescents, Health Literacy for School-aged Children in the English, Turkish and Lithuanian versions, and Chinese version of the eight-item Health Literacy Assessment Tool. Generally, the instruments are adequate, while only two instruments in this study are inadequate because they do not describe the validity and reliability.

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## INTRODUCTION

Health literacy as an emerging issue in the discussion about health has a variety of meanings. Health literacy defined the topic as an understanding and a skill to digest information. People decide about types of healthcare, health promotion, and prevention of diseases that they will apply to improve their life quality<sup>1</sup>. Another similar meaning defining health literacy, especially in children, explained that children's conception of health literacy determines how they understand health guidance and other health-related information<sup>2</sup>. For this study, we defined children using the definition by the World Health Organization (WHO). It defines children as persons aged 19 years or younger<sup>3</sup>.

Children are the core target groups for health literacy interventions because they are undergoing primary physical, emotional, and cognitive development in the childhood and adolescence phases. Besides, there are

changes in behavior and skills that are developing within this age group. Therefore, these life stages are considered essential for one's healthy development and personal well-being and one's health for years to come. A high rate of health literacy in children can help them to exercise healthy behaviors that will be beneficial to lessen health risks in the future<sup>4</sup>.

Nowadays, there is no consensus concerning a gold standard for the measurement of health literacy<sup>5</sup>. Some earlier standards had deficiencies such as not comprehensively evaluating the components of each health literacy measurement instrument<sup>6</sup>. Research reviews have tried to summarize the components of each instrument for health literacy measurements; however, the explanations were inadequate, and most were descriptive without a satisfying critical valuation<sup>7,8</sup>. None of these reviews considered the methodological quality of the reviewed studies. The lack of assessment on the quality of research

raises questions about the usefulness of these reviews to measure and select proper health literacy measurements<sup>5</sup>. This is an important issue before intervening in patients' health; health workers need to assess the patients using valid and reliable instruments.

Research related to child health literacy is still limited due to the lack of measurement instruments for this population. Most of the time, measurement instruments applied to measuring child health literacy are derived from its adult version. In addition, many of the studies focusing on child health literacy are only examining children's medical conditions. Furthermore, only a small number of studies have tried to measure child health literacy, not in a clinical environment, such as schools<sup>9,10</sup>. Researches related to instruments measuring health literacy in adults are common. However, studies related to instruments measuring health literacy that can be used for children in the school environment are far from adequate. This review aimed to identify any instruments that can be utilized to measure health literacy related to health behavior in children to bridge the gap.

## METHOD

### Design and search methods

The references for this literature review come from four databases: PubMed, ProQuest, ScienceDirect, and Sage Journals published between 2010 to 2020. The searching process of this review used specific clinical questions, abbreviated as PCC [population (P), concept (C), and content (C)]. The population was children; the concept was an instrument measuring health literacy related to health behavior; and the context was studies conducted in the community setting. We used several keywords for Boolean searching: instrument AND health literacy AND health behavior AND school-age children AND community. The article selection in this study followed the method called Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)<sup>11</sup>.

### Inclusion and exclusion criteria

The references included in this study were articles: (1) published in 2010-2020; (2) published in English; (3) in which the subjects are children; (4) describing health literacy instrument; (5) used in a community setting, i.e., school; and (6) which are original or research articles with quantitative or qualitative methods. However, articles discussing health literacy in children with a mental health disorder excluded from this study. All authors did both the first screening and content analysis.

### Quality appraisal

Before the quality appraisal, the author team read six selected full texts. Once the team finished reading the

articles, the team conducted critical appraisal using The Joanna Briggs Institute (JBI) critical appraisal checklist for analytical cross-sectional studies and qualitative research. The method uses several criteria to value the quality of articles to decide whether they can be processed in the synthesis phase or not. These criteria including samples and subjects of researches, research measuring instrument validity and reliability, confounding factors, and statistical analysis. There were no excluded studies based on this quality assessment.

### Data Extraction and analysis

Within this stage, the six articles were extracted and analyzed to identify their author(s), year of publication, country of origin, aims, population and sample size, outcomes measurements (method), and important findings following the review questions<sup>12</sup>.

## RESULT AND DISCUSSION

### Search outcome

We yielded 328 articles consist of 27 articles from PubMed, six from ProQuest, 152 from Scencedirect, and 143 from Sage Journals. There were two duplicate articles, leaving the remaining 326 articles. Then, the screening process with the inclusion and exclusion criteria was done on the article's title and abstract, and only 15 articles matched with the criteria. At the final stage, only six articles were included for this study (see Figure 1).

### Descriptive characteristics of the studies

Six selected studies were recently published, from 2016 to 2019. The studies were conducted in several countries such as Iran, Turkey, Finland, China, Lithuania<sup>13-18</sup>. Characteristics of the study is shown in Table 1.

Five studies in this review used a cross-sectional study design, and the other one study used a cross-sectional and qualitative research design using in-depth interviews<sup>16</sup>. The respondents in the studies ranged from 11 to 18 years, and most were students of various selected schools. In general, the studies aimed to develop and evaluate the instrument related to health literacy in children<sup>14,16,17</sup>. Other studies compared health literacy in children who engaged in certain physical activities such as sports<sup>15</sup>. In addition, several studies show the correlation of health literacy to school performances, learning intricacies, educational targets, family affluence, and health education in schools<sup>13,19</sup> as shown in Table 2.

### Measuring health literacy instruments

There are several instruments used to measure health literacy, i.e., Health Literacy Measure for Adolescents (HELMA), Health Literacy for School-aged Children

(HLSAC) in English, Turkish and Lithuanian versions; and the Chinese version of the eight-item Health Literacy Assessment Tool (c-HLAT-8) as shown in Table 3. Generally, these instruments are inadequate, and two are

considered poor instruments because they are unable to explain the validity and the reliability of the instrument to measure child health literacy (as shown in Table 4.)

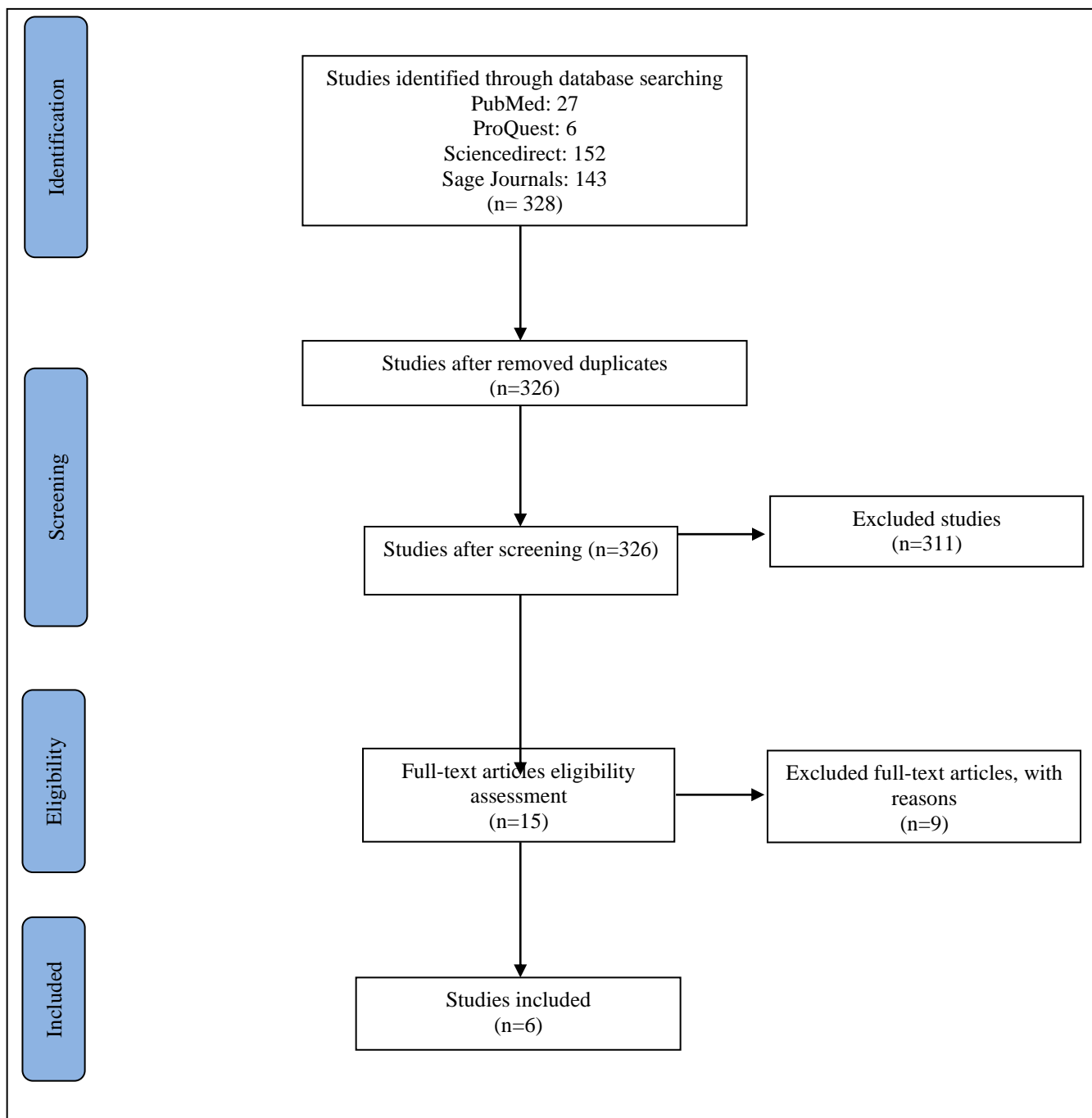


Figure 1. Study selection process

**Table 1. General information of the six included studies**

No	Author(s)	Year of Publication	Country of Origin	Continent
1	Ghanbari et al.	2016	Iran	Asia
2	Paakkari et al.	2017	Finland	Europe
3	Haney	2018	Turkey	Asia and Europe
4	Paakkari et al.	2018	Finland	Europe
5	Guo et al.	2018	China	Asia
6	Sukys et al.	2019	Lithuania	Europe

**Table 2. Summary of the included studies**

No	Authors, year	Purpose	Design	n	Setting	Study population
1	Ghanbari et al., 2016	Developing and evaluating the psychometric properties of an measurement instrument to measure adolescent health literacy (the Health Literacy Measure for Adolescents-HELMA)	Qualitative (in-depth interviews) and quantitative (Cross-sectional)	717	The selected high school in Tehran, Iran	Students aged 15–18 years
2	Paakkari et al., 2017	Comparing the levels of perceived health literacy among adolescents who do or do not participate in sports club activities	Cross-sectional	3.852	Selected schools in Finland	School children aged 13 and 15-year-old
3	Haney, 2018	Assessing the validity and reliability of the Turkish version of the Health Literacy for School-Aged Children (HLSAC-T) scale	Cross-sectional	563	Two junior high schools and two senior high schools in Izmir, Turkey	Students with the mean age 13.67 (SD 1.54)
4	Paakkari et al., 2018	Investigating the level of subjective health literacy among adolescents based on the HLSAC instrument and determining the associations between health literacy, school performances, learning impediments, educational goals, and family welfare.	Cross-sectional	3.833	Selected schools in Finland	Students aged 13 and 15-year-old
5	Guo et al., 2018	Adopting a skill-based and three-domain (functional, interactive, and critical) instruments to assess adolescent health literacy in China and examining the status and determining factors of each domain.	Cross-sectional	650	Secondary schools in two district of Beijing	Students aged 11-17 years
6	Sukys et al., 2019	Determining the level of subjective health literacy among adolescents in Lithuania and examining the correlations of health literacy, school performances, health education in schools, and family welfare	Cross-sectional	2.369	General schools in Lithuania	Students aged 13-16 years

**Table 3. Instrument characteristics of the studies**

<b>Tool</b>	<b>Reference</b>	<b>Focus</b>	<b>Intended respondents</b>	<b>Scale construction</b>
Health Literacy Measure for Adolescents (HELMA)	Ghanbari et al., 2016	To measure health literacy among adolescents	Adolescents aged 15-18 years	Self-completed; 8 subscales i.e., access (5 items), reading (5 items), understanding (10 items), appraisal (5 items), use (4 items), communication (8 items), self-efficacy (4 items), and numeracy (3 items). Total of 44 items.
Health Literacy for School-aged Children (HLSAC)	Paakkari et al., 2017	To measure health literacy among school-aged children	School-aged children	HLSAC includes 10 items focusing on theoretical knowledge, practical knowledge, critical thinking, self-awareness, and citizenship.
Turkish version of the Health Literacy for School-Aged Children (HLSAC-T)	Haney, 2018	To measure subjective literacy of school children	School-aged children	HLSAC-T adapted from HLSAC includes 10 items that focus on theoretical knowledge, practical knowledge, critical thinking, self-awareness, and citizenship.
Health Literacy for School-aged Children (HLSAC)	Paakkari et al., 2018	To measure the adolescents' subjective (self-reported, perceived) health literacy	School-aged children	HLSAC includes 10 items instrument, derived from 5 core components (each containing 2 items) i.e., theoretical knowledge, practical knowledge, critical thinking, self-awareness, and citizenship.
Chinese version of the eight-item Health Literacy Assessment Tool (c-HLAT-8)	Guo et al., 2018	Measuring adolescent health literacy in Chinese secondary schools	Adolescents in secondary school	The c-HLAT-8 includes 8 items to measure three domains -functional, interactive and critical health literacy. The total score ranges from 0 to 37, with higher scores indicating higher levels of health literacy
Lithuania version of Health Literacy for School-Aged Children (HLSAC)	Sukys et al., 2019	Measuring subjective health literacy of school children	School-aged children	The HLSAC instrument utilize ten items related to the theoretical and practical knowledge, critical thinking, self-awareness, and citizenship

**Table 4. Detailed assessment of the overall utility of the included instruments**

<b>Tool</b>	<b>Reference</b>	<b>Availability</b>	<b>Clinical utility</b>	<b>Reliability</b>	<b>Validity</b>	<b>Overall utility</b>	<b>Interpretation</b>
Health Literacy Measure for Adolescents-HELMA	Ghanbari et al., 2016	Information of measurement instrument items is shown in the study.	The instrument is deemed easy to administer.	The Cronbach's alpha coefficient for the entire scale was 0.93, ranging from 0.61 to 0.89 for various domains. The intraclass correlation coefficient (ICC = 0.93).	The content validity and face validity used in this study both qualitative and quantitative phase. The pre-final version of the instrument had 47 items in the qualitative phase, and 44 items final in the quantitative phase.	Adequate	The article does not describe the interpretation of the instrument. HELMA can be filled by adolescents within 15 minutes.
Health Literacy for School-aged Children (HLSAC)	Paakkari et al., 2017	List of instrument items is not available in the study. However, the study describes the assessment of items used Likert scale: 1 = not at all true, 2 = barely true, 3 = somewhat true, and 4 = absolutely true.	Scoring and interpretation are deemed easy.	Cannot tell	Cannot tell	Poor because the study did not examine the validity and reliability of the instruments.	Interpretation of the instruments i.e., low (score 10–25), moderate (score 26–35), and high (score 36–40). HLSAC reported by the children.
Turkish version of the Health Literacy for School-Aged Children (HLSAC-T)	Haney, 2018	Information of measurement instrument items is shown in the study.	Instrument is easy to administer, score and interpret.	Cronbach's alpha for the scale was .77 and item-total correlations were between .49 and .61 ( $p < .001$ ).	The validity was measured through the concordance validity, construct validity, convergent validity, and discriminant validity.	Adequate	The minimum and maximum score were 10 and 40, respectively. The higher score indicating the health literacy of students. HLSAC-T reported by the students during school hours in the classrooms.
Health Literacy for School-aged	Paakkari et al., 2018	List of instrument items is available in	Instrument is easy to administer, score	The HLSAC instrument has high	The validated 10-item instrument	Adequate	HLSAC categorized into 3 levels i.e low = score 10-25,

Children (HLSAC)		the study.	and interpret.	internal consistency (overall Cronbach's $\alpha$ 0.93)	contains 2 items from each of the 5 core components.		moderate = score 26-35, high = score 36-40. HLSAC is self-reported instrument by the children.
Chinese version of the eight-item Health Literacy Assessment Tool (c-HLAT-8)	Guo et al., 2018	Information of measurement instrument items is shown in the study.	Instrument is easy to administer, score and interpret.	c-HLAT-8 had satisfactory reliability (Cronbach's $\alpha = 0.79$ ; intra-class correlation coefficient = 0.72)	Strong validity (translation validity index (TVI) $\geq 0.95$ ; $\chi^2/df = 3.388$ , $p < 0.001$ ; comparative fit index = 0.975, Tucker and Lewis's index of fit = 0.945, normed fit index = 0.965, root mean error of approximation = 0.061.	Adequate	The total score range is 0-37. Higher score of c-HLAT-8 indicating higher levels of health literacy. It was self-administer questionnaire by adolescents in-class time.
Lithuania version of Health Literacy for School-Aged Children (HLSAC)	Sukys et al., 2019	List of instrument items is not available in the study. However, the study describes the assessment of items used 4-point Likert-type scale.	Scoring and interpretation are easy.	Cronbach's alpha value was 0.88.	Cannot tell	Poor because the study did not describe the validity of the instrument.	Health literacy levels described Into 3 levels as low (score 10-25), moderate (score 26-35), and high (score 36-40). The instrument reported by the children.

Health literacy needs to be applied in various situations. Improving the health literacy of children in the early stages is crucial for the development and personal health of children<sup>18</sup>. Children are selected to become the primary study focus for health literacy study and intervention since within this age group, the processes of fundamental physical, emotional, cognitive development and health-related behaviors and skills mature<sup>4</sup>. Because children usually spend a significant portion of their time at school, strengthening their comprehension concerning health literacy as a school learning outcome that includes a variety of knowledge and competencies will foster them to make a better understanding for themselves, other people, and the dynamics of the world. Importantly, this health literacy will also make them better able to make health decisions<sup>19</sup>.

Measurement of health literacy in school-age children can use several instruments. Six selected instruments were found to have adequate overall utility, while the other two were observed to have poor overall utility. Health Literacy Measure for Adolescents (HELMA), which aims to measure health literacy among adolescents, is constructed by 44 parameters within eight categories. These categories are: 1) access, 2) reading, 3) understanding, 4) appraisal, 5) use, 6) communication, 7) self-efficacy, and 8) numeracy<sup>16</sup>. Many researchers have indicated that overall, HELMA has been proven to perform appropriate validity and reliability.

Health Literacy for School-aged Children (HLSAC) which is widely used to measure health literacy among school-aged children utilizes 10 items in total which are derived from 5 core components; they are 1) theoretical knowledge, 2) practical knowledge, 3) critical thinking, 4) self-awareness, and 5) citizenship. To measure literacy, HLSAC uses a scoring and scaling system, with a minimum score of 10 and a maximum score of 40. From many observations, HLSAC has performed with an adequate overall utility because its ten parameters have high internal consistency and validity. This instrument has been translated into Turkish and Lithuanian versions. In the Turkish version, the use of HLSAC-T resulted in reliable and valid data. However, in the Lithuanian version, the study was not completed with any description of the instrument's reliability and validity. The ten items are assessed on a four-point Likert-type scale<sup>13-15,18</sup>. The original HLSAC is assumed to be easy to administer, score, and interpret.

The Chinese version of the eight-item Health Literacy Assessment Tool (c-HLAT-8), designed to measure adolescent health literacy in Chinese secondary schools, has been proven to have adequate overall utility. It has satisfactory reliability and strong validity. The c-HLAT-8 includes eight parameters to measure health

literacy in three overall construct areas: 1) functional, 2) interactive, and 3) critical. The total score ranges from 0 (minimum) to 37 (maximum). The higher scores suggest better levels of health literacy. Based on the analysis of the determinants of c-HLAT-8, overall health literacy is highly correlated with adolescent's self-efficacy, social supports that they acquired, and their perceptions of school environments. Similar to HLSAC, this instrument considered easy to administer, score, and interpret<sup>17</sup>.

Simple and short measurement tools available and able to assess student health literacy in many ways can provide an excellent opportunity for researchers, clinicians, and health professionals to analyze the results of their research conducted with a larger sample of the study. Involving the students in the research by encouraging them to self-measure and self-report their health data is also an excellent way to enhance their skills in discussions of basic health literacy<sup>20</sup>. School is an appropriate environment to support health literacy since it can provide engagement with almost all populations, including teachers, administrators, and peers in a similar age group. In general, the development of health literacy, health behavior, and healthy well-being take place during childhood and school hood period<sup>13</sup>.

Based on the above findings, HLSAC is among many health literacy measurement instruments that have been translated into several languages and are used in several countries, such as Turkey and Lithuania. HLSAC-T can be confidently applied by health professionals to assess health literacy and many factors that determine children's health literacy<sup>14</sup>.

## **CONCLUSION**

Several instruments have been developed that can measure health literacy in school-aged children i.e., Health Literacy Measures for Adolescents (HELMA), Health Literacy for School-aged Children (HLSAC) in English, Turkish and Lithuanian versions, and the Chinese version of the eight-item Health Literacy Assessment Tool (c-HLAT-8). In general, these instruments are adequate, while two instruments in this study are considered inadequate because they did not describe their validity and reliability.

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## **Conflicts of Interest**

The authors declare that there is no existing conflict of interest in this review.



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