Research Article

The Relationship Between Health Literacy and Preventive Behaviors Towards COVID-19 Among Rural Thai Youth: A Cross-sectional Study

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Abstract

Background: Health literacy is a key factor influencing how young people adopt coronavirus disease 2019 (COVID-19) preventive behaviors. Investigating this relationship is essential to protect youth, guide effective public health interventions, and strengthen resilience in future pandemics.

Objectives: The study aimed to investigate the relationship between health literacy and preventive behaviors among rural youths in Thailand.

Methods: This study employed a descriptive cross-sectional design and was conducted between December 2023 and May 2024. The sample consisted of 373 youths residing in rural areas of Samut Songkhram province, Thailand. Stratified random sampling was used, with educational institutions serving as the sampling units. Two schools were randomly selected from each of the province's three districts — totaling six schools — using simple random sampling. Data were collected through an online questionnaire (via Google Forms), which consisted of three parts. The data were analyzed using descriptive statistics and Pearson's correlation coefficient.

Results: The results showed that 60.9% of the participants were female, and the majority were 17 years old, accounting for 21.7%. Most participants had previously been infected with COVID-19, representing 70.0%, and the majority had received two full doses of the COVID-19 vaccine, totaling 91.4%. In addition, 50.9% of participants demonstrated a good level of health literacy, while 46.4% exhibited good preventive behaviors against COVID-19. Furthermore, a statistically significant positive correlation was found between health literacy and preventive behaviors ($R = 0.783$, $P < 0.001$).

Conclusions: The findings of this study can inform planning efforts aimed at enhancing health literacy and promoting preventive behaviors against COVID-19, including the development of targeted programs or activities for rural youths.

Keywords: Health Literacy, Preventive, Behavior, COVID-19, Rural, Youth

1. Background

Health literacy is a priority for health systems facing both communicable and non-communicable diseases worldwide. The World Health Organization (WHO) has urged member states to elevate health literacy on their agendas (1, 2). In Thailand, health literacy is emphasized as a set of cognitive and social skills that enable people to access, understand, appraise, and apply health information to make informed decisions and adopt appropriate health behaviors (3). Strengthening these skills helps individuals navigate health information and supports better decision-making and healthier behaviors (4). Beyond its conceptual importance, health literacy functions as a key predictor of preventive behavior. Evidence shows that consistent self-care and ongoing health monitoring are closely linked to higher health literacy (5). Conversely, low health literacy is associated with risky behaviors and lower uptake of

protective measures, including coronavirus disease 2019 (COVID-19) vaccination (2). Among adolescents, this gap is notable: For example, secondary school students in Nakhon Nayok province exhibited high health literacy but only moderate COVID-19 preventive behavior, suggesting that literacy does not always translate into optimal practice and that additional behavioral supports may be needed (6).

Globally, COVID-19 has posed a major public health challenge, with approximately 545 million confirmed cases and over 6.3 million deaths reported over the past several years (5). The WHO declared COVID-19 a Public Health Emergency of International Concern on January 30, 2020, and a pandemic on March 11, 2020 (7). Transmission occurs primarily via respiratory droplets and contacts with contaminated secretions, making control difficult (8). Core preventive behaviors that reduce transmission risk include physical distancing, mask wearing, regular hand hygiene, body temperature monitoring, and use of digital tools such as the "Thai Chana" application (9, 10).

In Thailand, the first confirmed COVID-19 case was reported on January 3, 2020, with more than 4.5 million cumulative cases and over 30,620 deaths recorded thereafter (11). Youth have been substantially affected: 31,041 cases were reported among those aged 10 - 20 years (10), and treatment statistics indicate higher infection numbers among individuals aged 15 - 20 compared with other age groups, most of whom were students (9). Although the national situation has improved and COVID-19 has been designated endemic (12, 13), continued adherence to preventive measures and comprehensive coverage of primary and booster vaccination doses remain essential (14, 15). In Samut Songkhram province, authorities implemented active surveillance, community screening, home visits, and vaccination campaigns, and temporarily shifted schools to online learning; subsequent reopening required that at least 90% of students and staff in secondary schools receive two or more vaccine doses (16).

Despite improved health literacy levels observed among secondary school students in some Thai provinces, preventive behaviors remain at only moderate levels (4). This gap between knowledge and practice highlights the critical need to examine the relationship between health literacy and COVID-19

preventive behaviors, particularly among rural youth populations who may face unique challenges in accessing health information and implementing protective measures (17, 18). Therefore, this study aims to investigate the relationship between health literacy and COVID-19 preventive behaviors among youth in rural areas of Samut Songkhram province. The findings will inform targeted interventions to enhance disease prevention and control strategies, supporting effective screening, surveillance, and outbreak prevention measures essential for protecting rural youth populations and facilitating successful adaptation to post-pandemic health practices.

2. Objectives

The study aimed to investigate the relationship between health literacy and preventive behaviors related to COVID-19 among rural youth in Thailand.

3. Methods

3.1. Study Design

This research employed a cross-sectional study design to examine health literacy and preventive behaviors related to COVID-19 among the youth in rural areas of Samut Songkhram province, Thailand. The study was conducted between December 2023 and May 2024.

3.2. Study Participants

The study population comprised youths aged 15 - 20 years residing in Samut Songkhram province. The sample size was determined using the Krejcie and Morgan formula (19), yielding a required sample of 319 participants. To account for potential attrition, the researcher added a 17% margin, resulting in a final sample size of 373 participants. This study employed stratified random sampling, using educational institutions as the primary sampling units. The province was divided into three districts, which served as the strata. From each district, two schools were randomly selected, resulting in a total of six schools included in the study. School selection within each district was conducted using simple random sampling. Specifically, a lottery method was employed: The names of all

eligible schools in each district were written on slips of paper, placed into a container, and drawn at random to ensure that each school had an equal chance of being selected. In the second stage, simple random sampling was applied to select individual participants based on the following inclusion criteria: (1) Respondents were youths aged 15 - 20 years, and (2) they voluntarily agreed to participate in the study by completing the questionnaire and exclusion criteria: Respondents who submitted incomplete or invalid questionnaires.

3.3. Instruments

The instrument used in this study was a questionnaire divided into three sections:

3.3.1. Part 1: General Information

This section included questions on gender, age, history of COVID-19 infection, and COVID-19 vaccination status.

3.3.2. Part 2: Health Literacy

This section was adapted from a health literacy assessment based on the "3A 2S" principles (access, analyze, apply, self-management, and media literacy), originally designed for the working-age population in health-promoting villages. Scoring followed the criteria set by the Bureau of Health Education, Department of Health Service Support, Ministry of Public Health. The interpretation of overall health literacy levels was as follows: A total score of less than 60.0 is considered to reflect a poor level of health literacy. Individuals in this range are likely to have insufficient knowledge and skills to effectively engage in behaviors that promote good health. Scores ranging from 60.0 to 70.0 indicate a fair level of health literacy, suggesting that individuals may possess only limited understanding and may occasionally practice appropriate health-promoting behaviors. Those who score between 70.0 and 80.0 are classified as having a good level of health literacy, demonstrating sufficient knowledge and the ability to consistently perform correct health-related behaviors. Finally, a score above 80.0 represents a very good level of health literacy, indicating a strong capacity to engage in accurate, sustainable, and proficient health-promoting practices (20). After developing the initial Health

Literacy Assessment Tool, both content and face validity were evaluated. Six experts in health literacy and infectious diseases reviewed the items, and revisions were made based on their feedback. Quantitative content validity was assessed using the content validity ratio (CVR) and the Content Validity Index (CVI), with a minimum acceptable CVR of 0.83 (21). In this study, the average CVR and CVI were 0.89 and 0.92, respectively. The scale was then pilot-tested with 30 adolescents in a neighboring province. Reliability testing yielded a Cronbach's alpha coefficient of 0.93, indicating good internal consistency.

3.3.3. Part 3: Coronavirus Disease 2019 Preventive Behaviors

This section was also adapted from the "3A 2S"-based health literacy assessment for the working-age population in health-promoting villages. Scoring followed the same criteria provided by the Bureau of Health Education, Department of Health Service Support, Ministry of Public Health. It consisted of 18 items, rated on a 4-point Likert scale. The interpretation of overall preventive behavior scores was as follows: A score of less than 60.0 is considered poor, indicating that the individual demonstrates inappropriate behaviors in maintaining personal health and preventing COVID-19. A score ranging from 60.0 to 70.0 is classified as fair, suggesting that the individual exhibits partially appropriate behaviors, with only limited adherence to recommended health and prevention practices. Those who score between 70.0 and 80.0 are considered to have a good level of behavior, reflecting mostly appropriate and consistent actions in health maintenance and disease prevention. Finally, a score exceeding 80.0 is regarded as very good, indicating that the individual consistently engages in appropriate, accurate, and sustainable health care and COVID-19 prevention behaviors (20). Content and face validity of the COVID-19 Preventive Behaviors Assessment Tool were evaluated. Six experts in health behavior and COVID-19 reviewed the items; revisions were made based on their feedback. Quantitative assessment used the CVR and CVI to evaluate necessity, relevance, simplicity, and clarity. With six experts, the minimum acceptable CVR is 0.83 (21). The mean (M) CVR and CVI were 0.85 and 0.90, respectively. The scale was pilot-tested with 30 adolescents from another university

in a neighboring province. Reliability testing yielded a Cronbach's alpha coefficient of 0.96, indicating good internal consistency.

3.4. Data Collection

1. After receiving approval from the Human Research Ethics Committee, the researcher coordinated with the selected schools and colleges, by sending official letters to request their cooperation in the data collection process.

2. The researcher prepared questionnaires and informed consent forms for participants to sign, indicating their voluntary agreement to participate before completing the questionnaire.

3. The research assistants were responsible for explaining the study details and ensuring that participants clearly understood the online questionnaire. Data collection was conducted using the online questionnaire, which was distributed to participants either through a QR code or a direct link. Once the required number of responses had been obtained, the questionnaires were reviewed for completeness before proceeding with data analysis.

3.5. Ethical Considerations

This study received ethical approval from the Research and Development Institute, Suan Sunandha Rajabhat University, Thailand (COA.1-035/2023). After receiving approval from the Human Research Ethics Committee, participants were informed that their participation in the study was entirely voluntary. They were also advised of their right to withdraw from the study at any time without consequence. All data were treated as confidential and anonymized, used solely for research purposes, and securely stored in accordance with ethical standards. No personal identifiers were collected, and participants were exposed to neither risks nor direct benefits, thereby ensuring that their autonomy and privacy were protected throughout the study.

3.6. Statistical Analysis

Statistical analysis was conducted using SPSS (SPSS Inc., Chicago, IL, USA) software for Windows. Descriptive statistics were used to analyze the general information

of the sample: Frequency, percentage, median, arithmetic mean, and standard deviation (SD). Using the Pearson correlation coefficient (R), was used to analyze the relationships between Health Literacy and COVID-19 Preventive Behaviors. For statistical tests, the significance level was set at 0.05.

4. Results

The research participants consisted of 373 individuals residing in Samut Songkhram province. A majority of the participants were female (60.9%), and the average age was 17 years (21.7%). Most participants had previously been infected with COVID-19 (70.0%), and the majority had received two full doses of the COVID-19 vaccine (91.4%), as shown in Table 1.

Table 1. Participants' Demographic Characteristics (N = 373) [a]

Demographic Variables	Values
Gender	
Male	146 (39.1)
Female	227 (60.9)
Age (y)	
15	63 (16.9)
16	65 (17.4)
17	81 (21.7)
18	80 (21.4)
19	46 (12.3)
20	38 (10.2)
COVID-19 infection history	
No	112 (30.0)
Yes	261 (70.0)
Getting vaccinated against COVID-19	
Fully vaccinated with two doses	341 (91.4)
Received the first dose only	29 (7.8)
Not yet vaccinated	3 (0.8)

Abbreviation: COVID-19, coronavirus disease 2019.

[a] Values are expressed as No. (%).

The majority of the sample group demonstrated an overall level of health literacy classified as good (50.9%), followed by very good (25.6%), fair (18.2%), and poor (1.9%), respectively, and the study found that the sample group mainly demonstrated COVID-19 preventive behaviors at a good level (46.4%), followed by a very good level (30.3%). The overall mean score for COVID-19 preventive behaviors was 68.03 ± 11.18, as shown in Table 2.

Table 2. Level of Health Literacy and Level of Coronavirus Disease 2019 Prevention Behaviors in Youth (N = 373) [a]

Variables	Values
Overall health literacy	20.54 ± 3.12
Excellent	108 (29.0)
Good	190 (50.9)
Fair	68 (18.2)
Poor	7 (1.9)
Accessibility skills and Communication skills	15.31 ± 2.85
Excellent	123 (33.0)
Good	175 (46.8)
Fair	70 (18.8)
Poor	5 (1.4)
Decision skills	30.18 ± 5.26
Excellent	111 (29.7)
Good	188 (50.4)
Fair	73 (19.6)
Poor	1 (0.3)
Self-management skills	15.65 ± 2.77
Excellent	130 (34.9)
Good	174 (46.6)
Fair	66 (17.7)
Poor	3 (0.8)
Media-literacy skills	15.43 ± 2.97
Excellent	123 (33.0)
Good	173 (46.4)
Fair	67 (18.0)
Poor	10 (2.6)
COVID-19 prevention behavior score	68.03 ± 11.18
Excellent	113 (30.3)
Good	173 (46.4)
Fair	83 (22.3)
Poor	7 (1.1)

Abbreviation: COVID-19, coronavirus disease 2019.

[a] Values are expressed as mean (M) ± standard deviation (SD) or No. (%).

The study found a statistically significant positive correlation between overall health literacy and COVID-19 preventive behaviors (R = 0.656, P < 0.001), as shown in Table 3.

Table 3. Relationship Between Health Literacy and Coronavirus Disease 2019 Prevention Behaviors (N = 373)

Variables	COVID-19 Prevention Behaviors	
	Pearson Correlation (R)	P-Value
Overall health literacy	0.783	< 0.001 [a]

Abbreviation: COVID-19, coronavirus disease 2019.

[a] P-value < 0.05.

5. Discussion

This study found that adolescents in Samut Songkhram province generally possessed a good level of health literacy. This may be attributed to the COVID-19 pandemic, which significantly affected individuals of all ages and was declared a Public Health Emergency of International Concern. During the pandemic, information regarding the situation, preventive measures, and guidelines for protective behaviors was disseminated widely across various media platforms. In particular, adolescents, who tend to have strong communication skills and are proficient in using online media technologies (22), were able to access and absorb health information more effectively, leading to improved health literacy. These findings are consistent with a study by Ramphueng Numsarapannuek, which examined health literacy related to COVID-19 among secondary school students in Nakhon Nayok province and found that the sample group exhibited a high level of health literacy (6). Health literacy is essential for understanding the risks and necessary actions to prevent COVID-19. Individuals with higher health literacy are more likely to recognize the severity of the disease and access reliable information, which influences their health decisions.

Similarly, a study by Wattanaburanon et al. found that high school students in Bangkok showed high levels of perceived risk and severity of COVID-19. This awareness was linked to strong preventive behaviors, such as mask usage and hand hygiene, highlighting the connection between perception and action (23).

Preventive behaviors among adolescents in Samut Songkhram province were generally at a good level. This may be attributed to preparations for school reopening, during which students were regularly reminded to follow COVID-19 preventive measures (24). Additionally, the Ministry of Public Health continuously promoted COVID-19 prevention throughout the pandemic. These efforts aimed to encourage individuals of all age groups to adopt preventive behaviors aligned with the "new normal" lifestyle, which included practices such as wearing face masks, maintaining social distancing, and complying with legal measures for non-adherence (25). As a result, students became accustomed to these practices. These findings are consistent with a study by

Khampisut, which examined COVID-19 preventive behaviors among students in the Faculty of Education and found that their overall preventive behaviors were at a high level (26). They also align with the study by Numsarapannuek, which investigated health literacy related to COVID-19 among secondary school students in Nakhon Nayok province and found that students exhibited high levels of COVID-19 preventive behaviors (6). The most consistently practiced behavior was wearing face masks, followed by handwashing with soap or alcohol-based gel. Furthermore, these findings correspond with a study which explored COVID-19 preventive behaviors among village health volunteers (VHVs) in Samut Songkhram province and found that VHVs demonstrated a high level of COVID-19 preventive behaviors (13).

This suggests that individuals with higher levels of health literacy are more likely to engage in effective COVID-19 preventive behaviors. This relationship may be explained by the fact that health literacy encompasses an individual's ability to access, interpret, and evaluate health-related information to make informed decisions about their behavior. It also involves acquiring knowledge, understanding health contexts, changing attitudes, and increasing motivation to adopt appropriate health practices (27). According to Nutbeam and Lloyd's framework, as individuals' health literacy improves, so do their skills and abilities in managing personal health, including both individual behaviors and health-related social activities (12, 28). These findings are consistent with a study by Chamnankit et al., which examined health literacy and COVID-19 preventive behaviors among VHVs in Samut Songkhram province. That study also reported a statistically significant positive correlation between health literacy and preventive behaviors (13). Similarly, the results align with the study by Numsarapannuek, which investigated the relationship between health literacy and COVID-19 preventive behaviors among secondary school students in Nakhon Nayok province, finding a statistically significant association (6).

This study is limited by its cross-sectional design, reliance on self-reported data, and sample restricted to a single geographic area, which may affect generalizability. Additionally, unmeasured contextual factors such as policy and media influences may have influenced preventive behaviors beyond health literacy.

5.1. Conclusions

This study of rural Thai youth found that more than half demonstrated good overall health literacy, with a strong positive correlation between health literacy and COVID-19 preventive behaviors. These findings indicate that improving health literacy may have related to the preventive practices. In practical terms, schools should integrate structured health education modules into the curriculum, focusing on topics such as hand hygiene, mask-wearing, vaccination awareness. Teacher training programs should be established to equip educators with both content knowledge and participatory teaching methods, enabling them to effectively promote health literacy. Partnerships with local health agencies could further support these initiatives by providing updated resources and community-based learning opportunities.

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Footnotes

Authors' Contribution: Conceptualization: N. S. and R. R.; Study design: N. S. and R. R.; Data analysis: N. S. and W. B.; Interpretation of data: N. S., W. B., and R. R.; Drafting and revising the manuscript: N. S., W. B., and R. R. The authors read and approved the final manuscript.

Conflict of Interests Statement: The authors declare no conflict of interest.

Data Availability: The dataset presented in the study is available on request from the corresponding author during submission or after publication.

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