The Prevention of Acute Diarrhea in the Elderly in Chachoengsao Province, Thailand

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Abstract

Acute diarrhea is a preventable and controllable disease, but it is the number one cause of illness among all surveillance infectious diseases in Thailand, especially among the elderly. Acute diarrhea is the number one disease requiring epidemiological surveillance in Chachoengsao Province. The occurrence of acute diarrhea in the elderly causes complications and has a higher chance of death than in other patients. This research aimed to study the factors related to preventing acute diarrhea in the elderly in Chachoengsao Province. This study was a cross-sectional study. The study examined elderly people's knowledge, attitudes, perceptions, and behaviors related to acute diarrhea. The sample comprised 390 elderly individuals from Mueang District, Chachoengsao Province, selected through stratified random sampling. Data were collected using a questionnaire to assess knowledge, attitudes, perceptions of risk and severity, self-efficacy, and preventive behaviors regarding acute diarrhea. Data were analyzed using descriptive statistics and Pearson's Product Moment Correlation Coefficient. The results revealed a moderate relationship between self-efficacy, knowledge, perceived severity, attitudes, and the prevention of acute diarrhea in older adults (r=0.662, 0.645, 0.588, 0.543, p<0.01). The perception of risk was a very low negative related to the prevention of acute diarrhea in the elderly (r=0.269, p<0.01). The study found a positive association between the factors of interest and the prevention of acute diarrhea in the elderly, although some variables exhibited a negative relationship. Therefore, it is necessary to encourage the elderly and their family to be aware of the risk of acute diarrhea. Local government organizations, the Subdistrict Health Promoting Hospital, community organizations, and community leaders should participate in setting disease surveillance measures such as washing hands often, eating clean, cooked food, drinking clean water, and disposing of garbage properly, to prevent the spread of the disease.

Keywords: elderly, prevention of acute diarrhea, self-efficacy, knowledge, perception of severity, attitudes

Introduction

Diarrhea remains a major public health problem in all countries around the world, particularly in developing countries. In 2010-2019, the number of patients with diarrhea increased. It predicted that the incidence of the disease will increase in 2020-2040, especially in the age group of 60 years and older (Liang et al., 2024) For the situation of diarrhoeal disease in Thailand, there were 368,383 patients, representing disease rate of 556.71 per 100,000 population. It was most commonly found in the age group of 25-34 years (26.94%), followed by 0-4 years (21.00%), and over 65 years (13.60)respectively (Kaewpradab et al, 2023).

In 2023, there were 634,415 acute diarrhea patients nationwide, with a morbidity rate of 958.74 per 100,000 population, and 1 death found. The top three age groups with the highest number of patients were in the group of 0-4 year olds, followed by 25-34 year olds and over 65 year olds (Kaewpradab et al, 2023). In Chachoengsao Province in 2022, there were 7,796 diarrhea patients, with a morbidity rate of 1,076.59 per 100,000 population. This province was ranked as the 5th in Health Region 6 and the 33rd in the country (Chachoengsao Provincial Public Health Office, 2023).

Given the above problems, the researchers were interested in studying what factors were related to the behavior of preventing acute diarrhea in the elderly in Mueang District, Chachoengsao Province. The Health Belief Model Theory from Becker et al. (1974), was modified by adding co-factors and motivators to practice with the addition to the 4 main components of Perceived Susceptibility, Perceived Severity, Perceived Benefits, and Perceived Barriers, together with the disease prevention motivation theory, were used in this study. Three further significant components: Source of Information, Cognitive Mediating Process, and Coping Model were included. Dunn and Roger (1986) added the component of self-efficacy expectation because people with high self-efficacy expectations can overcome obstacles. From studying documents and related research, the researcher studied the factors related to the prevention of acute diarrhea in the elderly by studying knowledge, attitude, risk perception, and severity perception, which are components of the health belief model theory, and self-efficacy expectation, which are components of the protection motivation theory. The results from the study can be used in the prevention of acute diarrhea in the elderly, and to reduce the rate of acute diarrhea in the area. Fig. 1 shows the conceptual framework of this study.

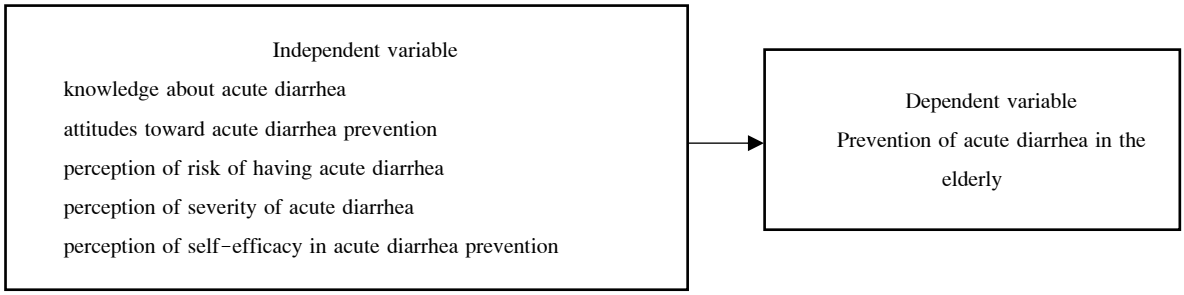

Figure 1 The conceptual framework of this study

Materials and Methods

The ethical approval for this study was granted by the Chachoengsao Provincial Public Health Office (No. PH_CCO_REC 014/2023). This study applied cross-sectional research to study the factors related to preventing acute diarrhea in the elderly in Chachoengsao Province. The population studied included 19,591 elderly people in the Mueang Chachoengsao District (Chachoengsao Provincial Public Health Office, 2023). The sample size was determined using Daniel's formula (Wayne, 1995). The sample size was 390 people, selected using stratified random sampling as follows:

Step 1: Randomly select 5 sub-districts from 20 sub-districts using simple random sampling: Na Muang Sub-district, Bang Tin Ped Sub-district, Khlong Na Sub-district, Sothon Sub-district, and Bang Phai Sub-district.

Step 2: Calculate the sample proportion according to the population size (Probability proportional size) and select the sample group systematically (Systematic random sampling). It can be calculated using the formula shown in Table 1.

Table 1 shows the proportion of the sample group according to the population studied

sub-districts	elderly people	calculate the sample proportion	sample group
Na Muang	2,317	(2,317x390)/6,339	143
Bang Tin Ped	1,290	(1,290x390)/6,339	79
Khlong Na	385	(385x390)/6,339	24
Sothon	1,414	(1,414x390)/6,339	87
Bang Phai	933	(933x390)/6,339	57
total	6,339		390

The inclusion criteria were 1) aged ≥60 years (Social Bound and Home Bound), 2) willing to participate in the study, and 3) being in good health. Ethics approval for this study was obtained from the Chachoengsao Provincial Public Health Office No. PH_CCO_REC 014/2023

The Instruments

The research instrument used in this research was a questionnaire based on relevant concepts and theories. It was created by the researchers, and it consisted of 3 parts as follows:

Part 1 was the personal information of the respondent, including gender, age, education level, and average monthly income. It contains multiple-choice and fill-in-the-blank questions.

Part 2 was the factors related to the behavior to prevent acute diarrhea in the elderly, including:

2.1 The knowledge about acute diarrhea: comprising 10 true-false questions, with a score of 0-10 points, divided into 3 levels: 0-3 points means having low knowledge, 4-7 points means having moderate knowledge, and 8-10 points means having high knowledge.

2.2 Attitudes toward the prevention of acute diarrhea: The questions were a 3-level rating scale: agree, unsure, and disagree (7 items). The scores range from 7-21 points, divided into 3 levels: 7-11 points meaning the attitude is at a low level, 12-16 points meaning the attitude is at a moderate level, and 17-21 points meaning the attitude is at a high level.

2.3 The perception of risk of having acute diarrhea: The questions were on a 3-level rating scale: agree, unsure, and disagree (10 items). The scores range from 10-30 points, divided into 3 levels: 8-18 points meaning the perception of risk is at a low level, 19-29 points meaning the perception is at a moderate level, and 30-40 points meaning the perception is at a high level.

2.4 The perception of the severity of acute diarrhea: The questions were on a 3-level rating scale: agree, unsure, and disagree (9 items). The scores range from 9-27 points, divided into 3 levels: 9-14 points meaning the perception of severity is at a low level, 15-21 points meaning the perception is at a moderate level, and 22-27 points meaning the perception is at a high level.

2.5 The perception of self-efficacy in preventing acute diarrhea: The questions are a rating scale with 3 levels: little confidence, moderate confidence, and very confidence (14 items). The scores range from 14-42 points, divided into 3 levels: 14-22 points meaning the perception of self-efficacy is at a low level, 23-33 points meaning the perception is at a moderate level, and 34-42 points meaning the perception is at a high level.

Part 3 is a questionnaire to elicit information about the behaviors for preventing acute diarrhea. The questions are a 3-level rating scale: always practice, sometimes practice, and never practice. There are 11 items with scores ranging from 11-33 points, divided into 3 levels: 11-17 points meaning the behavior is at a low level,

18-26 points meaning the behavior is at a moderate level, and 27-33 points meaning the behavior is at a high level.

The research instrument was examined for Content Validity by 3 public health experts, and the Item-Objective Congruence Index (IOC) was calculated. Questions with values ranging from 0.50-1.00 were selected. The researchers then tested the instrument with a group of 30 people with similar characteristics to the sample group. The reliability was analyzed using the KR-20 formula for the acute diarrhea knowledge test, which yielded a reliability of 0.77. The Cronbach's alpha coefficient analysis for the Rating scale questionnaire yielded a reliability of 0.71, 0.87, 0.81, 0.87, and 0.83.

Data Collection

Data were collected between May and September 2023. The sample group who were willing to participate in the research had to sign the consent form personally. The researchers then made an appointment with the sample group to explain the data collection and ask them to complete the questionnaire. It took approximately 30 minutes to complete the questionnaire. The researchers checked the completeness of the returned questionnaire, (390 copies in total), accounting for 100%. The questionnaire was then analyzed further.

Statistical analysis

Data were analyzed using the IBM Statistical Package for the Social Sciences (SPSS) version 22 program, divided into an analysis of personal data of the sample group using descriptive statistics and variables are scale measurement, analysis of related factors using Pearson's Product Moment Correlation Coefficient at p=0.05.

Results

1. General information about the sample group

Most of the sample were 228 female (58.5%) and 162 male (41.5%). Most were aged between 60-70 years (79.9%), followed by 71-80 years (14.1%). The majority had primary education (77.7%) and had income between 1,000-5,000 baht (60.5%), as shown in Table 2.

Table 2 General information of the subjects group (n = 390)

Personal Characteristics		Number	percentage
Sex			
	Male	162	41.5
	Female	228	58.5
Age			
	60-70	311	79.7
	71-80	55	14.1
	>80	24	6.2
mean = 67.4, S.D. = 6.6			
Education			
	Illiterate	3	0.8
	Primary school	303	77.7
	Junior high school	40	10.3
	High school/equivalent	25	6.4
	Bachelor's degree/higher	19	4.8

Table 2 (Cont.)

Personal Characteristics	Number	percentage
Average monthly income (Thai baht)		
<1,000	66	16.9
1,000-5,000	236	60.5
5,001-10,000	66	16.9
10,001-15,000	4	1.1
15,001-20,000	9	2.3
>20,000	9	2.3
mean = 4746.6, S.D. = 6504.6		

2. Results of the analysis of the levels of the studied variables

The results of the analysis of the levels of the studied variables revealed that 64.6% of the elderly knew about the problem of acute diarrhea, 59.0% held positive attitudes toward the prevention of acute diarrhea, with 65.4% showing a good perception of the severity of acute diarrhea, and 65.9% showing a good perception of self-efficacy in the prevention of acute diarrhea, and 66.7% understood prevention of acute diarrhea at a high level. However, it was found that, for the variable of perception of risk of having acute diarrhea, the sample group had perception at a moderate level (45.4%), followed by a low level (38.5%), as shown in Table 3.

Table 3 Results of the analysis of the levels of the studied variables (N = 390)

Variables	a low level Numbers (%)	a moderate level Numbers (%)	a high level Numbers (%)
Knowledge about acute diarrhea	8 (2.1)	130 (33.3)	252 (64.6)
Attitudes toward acute diarrhea prevention	-	160 (41.0)	230 (59.0)
Perception of risk of having acute diarrhea	150 (38.5)	177 (45.4)	63 (16.1)
Perception of severity of acute diarrhea		135 (34.6)	255 (65.4)
Perception of self-efficacy in acute diarrhea prevention		133 (34.1)	257 (65.9)
prevention of acute diarrhea		130 (33.3)	260 (66.7)

3. Results of the analysis of factors related to the prevention of acute diarrhea in the elderly in Mueang District, Chachoengsao Province

The results of the analysis of factors related to the prevention of acute diarrhea in the elderly using descriptive statistics and Pearson's Product Moment Correlation Coefficient showed that the perception of self-efficacy in the prevention of acute diarrhea, knowledge about acute diarrhea, perception of the severity of acute diarrhea, and attitudes toward the prevention of acute diarrhea had a positive relationship with the prevention of acute diarrhea in the elderly at a moderate level (r = 0.662, 0.645, 0.588, 0.543). The perception of risk of having acute diarrhea had a negative relationship with the prevention of acute diarrhea in the elderly at a very low level (r = -0.269) with p=0.05, as shown in Table 4.

Table 4 Correlation Coefficient among various factors and the prevention of acute diarrhea in the elderly (n=390)

Variables	r	p-value
Knowledge about acute diarrhea	0.645**	<0.001
Attitudes toward acute diarrhea prevention	0.543**	<0.001
Perception of risk of having acute diarrhea	-0.269**	<0.001
Perception of severity of acute diarrhea	0.588**	<0.001
Perception of self-efficacy in acute diarrhea prevention	0.662**	<0.001

Discussion

From the study of the factors related to the prevention of acute diarrhea in the elderly in Mueang District, Chachoengsao Province, considering the studied variables, it was found that the sample group had a high level of prevention of acute diarrhea (66.7%). This may be because acute diarrhea is the number one disease that requires epidemiological surveillance in Chachoengsao Province. The Chachoengsao Provincial Public Health Office has set important strategies for health promotion, disease prevention, and excellent consumer protection. One of the important strategies is to develop desirable health behaviors in the elderly group, along with the excellent service strategy, which develops the primary care service system so that every family has three personal doctors (Chachoengsao Provincial Public Health Office, 2023). The results of this operation resulted in a high level of protection against acute diarrhea in the elderly, which is consistent with the study of Tason and Thithaphan. (2024). The study on Knowledge and Behavior in Diarrhea Prevention among residents of Saingam Subdistrict, Saingam District, Kamphaeng Phet Province, found that the sample group exhibited very good preventive behaviors regarding diarrhea. The behavior that was practiced every time was defecating in the toilet.

The sample group had a high level of self-efficacy in preventing acute diarrhea. This may be because the sample group, having experienced the development of desirable health behaviors in the elderly according to the health strategy, had a high level of awareness about preventing acute diarrhea. This finding aligns with the study of Kiripoonphon and Yaengchan (2023). Development of the potential for prevention of diarrhea in the Karen hill tribe community, the Pga K'nyau tribe, in the area of Ban Kama Pha Do Health Promoting Hospital, Mae La Subdistrict, Tha Song Yang District, Tak Province. The results of the debriefing revealed that the cooperation of the people and local administrative organizations, academic support from officials, unity, love, and willingness to help solve the problem of diarrhea in the area together were the success factors in solving the problem.

The sample group had a high level of perception of the severity of acute diarrhea. Perception of disease severity is a factor that lets individuals know how much the patient will be affected by the disease and is one factor that influences the individual's health behavior and illness behavior. If a person perceives that the disease is severe enough to cause harm to health and affect their social duties, the person will be afraid and will show behaviors to avoid getting that disease (Nuankerd, 2020).

The sample group had a high level of knowledge about acute diarrhea, which may be a result of the implementation of acute diarrhea prevention and control by public health personnel in the area according to the strategy of the Chachoengsao Provincial Public Health Office. This is consistent with the study of Tason and Thithaphan. (2024). The Knowledge and Behavior Prevention Diarrhea Among People in Saignam Subdistrict, Saingam District, Kamphaeng Phet Province, The sample group had a high level of knowledge, more than 80%,

with the highest score on diarrhea caused by eating unclean food or water, contaminated with germs, and keeping food tightly closed to prevent flies from landing on it, which can prevent diarrhea.

The sample group had a high level of attitude toward acute diarrhea, which may be because the sample group had a high level of knowledge about acute diarrhea, resulting in a high level of attitude towards acute diarrhea as well, which is consistent with the study of Bethelhem et al. (2023) study knowledge and attitude on home-based management of diarrheal disease among mother/caregivers of under-five children at a tertiary hospital in Ethiopia, results found that knowledge and attitudes towards preventing diarrhea were related, which was consistent with the study of Jaidee et al. (2020) study the behaviors on prevention of diarrhea in newborn to 5 years of parents at Namon District, Kalasin Province, results found that knowledge about diarrhea prevention and attitude towards diarrhea prevention were related to diarrhea prevention behavior.

The sample group had the highest level of perception of risk of having acute diarrhea at a moderate level, followed by a low level. This may be because the prevention of acute diarrhea in the elderly is related to factors according to the health belief framework, namely health knowledge and attitude, and perception of disease severity, which is consistent with the study of Unahalekhaka et al. (2014). Knowledge, risk perception, and behavior on foodborne disease among people in high and low diarrheal incident areas of Northern Thailand, results found that the sample groups in areas with high and low disease incidence had different perceptions of risks of food-borne diseases. They perceived that eating meat from sick animals may cause diarrhea, and the risk of diarrhea depended on each person's eating behavior. However, the perception of other risks was not different, such as eating food without washing hands, which increases the risk of diarrhea, eating food that was stored without covering, which increases the risk of diarrhea, eating food that was stored without heating, which increases the risk of diarrhea, and eating raw or partially cooked food, which increases the risk of diarrhea, etc.

Study of factors related to prevention of acute diarrhea in the elderly. The results showed that the perception of self-efficacy had a positive relationship at a moderate level with the prevention of acute diarrhea in the elderly with statistical significance at the 0.05 level (r = 0.662). This may be due to the perception of self-efficacy in self-care, which is the feeling of confidence in one's ability to manage behaviors to achieve the set goals. If an individual has high self-efficacy in any behavior, they will be more likely to decide to manage that behavior (Bandura, 1998). Jaimao (2022) studied factors affecting parental behaviors in promoting early childhood development, Li District, Lamphun Province. The result was that perception of self-efficacy influences promoting health promotion behaviors. Swangsap and Chuchuen (2019) perceived self-efficacy in physical and mental health care behavior in community village health volunteers. The result was that the perception of self-efficacy in physical and mental health care of village health volunteers had a high positive relationship with physical and mental health care behaviors in the community with statistical significance. This is because when a person has appropriate and effective behaviors, it is related to the person's perception of self-efficacy in that matter, resulting in moderate and high confidence in managing the behaviors.

The present results found that knowledge about acute diarrhea had a positive relationship at a moderate level with the prevention of acute diarrhea in the elderly (p=0.05, r = 0.645). Donla (2019) studied knowledge and behavior for control and prevention in Diarrhea Sakhrai Hospital, Nongkhai Province. The result was that the knowledge about acute diarrhea had a moderate positive relationship with acute diarrhea prevention in the elderly (p=0.05, r = .645). This may be because the elderly receive correct knowledge and information about acute diarrhea through various media, such as personal media, radio or television, and online media. This helps

the elderly to prevent acute diarrhea appropriately. From the previous study, it was found that knowledge and behaviors for acute diarrhea prevention are related. Pichairat et al. (2020) studied factors influencing caregivers' acute diarrhea prevention behaviors in pediatric patients at Trang Hospital. The result was that the knowledge about acute diarrhea prevention is related to behaviors for acute diarrhea prevention of caregivers.

The present results found that perception of the severity of acute diarrhea had a positive relationship at a moderate level with the prevention of acute diarrhea in the elderly (p=0.05, r = 0.588). Nuankerd (2020) studied factors affecting the prevention behavior of Hand Foot Mouth disease among guardians in child development centers in Wangthong District, Phisanulok Province. The result showed that the perception of the severity of acute diarrhea had a positive relationship at a moderate level with the prevention of acute diarrhea in the elderly (p=0.05, r = .588). This may be because the perception of the severity of the disease will make the elderly aware of the impact and dangers that will occur from acute diarrhea if they do not practice appropriate behaviors for disease prevention. If the elderly perceive that the disease is severe enough to cause health harm, they will be afraid and manage their behaviors to avoid getting that disease. Raksaken et al. (2019) studied the effects of providing information based on the health belief model on knowledge and health behaviors among patients with upper gastrointestinal hemorrhage. The result showed consistency with the previous study indicating that when individuals were stimulated to perceive the severity of upper gastrointestinal bleeding by providing knowledge along with receiving a health behavior manual, those with upper gastrointestinal bleeding had higher healthy behaviors than before they received the knowledge and a health behavior manual.

The results indicated that attitudes toward acute diarrhea prevention had a positive relationship at a moderate level with the prevention of acute diarrhea in the elderly (p=0.05, r = 0.588). Jaidee et al. (2020) studied the behaviors on prevention of diarrhea in newborns to 5 years of parents in Namon District, Kalasin Province. The result demonstrated that the attitudes toward the prevention of acute diarrhea had a positive relationship at a moderate level with the prevention of acute diarrhea in the elderly (p=0.05, r = .543). This may be because individuals with positive attitudes together with other factors such as knowledge will make them more likely to manage or practice disease prevention behaviors than those who have negative attitudes. This is in line with the previous study showing that the attitudes toward the prevention of diarrhea have a statistically significant relationship with the behaviors to prevent diarrhea at p=0.05.

The perception of the risk of having acute diarrhea was shown to have a negative relationship with the prevention of acute diarrhea in the elderly at a very low level (r = -0.269). Kalim (2021) studied the relationship between health perceptions and health behaviors among healthcare personnel with metabolic syndrome, Banpong Hospital. The result suggested that the perception of risk of having acute diarrhea had a very low negative relationship with the prevention of acute diarrhea in the elderly (r = -.269). This can be explained by the elderly perceiving the risk of having acute diarrhea at a high level resulting in them demonstrating preventive behavior at a low level. This may be because the perception of the risk of having this disease is the individual's perception of the illness that leads to different behaviors for each individual. The elderly group perceive and understand the risk of the disease, but they may believe that they can protect themselves from such a disease. Therefore, they lack awareness and neglect to take care of their health. This supports the previous study showing that the perception of the risk of having the disease has a negative relationship with health behavior in terms of taking responsibility for their health.

The results of the study found that the sample group responded at a high level for the studied variables, except for the variable of risk perception, which was at a moderate level. When considering the factors related to the prevention of acute diarrhea, the results of the study found that the perception of self-efficacy in the prevention of acute diarrhea, knowledge about acute diarrhea, perception of the severity of acute diarrhea, and attitudes about the prevention of acute diarrhea was related to the prevention of acute diarrhea at a moderate level, except for the perception of the risk of acute diarrhea, which had a very low negative relationship with the prevention of acute diarrhea in the elderly.

Therefore, public health personnel should focus on promoting the elderly to be aware of and aware of the severity of the disease, in addition to providing knowledge, determining measures for prevention, controlling the outbreak of the disease, surveillance, and searching for patients.

This study has strengths in integrating theories to gain a deeper understanding of factors associated with the prevention of acute diarrhea in the elderly. However, it is limited by the elderly sample, which makes it impossible to generalize the results to other populations.

Conclusion and Suggestions

As Thailand enters an aging society, health problems and needs increase. This study found that knowledge, attitudes, perception of risk, perception of disease severity, and perception of self- efficacy are related to acute diarrhea prevention in the elderly, especially promoting the elderly to have correct knowledge and perception of the risk of having acute diarrhea. This leads to creating appropriate disease prevention behaviors. Relevant stakeholders including individual, community, public health personnel, and local government agencies should give importance to and use the results of this study in planning to reduce the risk of this disease, promote participation in self-care, and take care of family members and people in the community.

For future research, the results from this study should be used to develop a model for the prevention of diarrhea in the elderly, as well as to study other factors affecting the prevention of diarrhea in the elderly.

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Author Contributions

The authors wrote the manuscript according to the following types of contributions：

Supranee Joyrod: contributions are conceptualization and design of methodology, providing of materials subjects or patients, investigation, collection of data, data analysis and interpretation, manuscript writing, and manuscript review and editing.

Worraphol Waengnork: contributions are conceptualization and design of methodology, providing of materials subjects or patients, investigation, collection of data, data analysis and interpretation, and manuscript review and editing.

Rapeepat Srimala: contributions are conceptualization and design of methodology, providing of materials subjects or patients, investigation, collection of data, data analysis and interpretation, and manuscript review and editing.

Conflict of Interests

All authors contributed equally to the conception and design of the study. None declared.

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References

Bandura, A. (1998). Personal and collective efficacy in human adaptation and change. In J. G. Adair, D. Bélanger, & K. L. Dion (Eds.), Advances in psychological science, Vol. 1. Social, personal, and cultural aspects (pp. 51-71). Psychology Press/Erlbaum (UK) Taylor & Francis.

Becker, M. H. (1974). *The Health Belief Model and Sick Role Behavior. Society for Public Health Education, 2*(4), 409. http://dx.doi.org/10.1177/ 109019817400200407

Bethelhem, S., Mekdes, M., Tomas, F., Dawit, H., Yacob, A. B., Tomas, Y., & Getenet, K. (2023). Knowledge and attitude on home-based management of diarrheal disease among mother/caregivers of under-five children at a tertiary hospital in Ethiopia. *The Pan African Medical Journal, 44*(38), 1-12. https://doi.org/10.11604/pamj.2023.44.38.34431

Chachoengsao Provincial Public Health Office. (2023). *Health KPIs 2022 (1 January-26 December 2022). Annual report 2022*. Ministry of Public Health.

Donla, A. (2019). Knowledge and Behavior for control and prevention in Diarrhea Sakhrai Hospital, Nongkhai Province. *The Office of Disease Prevention and Control 10th Journal*, *17*(2), 59-66.

Dunn, S. P., & Roger, R.W. (1986). Protection motivation theory and preventive health: Beyond the health belief model. *Journal of Health Education Research, 1*(3), 153-161. https://doi.org/10.1093/her/1.3.153

Jaidee, K., Promlun, P., Onlao, W., Sukserm, T., & Suwannarong, B. (2020, February 28). *The behaviors on prevention of diarrhea in newborn to 5 years of parents at Namon District, Kalasin Province* [Paper presentation]. 2nd National Conference in Science, Technology and Innovation 2020. Loei Rajabhat University.

Jaimao, P. (2022). *Factors affecting parental behaviors on promoting early childhood development, Li District, Lamphun Province* [Master's thesis, Naresuan University]. ThaiLIS.

Kaepradab, Y., Menkoon, K., & Doung-ngern, P. (2023). Situation of acute diarrhea and food poisoning in 2023 [updated 19 June 2023]. *Weekly Epidemiological Surveillance Report*, 54(25), 385-387.

Kalim, N. (2021). Relationship between health perceptions and health behaviors among health care personnel with metabolic syndrome, Banpong Hospital. *Journal of Research for Health Improvement and Quality of Life*, *1*(1), 37-48.

Kiripoonphon, K., & Yaengchan, P. (2023, June 17-19). Development of the potential for prevention of diarrhea in the Karen hill tribe community, the Pga K'nyau tribe, in the area of Ban Kama Pha Do Health Promoting Hospital, Mae La Subdistrict, Tha Song Yang District, Tak Province. *Conference Health Center No. 2 Phitsanulok*. (p.136). Phitsanulok.

Liang, D., Wang, L., Liu, S., Li, S., Zhou, X., Xiao, Y., ... & Lai, Y. (2024). Global Incidence of Diarrheal Diseases—An Update Using an Interpretable Predictive Model Based on XGBoost and SHAP: A Systematic Analysis. *Nutrients*, *16*(18), 3217. https://doi.org/10.3390/nu16183217

Nuankerd, K. (2020). *Factors affecting the prevention behavior of Hand Foot Mouth disease among guardians in child development centers, Wangthong District, Phisanulok Province* (Publication No. 60060196). [Master's thesis, Naresuan University]. ThaiLIS.

Pichairat, A., Chuaykaew, B., & Lertwanawattana, J. (2020). Factor Influencing Caregivers' Acute Diarrhea Prevention Behaviors in Pediatric Patients at Trang Hospital. *Journal of Health and Nursing Education*, *26*(2), 82-97.

Raksaken, N., Chumpawadee, U., & Phumephak, P. (2019). Effects of information providing based on the health belief model to knowledge and health behaviors among patients with upper gastrointestinal hemorrhage. *Journal of Nursing and Health Care*, *37*(4), 225-234.

Swangsap, K., & Chuchuen, U. (2019). Perceived self-efficacy on physical and mental health care behavior in community village health volunteers. *Srinakharinwirot Research and Development Journal of Humanities and Social Sciences*, *11*(22), 1-12.

Tason, S., & Thithaphan, R. (2024). The Knowledge and Behavior Prevention Diarrhea Among People in Saignam Subdistrict, Saingam District, Kamphaeng Phet Province. *Science and Technology Northern Journal*, *5(3)*, 133-144.

Unahalekhaka, A., Meeyam, T., Unger, F., & Pichpol, D. (2014, August 11-15). *Knowledge, risk perception, and behavior on foodborne disease among people in high and low diarrheal incident areas of Northern Thailand* [Poster presentation]. The Ecohealth 2014 conference, Montreal, Canada. https://hdl.handle.net/10568/43755

Wayne, W. D. (1995). *Biostatistics: A Foundation of Analysis in the Health Science* (6th ed.) John Wiley & Sons.