


Rabies-Related Knowledge, Attitudes, and Practices Among Primary School Students in Chonburi Province, Thailand

INQUIRY: The Journal of Health Care Organization, Provision, and Financing
Volume 59: 1–10
© The Author(s) 2022
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/00469580221087881
journals.sagepub.com/home/inq


Mayurin Laorujisawat, DVM, MPH¹ , Aimutcha Wattanaburanon, MSc, DEdu¹, Pajaree Abdullakasim, MSc, PhD¹ and Nipa Maharachpong, MSc, PhD¹

Abstract

In Thailand, rabies is an endemic fatal viral zoonosis where 40% of those infected are under age 15. The aim of this rabies KAP study (Knowledge, Attitudes, and Practices) is to examine preventive behaviors. A multistage sampling technique was employed for selecting the sample. Of 290 primary school students, 52.1% of them had poor knowledge, 89% had favorable attitudes, and 52.1% exercised proper preventive behaviors. We employed structural equation modeling to verify the systemic relationships and found rabies knowledge ($\beta = .157$, $se = .059$, $P = .008$) and attitude ($\beta = .206$, $se = .054$, $P < .001$) were associated with rabies preventive behaviors. Moreover, children in school No.4 statistically had less adept at rabies prevention than others. ($\beta = -.232$, $se = .054$, $P < .001$). This study highlights the need to strengthen rabies education programs, especially for rabies risk situations among school-aged children.

Keywords

rabies, school children, knowledge, attitudes, preventive behaviors, knowledge, attitudes, and practices, Thailand

Introduction

Rabies, caused by a virus belonging to the Lyssavirus genus, is the deadliest zoonotic disease worldwide. It was found that one person dies every 9 min, and an estimated 59 000 deaths occur each year.¹ The case fatality rate is almost 100% in humans and animals, where more than 98% of the patients were infected by a dog bite or scratch. It was found that 95% of the total recorded deaths were from Africa and Asian countries.² In Thailand, rabies is an endemic disease, and in 93% of cases, canines are the primary disease reservoirs.³ It is annually estimated that there are at least 500 000 mammal scratch/bite injuries and that 40% of those affected are children under age 15. From 2011–18, 36% of the people who died were from Thailand's eastern region.⁴ Every year from 2015 to 2017 in Chonburi Province, rabies-related deaths have been recorded.⁴ All of the deaths had a history of

exposure to a suspected animal, and additionally, none of the victims had received any form of treatment.⁵

Knowledge, Attitudes, and Practice (KAP) surveys are widely used around the world for health science studies.⁶ They are based on the principle that knowledge enhancement will result in changes in attitudes and practices to reduce the disease burden.⁷ Furthermore, KAP surveys identify cognitive, behavioral, and cultural beliefs that may hinder infection control, especially in animal diseases. KAP studies can also be used for creating public health awareness campaigns, which can provide the baseline data for the planning, application, and evaluation of national disease control programs.⁸

While many rabies KAP studies have been conducted in Africa and Asia, few have been administered in Thailand. Consequently, there is little to no survey data regarding rabies' high-risk population: elementary school students. The reason for

¹Faculty of Public Health, Burapha University, Chonburi, Thailand

Corresponding Author:

Nipa Maharachpong, Faculty of Public Health, Burapha University, 169 Long Had Bangsaen Rd, Saen Suk, Chon Buri District, Chonburi 20131, Thailand.
Email: nipam@buu.ac.th



Creative Commons Non Commercial CC BY-NC: This article is distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 License (<https://creativecommons.org/licenses/by-nc/4.0/>) which permits non-commercial use, reproduction and distribution of the work without further permission provided the original work is attributed as specified on the SAGE and

Open Access pages (<https://us.sagepub.com/en-us/nam/open-access-at-sage>).

What we already know about this topic?

- Rabies knowledge and attitudes are significantly associated with rabies preventive behaviors (RPB).

How does the research contribute to the field?

- This research shows the key findings regarding important performance factors that are associated with rabies preventive behaviors. For instance,
- Most of the sample school students had poor knowledge, good attitudes, and good preventive behaviors.
- Understanding Knowledge gaps for primary school students particularly related to high-risk infection situations, followed by Knowledge of the common clinical signs of rabies in animals, and basic laws regarding rabies (i.e., Rabies Act B.E. 2535).
- Attitudes about washing blood/fewer wounds with running water and soap for at least 15 minutes after being contacted by risk animals (WASH15) had a very high total effect on rabies preventive behaviors (RPB) so it is appropriate to reinforce this attitude.

What are the research's implications towards theory, practice, or policy?

- This study showed The theory model of KAP (Knowledge, Attitudes, and Practices) is a useful framework for predicting rabies preventive behaviors.

this vulnerability is the likely nature of children will have animal affection.⁹ Moreover, the age range 9–10 years is the appropriate starting point for knowledge and awareness education.¹⁰ At this level of development, they can comprehend the issues (knowledge, attitude, and protection). These developments, using knowledge and reasoning, all contribute to the development of greater healthcare awareness.¹¹

Partial least squares structural equation modeling (PLS-SEM) is one of the most widely used multivariate data analysis methods among business and social science scholars, including education, psychology, health, and nursing. The importance-performance map analysis (IPMA) extends the results of PLS-SEM by also taking the performance of each construct into account. As a result, conclusions can be drawn on two dimensions (i.e., both importance and performance), which is particularly important to prioritize managerial actions,¹² and expanding the analysis to the indicator level facilitates identifying the essential areas of specific actions.¹³ Due to the practical and straightforward approach of importance-performance analysis (IPA), this powerful technique has been popular among researchers and practitioners involved in customer satisfaction and quality management for offering efficient resource consumption in various fields, including health.¹³⁻¹⁵

This study aims to examine the associations among KAP regarding rabies and the factors related to preventive behaviors in elementary school students by using PLS-SEM and IPMA. To make an analysis that will increase knowledge, improve attitudes, and practices. After a successful KAP analysis, the next step will be to design targeted awareness programs that will inform, educate, and bring strong prevention measures to young school children who statistically are reported to have the highest exposure rates.

Methods**Study Design and Participants**

From December 2020 to February 2021, a cross-sectional study with a target structure (Grade 4 students). A Knowledge, Attitudes, and Practices (KAP) survey predicted rabies preventive behaviors (RPB) and associated risk factors. The researchers conducted information with the permission of the children and their guardians.

Participants in this study calculated by using G * Power 3.1,16 by selecting F tests: Linear multiple regression: Fixed model, R2 deviation from zero. We used a 95% confidence interval and a 5% error rate for calculating the sample size. As a result, 270 respondents were selected as the study population by adding 10% non-response rate; thus, the total sample size was 300 subjects. A multistage sampling technique was employed for the selection of sample units. The 11 districts in Chonburi Province were divided into two strata: stratum one consisted of four districts with rabies-infected dog's history in 2020, and in stratum two was, seven districts were not found that. Three sub-districts were randomly selected from each stratum, yielding six sub-districts (Figure 1). In step II, one school was randomly selected per 1 sub-district, except the Nong Samsak sub-district had only small schools, so we selected two schools, yielding seven schools. In step III, students in grade 4 were randomly sampled by the lottery method. After the data were cleaned and checked, 290 grade 4 students were accounted for from seven primary schools in six sub-districts of Chonburi Province.

Research Instruments

These rabies questions were developed based on academically reviewed information on how children can protect themselves. The research instrument was 26 close-ended

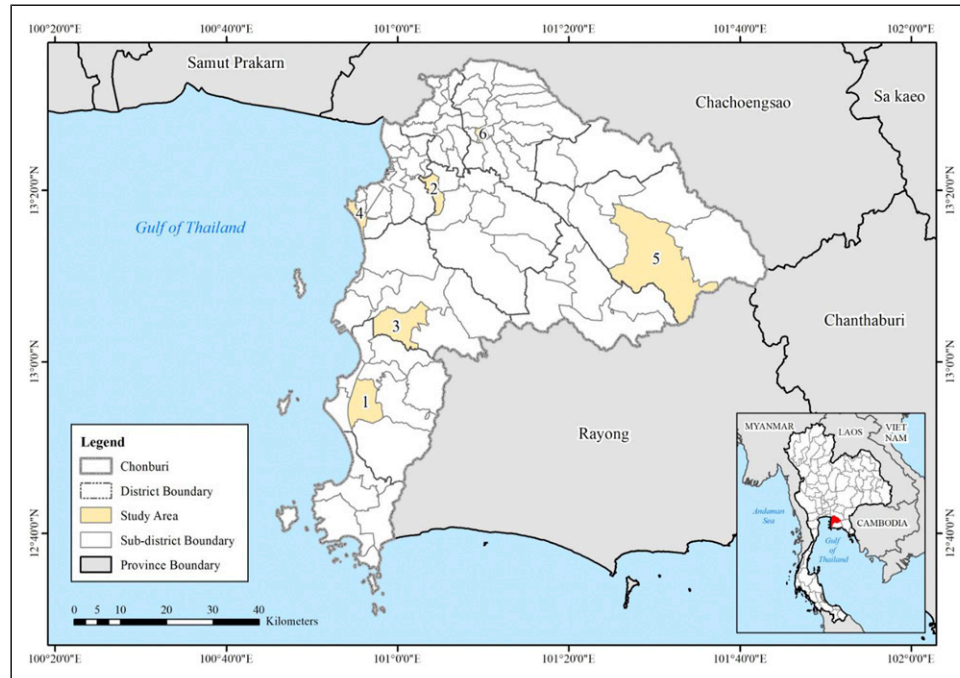


Figure 1. 6 sub-districts studied in Chonburi province, Thailand. Remarks: 3 sub-districts where rabies-infected dogs were found in 2020: 1. Nong Prue, 2. Nong Samsak, and 3. Bueng, and 3 others with no history of rabies-infected dogs in that year which are selected for randomness: 4. Saen Suk, 5. Bo Thong, and 6. Kut Ngong.

questions with three sections: 1. Socio-Demographic data (9 items), 2. Rabies Knowledge (six items) and Attitudes (seven items), 3. Rabies Preventive Behaviors : RPB) (four items). (See [Appendix](#)).

The questionnaire data were analyzed with validity and reliability tests to measure the correlation. A .82 Item-Objective Congruence (IOC) was used to measure the validity of questionnaires. The rabies knowledge analysis included the calculation of item discrimination and difficulty indices ranging from .21 to .83 and .3 to .67, respectively. Cronbach's alpha reliability analysis was .63 for rabies attitudes and .77 for RPB.

Data Analysis

The data collected from the surveys were cleaned and checked for completeness and entered into EPI-Info version 3.1. Descriptive statistics were calculated for socio-demographic data, rabies knowledge, attitudes, and preventative behaviors. The KAP scores were also categorized according to Bloom's cut-off point (<60% is poor, 60%–80% is fair, and >80% is good).¹⁷ Inferential statistics were tested using the partial least squares (PLS-SEM) model, and a P-value of less than .05 was judged significant in investigating the relationship between socio-demography, rabies knowledge, attitudes, and preventative behaviors.

IPMA analysis of latent variables affecting RPB in the sample school children: IPMA is the analysis of the dimensions of impact or importance and the dimension of performance which consists of the x-axis: Importance,

measured by Total effect (0–1.0) and the y-axis: Performance, adjusted from raw score to 0–100 corresponding to the percentage value. When dividing the two axes at the mean to characterize Quadrants A–D, this four-quadrant matrix depicted can be applied to both identify improvement opportunities and guide strategic planning schemes.¹⁸

Results

The Socio-Demographic Characteristics of Students

A total of 314 grade 4 students were accounted for from seven primary schools in six Chonburi Province sub-districts. After cleaning and checking the data, 290 subjects were remaining in the study. [Table 1](#) presents that the majority of cases were females (60.34%). Subjects studied at school No.1 to No.7 were 16.21%, 10.34%, 5.52%, 18.97%, 20.34%, 14.83%, and 13.79%, respectively.

Of the respondents, just over half (51.00%) lived in areas where there was an indication of infected dogs. Almost a half (46.21%) of fathers and more than a third (38.97%) of mothers reported being self-employed. Of the participants, almost forty (39.31%) reported YouTube as their favorite media, followed by TikTok at 37.59%. Furthermore, 26.21% reported more than one hour but not more than two hours per day watching media.

In regards to pets, mainly (60.69%) reported having a pet of which the majority were dogs (43.10%), with an average

Table I. Demographic Characteristics of Respondents (n=290).

Variable/category	n (%)
Gender	
Boys	115 (39.66)
Girls	175 (60.34)
School	
School No.1 (Nong Prue sub-district)	47 (16.21)
School No.2 (Nong Samsak sub-district)	30 (10.34)
School No.3 (Nong Samsak sub-district)	16 (5.52)
School No.4 (Bueng sub-district)	55 (18.97)
School No.5 (Saen Suk sub-district)	59 (20.34)
School No.6 (Bo Thong sub-district)	43 (14.83)
School No.7 (Kut Ngong sub-district)	40 (13.79)
Areas where dogs with rabies were found	
No	148 (51.00)
Yes	142 (49.00)
Father's occupation	
Not working/house husband/died	23 (7.93)
Company employee	77 (26.55)
Self-employed	134 (46.21)
Others	56 (19.31)
Mother's occupation	
Not working/housewife/died	53 (17.59)
Company employee	64 (22.07)
Self-employed	113 (38.97)
Others	62 (21.37)
Favorite media type	
None	3 (1.03)
YouTube	114 (39.31)
TikTok	109 (37.59)
Others	64 (22.07)
Variable/Category	n (%)
Per day hours spent on favorite media (that they answer the previous question)	
<1 hour per day	68 (23.45)
≥1 - < 2 hours per day	76 (26.21)
≥2 - < 3 hours per day	57 (19.66)
≥3 - < 4 hours per day	37 (12.76)
≥4 hours per day	52 (17.92)
Take care of the pet (mammal)	
No	114 (39.31)
Yes	176 (60.69)
Take care of a dog	
No	165 (56.90)
Yes	125 (43.10)
Mean = 1.26, SD = 2.26, Min = 0, Max = 15	
Take care of a cat	
No	195 (67.24)
Yes	95 (32.76)
Mean = .86, SD = 1.93, Min = 0, Max = 18	
Take care of other mammals	
No	277 (95.52)
Yes	13 (4.48)
Mean = .13, SD = 1.43, Min = 0, Max = 25	

(continued)

Table I. (continued)

Variable/category	n (%)
Past year animal bites, scratches, or licks at a wound site	
No	156 (53.80)
Yes	134 (46.20)
Past year animal bites	
No	227 (78.28)
Yes	63 (21.72)
Past year animal scratches	
No	188 (64.83)
Yes	102 (35.17)
Past year animal licks at a wound site	
No	280 (96.55)
Yes	10 (3.45)

number of 1.26 (SD = 2.26). More than half (53.80%) had no history of being bitten, scratched, or licked at a wound area by mammals. Of the participants for whom mammals were injured, more than a third (35.17%) reported being scratched, just under a quarter (21.72%) bitten, and a tiny portion (3.45%) licked at a wound.

The Rabies Knowledge, Attitudes, and Preventive Behavior Scores

The knowledge scores categorized using Bloom's cut-off point showed that 52.10% had poor rabies knowledge, 27.00% had an acceptable level, and only 20.80% of respondents had good rabies knowledge. We found attitudes scores categorized; 89.00% had good attitudes about rabies, 9.10% had a reasonable level, and 1.90% were poor. According to the RPB categorized scores, 52.10% had good RPB, 18.00% were fair, and 29.80% scored poorly.

In Tables 2–4, respondents were queried regarding rabies knowledge, attitudes, and preventive behaviors. The knowledge questions were multiple choices with a score range of 0–6 (mean score = 3.34, SD 1.34). Less than half of the respondents correctly answered K1: the situations that can cause rabies infection (41.00%) and K3: the symptoms of a rabid dog (48.30%). Only some students (21.70%) could answer about K6: the fine for an unvaccinated pet.

Students achieved attitudes scores ranging from 9–21 (mean score = 18.72, SD 2.10). 69.30% had positive attitudes of A7: vaccinating a dog that only stays in and around the house. Also, 54.80% had a good perception of A6: washing a wound with water and soap for 10–15 minutes after getting a non-bleeding cat scratch (WASH15). However, only 40.00% were conscious that there is a chance to get rabies from a cat scratch (A2), and 47.60% were not sure.

Table 2. Distribution of knowledge about rabies (n=290).

Questions	Correct		Incorrect	
Knowledge about rabies				
K1: What situation can cause rabies infection?	119	41.00%	171	59.00%
K2: Which animals cannot get rabies?	245	84.50%	45	15.50%
K3: What are the symptoms of a rabid dog?	140	48.30%	150	51.70%
K4: What will you do if you are bitten/scratched or licked at the wound by an at-risk cat?	226	77.90%	64	22.10%
K5: What is the veterinary prescribed rabies vaccine schedule for your pets?	174	60.00%	116	40.00%
K6: What is the fine for an unvaccinated pet?	63	21.70%	227	78.30%

Table 3. Distribution of Attitudes about rabies (n=290).

Attitudes About Rabies	Proper		Improper ^a	
A1: Rabies is not to be feared. If you get rabies there is no need to worry	261	90.00%	29	10.00%
A2: There is no chance to get rabies from a cat scratch	116	40.00%	174	60.00%
A3: When you see fighting dogs you should stop them immediately	251	86.60%	39	13.40%
A4: Dogs like to play when they are eating. They will be in a good mood and want to play	232	80.00%	58	20.00%
A5: When you are bitten by a dog, you don't have to tell your parents or teachers because you will be scolded	273	94.20%	17	5.80%
A6: If you are scratched by a cat and there is no blood there is no need to wash the wound with running water and soap for at least 10–15 minutes	159	54.80%	131	45.20%
A7: There is no need to rabies vaccinates dogs that do not go outside and play with other dogs	201	69.30%	89	30.70%

^aThe respondents answered that they were not sure and disagreed with the questions they should have agreed or agreed with the question that should not have disagreed.

Table 4. Distribution of Preventive Behaviors about rabies (n=290).

Preventive behaviors about rabies	Practice ^a		Rarely practice	
PB1: I Will tell local people to annually vaccinate their pets	139	47.90%	151	52.10%
PB2: I Will immediately tell my parents or teachers if I get scratched by a mammal, even though it was not bleeding	232	80.00%	58	20.00%
PB3: I will immediately tell the parents/teacher of friends if I see them bitten/scratched/or licked at the wound by a risk mammal	225	77.60%	65	22.40%
PB4: I Will wash the wound with running water and soap for at least 15 minutes if I am bitten, scratched, or licked at the wound by a mammal	229	79.00%	61	21.00%

^a Practice = Practice Usually, Practice Frequently and Practice Occasionally.

For the preventive behavior questions, participants achieved RPB scores ranging from 4 to 16 (mean score =9.74, SD 3.44). It showed that 80.00% tell their parents or teachers if they are scratched by a mammal (PB2). 77.60% tell their friends' parents or teachers if they see them contacted by a suspected mammal. Also, 79.00% would follow the WASH15 protocol upon exposure. On the other hand, 52.10% have rarely told local people to have their pets vaccinated.

The Structural Model

Figure 2 illustrates the SEM results of the model. Regressions modeled were (i) inform local people to vaccinate their pets (PB1), inform parents or teachers that if they are contacted by a risk mammal (PB2), inform friends' parents or teachers if they see a friend exposed to a suspected mammal (PB3), and

follow WASH15 protocol upon exposure (PB4) variables of preventive behaviors. (ii) Risk situations of contracting rabies (K1) and prevention need after being contacted by a risk mammal (K4) variable of rabies knowledge. (iii) Risk to contract rabies if playing with dogs while they are eating (A4), opinions about WASH15 (A6), and opinions about vaccinating domestic dogs that only stay around the house (A7) variables of rabies attitudes. (iv) Preventive behaviors as a dependent variable of socio-economic status (School No.4: S4)

Detailed measurement and regression results of the structural equation modeling showed rabies knowledge and attitude were positively associated with RPB, better knowledge promoted positive preventive behaviors ($\beta = .157$, $se=.059$, $P = .008$), and positive attitudes facilitated better preventive behaviors too ($\beta = .206$ $se=.054$, $P < .001$).

Furthermore, children in school No.4 statistically had less RPB than other schools in this study, at 5% level of significance (β , the coefficient = $-.232$, $se=.054$, $P < .001$).

Importance-Performance Map Analysis: IPMA

In this four-quadrant matrix, Quadrants A–D, as in Figure 3, it was found that A6: opinion about WASH15 was in Quadrants A, meaning A6 had higher importance than above-average total

effect and higher performance than above-average RPB Performance. A4: Risk to contract rabies if playing with dogs while they are eating, A7: opinion about giving a rabies vaccine to their dogs even though those dogs only live in houses, and K4: the actions needed to be done after being contacted by a risk mammal, were in the Quadrants B, showed A4, A7, and K4 had lower total effect than average importance score but had higher performance than average operating score. K1: risk situations of contracting rabies and School No.4 (S4) were in Quadrants D, which had high importance, but the performance is below average.

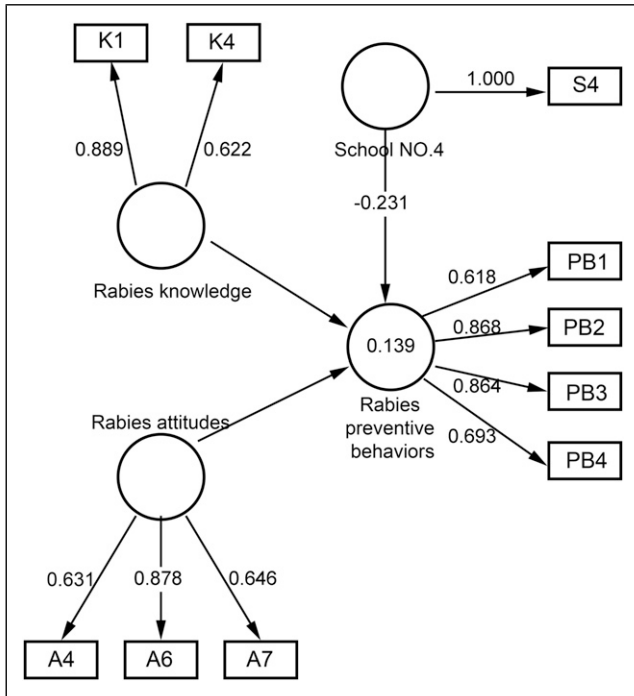


Figure 2. Path diagram of the structural equation model. Remarks: The codes shown in this figure are derived from the questionnaire’s questions. (See table 2–4)

Discussion

The results of our findings indicate that the first media favorite and most followed was YouTube, followed by TikTok, which is consistent with the research.¹⁹ YouTube and TikTok are good health education teaching channels and could connect with others who may reinforce health-compromising behaviors.²⁰⁻²² But they need to improve the quality and reliability of health information on YouTube and increase the partnership between the parties involved to enhance its potential as a rapidly implementable public health intervention aiming to engage a broad audience and increase awareness and knowledge.²³ Parents and teachers should guide children so they can know and select appropriate health content or shows or channels.²⁴

We found that 52.1% of the respondents had inadequate rabies knowledge, consistent with similar studies on rabies in Thailand.²⁵⁻²⁷ Reasons for inadequate knowledge range from little inculcation to young students’ lower performance on knowledge tests.^{27,28} The reason why youngsters have lower rabies knowledge than older may have been that were adults able to recall personal experiences of witnessing rabies cases.²⁷ Additionally, there exist some knowledge gaps between age groups, particularly related

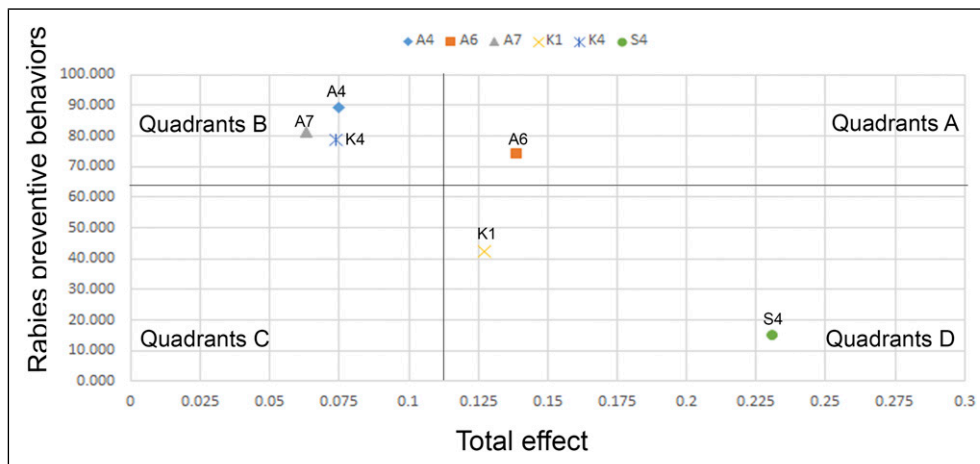


Figure 3. Importance Performance Map Analysis: IPMA. Remarks: The codes shown in this figure are derived from the questionnaire’s questions. (See table 2–4)

to the typical clinical signs of rabies in animals, risk situations to infect rabies, and basic rabies laws, especially Rabies Act B.E. 2535. Studies conducted among students in Thailand,²⁹ Benin Republic,³⁰ and Nigeria³¹ have reported similar knowledge gaps, underlining the associated risks, and the need for school-specific rabies education. A large proportion had good attitudes about rabies. The level of awareness obtained from this study agrees with these findings.^{25,32} Of all the children, 90% were aware that rabies is a fatal disease. Most had a positive perception of WASH15, parental/teacher reporting, pet vaccination, and suspected mammal avoidance as means to mitigate rabies risk. These all align with the previous finding.²⁶ 47.6% were unsure that they could get rabies from a cat scratch. It is vital to raise awareness here because cat scratch infections have reportedly increased.⁵

Overall, it was determined that 52.1% had good RPB. These results are consistent with other Thai research.^{32,33} More than a third reported that they would inform parents or teachers if they were contacted or saw a friend who was engaged with a suspected animal. Most participants in this study and other related research^{34,35} reported that they “would” follow WASH15 protocol upon exposure, but 21.2% disclosed that they “would not,” consistent with findings in Ethiopia.^{36,37} One of the critical findings of this survey is that 52.1% will rarely inform local people to vaccinate their pets, consistent with a similar study in Thailand.³⁸ Animal vaccination is critical (>70% of dog population vaccinated) in reducing of infection in dogs and humans where the disease has prevalence.³⁹

Adequate knowledge and favorable attitudes have significantly affected appropriate behaviors at statistically significant levels. These results were comparable to other studies.^{25,40} Indeed, knowledge and attitudes affect the individual’s behaviors. The literature on KAP studies reveals that healthy behaviors are enhanced by a person’s increased knowledge, including promoting attitudes that can impress all aspects of one’s behavior.^{41,42} For other factors, only School No. 4 was associated with the dependent variable with RPB scores below the other schools. The reason might be because School No.4 district area had fewer reported outbreaks than in the areas of the other schools.⁴³ Thus, the parents and/or teachers may not have been as focused on rabies prevention as in other schools.

The results highlight critical findings regarding essential performance factors associated with RPB (shown in [Figure 2](#)). We found that the variables K1 (knowledge of rabies infection situations) found in Quadrants D show K1 the importance of RPB, but most students did not have sufficient

knowledge. Consequently, teaching students what situations are at risk of rabies infection with the result they could potentially be to avoid those situations appropriately. It is an essential component in preventing rabies. S4 (School No.4) was also found in Quadrants D, which had a very high total effect for the RPB but had the lowest performance scores. Therefore, it should be the first school and or area to address RPB.

A6 (attitude about WASH15) is at Quadrants A and showed A6 was crucial for RPB, and those students already had a high positive attitude about it. Conversely, because this factor had a very high total effect on the dependent variable, it is appropriate to continue reinforcing the students’ attitude about wound washing, even though they already have this attitude.

A4 (attitude about not playing with dogs while eating), A7 (domestic dog vaccination attitudes), and K4 (post-exposure management knowledge of rabies risk factors) were the variable addressed in Quadrants B. It indicates a trait reflected that those factors were not very important for RPB, but students had good attitudes and knowledge of those factors, especially the A4 that respondents had the highest score than the other factors. In contrast, although there is little influence on the anti-rabies behavior, it is still important and appropriate to promote those attitudes and knowledge to students after promoting factors K1, S4, and A6.

This study has two limitations. First, data used for this study were collected through a cross-sectional survey. Therefore, the observed relationship between KAP needs to be verified through longitudinal studies. Second, the findings of the study are based on reported practice rather than actual practice. However, there could be a difference between the two. A future study extending to interview is recommended.

Conclusion and Recommendations

Overall, the study was indicative of a lack of basic rabies knowledge, prevention measures, recognition of animals with clinical symptoms, and Thai law regarding rabies. Conversely, student attitudes recognized with high scores are the need for WASH15, avoidance of playing with the dog while feeding, and domestic annual animal vaccination. Nevertheless, repeated indoctrination by families and schools is still of paramount importance. This study also underscores the important role that could be played by children’s favorite internet media (e.g., YouTube, TikTok, etc.) in the dissemination of rabies education in future rabies prevention and or control programs.

Appendix

Part 1: Grade 4 Socio-Demographic Survey

Explanation: Please mark ✓ or □ and fill in the blanks which the same as your information

1. No..... Room..... School.....
2. Gender 1) Male 2) Female
3. Father's occupation 0) Not working / house husband / Died
 - 1) Government officer 2) Company employee
 - 3) Agriculturist
 - 4) Self-employed 5) Others.....
4. Mother's occupation 0) Not working / housewife / Died
 - 1) Government officer 2) Company employee
 - 3) Agriculturist
 - 4) Self-employed 5) Others.....
5. Favorite media type (choose only 1)
 - 0) Not playing at all 1) TV shows 2) Line
 - 3) Facebook 4) YouTube 5) Instagram
 - 6) Twitter 7) TikTok 8) Others.....
7. Average daily hours spent on favorite media that you answer question 6
 - 1) < 1 hour per day
 - 2) ≥ 1 to < 2 hours per day
 - 3) ≥ 2 to < 3 hours per day
 - 4) ≥ 3 to < 4 hours per day
 - 5) ≥ 4 hours per day
8. Your pets type and number (can answer more than 1)
 - 0) Not raising any pets 1) Dogs 2) Cats
 - 3) other mammals
9. Experience of mammals bites or scratches or licks at the wound in the past 1 year (can answer more than 1)
 - 0) Have no experience 1) Got bitten 2) Got scratched
 - 3) Got licked at the wound

Part 2: Rabies Knowledge, Attitudes and Protection motivation

Rabies knowledge

Explanation: Please mark a or at A, B, C, or D only one option which the most correct answer.

1. What is the situation that can make you infected with rabies?
 - A. You eat unclean food
 - B. The dog licks your mouth while you are playing with that dog.
 - C. You do not wash their hands after playing with their dogs.
 - ✓D. The cat of your neighbor licks the wound on your hand.
 2. Which animals cannot get rabies?
 - ✓A. Chicken B. Rats C. Cats. D. Dogs
 3. What are the symptoms of rabies dogs?
 - A. barking a lot, excessive drooling
 - B. Walk in a circle
 - ✓C. Unable to balance, tongue outside the mouth, drooling
 - D. have a fever, sleep all day, paralysis
 4. What will you do If you get bitten or scratched or licked at the wound by an at-risk cat?
 - A. No need to do anything, it will be better soon.
 - B. Notifying your parents or teachers as soon as possible.
 - C. Wash the wound with clean running water and soap for at least 15 minutes.
 - ✓D. Item B and C, both are correct.
 5. If you have pets, what is the Rabies vaccine schedules for your pets
 - A. 1 injection every 2 years
 - B. Only one vaccination time and not need to be vaccinated for the rest of your pet life
 - C. Only vaccinated for the first year as a puppy or kitten and no need to inject again anymore when they grow up
 - ✓D. For puppies or kittens, get twice the vaccination per year and for more than one years old dogs and cats get one injection every year
 6. What is the fine for an unvaccinated pet?
 - ✓A. 200 baht B. 400 baht C. 600 baht 800 baht
- * ✓ = correct

Rabies Attitude

Explanation: Please mark ✓ in the box only one option which is the same as your opinions in each question.

Opinions

Disagree Unsure Agree

- 1) Rabies is not to be feared. If you get rabies, there is no need to worry.
- 2) There is no chance to get rabies from a cat scratch.
- 3) When you see fighting dogs you should stop them immediately.
- 4) Dogs like to play when they are eating. They will be in a good mood and want to play.
- 5) When you are bitten by a dog, you don't have to tell your parents or teachers because you will be scolded.
- 6) If you are scratched by a cat and there is no blood there is no need to wash the wound with running water and soap for at least 10–15 minutes.
- 7) There is no need to rabies vaccinate a dog if s/he only lives in a house and does not go out and play with other dogs outside.

Question	Rarely	Occasionally*	Frequently*	Usually*
1. I will tell local people to annually vaccinate their pets.				
2. I will immediately tell my parents or teachers if I get scratched by a mammal, even though it was not bleeding				
3. I will immediately tell their parents or teachers if I see my friend getting bitten or scratched or licked at the wound by a mammal				
4. I will wash the wound with running water and soap for at least 15 minutes If I am bitten, scratched, or licked at the wound by a mammal				

Part 3: Rabies Preventive behavior

“Usually” = do that behavior 81 to 100 % of time when you encounter that occurrence.

“Frequently” = do that behavior 51 to 80 % of time when you encounter that occurrence.

“Occasionally” = do that behavior 21 to 50 % of time when you encounter that occurrence.

“Rarely” = do that behavior 0 to 20% of time when you encounter that occurrence.

Explanation: Please mark ✓ in the box only one item, according to the frequency of those practices.

Acknowledgments

The authors would also like to acknowledge the students gratefully, their parents of the study and the teachers of sampled elementary schools for their cooperation. Also, appreciate Associate Professor Wathna Soonthornchai for assisting in vetting statistical data. Genuinely grateful to Lecturer John Daly (USA) and Assistant Professor Dr. Kowit Suwannahong for their helpful discussion critical reading, and editing of the manuscript.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

ORCID iD

Mayurin Laorujisawat  <https://orcid.org/0000-0003-0119-5770>

References

- Centers for Disease Control and Prevention. *Global Rabies Work. National Center for Emerging and Zoonotic Infectious Diseases (NCEZID)*; 2018. Accessed 17 February 2022 <https://www.cdc.gov/ncezid/pdf/global/global-stories-global-rabies-work-H.pdf>.
- World Health Organization. *Epidemiology and Burden of Disease*. World Health Organization; 2018. Accessed 17 February 2022 <https://apps.who.int/rabies/epidemiology/en/>. Published
- WHO/Department of Control of Neglected Tropical Diseases. *Human Rabies: 2016 Updates and Call for Data*. Geneva, Switzerland; 2021.
- Janchai S. Rabies and Situation in Thailand. *Region 4-5 Medical Journal*. 2018;37(1):1-3. (Thai).
- Bureau of Epidemiology Department of Disease Control. *Summary of Guidelines for Analysis of Surveillance Systems in 5 Groups of Diseases in 5 Dimensions*. 1 ed. Bangkok: TS Interprint Co., Ltd.; 2016. (Thai).
- Premashthira S, Suwanpakdee S, Thanapongtharm W, Sagarasaerane O, Thichumpa W, Sararat C, et al. The impact of socioeconomic factors on knowledge, attitudes, and practices of dog owners on dog rabies control in thailand. *Front Vet Sci*. 2021;8:699352. (Thai).
- Andrade C, Menon V, Ameen S, Kumar Praharaj S. Designing and conducting knowledge, attitude, and practice surveys in psychiatry: Practical guidance. *Indian J Psychol Med*. 2020;42(5):478-481.
- Tiwari HK, Robertson ID, O’Dea M, Vanak AT. Knowledge, attitudes and practices (KAP) towards rabies and free roaming dogs (FRD) in Panchkula district of north India: A cross-sectional study of urban residents. *PLoS NTD*. 2019;13(4):e0007384.
- Christopher Rine R, Pam MD. Knowledge, attitude and practice of rabies in and around lafia metropolis, nigeria. *CAJPH*. 2017;3(3):27-33.
- World Health Organization. *Life Skills Education for Children and Adolescents in Schools*. Switzerland: Programme on Mental Health World Health Organization; 1997.
- Sotanasathien S. Concepts and Theories about Knowledge Attitude and Behavior. In *Communication and Social Bangkok*. Chulalongkorn University Press; 1990. (Thai).
- Petter S, Hadavi Y. With great power comes great responsibility. *SIGMIS - Data Base*. 2021;52(SI):10-23.
- Markazi-Moghaddam N, Kazemi A, Alimoradnori M. Using the importance-performance analysis to improve hospital information system attributes based on nurses’ perceptions. *IMU*. 2019;17:100251.
- Mohd Salleh MI, Abdullah R, Zakaria N. *Extending Health Information System Evaluation with an Importance-Performance Map Analysis*. 2017:33-55.
- Aeyels D, Seys D, Sinnaeve PR, et al. Managing in-hospital quality improvement: An importance-performance analysis to set priorities for ST-elevation myocardial infarction care. *Eur J Cardiovasc Nurs*. 2018;17:535-542.

16. Faul F, Erdfelder E, Lang A-G, Buchner A. G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behav Res Methods*. 2007;39:175-191.
17. Bloom BS. Learning for mastery. instruction and curriculum. *Regional education laboratory for the Carolinas and Virginia*. 1968;1(2):1-12.
18. Wu HH, Shieh JI. Quantifying uncertainty in applying importance-performance analysis. *Qual Quant*. 2010;44(5):997-1003.
19. Wongrujira M. Children's Access to Indecent Content in New Media. *e-JODIL*. 2018;8(2):248-266.
20. Mueller SM, Hongler VNS, Jungo P, et al. Fiction, falsehoods, and few facts: Cross-sectional study on the content-related quality of atopic eczema-related videos on youtube. *J Med Internet Res*. 2020;22(4):e15599-e15610.
- Comp G, , Dyer S, and Gottlieb M. Is tiktok the next social media frontier for medicine? *AEM Educ Train* 2021;5(3):1-4. doi:10.1002/aet2.10532.
22. Song S, Xue X, Zhao YC, Li J, Zhu Q, Zhao M. Short-video apps as a health information source for chronic obstructive pulmonary disease: Information quality assessment of tiktok videos. *J Med Internet Res*. 2021;23(12):e28318.
23. Chan C, Sounderajah V, Daniels E, et al. The Reliability and Quality of YouTube Videos as a Source of Public Health Information Regarding COVID-19 Vaccination: Cross-sectional Study. *JMIR Public Health and Surveill*. 2021;7(7):e29942.
24. Temban MM, Hua TK, Mohd Said NE. Exploring Informal Learning Opportunities via YouTube Kids among Children During COVID-19. *ACAD*. 2021;10(3):272.
25. Rakpanit S, Vaeteewootacharn K. Factors associated with dog owner's behavior on rabies prevention, Muang district, Buriram province. *J nurs. healthc*. 2018;36(2):158-166. (Thai).
26. Sagarasearane O, Hinjoy S, Chuxnum T, et al. Survey of knowledge, attitude, and practice initiated by an investigation of a human rabies death in Chanthaburi Province, Thailand, 2015. *OSIR*. 2017;10(3):1-8. (Thai).
27. Kiratitana-olan K, Chaisowwong W, Chaisowwong W, Thongkorn K, Kreasukon K. Keys to good knowledge, attitude and practice on rabies prevention in disease-free communities. *Vet Integr Sci*. 2021;19(3):407-422. (Thai).
28. Cowan N, AuBuchon AM, Gilchrist AL, Ricker TJ, Sauls JS. Age differences in visual working memory capacity: not based on encoding limitations. *Dev Sci*. 2011;14(5):1066-1074.
29. Puanghat A, Theerawithhayalert R, Thanachoenrat N. Knowledge, attitude and practice of thai people in prevention and control of rabies. *Dis Control J*. 2010;36(1):50-59. (Thai).
30. Philippe S, Noudeke N, Thomson DJ, Salako D, Farougou S. Evaluation of the knowledge, attitudes and practices of students at the University of Abomey Calavi on rabies in Benin Republic, West Africa. *PAMJ*. 2021;38(235):1-15.
31. Dzikwi AA, Ibrahim AS, Umoh JU. Knowledge, attitude and practice about rabies among children receiving formal and informal education in Samaru, Zaria, Nigeria. *Glob J Health Sci*. 2012;4(5):132-139.
32. Chokluechai K. Participation in Rabies Prevention of Residents of Na Chomtian Municipality, Sattahip District, Chonburi Province. *Chonburi*. Graduate School of Commerce Burapha university; 2015. (Thai).
33. Kumsri S. Health Beliefs Affecting Rabies Disease Prevention Behavior in the local outbreaks at Hua Sai sub-district Bang Khla district. *JDMS*. 2018;43(2):137-140. (Thai).
34. Surin W, Amin K, Khunthong P, Wattanaphalachaikun A. *A Survey of Behaviors to Prevent Rabies Among Populations Residing along Border Areas, Sa Kaeo, Thailand*. Nonthaburi: Bureau of Epidemiology, Department of Disease Control, Ministry of Public Health; 2016. (Thai).
35. Guadu T, Anmaw Shite, Chanie M, Bogale B, Fentahun T. Assessment of knowledge, attitude and practices about rabies and associated factors in the case of bahir dar town. *Glob. Vet*. 2014;13(3):348-354.
36. Digafe RT, Kifelew LG, Mechesso AF. Knowledge, attitudes and practices towards rabies: questionnaire survey in rural household heads of Gondar Zuria District, Ethiopia. *BMC Res Notes*. 2015;8(1):400.
37. Bihon A, Meresa D, Tesfaw A. Rabies: Knowledge, attitude and practices in and around south gondar, north west Ethiopia. *Diseases*. 2020;8(1).
38. Kriuna K, Opaswacharanon S, Samala W. *Knowledge Attitude and Practice (KAP) Survey Regarding Rabies Prevention and Control Programs in Khok Ngam Sub District, Dansai District, Loei Province, 2015*. Nonthaburi: Bureau of Epidemiology, Department of Disease Control, Ministry of Public Health; 2017. (Thai).
39. World Health Organization, World Organization for Animal Health. Global elimination of dog-mediated human rabies. The Rabies Global Conference. 10-11 December 2015, 2015;Geneva, Switzerland.
40. Leesurapong C, Charoenrit P. Factors related with rabies prevention behavior of pet owners in area where positive samples in trang province, 2563. *srPHCJ*. 2021;35(1):6-16. (Thai).
41. Vandamme E. *Concepts and Challenges in the Use of Knowledge Attitude –practice Surveys: Literature Review*. Antwerp, Belgium: Institute of Tropical Medicine; 2009.
42. Badran IG. Knowledge, attitude and practice the three pillars of excellence and wisdom: a place in the medical profession. *East Mediterr Health J*. 1995;1:8-16.
43. Bureau of Disease Control and Veterinary Services. *Animal Rabies Surveillance Database System (Thai Rabies Net)*. Department of Livestock Development; 2021. (Thai).