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Research article

Keys to Good Knowledge, Attitude and Practice for Rabies Prevention in Disease-Free Communities in Thailand

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Abstract

Many developing countries have recently faced public health challenges due to outbreaks of human rabies, while some areas have remained free from outbreaks of the disease. The aim of this study was to identify keys to good knowledge, attitude and practice (KAP) in rabies-free areas of Thailand to provide a functional model for rabies prevention in endemic zones. A cross-sectional study was conducted using a questionnaire in conjunction with interviews that were designed to elicit relevant information. Multivariate logistic regression analysis and content analysis were used to interpret the data obtained from the questionnaire and interviews, respectively. The results gathered from 1,392 respondents and 36 interviewees indicated that age, education and the residential area of the subjects were associated with knowledge and practice, but not with attitude. Late midlife subjects reported good knowledge and practice scores due to some form of personal encounter with rabies and attendance at rabies meetings and campaigns, while secondary education levels or above were associated with higher knowledge and practice scores due to the inclusion of a rabies course in the secondary school curriculum. Moreover, the findings showed that a community using a form of public communication known as wired broadcasting had greater knowledge, and a community organizing comprehensive participatory activities had better practice. Ultimately, it was not only age, education and residential area, but also the integration of appropriate interventions and control measures by the authorities that proved beneficial in making good knowledge and practice more uniform throughout the communities included in the study.

Keywords: : Intervention, Preventive approach, Public communication, Participatory activity, Rabies-free area

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INTRODUCTION

Rabies is a vaccine-preventable disease with pre- or post-exposure prophylaxis (PrEP or PEP), but it is an incurable disease beyond the appearance of clinical signs (WHO, 2013). This viral disease continues to be a significant cause of animal and human deaths worldwide, particularly in Asia and Africa (Fooks and Müller, 2012). As the majority of human deaths are caused by canine-mediated rabies, controlling and eliminating this disease in dogs is critically important for human health (WHO, 2013). Although there has been widespread use of rabies control measures in many countries, some cities in developing countries have still not managed to bring rabies outbreaks under control (Hampson et al., 2015).

In Thailand, there was a substantial decline in the number of reported human deaths that were attributed to rabies annually from nearly 100 to 5 during the period of 1993-2015 (Ministry of Public Health, 2017). However, the number of human rabies fatalities in 2016 was more than twice as high as in 2015 (Ministry of Public Health, 2017) while the number of animal rabies deaths increased dramatically from around 300 in 2015 to roughly 600 in 2016 (Ministry of Agriculture and Cooperatives, 2017a). Temporary rabies-endemic areas were more frequently identified in many provinces across the country (Ministry of Agriculture and Cooperatives, 2017b). The government has therefore been reintroducing rabies prevention and control programs using multisectoral collaboration (Ministry of Interior, 2016). Keeping rabies under control is not only the responsibility of regulatory authorities but also of the general population; consequently, raising public awareness over the importance of controlling this disease must be considered essential, particularly in endemic areas (Ministry of Public Health, 2014; WHO, 2012).

Lessons about rabies prevention can be learnt from knowledge, attitude and practice (KAP) surveys conducted in disease-free communities and the findings can then be applied to endemic areas. The lessons learnt could then encourage people in communities where rabies is endemic to take positive action against this deadly disease and suggest specific interventions that would be particularly suited to similar populations and cultural circumstances. However, there was no previous research in rabies-free zones in Thailand. An earlier study from the areas with confirmed animal rabies cases in Chanthaburi province of Thailand showed that the proportion of respondents who had good KAP scores was low (Sagarasearanee et al., 2015). Therefore, the present study designed to find pointers that could assist in reverse engineering a model for rabies prevention and control from disease-free areas to endemic areas. The objective of this study was to examine the specific variables related to rabies prevention in this disease-free province in Thailand

MATERIALS and METHODS

Study areas

A descriptive cross-sectional study was conducted in Chiang Mai between March and May 2018. Three subdistricts in Chiang Mai, which was a rabies-free province in northern Thailand, were selected by purposive sampling on the grounds that they had won Thailand Rabies Awards during the period of

2010-2011 (Ministry of Public Health, 2013). These subdistricts differed demographically which were Mae Hia (urban), San Klang (semi-urban) and Sob Tia (rural) subdistricts. They also differed geographically as has been shown in Figure 1.

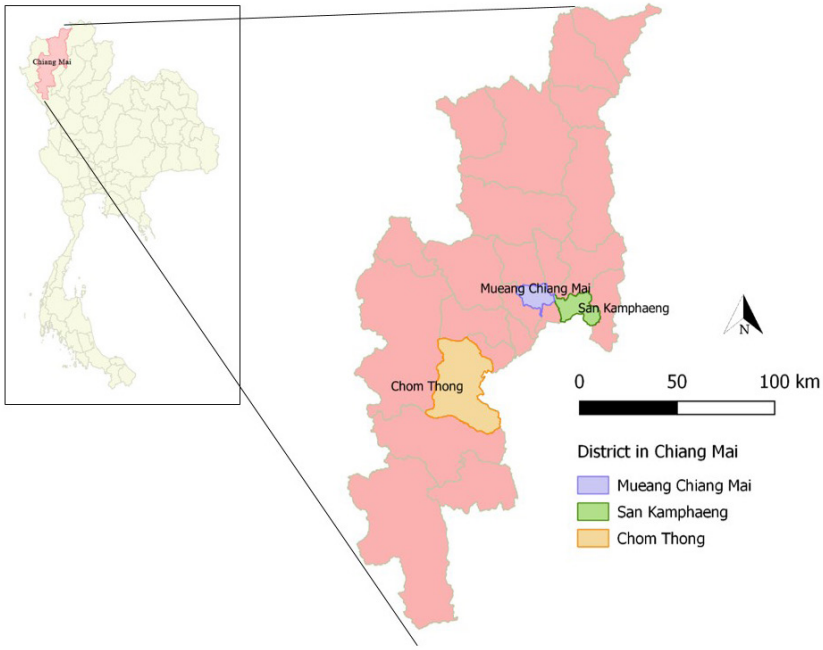

Figure 1 Geographical location of the three subdistricts (Mae Hia, San Klang and Sob Tia) in Chiang Mai.

Sampling procedures

The participants of the questionnaire, who were permanent residents aged between 20 and 79 years, were enrolled in accordance with the systematic random sampling method employed by the census registration authority. As there were no previous awareness studies conducted in these areas, the required sample size in each community was estimated on the assumption that 50% of the population would know about rabies. The sample size was calculated using Cochran's formula with 95% confidence interval and 0.05 absolute precision. The minimum sample size for each subdistrict was 384 subjects. Moreover, the survey sample size was added 30% of the minimum sample size due to using listwise deletion for missing data. While the number of interviewees, who were enrolled in accordance with the convenience sampling method, was determined by data saturation.

Study design

The survey approach employed in the study used both questionnaires and interviews. The questions were developed following a literature review on rabies. The questions were initially formulated in English and then translated into formal Thai. A structured questionnaire took the form of a multiple-choice test with 33 questions, which was preceded by personal information such as gender, age, occupation, education and religion. The questions were subdivided into three sections. The knowledge component of the questionnaire contained 15 questions on the basics of the disease and principal preventive approaches to the rabies disease in animals and humans. The attitude component of the questionnaire was comprised of eight questions that focused on the respondents' opinions regarding the severity of the disease and their perspectives on preventive approaches. The practice component consisted of 10 questions on the behavioral risks of contracting rabies and the reporting practices associated with the preventive approaches. The focus of each question is described in Table 1.

Table 1 The focus of questions on the aspects of KAP relevant to rabies prevention

Part	Aspect	Focus of question
Knowledge	The basics of the disease	1. You had previously heard about rabies
		2. Cause of rabies is an infectious agent (virus)
		3. Rabies occurs in all seasons
		4. Humans and all mammals can be affected by rabies
		5. Main reservoirs are free-roaming and unvaccinated dogs
		6. Rabies can be transmitted from animals to animals
		7. Rabies can be transmitted from animals to humans
		8. Rabies can be transmitted from humans to humans via organ transplantation
		9. Main mode of transmission is biting
		10. Two clinical forms of rabies are furious and paralytic forms
		11. Rabies cannot be treated after the onset of clinical signs
		12. Rabies is a dangerous and fatal disease
	Principal preventive approaches	13. Rabies cases can be prevented through vaccination
		14. Animal rabies vaccines require a booster annually
		15. PEP can prevent human cases and deaths
Attitude	Respondents' opinions of the severity of rabies	16. You think that rabies is a worldwide public health problem
		17. You think that you and your family are at risk from rabies
		18. You think that the elimination of rabies is important
	Respondents' perspectives on preventive approaches	19. You think that the key components in the prevention of rabies are human and animals
		20. You think that animal owners and community members should be responsible for rabies prevention and control
		21. If you are the owner, you are willing to take your animals for rabies vaccination
		22. If you are bitten by a suspected rabid animal, you are willing to receive PEP
		23. If you have an opportunity, you will be part of the rabies campaigns

Table 1 The focus of questions on the aspects of KAP relevant to rabies prevention (Cont.)

Part	Aspect	Focus of question
Practice	Behavioral risk of rabies	24. You have participated in an education or vaccination campaign about rabies while you have had a dog or cat
		25. You received rabies vaccine (PrEP or PEP) before or after you were bitten by dog(s)
		26. When a dog barks at you or runs up to you, you look at the floor and slowly back away from it
	The reporting practices of preventive approaches	27. The best action after identifying a suspected rabid animal is capturing and observing it
		28. The best action after seeing the carcass of a suspected rabid animal is contacting the DLD to cut off the head and send it to a laboratory
		29. A first aid treatment after a suspected animal bite is washing wound(s) with water and soap
		30. An immediate action after the first aid treatment is receiving treatment at a health center
		31. Both public health and veterinary sectors are agencies a suspected animal bite would be reported to
		32. You would like to receive anti-rabies vaccine immediately after a suspected animal bite
		33. The primary aims of a rabies vaccination program are animal health and disease prevention and control

Pre-testing was conducted to determine the clarity of the survey questions and then to establish the reliability and validity of both the questionnaire and the interviews. It was tested on a small group, who are as similar as possible to the target population in one out of three research areas before a full-scale study. The full-scale study was carried out using a self-administered questionnaire on paper in the presence of the study coordinators for the quantitative data, and semi-structured face-to-face interviews for the qualitative data after the results of the quantitative data. The questions asked in the questionnaire and in the interviews were different since the interview was used to investigate issues in greater depth and detail. For instance, what was the main source of information for you about rabies? and why (or why not) did you participate in rabies meetings and campaigns? are the questions asked in the interviews.

Ethical considerations

The study protocol and questionnaire were ethically reviewed and approved by the Chiang Mai University Research Ethics Committee (approval number 61/004). The survey was authorized by the Chief Executive of the Subdistrict Administrative Organization prior to being distributed in each community. Data were collected after informing participants about the purpose of the study, the potential benefits for the community, the confidentiality of the study and their right to refuse or withdraw any and all contact information. Written approval was obtained from each participant who agreed to take part in the survey and from all those who were able to read and sign the consent form.

Statistical analysis

Completed data were coded and imported into R programming version 3.6.1. The questionnaire data were presented in terms of both frequency (f) and percentage (%). For KAP assessment, Bloom's cutoff points were adopted to analyze (Bloom, 1968). Since good scores of KAP were focused on in this study, the KAP scores were classified into two categories: 1) good (≥80%) and 2) fair to poor (<80%). Impact of socio-demographic variables (independent variables) was explored as predictor of KAP (dependents variables). To describe each dependent variable, univariate analysis was performed using the chi-square ($\chi 2$) test. Multivariate logistic regression models, at an alpha level of 0.25 based on univariate analysis, were constructed to identify the relationships between variables and KAP scores with a P-value of < 0.01. In addition, content analysis was used to interpret the interview data.

RESULTS

Socio-demographic characteristics

A total of 1,392 respondents completed the quantitative survey within three communities: Mae Hia, San Klang and Sob Tia subdistricts. Socio-demographic profiles of the respondents in total and in each community are presented in Table 2. The largest proportion of total respondents were female, were described as being in late midlife (50-64 years old) with a median age of 54, worked as independent contractors, had attained primary education or lower and were Buddhists.

Table 2 Socio-demographic characteristics of respondents

Socio-demographic variables	Total n = 1,392 (%)	Mae Hia n = 473 (%)	San Klang n = 455 (%)	Sob Tia n = 464 (%)
Gender				
Male	510 (36.6)	169 (35.7)	166 (36.5)	175 (37.7)
Female	882 (63.4)	304 (64.3)	289 (63.5)	289 (62.3)
Years of age				
20-34	152 (10.9)	64 (13.5)	48 (10.5)	40 (8.6)
35-49	360 (25.9)	122 (25.8)	91 (20.0)	147 (31.7)
50-64	630 (45.2)	195 (41.2)	225 (49.5)	210 (45.3)
65-79	250 (18.0)	92 (19.5)	91 (20.0)	67 (14.4)
Occupation				
Unemployed	459 (33.0)	190 (41.2)	177 (38.9)	92 (19.9)
Employed	440 (31.6)	145 (30.6)	151 (33.2)	144 (31.0)
Independent	493 (35.4)	138 (29.2)	127 (27.9)	228 (49.1)
Education				
Primary or lower	617 (44.3)	132 (27.9)	185 (40.7)	300 (64.6)
Secondary	421 (30.3)	128 (27.1)	167 (36.7)	126 (27.2)
Tertiary	354 (25.4)	213 (45.0)	103 (22.6)	38 (8.2)
Religion				
Buddhism	1,355 (97.3)	464 (98.1)	437 (96.0)	454 (97.8)
Others	37 (2.7)	9 (1.9)	18 (4.0)	10 (2.2)

KAP scores

The scores for knowledge, attitude and practice are shown in Table 3. More than half of all respondents revealed good scores of knowledge, attitude and practice towards rabies prevention. The proportion of the participants who had high knowledge, positive attitude and good practice were 53.6%, 79.1% and 63.4%, respectively.

Table 3 Frequency and percentage for knowledge, attitude and practice

KAP variables	Total n = 1,392 f (%)	Mae Hia n = 473 f (%)	San Klang n = 455 f (%)	Sob Tia n = 464 f (%)
Knowledge				
High	746 (53.6)	235 (49.7)	237 (52.1)	274 (59.1)
Medium to low	646 (46.4)	238 (50.3)	218 (47.9)	190 (40.9)
Attitude				
Positive	1,101 (79.1)	363 (76.7)	366 (80.4)	372 (80.2)
Neutral to negative	291 (20.9)	110 (23.3)	89 (19.6)	92 (19.8)
Practice				
Good	883 (63.4)	268 (56.7)	320 (70.3)	295 (63.6)
Fair to poor	509 (36.6)	205 (43.3)	135 (29.7)	169 (36.4)

Association between predictive variables and KAP scores

The findings of the multivariate analysis indicated that variables such as age, education and residential area were associated with knowledge (Table 4) and practice (Table 6). By contrast, there was no association between the predictive variables and attitude (Table 5).

For instance, in the multivariate logistic regression analysis, a tertiary educational background was 3.18 times and a secondary educational background was 1.83 times more likely to be associated with a high level of knowledge about rabies as compared to a primary educational background or lower ($P < 0.001$). Furthermore, individuals who had attained a tertiary education were 2.32 times and those who had attained a secondary education were 1.75 times more likely to have good practice than those who had attained a primary education or lower ($P < 0.001$). However, no association was found between education and attitude in the multivariate analysis.

Table 4 Association between predictive variables and separate scores for knowledge

Variables	Good	Fair to poor	Univariate		Multivariate	
	f (%)	f (%)	χ^2	P-value	OR (95% CI)	P-value
Gender						
Male	282 (20.3)	228 (16.4)	0.938	0.333	-	-
Female	464 (33.3)	418 (30.0)				
Years of age						
20-34	76 (5.5)	76 (5.5)	6.791	0.079	Reference	
35-49	202 (14.5)	158 (11.3)			1.51 (1.02-2.24)	0.040
50-64	350 (25.1)	280 (20.1)			2.08 (1.40-3.08)	< 0.001
65-79	118 (8.5)	132 (9.5)			1.68 (1.07-2.64)	0.024
Occupation						
Unemployed	229 (16.5)	230 (16.5)	7.251	0.027	-	-
Employed	258 (18.5)	182 (13.1)				
Independent	259 (18.6)	234 (16.8)				
Education						
Primary or lower	291 (20.9)	326 (23.4)	22.038	$1.639e^{-05}$	Reference	
Secondary	234 (16.8)	187 (13.4)			1.83 (1.38-2.42)	< 0.001
Tertiary	221 (15.9)	133 (9.6)			3.18 (2.27-4.46)	< 0.001
Religion						
Buddhism	726 (52.2)	629 (45.2)	0.003	0.954	-	-
Others	20 (1.4)	17 (1.2)				
Residence						
Mae Hia	235 (16.9)	238 (17.1)	8.881	0.012	Reference	
San Klang	237 (17.0)	218 (15.7)			1.30 (0.99-1.71)	0.057
Sob Tia	274 (19.7)	190 (13.6)			2.20 (1.64-2.95)	< 0.001

Note: Since knowledge was related to village wired broadcasting, Mae Hia that used less of wired broadcastings was a predictor or reference.

Table 5 Association between predictive variables and separate scores for attitude

Variables	Good	Fair to poor	Univariate		Multivariate	
	f (%)	*f* (%)	χ^2	P-value	OR (95% CI)	P-value
Gender						
Male	394 (28.3)	116 (8.3)	1.648	0.199	-	-
Female	707 (50.8)	175 (12.6)				
Years of age						
20-34	126 (9.0)	26 (1.8)	9.179	0.027	-	-
35-49	299 (21.5)	61 (4.4)				
50-64	491 (35.3)	139 (10.0)				
65-79	185 (13.3)	65 (4.7)				
Occupation						
Unemployed	354 (25.4)	105 (7.6)	1.889	0.389	-	-
Employed	349 (25.1)	91 (6.5)				
Independent	398 (28.6)	95 (6.8)				
Education						
Primary or lower	466 (33.5)	151 (10.8)	10.097	$6.420e^{-03}$	-	-
Secondary	352 (25.3)	69 (5.0)				
Tertiary	283 (20.3)	71 (5.1)				
Religion						
Buddhism	1,070 (76.9)	285 (20.5)	0.505	0.477	-	-
Others	31 (2.2)	6 (0.4)				
Residence						
Mae Hia	363 (26.1)	110 (7.9)	2.404	0.301	-	-
San Klang	366 (26.3)	89 (6.4)				
Sob Tia	372 (26.7)	92 (6.6)				

Table 6 Association between predictive variables and the separate scores for practice

Personal variables	Good	Fair to poor	Univariate		Multivariate	
	f (%)	*f* (%)	χ^2	P-value	OR (95% CI)	P-value
Gender						
Male	316 (22.7)	194 (14.0)	0.753	0.386	-	-
Female	567 (40.7)	315 (22.6)				
Years of age						
20-34	91 (6.5)	61 (4.4)	12.056	$7.195e^{-03}$	Reference	
35-49	245 (17.6)	115 (8.3)			1.67 (1.12-2.51)	0.013
50-64	409 (29.4)	221 (15.9)			1.79 (1.20-2.69)	0.005
65-79	138 (9.9)	112 (8.0)			1.31 (0.83-2.07)	0.248
Occupation						
Unemployed	283 (20.3)	176 (12.6)	3.622	0.164	-	-
Employed	295 (21.2)	145 (10.5)				
Independent	305 (21.9)	188 (13.5)				
Education						
Primary or lower	353 (25.4)	264 (19.0)	18.512	$9.552e^{-05}$	Reference	
Secondary	287 (20.6)	134 (9.6)			1.75 (1.31-2.35)	< 0.001
Tertiary	243 (17.4)	111 (8.0)			2.32 (1.64-3.28)	< 0.001
Religion						
Buddhism	858 (61.6)	497 (35.7)	0.280	0.597	-	-
Others	25 (1.8)	12 (0.9)				
Residence						
Mae Hia	268 (19.3)	205 (14.7)	18.690	$8.740e^{-05}$	Reference	
San Klang	320 (23.0)	135 (9.7)			2.07 (1.56-2.75)	< 0.001
Sob Tia	295 (21.2)	169 (12.1)			1.76 (1.31-2.36)	< 0.001

Note: Since practice was related to participation in rabies campaigns, Mae Hia that had low rates of participating in was a predictor or reference.

Interview findings

Following the survey results, the interview data obtained from 36 informants (12 informants per community) were collated to explore the main sources of knowledge for rabies and the preventive practices adopted in each of the residential areas. The findings showed that almost half of all interviewees from the three communities were in their late midlife in terms of age. The themes of content analysis were personal experience, village wired broadcasting as an intervention and rabies campaigns by the authorities as an implementation of control measure.

Taking Sob Tia district first, all of the late midlife informants had witnessed cases of animal or human rabies through personal experiences when they were children. Additionally, for over a decade, all of them had received information about rabies when listening to the public address system known as the village wired broadcasting network. Most of them participated in rabies campaigns annually. However, some of them complained that it was difficult to attend rabies meetings on preventive practices when the meetings were held in

other villages. This was due to the distance involved between the location of the meeting and the participant's home.

"When I was a child, I saw rabid dogs very often. I have seen about 40-50 rabid dogs in my lifetime." (male, age 62, farmer)

"Two village health volunteers always come to vaccinate my dogs every year as my house is a long way from the campaign location. But I could not take part in any meetings that were held in a remote village." (female, age 63, housewife)

Turning to San Klang district, most of the late midlife informants had had direct conversations with their parents about rabies when they were younger. They had also listened to village health volunteers through wired broadcasting and mass media when they became older. Although wired broadcasting was discontinued in some housing estates, volunteers continued to inform villagers about rabies meetings and campaigns. Furthermore, some informants stated that they had attended rabies activities organized by the local government and followed the advice given by staff at these activities.

"I knew about the disease from television. And I heard the village headman announce a year-round rabies vaccination campaign on the wired broadcasting network. Some years, village health volunteers visited my house and talked about rabies, bird flu and dengue." (female, age 60, retired)

"I join the campaigns every year because my cat is vaccinated each year for free and it doesn't take long to inject it. Some years, stray cats and dogs were neutered for free when community members caught them and brought them to the campaign locations." (male, age 61, unemployed)

Finally, regarding Mae Hia subdistrict, none of the late midlife informants had witnessed any rabies cases in the community, but they had been educated about rabies at school and by their family during their youth. Furthermore, a mobile application on smartphones known as Line has been used for communication instead of wired broadcasting in some villages over the past few years. However, some informants commented that they did not pay attention to some rabies-related content sent via the application. Some animal owners also mentioned that they used the service of veterinary clinics for vaccinations due to its convenience, but did not attend rabies meeting or campaigns.

"I learned about this disease from a teacher at secondary school and from my parents as well." (male, age 66, entrepreneur)

"There is no wired broadcasting available in my housing estate, but we are always informed using Line. As I do not have my own pet, I have never read any rabies articles as they do not interest me." (female, age 52, housewife)

"Normally, my dogs get yearly vaccinations from a veterinary clinic. I have not attended any meetings or campaigns yet. If I am free on the event date, I may join them." (male, age 67, retired).

DISCUSSION

This study was conducted in rabies-free communities in Chiang Mai and was designed to examine the relevant factors influencing KAP regarding rabies prevention. The findings showed that more than half of all respondents displayed good knowledge and practice scores, and most of them had a positive

attitude. Variables including age, education and residential area were associated with knowledge and practice, but none of the variables was associated with attitude.

Although several previous studies were conducted in different contexts in terms of disease occurrence, location and time, their findings partially corroborate those of the present study. For instance, studies in Morocco (Bouaddi et al., 2020), Bhutan (Rinchen et al., 2019), Cambodia (Sor, et al., 2018), Tanzania (Sambo et al., 2014) and India (Herbert et al., 2012) showed at least one of the three variables to be a key factor associated with knowledge and practice. However, none of these studies indicated that age, education and residential area were associated with knowledge and practice.

Taking age first, late midlife participants were more likely to have higher knowledge and practice scores than young adult participants. Individuals who were 50-64 years of age were 2.08 times more knowledgeable than those who were 20-34 years of age ($P < 0.001$) while individuals who were 50-64 years old were 1.79 times more practicable than those who were 20-34 years old ($P < 0.01$). It was found that late midlife participants were able to recall personal experiences of witnessing rabies cases, and others had had direct conversations with their parents or had convenient access to public communication. Moreover, some of them were willing not only to participate in the activities, but were also willing to follow the advice of staff regarding preventive practices.

Turning to education, participants who had attained a secondary level of education or higher were more likely to report good knowledge and practice scores than those who had attained a primary education level or lower. Individuals with a tertiary educational background were 3.18 times and those with a secondary educational background were 1.83 times more likely to have good knowledge than those with a primary educational background or lower ($P < 0.001$). Furthermore, individuals who had attained a tertiary education were 2.32 times and those who had attained a secondary education were 1.75 times more likely to have good practice than those who had attained a primary education or lower ($P < 0.001$). One reason for this was that rabies-health courses that included dog-bite prevention and treatment protocols were taught in secondary schools. Another reason could be that more highly educated participants were able to develop a better understanding of rabies and improve their preventive practices more easily when most needed.

With regard to residential areas, communities in which personal encounters with rabies were more common and wired broadcasting was used more intensively had greater knowledge. Individuals who lived in Sob Tia were 2.20 times more likely to have good knowledge than those who lived in Mae Hia ($P < 0.001$). Furthermore, a community that had organized participatory activities more comprehensively had better practice scores. Living in San Klang was 2.07 times and living in Sob Tia was 1.76 times more likely to be associated with good practice as compared to living in Mae Hia ($P < 0.001$).

In terms of knowledge, participants from Sob Tia subdistrict had more firsthand knowledge of rabies cases in their residential area than participants from San Klang and Mae Hia subdistricts. Additionally, the main source of public communication in Sob Tia subdistrict was village wired broadcasting. By contrast, none of the participants from Mae Hia subdistrict had any firsthand experience with or knowledge of rabies. Some housing estates and villages in

San Klang and Mae Hia subdistricts had also stopped using wired broadcasting and had started communicating information via mobile applications. This provided individual community members with the option of either accessing or not accessing the information in accordance with their personal interests. However, this finding of the present study differed from that of a study conducted in rural China, which found that a combined intervention of cell phone short message service and rabies information sessions improved knowledge and protective behavior against rabies in the short term (Wu et al., 2016). It is interesting to note that in Thailand a combination of personal experience and receiving information through wired broadcasting had enabled participants in local communities to acquire basic knowledge regarding rabies in both the short and long terms.

Since raising public awareness is one of the socio-cultural activities recommended in the five pillars of rabies elimination (WHO, 2016), it can be concluded that communication via wired broadcasting appears to be useful in disseminating information about rabies in communities where the disease is not present. By contrast, although the use of social media for health-related communication is popular (de Las Heras-Pedrosa et al., 2020; Jha et al., 2016), this communication tool should not be used as the primary source for rabies information sharing as some people will not actually click on a link if it does not interest them. It will be a challenge and take time to develop a form of social media that can attempt to reach the entire population.

In terms of practice, the local governments of San Klang and Sob Tia subdistricts were able to educate and empower people most thoroughly. Moreover, San Klang was more suitable for the implementation of canine rabies preventive practices across the whole community as it was significantly smaller in area size and total population than other subdistricts (Ministry of Interior, 2018). Since community engagement is another socio-cultural factor identified as critical in the five pillars (WHO, 2016), active participation should be advocated and fostered more comprehensively at all levels. Additionally, the use of collaborative methods to deliver rabies interventions can extend preventive practices among the general population. A mobile vaccination service run by village health volunteers should be administered in parallel to give the service a wider reach. The engagement of private veterinary practitioners in educating animal owners should also be formalized as the convenience of using veterinary services for rabies vaccination has an influence on campaign attendance. This will enable veterinarians to be directly involved in the creation of rabies-free communities (Fooks and Müller, 2012).

There are two limitations in this study that could be addressed in future research. First, the findings of the study are based on reported practice rather than actual practice. However, there could be a difference between the two. Second, children and adolescents were excluded from the study due to exclusion criteria. As a result, the study explored the KAP of adults in the communities. However, the involvement of the next generation might be an effective mechanism for maintaining community awareness of rabies in the long term.

It is hoped that the present study will contribute to the use of appropriate interventions in conjunction with rabies control measures by regulatory bodies. It is also important to highlight that, as well as enabling countries to establish

comprehensive and sustainable protection campaigns against rabies, effective public communication and participation strategies are an essential part of these national programs to combat other current and future disease threats.

CONCLUSION

In summary, most respondents in the rabies-free communities that were studied in Thailand had good knowledge, positive attitude and good practice scores regarding rabies prevention. Three key factors associated with good knowledge and practice were the attainment of secondary or tertiary education, personal experience of rabies related to late midlife, and effective interventions and control measures in residential areas. Public announcements delivered through wired broadcasting networks and participatory activities designed to engage the entire community in the implementation of rabies control will be particularly beneficial in enabling communities to bring the disease under control wherever it may be endemic. It is also recommended that further studies should apply these findings to the prevention and control of other communicable diseases. It may be possible to develop a general model for disease prevention and control programs that could be effective in combating other communicable diseases as well as rabies.

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AUTHORS' CONTRIBUTIONS

Kritkarnda Kiratitana-olan; Methodology, Investigation, Writing-original draft, Writing-review & editing.
Warangkhana Chaisowwong; Conceptualization, Methodology, Writing-review & editing.
Kriangkrai Thongkorn; Conceptualization, Methodology, Investigation.
Khwanchai Kreausukon; Conceptualization, Methodology, Writing-review & editing

CONFLICT OF INTEREST

The authors declare that they hold no conflicts of interest

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