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A perception of COVID-19 and self-protection behavior of Thai people in rural communities

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Abstract

This research was aimed to (1) study the perception of COVID-19 of Thai people in rural communities; (2) compare their perception among sexes and age groups using Q-methodology; and (3) to study their self-protection behaviors and the relationships of their COVID-19 perceptions and self-protection behaviors. The study process comprised (1) three focus group interviews, and (2) the data collection from 64 samples with balanced numbers of sexes and age groups. Three sets of research instruments were used (1) open-ended questions for focus group interview; (2) COVID-19 Perception questionnaire; a Q-sort questions developed by researchers, based on Health Belief Model and the information obtained from focus group interviews; and (3) Self-Protection Behavior questionnaire, a three-level rating scale. The results revealed that COVID-19 perception on five domains of Health Belief Model which obtained highest score were relevant with family e.g., on Perceived severity domain, "If I get COVID-19 my family will be in trouble."; Perceived benefits, "I will do everything for the safety of my family members." It was found that Thai people in rural communities have self-protection behaviors much appropriate in general. Women had higher Self-protection behavior scores than men and people in age-group > 60 had highest Self-protection behavior scores. Negative relationships were found between Perceived barriers and Self-protection behaviors in general and two other domains. A conclusion that Thai people in rural communities gave priority to family can be used as the key message on health campaign against COVID-19 and other emerging diseases in the future.

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Introduction

Thailand faced several waves of COVID-19 pandemic, since January 2020 until now, as other countries had around the globe. The government had declared completely and partially emergency lockdowns and introduced measures such as masks wearing, hand washing, social distancing etc. to control the spread of disease. The effects of the lockdowns and preventive measures had caused troubles, physically, emotionally, and economically to individuals and societies. Persons in lockdown had to cope with their own fears, insecurity of losing jobs and incomes and the outcome of being isolated (Bussing et al., 2020; Yongthassaneekul & Thammboosadee, 2022). The increases of unemployment rate effected not only individuals but also societies and the world (Markeviciute et al., 2022).

Thailand was ranked among the best countries which made the most progress in curtailing the spread of the COVID-9 pandemic by the GCI-Global COVID-19 Index (PEMANDU Associates, 2023). Adherence to health information instructions and self-protection behaviors of individuals and societies, called "public obedience" (Galassoa et al., 2020), were the key to success. Some studies conducted in Thailand revealed the similar results that the key to success in fighting against the pandemic at community level were the active participation of community and District Level Committees (Ketdao et al., 2021; Panyathorn et al., 2021). The literature review found that Thai people have maintained self-protection behaviors e.g., wearing mask, washing hands, and keeping social distance etc. at high level since the beginning of the outbreak. The percentage of Thai people wearing masks when going out was 98.7 in 2020 (Singweratham et al., 2020) and still high at 99.80 percent in 2021 (Khumsaen, 2021).

The studies in other countries showed different results. Kramer (2020) reported that 85 percent of the American adults were wearing masks regularly when going out (the survey was conducted in June 2020), which increased from 65 percent (when conducted in August 2020). Betscha et al. (2020) found that, in Germany, the mandatory mask wearing policy appeared to be an effective, fair, and socially responsible solution to control the COVID-19 transmission while the voluntary policy was less effective and judged as less fair, especially by risk groups. Galassoa et al. (2020) revealed the results of studies conducted in eight countries i.e., Australia, Austria, France, Germany, Italy, New Zealand, the United Kingdom and the United States with 21,647 samples, that women were more likely to perceive COVID-19 as a very serious health problem and compliant with restraining measures than men.

The Health Belief Model explains and predicts individual changes in health behaviors when experiencing a personal threat or risk, but only if the benefits of taking action outweigh the barriers. Therefore, it was interesting to study how Thai people especially in rural communities had perceptions on COVID-19 and whether their perceptions related to their self-protection behaviors. Q methodology was used as an approach to gain the viewpoint of participants. As Lein, Ruyle & Lopez-Hoffman (2018) had suggested, Q methodology was unique because it allowed identification of a range of viewpoints on a single issue through the use of an easy-to -implement technique, and it provided both quantitative and qualitative data on individual and group viewpoints.

Suphanburi Province was selected as the study site due to its location which is not very far from Bangkok enabling the people to commute to work in Bangkok and other surrounding provinces, nevertheless they still preserve their rural community way of lives.

The Purposes of This Research

1. Study the perception of COVID-19 of Thai people in rural communities using Q-methodology
2. Compare their perception among sexes and age groups using Q-methodology
3. Study their self-protection behaviors and the relationship of their COVID-19 perceptions and self-protection behaviors.

Methodology

This is a mixed-methods descriptive research design. The study process comprised two major steps as follows:

1. The focus group interviews to gather information on research questions for Q-sort development

Three focus group interviews of six to seven persons in each group were conducted during 23–26 September 2021 with (1) health personnel from a Community Hospital and a District Health Office; (2) Village Health Volunteers, sub-district officials and village headmen who were the disease control officers at local level according to the Disease Control Act; (3) ordinary people. Altogether there were 20 participants in this step.

2. The data collection on COVID-19 perception and self-protection behaviors

The sample size was estimated at 60 persons for Q-sort study as recommended by Brown (1980, p. 269 as cited in Lee, 2017, p. 69). Finally, 64 participants with balanced numbers of sexes and age groups 20–40, 41–60, >60 years, in two randomly selected rural districts i.e., Bang-Plama and Song-Pinong were selected during January-February 2022.

In this study the rural communities were defined as communities situated out of the municipal area of each district, where there was low density of population. The inclusion criteria were that participants were permanent residents of the village, aged 20 years or over, could read and write and willing to participate in this study. Hence each participant was carefully selected according to the criteria. Data collection was done in their villages, after researchers explained about the purposes of the study and how they were expected to cooperate. They were asked to show an ID card after giving informed consent.

Research Instruments

Three sets of research instruments were used i.e.,

1. Open-ended questions for focus group interview: The questions asked participants in groups (1) and (2) involved the pandemic situation in Suphanburi province and how they managed on giving health education, prevention of COVID-19, case detection, home quarantine/community quarantine, referring cases to the hospital and so on while the questions asked ordinary people in Group (3) were about how they got involved in the pandemic situation and what were their perception of COVID-19 based on five domains of the Health Belief Model and Self-protection behaviors.

2. COVID-19 Perception questionnaire; a Q-sort questions developed by researchers, based on Health Belief Model and the information obtained from focus group interview having CVI = 0.80.

3. Self-Protection Behavior questionnaire, a three-level rating scale having CVI = 0.90 and Cronbach's alpha coefficient = .78. The criteria to interpret the results were that scores = 1 means inappropriate behaviors; 1.01–1.50 means less appropriate; 1.52–2.00 means moderately appropriate; 2.01–2.50 means much appropriate and 2.51–3.00 means very much appropriate self-protection behaviors respectively.

The research proposal and instruments were approved by the Institutional Review Board of Kasem Bundit University on 11 June 2021, Document No. R007/64P.

Results

There were 64 participants in this study, aged 20–84 years, average 50 years old. Fifty three percent were female and forty seven percent were male. Forty eight and fifty one percent were from Bang-Plama and Song-Pinong District respectively. The results of the study will be presented in three parts as follows: the perception of COVID-19 according to the Health Belief Model of Thai people in rural communities using Q-methodology, the comparison of their perception among sexes and age groups using Q-methodology, and self-protection behaviors and the relationship of their COVID-19 perceptions and self-protection behaviors.

The Perception of COVID-19 of Thai People in Rural Communities Using Q-methodology

We studied the perception of COVID-19 of Thai people in rural communities, based on five domains of the Health Belief Model i.e., perceived susceptibility, perceived severity, perceived benefits, perceived barriers and cues to action domains. Due to a limitation of space, we have shown only the items with the three highest scores on each domain in Table 1.

In summary, the results revealed that COVID-19 perception on five domains of Health Belief Model which obtained the highest score by Q sort technique were as follows:

- Perceived susceptibility, "We never know who has COVID-19."
- Perceived severity, "If I get COVID-19 my family will be in trouble."
- Perceived benefits of self-prevention, "I will do everything for the safety of my family members. Be safest for my family."
- Perceived barriers, "Some careless activities such as cockfighting, drinking alcohol, hanging out with friends etc. make the virus spread."
- Cues to action, "I have pity for doctors and nurses who work so hard."

Table 1 The perception of COVID-19 of Thai people in rural communities based on five domains of the Health Belief Model

Domains/Items	Mean	*SD*
Perceived susceptibility domain		
We never know who has COVID-19.	3.95	1.24
We must go out of home to earn a living.	3.61	0.97
Some of our family members have to go out for work every day.	3.09	0.83
Perceived severity domain		
If I get COVID-19, my family will be in trouble.	3.70	0.99
I am afraid the virus will infect my lungs, then I die.	3.52	0.76
The virus can mutate and becomes more severe.	3.22	0.93
Perceived benefit domain		
I will do everything for the safety of my family members. Be safest for my family.	4.09	1.20
If I get COVID-19, other persons will be affected.	3.09	1.27
If we adhere to the measure recommended, we will be able to earn a living.	3.03	0.82
Perceived barriers domain		
Some careless activities such as cockfighting, drinking alcohol, hanging out with friends etc. make the virus spread.	4.27	1.12
I can't breathe freely when I do exercise while wearing a mask.	3.08	0.74
Wearing a mask makes me feel uncomfortable. I can't breathe freely.	3.02	1.29
Cues to action domain		
I have pity for doctors and nurses who work so hard.	3.53	0.87
The village headman and health volunteers keep coming to inform us about the measures.	3.42	0.87
The government asked for our cooperation to get vaccines, so we did.	3.34	1.10

The Comparison of Their Perception among Sexes and Age Groups using Q-methodology

The comparison between male and female on their perception of COVID-19 in Table 2 showed almost the same responses of the two highest score items of each domain except the cues to action domain. Surprisingly, the comparison of their perception among age groups of 20–40, 41–60 and over 60 years revealed the same answers in each domain except the cues to action domain for which the 20–40 age group chose "I adhere to the measures because I don't want to be in quarantine or isolated and can't go to work" as the first rank while the 41–60 and over 60 age groups chose the item "I have pity for doctors and nurses who work so hard." as the first rank.

Table 2 The comparison of people's perception of COVID-19 between male and female (only the two highest score items were presented)

Domains/Items	Male ($n = 30$)		Domains/Items	Female ($n = 34$)	
	Mean	*SD*		Mean	*SD*
Perceived susceptibility			Perceived susceptibility		
We must go out of home to earn a living.	3.77	0.90	We never know who has COVID-19.	4.21	1.25
We never know who has COVID-19.	3.67	1.18	We must go out of home to earn a living.	3.47	1.02
Perceived severity			Perceived severity		
I am afraid the virus will infect my lungs, then I die.	3.70	0.70	If I get COVID-19, my family will be in trouble.	3.71	1.00
If I get COVID-19, my family will be in trouble.	3.70	0.99	I am afraid the virus will infect my lungs, then I die.	3.35	0.77
Perceived benefits			Perceived benefits		
I will do everything for the safety of my family members. Be safest for my family.	4.37	0.85	I will do everything for the safety of my family members. Be safest for my family.	3.85	1.42
If I get COVID-19, other persons will be affected.	3.23	1.10	Everyone, rich or poor, is affected, but if we are strict with the measure, we will pass this situation.	3.12	1.17
Perceived barriers			Perceived barriers		
Some careless activities such as cockfighting, drinking alcohol, hanging out with friends etc. make the virus spread.	4.17	1.21	Some careless activities such as cockfighting, drinking alcohol, hanging out with friends etc. make the virus spread.	4.35	1.04
Wearing a mask makes me feel uncomfortable. I can't breathe freely.	3.27	1.11	I think I am not going to get it because I am not close with anyone.	3.21	1.41
Cues to action			Cues to action		
I have pity for doctors and nurses who work so hard.	3.70	0.92	The village headman and health volunteers keep coming to inform us about the measures.	3.65	0.77
The government asked for our cooperation to get vaccines, so we did.	3.43	1.10	I adhere to the measures because I don't want to be in quarantine or isolated and can't go to work.	3.44	1.60

Self-protection Behaviors and the Relationship of Their COVID-19 Perceptions and Self-Protection Behaviors

It was found that Thai people in rural communities have self-protection behaviors much appropriate in general as shown in Table 3, with the highest score on Adherence to health information instructions domain. The item with highest score was "Always wearing masks when going out" and the lowest score was "Separating dishes, spoons and personal items", which were under Personal hygiene domain. Among all participants, females had higher Self-protection behavior scores than males, and people in age-group > 60 had the highest Self-protection behavior scores as shown in Table 4. The analysis showed that sex and age-group had significant effects on self-protection behavior scores. A two-way ANOVA revealed that there was not a statistically significant interaction between the effects of sex and age-group (F (2, 58) = 2.89, p = .06).

It was not possible to use the perception of COVID-19 mean scores in calculation because the mean score of each participant would be equal due to the symmetrical pattern of Q sorts. In order to investigate the relationships between their COVID-19 perceptions and self-protection behaviors, we used the scores of participants who chose the three highest score items to run the Pearson's Product-Moment Correlation. It was found that there were statistically significant negative relationships between Perceived barriers domain and Self-protection behaviors in general and on Adherence to health information instructions and Stress management domains with p-value .002, .029, and .019 respectively.

Discussion

The Perception of COVID-19 of Thai People in Rural Communities and Comparison of Their Perception among Sexes and Age Groups using Q-methodology

Regarding Perceived susceptibility domain, for the three highest score items, either in general or in sex or age-group, participants considered that it was a risk to get COVID-19 because "We never know who has COVID-19.", "We must go out of home to earn a living", and "Some of our family members have to go out for work every day.". In terms of Perceived severity domain, they all agreed in general and in groups that "If I get COVID-19 my family will be in trouble", which was in line with their perceived benefits of self-prevention domain that they chose the items, "I will do everything for the safety of my family members. Be safest for my family." and "If we adhere to the measure recommended, we will be able to earn a living."

Table 3 The self-protection behavior scores of Thai people in rural communities

Domain	Mean	*SD*	Meaning
1. Personal hygiene	2.48	0.33	Much appropriate
2. Life activities and social distancing	2.43	0.43	Much appropriate
3. Food, herbs and exercise	2.36	0.44	Much appropriate
4. Adherence to health information instructions	2.76	0.35	Very much appropriate
5. Stress management	2.25	0.39	Much appropriate
Overall	2.45	0.26	Much appropriate

Table 4 The comparation of the self-protection behavior scores of Thai people in rural communities according to sex and age-group using two-way ANOVA

Variables/groups		n	Self-protection behavior scores		
			Mean		*SD*
Sex	Male	30	2.37		0.28
	Female	34	2.53		0.23
Age-group	20–40	25	2.37		0.25
	41–60	19	2.43		0.28
	> 60	20	2.58		0.23
Source of variation	SS	*df*	MS	*F*	*p*-value
Sex	0.32	1	0.32	5.76*	.02
Age group	0.54	2	0.27	4.83*	.01
Interaction	0.32	2	0.16	2.89	.06
Within	3.23	58	0.06		
Corrected total	4.40	63			

Note: *α = .05

These results implied that people in rural communities gave most importance to the family. Family safety takes priority over other matters, and to be able to earn a living was the second priority.

As for Perceived barriers domain, participants in general and in groups considered that some careless activities such as cockfighting, drinking alcohol, hanging out with friends etc. made the virus spread. People in rural communities conformed to social measures or regulations (Laosupap et al., 2021), then they viewed persons who did not follow the measures as those who caused the spreading of COVID-19.

For the last domain on Cue to action, the three highest score items were "I have pity for doctors and nurses who work so hard.", "The village headman and health volunteers keep coming to inform us about the measures." and "The government asked for our cooperation to get vaccines, so we did.". Those three items were agreeable among all participants and between male and female groups except that the age-group 20–40 years gave priority to item "I adhere to the measures because I don't want to be in quarantine or isolated and can't go to work.", while the age-group > 60 years chose the item "My children and grandchildren keep reminding me." as the third highest score.

Those results could be explained that people in rural communities gave recognition to the village headmen and health volunteers who keep reminding them, which is accordance with the study by Prommunee and Boonpunth (2022, p. 12) who found that personal-contact public relation media e.g., health personnel, village headmen, health volunteers, religion leaders etc. were more affecting and had positive relationship with people's participation behavior in preventing the Corona Virus 2019 pandemic than non-personal-contact public relation media e.g., village wire broadcasting, websites, Facebook, Line groups etc. Besides that, the sympathetic feelings that people acknowledged that doctors, nurses, and other health personnel had worked so hard during COVID-19 pandemic made them receptive to health instructions and respect health personnel. It was a kind of respect and trust that Dr.Ampol Jindawattana called "social credit", and it is considered as one of the strongest points of the Thai health system which enabled Thailand to fight the COVID-19 crisis (Jindawattana, 2021, p. 16).

The qualitative part of study by focused group interviews revealed more details of the work of village headmen, sub-district administrative committee, health volunteers, and health personnel at sub-district and district levels who tried to apply modern technology in the prevention and control of COVID-19. They had very good teamwork in rapid investigation, establishing state/home quarantine, referring patients for proper treatment, creating and updating database of high risk and infected persons so that all involved parties could access up to date information, and that the messages conveyed to the people through personal-contacts or social media were reliable. These can partly explain why people in rural communities respect and trust their village headmen, health volunteers and health personnel.

Self-protection Behaviors of Thai People in Rural Communities

Self-protection behaviors towards COVID-19 of Thai people in rural communities in general was moderately appropriate, by which the highest score domain was Adherence to health information instructions, and the lowest was Stress management domain. The item that got the highest score was "Always wearing a mask when going out", which was interpreted as very much appropriate self-protection behavior while the item with lowest score was "Separating dishes, spoons and personal items", but it was still interpreted as moderately appropriate. These results were accordance with Singweratham et al. (2020, p. 110), who found that COVID-19 prevention behavior that participants practiced most was wearing a mask when going out, which accounted for 98.7 percent. This was also supported by Khumsaen (2021, p. 43), who found that 99.80 percent of participants from U-Thong district, Suphanburi were wearing mask when going out, and by Zhong et al. (2020, p. 174) who reported that 98 percent of Chinese participants were wearing mask when going out. Hence, wearing masks was an effective practice in prevention of getting or transmitting COVID-19, and it was one of the measures on which the government and health personnel campaigned and asked people continually for cooperation (Dissara & Junwin, 2021; Tuicharoen et al., 2020).

When we compared self-protection behaviors between men and women, it was found that female participants had self-protection behaviors better than male. Then, the researchers did further analysis, and it was revealed that women had done better than men on stress management by prayers, chanting mantra or seeking advice from relatives or releasing stress with family members. This finding was in accordance with Reawreab (2021), who studied in a urban community in Thailand, Shahnazi et al. (2020), who studied in Iran, and with Galasso et al. (2020), who conducted their research in eight countries, which are members of the Organization

for Economic Cooperation and Development (OECD), namely, Australia, Austria, France, Germany, Italy, New Zealand, United Kingdom and the United States and found that women perceived that COVID-19 was a dangerous health problem. Therefore, they agreed with and followed the policy to stay at home and protect themselves by wearing a mask, washing hands, not hugging one another and keeping social distance better than men.

The comparison of self-protection behaviors among different age-groups found that there were differences between age-group 20–40 years and > 60 years, where the former had highest scores and the latter had lowest scores. Their self-protection behaviors were distinctively different in terms of "separating dishes, spoons and personal items", "using medicinal herbs e.g. gingers, finger root etc." and "stress management by prayers, chanting mantra". These results could be explained that people in age-group 20–40 may have a hectic life and still be healthy, so they might not pay much attention to those matters. These results were different from the study by Jamjumrus (2021), who found no significant relationship between age and health promotion behaviors towards COVID-19. In this study, we further analyzed data in details, then we could find the differences in some certain matters.

The investigation of the relationship between the perception of COVID-19 in all and each of five domains and self-protection behaviors by Pearson's Product Moment Correlation found negative statistically significant relationships between the Perceived barrier domain and self-protection behaviors overall, on Adherence to health information instructions, and on Stress management. These results were in accordance with the Health Belief Model, which explained that when persons perceived that there were obstacles to follow the health instructions, then their overall self-protection abilities would be decreased, and they might not be able to manage their stress e.g. there was advice for people to get vaccines, but such persons might not be able to go or might be afraid that they would be allergic to the vaccines. At the same time, they were afraid of having severe symptoms or even dying when they got infected.

The qualitative data got from focused group interviews show that some participants reported that "…I haven't got vaccinated yet because I am not sure about ... (a kind of vaccine)…, I would rather wait for a better one, at the same time I am worried that when I am sick, there may not be an available bed at the hospital...". These results were in accordance with Santiparp (2022, p. 174), who found that knowledge and Perceived susceptibility to get infected, be admitted to hospital and die had positive effects on self-prevention behaviors, but the stress had a negative effect on self-prevention behaviors.

Conclusions and Applications

1. The COVID-19 perceptions obtained by Q-methodology revealed that Thai people in rural communities gave most importance to family, which can be used as the key message on health campaign against COVID-19 and other emerging diseases in the future.

2. It would be more effective to provide health instructions with focused message relevant to target population e.g., for persons in age-group 20–40 years, such would concern earning a living while >60 years old persons may need children and grand-children to keep reminding and warning them.

3. Health information communication given through person-contact media would be more effective than nonperson-contact media.

4. Community participation should be encouraged and promoted in every step of handling disease outbreaks and emerging diseases.

5. It is needed to strengthen self-protection abilities especially among men and persons in age-group 20–40 on stress management.

Conflict of Interest

The authors declare that there is no conflict of interest.

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References

Betscha, C., Korna, L., Sprengholza, P., Felgendreffa, L., Eitzea, S., Schmida, P., & Böhmc, R. (2020). Social and behavioral consequences of mask policies during the COVID-19 pandemic. *Journal of the National Academy of Sciences (NAS)*, *117*(36), 21851–21853. https://www.pnas.org/cgi/doi/10.1073/pnas.2011674117

Büssing, A., Recchia, D. R., Hein, R., & Dienberg, T. (2020). Perceived changes of specific attitudes, perceptions and behaviors during the Corona pandemic and their relation to wellbeing. *Health and Quality of Life Outcomes*, *18*, 374. https://doi.org/10.1186/s12955-020-01623-6

Dissara, W., & Junwin, B. (2021). Nurses with prevention management and controlling the COVID-19 outbreak in the community. *Journal of MCU Nakhondhat*, *8*(12), 89–104. https://so03.tci-thaijo.org/index.php/JMND/article/view/257648 [in Thai]

Galasso, V., Pons, V., Profeta, P., Becher, M., Brouard, S. & Faucault, M. (2020). Gender differences in COVID-19 attitudes and behavior: Panel evidence from eight countries. *Proceedings of the National Academy of Sciences (PNAS)*, *117*(44), 27285–27291. https://doi.org/10.1073/pnas.2012520117

Jamjumrus, C. (2021). Health promoting behavior of COVID-19 prevention among village health volunteers at Uthai Thani Province, Thailand. *Regional Health Promotion Center 9 Journal*, *15*(38), 645–658. [in Thai]

Jindawattana, A. (2021). *The strength of Thailand's health system (E-book in Thai)*. National Health Commission Office. https://www.sem100library.in.th/medias/15779.pdf

Ketdao, R., Thiengtrongdee, A., & Thoin, P. (2021). Development of COVID-19 surveillance prevention and control model at health promoting hospital in Sub-district level, Udonthani Province-Udon Model COVID-19. *Journal of Health Science*, *30*(1), 53–61. [in Thai]

Khumsaen, N. (2021). Knowledge, attitudes, and preventive behaviors of COVID-19 among people living in Amphoe U-Thong, Suphanburi Province. *Journal of Prachomklao College of Nursing, Phetchaburi Province*, *4*(1), 31–48. [in Thai]

Kramer, S. (August 27, 2020). *More American say they are regularly wearing mask in stores and other businesses*. Fact Tank. Pew Research Center. https://www.pewresearch.org/fact-tank/2020/08/27/more-americans-say-they-are-regularly-wearing-masks-in-stores-and-other-businesses/

Laosupap, K., Limpiteeprakan, P., & Tubtimhin, S. (2021). Development of social measures for prevention and reduction the effects of alcohol consumption in Nonno Sub-district, Warinchamrab District. *Journal pf Medicine and Public Health*, Ubon Ratchathani University, *4*(1), 57–66. [in Thai]

Lee, B. S. (2017). The fundamentals of Q Methodology. *Journal of Research Methodology*, *2*(2), 57–95. https://doi.org/10.21487/jrm.2017.11.2.2.57

Lein, A. M., Ruyle, G. & Lopez-Hoffman L. (2018). Q Methodology: A method for understanding complex viewpoints in communities served by extension. *Journal of Extension*, *56*(2), 18.

Markeviciute, J., Bernataviciciene, J., Levuliene, R., Medvedev, V., Treigys, P., & Venskus, J. (2022). Impact of COVID-19-Related lockdown measure on economic and social outcomes in Lithuania. *Mathematics*, *10*(15), 2734. https://doi.org/10.3390/math/10152734

Panyathorn, K., Sapsirisopa, K., Tanglakmankhong, K., & Krongyuth, W. (2021). Community participation in COVID-19 prevention at Nongsawan Village, Chiangpin Sub-district, Mueang District, Udonthani Province. *Journal of Phrapokklao Nursing College*, *32*(1), 189–204. [in Thai]

PEMANDU Associates. (2023). *GCI dashboard*. https://covid19.pemandu.org/

Prommunee, K., & Boonpunth, K.C. (2022). People's participation behavior in preventing the Corona Virus 2019 pandemic: A case study of Yaha Sub-district, Yaha District, Yala Province [Minor thesis]. Prince of Songkla University. [in Thai]

Reawreab, N, (2021). Knowledge, attitude, and COVID-19 preventive behaviors among Thai people in Pakor Subdistrict, Muang District, Phang Nga Province. *Institute for Urban Disease Control and Prevention Journal*, *6*(2), 31–51. [in Thai]

Santiparp, P. (2022). Factors influencing protection COVID-19 to people in the community, Wandmoung District, Saraburi Province. *Santapol College Academic Journal*, *8*(1), 169–178. [in Thai]

Shahnazi, H., Ahmadi-Livani, M., Pahlavanzadeh, B., Rajabi, A., Hamrah, M. S., & Charkazi, A. (2020). Assessing preventive health behaviors from COVID-19: A cross sectional study with health belief model in Golestan Province, Northern of Iran. *Infectious Diseases of Poverty*, *9*, 157. https://doi.org/10.1186/s40249-020-00776-2

Singweratham, N., Thaopan, W. W., Nawsuwan, K., Pohboon, C., & Surirak, S. (2020). Perception and preventive behaviors on the coronavirus disease-2019 (COVID-19) among dental nurses under the Ministry of Public Health. *Journal of Bamrasnaradura Infectious Diseases Institute*, *14*(2), 104–115. https://he01.tci-thaijo.org/index.php/bamrasjournal/article/view/241731 [in Thai]

Tuicharoen, J., Wongprakhob, N., Munsraket, K. & Nimkratoke, T. (2020). Management of the COVID-19 in primary care setting. *Journal of Health Science Boromarajonani College of Nursing Sunprasitthiprosong*, *4*(3), 1–20. [in Thai]

Yongthassaneekul, T., & Thammboosadee, S. (2022). Emotion and worry measurement comparison of United Kingdom and Thailand during the first COVID-19 lockdown situation. *Science Technology and Innovation*, *3*(4), 12–24. [in Thai]

Zhong, B. L., Luo, W, Hai-Mei Li, H. M., Zhang, Q. Q., Liu, X. G., Li, W. T., & Li, Y. (2020). Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: A quick online cross-sectional survey. *International Journal of Biological Sciences*, *16*(10), 1745–1752. https://doi.org/10.7150/ijbs.45221