ORIGINAL ARTICLE

Health literacy, anxiety and stress among people during Coronavirus-2019 pandemic at the northern of Thailand

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Received: 8 June 2022 **Revised:** 24 July 2022 **Accepted:** 25 July 2022 **Available online:** September 2022
DOI: 10.55131/jphd/2022/200318

ABSTRACT

COVID-19 outbreaks have caused anxiety and stress for the world and Thailand. Low health literacy can cause higher mortality rates. This study investigated stress levels, anxiety, health literacy and predictive factors, creating an equation to predict stress in the upper northern region of Thailand. The sample was 400 people aged over 18 years in Phayao Province, Northern Thailand, selected by multi-stage cluster sampling. The instruments were interview guidelines. Data were collected on 1-30 January 2021 and analyzed with descriptive analysis and univariate analysis by using chi-square test, Phi, Cramer's V, Spearman's Rank Correlation and multiple logistic regression for the multivariate analysis.

According to the findings, the study participants (52.2%) had high stress. The univariate analysis showed the independent variables correlated with stress with statistical significance to be gender (p-value < 0.01), occupation (p-value < 0.01), income (p-value < 0.001), number of vulnerable family members (r = 0.170), health literacy (r = -.275), economic anxiety (p-value < 0.05), anxiety about illness (p-value < 0.05) and anxiety about social activity (p-value < 0.01). From multiple logistic regression analysis, negative predictive factors were male gender (OR = 0.543, 95% CI = 0.340-0.868), number of family members (OR = 0.870, 95% CI = 0.758-1.00) and Covid-19 health literacy (OR = 0.941, 95% CI = 0.913-0.969). Positive predictive factors consisted of the sample with occupations as farmers (OR = 2.068, 95% CI = 1.259-3.395), number of vulnerable family members (OR = 1.546, 95% CI = 1.039-2.303) and economic anxiety (OR = 1.156, 95% CI = 1.005-1.330).

Constant (2.015) = OC (0.726) + VUL (0.436) + AECON (0.145) - CVHL (0.061) – FAM (0.139) – SEX (0.611)

The findings can be used to promote care for families with vulnerable family members by considering socioeconomic factors with activities to promote COVID-19 health literacy and policy-setting on healthcare development.

Key words:
stress; anxiety; covid-19 pandemic; health literacy.

Citation:
Taweewun Srisookkum, Somkid Juwa, Orathai Katkhaw, Tienthong Takaew, Saengduean Phromkaewngam, Naphat Prapasuchat. Health literacy, anxiety and stress among people during Coronavirus-2019 pandemic at the northern of Thailand. J Public Hlth Dev. 2022;20(3):221-235 (https://doi.org/10.55131/jphd/2022/200318)

INTRODUCTION

During the COVID-19 pandemic, the number of infected patients has risen to over 384 million people worldwide. After two years, the number of deaths is almost 5.7 million deaths or a mortality rate of 1.6% with 80% of all infected patients being cured. In Thailand, COVID-19 entered a new wave or the 4th wave since 29 December 2021 led by the omicron variant of COVID-19. Outbreaks in Thailand are divided into the first wave, the second wave, the third wave and the fourth wave. At the time of the study, thirteen days after the lockdown on January 23, 2020, the outbreak is entering its rapid growth period, assessment of subsequent community measures in the early weeks of the outbreak focused on depressive symptoms and anxiety, which are most commonly observed mental health outcomes during natural adversities, the Perceived Stress Scale (PSS-10) by Cohen and additional queries that assessed the current worry and change of behaviours due to this pandemic. Significantly higher scores were observed among women, youth, students, and among those who expressed concern and those who perceived increased susceptibility to COVID-19. In contrast, no significant differences were observed between the health professionals and the general population. A weak correlation was observed between mean relative volume (RSV) of the last 28 days and the number of cases reported (rho = 0.31, p <0.001) and deaths (rho = 0.28, p <0.001)[1,2,3,4]

Stress is a physical and psychological response that results from internal or external stimuli. It is associated with changes in body systems that affect a person's mental health and behavior, such as palpitations, sweating, dry mouth, and shortness of breath. During the COVID-19 pandemic, it is inevitable that a person will be exposed to stress, which is a normal response to the situation of the COVID-19 crisis and can affect different people, who are at risk of mental health problems. The symptoms of anxiety and stress related to the COVID-19 outbreak and the relative risk factors were involving participant characteristics and sociodemographic characteristics. [3,4]

During COVID-19 outbreaks, health literacy played a role as a social vaccine[5] in empowering people at the individual and community levels by creating an understanding of information and using the information to think and appropriately modify behaviors, because health literacy is a personal skill[6,7,8,9]. High health literacy caused mortality rates to be low [10] and helped to reduce hospital admissions[11]. Therefore, if the population has good COVID-19 health literacy, this will lead to skills for making changes to mental health during COVID-19 outbreaks. Thus, it was important to study COVID-19 health literacy in this study.

According to studies conducted internationally and in Thailand on the factors related to stress during COVID-19 outbreaks, many issues were found to have been studied. Firstly, the studied groups were the population[2, 3, 12, 13, 14, 15], health officials[16, 17, 18, 19], students[20, 21, 22, 23, 24], factory workers[25], COVID-19 patients[18], study models[2, 13, 16], instruments and data collection methods. In the past, predictors of stress were age[2, 13, 16], gender[2, 3, 13, 14, 16, 17, 20, 23, 26], education[3, 12], occupation[14, 17, 23, 26, 27], income[3, 12], number of family members[3, 12], anxiety[3, 12, 20, 28, 29, 30], economic anxiety[3, 12], illness anxiety[3, 12] and mental health literacy[3, 12, 24, 31, 32].

There are numerous studies in India attempting to understand the impact of illness on caregivers and the problems faced by the caregivers of persons with Bipolar affective disorder (BPAD), that burden and perceived stress were elevated among the caregivers of people with BPAD during the COVID-19 pandemic[33]. Mental illness is also increasing at an epidemic rate worldwide, which was severe due to fear of COVID-19. The world population has been

impacted not only by anxiety and trauma but also by unfavorable societal dynamics[34]. Among Indian medical students, increased stress and anxiety were observed due to overburdened responsibilities and lack of adequate resources[24]. Psychological distress was significantly more common among health-care workers[28, 31, 32, 34].

The current study differs from previous studies. Almost all previous studies used concepts related to stress. This study used concepts on stress with COVID-19 health literacy and studied additional variables consisting of vulnerable family members with Thailand as a context. According to statistics, since 1 April 2021, and TNN news, as of 25 July 2021, the Centre for COVID-19 Situation Administration report on the COVID-19 outbreak situation found 15,335 newly infected patients divided into 14,694 newly infected patients and 641 patients who were infected in prison with a total of 468,439 patients who were infected (since 1 April 2020). Of this number, 6,904 patients recovered and returned home with a total recovery number of 307,267 patients, 129 patients died, and 26,873 patients recovered. This study aimed to find an answer to determine levels of stress, health literacy and the factors involved with the ability to predict stress among the population during the fourth wave of COVID-19 outbreaks in Thailand. The cross-sectional study aimed to study stress levels, predictors of stress and create an equation for predicting stress among the population of Thailand's upper northern region during COVID-19 outbreaks.

METHODS

Population and the Sample

The population aged 18 years and up in Phayao Province who were aged 20 years and up numbered 381,870 according to the database of Phayao City Hall, government agency[35]. Inclusion criteria in this study were as follows: subjects who are literate, living in villages where the subjects were sampled during outbreaks in Thailand in January-March 2021 and subjects who consented to participate in the study. Exclusion criteria consisted of subjects who provided incomplete responses to instruments as shown below.

$$n = \frac{Np(1-p)z^2_{1-\frac{\alpha}{2}}}{d^2(N-1)+p(1-p)z^2_{1-\frac{\alpha}{2}}}$$

$n = 340$

This sample size was obtained by calculating with the n4studies program formula[36, 37] and specifying proportions (p) from previous studies[38] = 0.67, Error (d) = 0.05, Alpha (α) = 0.05. The sample size in this study was 340 subjects, and added 17.5 % to the estimated sample size to allow for losses, so the sample size of this study was 400 samples. The subjects were sampled in multi-stage sampling. The first step was dividing the province into nine districts consisting of Muang Phayao, Chiang Kham, Jun, Chiang Muan, Dok Kham Tai, Pong, Mae Chai, Phu Kham Yao and Phu Sang. The second step was to perform simple random sampling and acquire five districts consisting of Mai Chai, Phu Kham Yao, Muang Phayao, Dok Kham Tai and Jun. The third step was to perform simple random sampling of sub-districts in each district to obtain one sub-district from each district consisting of Sri Toy in Mae Chai, Dong Chen in Phu Kham Yao, Mae Ka in Muang Phayao, San Khong in Dok Kham Tai and Phra That Khing Kang in Jun. The fourth step was to perform simple random sampling to select four villages, select 20 subjects from each village and collect data within the specified time as shown in Fig.1

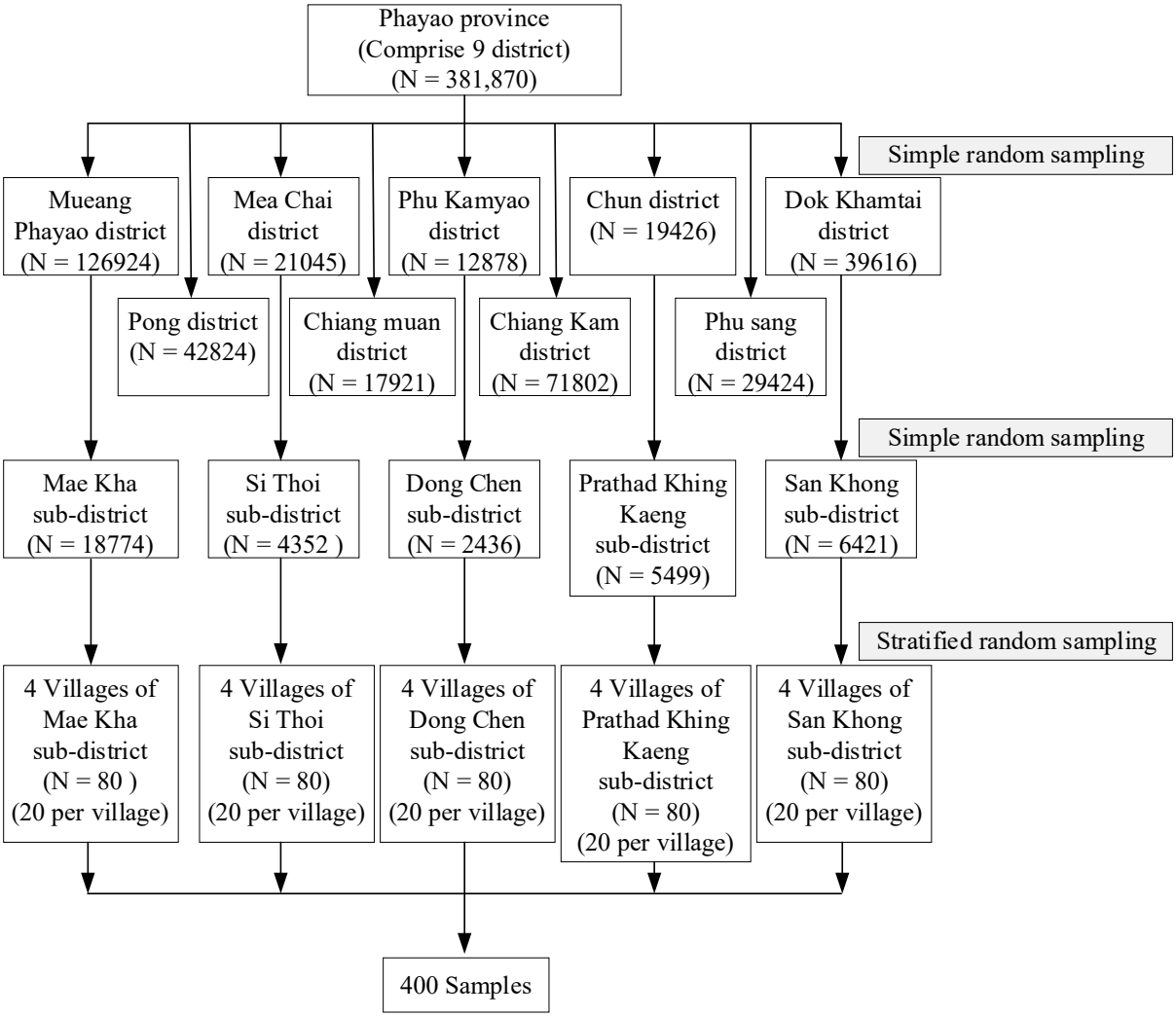

Figure 1: flow chart for study selection

The instrument used in the research was a questionnaire created and developed based on related research and divided into four parts: Part 1 collected data on the key respondents' personal information with 7 items on age, gender, education, occupation, number of household members, income and vulnerable family members; Part 2 collected data on anxiety about Covid-19 outbreaks developed based on related research on the topic of stress during the situation, outbreaks, anxiety about the economy of self and family with 2 items, anxiety about illness with Covid-19 of self and family members with 2 items and anxiety about entering the society of self and family during Covid-19 outbreaks with 2 items. The questions were rated on 5-point rating scales (5 = most; 4 = high; 3 = medium; 2= low and 1 = least); Part 3 collected data on Covid-19 literacy with application from the international study of Duong et al[39]. to develop 12 items for which quality was determined by Cronbach's alpha coefficient = 0.85. The questions were rated on 5-point rating scales (5 = easiest; 4 = easy; 3 = medium; 2 = difficult and 1 = most difficult); Part 4 collected data on stress during Covid-19 outbreaks with 20 items taken from the Suanprung Stress Test-20: SPST-20 containing 20 self-administered questions [40]. The 20 questions were rated on 5-point rating scales in which stress levels were categorized as follows: 5 = highest stress; 4 = high stress; 3 = medium stress; 2= low stress 1 = no stress. For

reliability analysis, Cronbach's alpha coefficient of this test is more than 0.7. The SPST-20 score defines four levels of stress: (i) 0-24: mild, (ii) 25-42: moderate, (iii) 43-62: high, and (iv) over 63: severe stress[40] .

The results on the level of correlation between the nominal variables were interpreted by using the criteria of Cohen by dividing it into three levels: 0.10-0.29 = low; 0.30-0.49 = medium and 0.50-1.00 = high[42]. The levels of correlation for the quantitative variables were interpreted by using Davis Criteria[42].

Data Collection Method

Before data collection, this research was certified by the Institutional Review Board of Phayao University, Certificate No. 1.2/016/63 on 29 December 2020. Next, a meeting was held with 10 research assistants to ask questions about data collection. Data were collected from the sample obtained by random sampling in the area studied. Before collecting data from the sample, the research team requested consent for providing information and conducting interviews according to the questionnaire created, which took 15 minutes per person. The data were then checked for accuracy for subsequent analysis.

The analysis of general information used descriptive statistics, and demographic data such as gender, age, education level, occupation and income are presented using descriptive statistics. For non-normal frequency distribution, correlational analysis for two variables used univariate analysis. Chi-square test, Spearman's rank and level of correlations for the group variables, that were tables Phi (ϕ) and Cramer's V (V) were set by using Davis criteria and multiple logistic regression[43, 44]. Using the criteria the stress level was divided into 2 groups. For example, low stress scores 20-46 points, high stress scores 47-96 points.

RESULT

Most of the sample consisted of females (66.5%) with a maximum age group of 50-59 years (45.7%) and a mean age of 51.34%; standard deviation of 13.71%; a minimum age of 19 years and a maximum age of 92 years. Most had graduated from primary education (49.2%) with 3-5 household members (43.0%) with a mean of 3.93, a standard deviation of 1.63 and a minimum-maximum of 1-11. Income was sufficient with no savings (53.8%) and fragile family members included disabled, dependent elderly, unemployed and abandoned children or youths. Most were disabled at 13.0%, as shown in Table 1.

Table 1: Variables of samples.

Demographic Variables	Frequency (%)
1. Gender	
Male	134(33.5)
Female	266(66.5)
2. Age.....yrs.	
Age. 19-29 yrs.	28(7.0)
Age. 30-49 yrs.	57(14.2)
Age. 50-59 yrs.	183(45.7)
Age. 60 yrs. and up	132(33.1)
Mean Age: 51.34; Standard Deviation 13.71; Min.-Max. Ages 19-92	
3. Education	
No Education	18(4.5)
Primary Education	197(49.2)
Lower Secondary Education	65(16.3)
Upper Secondary Education	83(20.7)
Associate's Degree and Higher	37(9.3)
4. Occupation	
Farmer	173(43.2)
Hired Worker	121(30.2)
Business Owner	14(3.5)
Civil Servant	3(0.8)
Government Agency Employee	8(2.0)
Unemployed	81(20.2)
5. No. of Household Members……people.	
1-2	164(41.0)
3-5	172(43.0)
>=6	64(16.0)
mean 3.93 standard deviation 1.63 Min.-Max. No. of Members 1-11	
7. Income	
Insufficient	122(30.4)
Sufficient with No Savings	215(53.8)
Sufficient with Savings	63(15.8)
6. Vulnerable Family Members	
Disabled	52(13.0)
Dependent Elderly	22(5.5)
Unemployed	41(10.3)
Abandoned Child or Youth	9(2.3)

Most of the sample had high stress levels (52.2%). In the univariate analysis of four independent variables by using the chi-square test consisting of gender, education, occupation, income and the dependent variable (stress), gender, occupation and income were found to be correlated with stress during COVID-19 outbreaks with statistical significance (p-value < 0.01, 0.001 and 0.001). All three correlated variables were correlated with stress at a low level. The aforementioned variables that correlated with stress were gender, occupation and income (V = 0.149, Phi = 0.206 and Phi = 0.206) as shown in Table 2.

Table 2: Stress level, correlations, level of correlations between gender, education, occupation and income with stress during Covid-19 outbreaks.

Variables	Low Stress 20-46 Points	High Stress 47-96 Points	X^2	p-value	ϕ/V	level
Stress Level	191(47.8)	191(52.2)	-	-	-	-
	mean = 46,08; standard deviation 8.30; Min.-Max. 12-60					
Gender						
Male	78(40.8)	56(26.8)	8.835	0.003	0.149	low
Female	113(59.2)	113(73.2)				
Education						
No Education	9(4.7)	9(4.3)				
Primary Education	91(47.6)	106(50.7)	0.382	0.826	0.031	none
Secondary and Higher	91(47.6)	94(45.0)				
Occupation						
Unemployed	32(16.8)	49(23.4)				
Not a Farmer	56(29.3)	90(43.1)	17.005	0.000***	0.206	low
Farmer	103(59.3)	70(33.5)				
Income						
Insufficient	46(24.1)	77(36.8)				
Sufficient with no savings	98(51.3)	109(52.2)	15.848	0.000***	0.206	low
Sufficient with savings	47(24.6)	23(11.0)				

Note p-value < 0.05, ** p-value < 0.01, *** p-value < 0.001*

The univariate analysis using Spearman's Rank Correlation Coefficient of seven independent variables, namely, age, number of family members, number of vulnerable family members, COVID-19 health literacy, economic anxiety, illness and socialization and income, and the dependent variable, namely, stress, found five variables to be correlated with stress with statistical significance. The variables positively correlated with stress at a low level consisted of number of vulnerable family members, economic anxiety, anxiety about COVID-19, illness in the family and anxiety about social activity (r=0.170, r=0.119, r=0.110 and r=0.144). In the meantime, COVID-19 health literacy was negatively correlated with stress with statistical significance (-r = 0.275) as shown in Table 3.

Table 3 Correlations between age, no. of family members, no. of vulnerable family members, Covid-19 health literacy, economic anxiety, illness with Covid-19 in the family, anxiety about social activity, stress during Covid-19 outbreaks and anxiety about social activity

Variable	Spearman's Rank	p-value	Level
Age....years	-0.94	0.600	Not Correlated
No. of Family Members	-0.028	0.579	Not Correlated
No. of Vulnerable Family Members	0.170	0.001**	Low
Health Literacy on Covid-19	-0.275	0.000***	Low
Economic Anxiety	0.119	0.017*	Low
Anxiety about Covid in the Family	0.110	0.027*	Low
Anxiety about Social Activity	0.144	0.004**	Low

Note p-value < 0.05, ** p-value < 0.01, *** p-value < 0.001*

The multivariate analysis with binary logistic regression statistics had a total of 11 independent variables consisting of age, gender, education, occupation, income, number of family members, number of vulnerable family members, COVID-19 health literacy, economic anxiety, anxiety about COVID-19 infection and anxiety about social activity. Six variables were found to be capable of predicting stress among the sample during COVID-19 outbreaks. The order of variables capable of predicting stress with statistical significance and negative predictions is as follows: COVID-19 health literacy (OR= 0.941, 95% CI= 0.913-0.969), gender (OR= 0.543, 95% CI= 0.340-0.868) and number of family members (OR= 0.870, 95% CI= 0.758-1.00). In contrast, variables with positive predictions consisted of subjects with occupations as farmers (OR= 2.068, 95% CI=1.259-3.395), number of vulnerable family members (OR= 1.546, 95% CI= 1.039-2.303) and economic anxiety (OR= 1.156, 95% CI= 1.005-1.330).

Table 4: The multivariable logistic regression model of the Population's Stress during COVID-19 Outbreaks

Variable	B	SE	Wald	OR	95% CI
GENDER (ref=female)	-0.611	0.239	6.502*	0.543	0.340-0.868
AGE	-0.009	0.010	0.902	0.991	0.972-1.010
Education (ED) (ref=secondary and higher)			0.476		
No Education	-0.223	0.571	0.152	0.800	0.262-2.449
Primary Education	0.105	0.263	0.159	1.110	0.664-1.858
Occupation (OC)(ref=farmer)			8.626*		
Not a Farmer	0.726	0.253	8.244**	2.068	1.259-3.395
Unemployed	0.525	0.311	2.844	1.690	0.918-3.111
Income (MON)(ref=Sufficient with savings)			2.803		
Insufficient income	0.559	0.382	2.147	1.749	0.828-3.698
Sufficient Income	0.181	0.338	0.287	1.199	0.618-2.326
No. of Family Members (FAM)	-0.139	0.071	3.861*	0.870	0.758-1.00
No. of Vulnerable Family Members (VUL)	0.436	0.203	4.605**	1.546	1.039-2.303
Covid-19 health literacy (CVHL)	-0.061	0.015	16.308***	0.941	0.913-0.969
Economic Anxiety (AECON)	0.145	0.071	4.125**	1.156	1.005-1.330
Anxiety about Illness from Covid-19 (AILL)	-0.058	0.056	1.081	0.943	0.845-1.053
Anxiety about Social Activity (ASOC)	0.073	0.061	1.434	1.076	0.954-1.214
Constant	2.015				
-2 log likelihood = 488.272	Model Chi-Square = 65.434			R Square=.201	

Note p-value < 0.05, ** p-value < 0.01, *** p-value < 0.001*

According to Table 4, all six independent variables were able to predict stress among the sample at 20.1%. When the six independent variables were used to create an equation for predicting stress, the equation was as follows:

Constant (2.015) = OC (0.726) + VUL (0.436) + AECON (0.145) - CVHL (0.061) – FAM (0.139) – SEX (0.611)

DISCUSSION

During the COVID-19 pandemic, people had high levels of stress. According to the findings, more than half of the sample had high levels of stress. The findings from this study showed stress levels were higher than in a study conducted by Fatemeh et al.[3] among the population of Iran and a study conducted by Pinho et al[16]. among nurses. This may be because the instruments used to take measurements were different. Both of the aforementioned studies used DASS-21 while this study used STP-20, which was developed for the population of Thailand. Furthermore, this instrument was used to ask questions six weeks in retrospect while DASS-21 asked questions only one week in retrospect. Stress began in the third wave of outbreaks in Thailand, causing the findings to show stress in this study as higher than in both of the aforementioned studies. Furthermore, data were collected at different times. The number of patients in the period when the researcher conducted this study was from a period when the number of outbreaks was higher than in the previous year.

In the univariate analysis, two groups were analyzed consisting of: 1) Group Variables – Gender was found to be correlated with stress with statistical significance (p-value < 0.05) at a low level. The findings were concurrent with those from a study conducted by Mautong et al[12]. and similar to a study conducted by Yomchinda et al[25] . who found people of different genders to have different stress levels because the male gender in Thai society has social roles as family leaders. Occupation was correlated with stress. The findings were in agreement with Limcaoco et al[2]. and Nootchanart et al[13]. who stated that occupation was correlated with stress with statistical significance at p-value < 0.001 and 0.05. The findings were also similar to studies conducted by Rehmen et al[27]. and Yomchinda et al[25]. who found people with different occupations to have different stress levels with statistical significance at p-value < 0.01 and < 0.05. The sample's income was correlated with stress with statistical significance. This was consistent with a study conducted in Thailand by Netirojjanakul[17] who found people with insufficient income to be at greater risk of mental health problems than people with sufficient income by 2.13 times (95% CI= 1.14-3.97). Moreover, the findings were comparable to those from a study conducted by Harnlakorm et al[14]. who reported people with different income levels to have different stress levels. The reason causing all three variables in this study to be consistent and similar to the aforementioned studies may be because of similarities in the area of the sample's ages, which were similar to this study.

2) Concerning quantitative variables with non-curved abnormal data distribution, high numbers of vulnerable family members, economic anxiety, illness with COVID-19 in the family and high levels of socialization were found to be positively correlated, meaning the sample had high stress. The fact that a family had disabled persons, dependent elderly family members, unemployed family members during COVID-19 outbreaks and abandoned children or youths created burdens in supporting vulnerable family members. In addition, COVID-19 outbreaks caused economic impacts domestically and in households, causing the sample to have stress. Economic anxiety was correlated with stress. This result was in agreement with a study conducted by Hu et al[20]. who stated that economic insecurity was correlated with stress ($r = 0.215^{***}$). Scores for anxiety related to illness with COVID-19 in the family were correlated with stress which was similar to a study conducted by Mautong et al[12]. Living in a family is associated with stress which may be because COVID-19 outbreak situation along with social quarantine measures has affected the mental health of the general public. This may be because environments

or events had effects on psychological states, preventing the sample from being able to overcome or manage anxiety. In addition, high anxiety scores during socialization were correlated with high stress. This was similar to a study conducted by Hu et al[20]. who reported anxiety to be correlated with stress possibly because anxiety feeling is a state of uneasiness. Anxious and tense when acknowledging or predicting the worst, thus causing stress to be a mental state that responds to the events that one is experiencing. Overthinking or anticipation of potentially negative events in personal lives, causes the sample to have higher anxiety. On the contrary, COVID-19 health literacy scores were negatively correlated, meaning the sample with low COVID-19 health literacy scores had high stress. The findings concurred with Hu et al [20]. who stated that mental health literacy was correlated with stress.

From a multivariate analysis with logistic regression, gender, occupation, number of vulnerable family members, COVID-19 health literacy and economic anxiety were found to be able to predict stress with statistical significance as follows: gender was able to predict stress with the male gender having more stress than the female gender (45.7%). This was because males are family leaders in Thai society. Therefore, during outbreaks and because of economic burdens in the family, males had more stress than females. This was similar to a study conducted by Netirojjanakul[17] who found gender to be able to predict mental health problems with the male gender having more stress than the female gender (AOR=3.30, 95% CI= 1.60-6.82). Occupation was able to predict stress and individuals with non-farmer occupations were found to be 2.068 times more stressed than individuals with farming occupations. This was because individuals with farming occupations were able to support themselves by growing vegetables and animals in the family while individuals in non-farming occupations had to use money to buy food. This was similar to studies conducted by Rehman et al[27]. and Harnlakorn et al[14]. who found people in different occupations to have different levels of stress with statistical significance at p-value < 0.001). Concerning the number of vulnerable family members, families with many types of vulnerable members were 1.546 times more stressed than families with few vulnerable members. This may be because family members needed to take care of other family members. The findings from this study were similar to a study conducted by Fatemeh et al[3]. who found families with family members at risk of COVID-19 infection to be more stressed by 21.7%. In the area of COVID-19 health literacy, the sample with low COVID-19 health literacy scores had more stress than the sample with high COVID-19 health literacy scores. This may be because the sample had little access to information while COVID-19 was severe, causing effects on the thinking process with the sample having stress before behaviors[22]. This was similar to a study conducted by Hu et al[20]. who found the subjects with low health literacy to have high stress (r= -0.208, p-value<0.01). With regard to economic anxiety, the sample with high economic anxiety scores was found to have 1.156 times higher stress scores than the sample with low economic anxiety scores. This may be because the sample had problems with income as evident from analysis data in Table 2. The group with high stress can be seen to have insufficient income at 36.8%, which was higher than the group with low anxiety who had insufficient income at 24.1%. The findings were similar to a study conducted by Hu et al[20]. who found that high economic insecurity has caused the sample to have high stress. In addition, Netirojjanakul [17]

reported income as a factor able to predict mental health problems (AOR=2.43, 95 % CI=1.28-4.62).

On the contrary, number of family members was analyzed in a univariate analysis and found to not be correlated with stress. However, when analyzed in a multivariate analysis with logistic regression, the number of family members was found to be able to co-predict stress, possibly because the sample with lower numbers of family members had more stress than the sample with higher numbers of family members by 27%, possibly because families with a high number of family members had high interdependence in the family. This was consistent with a study conducted by Nootchanart et al[13]. who reported that the number of family members was correlated with stress.

The stress model and the stress prediction equation included six independent variables consisting of male gender, non-farmer occupations, number of vulnerable family members, number of family members, health literacy concerning COVID-19 and anxiety related to the economy. The model and the equation were able to predict stress at 20.1%, which was lower than the findings from studies conducted by Limcaoco[2] and Pinho et al[16]. who found variables in the model to be able to predict stress at 25% and 23.2%.

In conclusion, the findings showed stress among most of the sample to be high during the COVID-19 pandemic with six predictors of stress consisting of socioeconomic factors (male gender, people with no occupations, number of vulnerable family members and number of family members), health literacy about COVID-19 and economic concerns. The agencies involved should use the aforementioned variables to determine policies and measures for improving health literacy concerning COVID-19.

RECOMMENDATIONS

In the area of policies, agencies involved in the fields of health and social welfare should make policies and specify guidelines on healthcare by considering demographic and social variables such as gender, occupation, number of family members, number of vulnerable family members, health literacy on COVID-19 and concerns of local people.

In the area of academic knowledge, the organizations and agencies involved in the area of health should develop guidelines for promoting health literacy concerning COVID-19 for local people.

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