DETERMINING STRESS AND ASSOCIATED FACTORS IN A RURAL COMMUNITY DURING COVID-19 PANDEMIC USING THE COVID STRESS SCALE

Kavinthra Teerakathiti[*], Arin Jaisin[*], Phasittha Pongsapan[*], Nattapas Wanaporn[*], Phakhajee Rattanalertpaiboon[*], Supisa Chantanawanichwong[*], Sopittar Kittipavara[*], Supicha Sroythong[*], Nutchaphon Kanchan[*], Phasit Hongpromyati[*], Yotsakorn Chuaychoo[*], Raweeroj Uengpitugpun[*], Poopan Kiraniponpan[*], Witchakorn Trisukon[**], Mathirut Mungthin[***], Sakarn Charoensakulchai[***]

[*]Department of Military and Community Medicine, Phramongkutklao College of Medicine, Bangkok, Thailand
[**]Department of Psychiatry, Phramongkutklao Hospital and Phramongkutklao College of Medicine, Bangkok, Thailand
[***]Department of Parasitology, Phramongkutklao College of Medicine, Bangkok, Thailand

Abstract

Background: The COVID-19 pandemic has affected people worldwide, both physically and mentally. Stress is one of the burdens being faced, especially in the working class. Therefore, this study aimed to explore and compare associated stress factors during the COVID-19 pandemic lockdown among adults in a rural community in Thailand using the COVID stress scale.

Methods: This cross-sectional study was conducted from December 2021 to March 2022 in Chachoengsao Province. It included adults aged 20 to 60 years old. The questionnaire included demographic data and the Thai COVID stress scale (T-CSS) version. The data were collected using face-to-face interviews. Associated factors of stress were assessed using linear regression.

Results: Data were compared with their counterparts, illiteracy (adjusted β=18.4, 95% CI 5.9-30.1) and agriculturists (adjusted β=13.2, 95% CI 3.1-23.4). At the same time, age 51-60 (adjusted β=-11.1, 95% CI 3.9-27.3) and vaccination with ≥3 doses of COVID-19 vaccine (adjusted β=-8.9, 95% CI -16.4 to -1.5) were associated with decreased stress level.

Discussion: Illiteracy and agriculturists were associated with higher stress scores. COVID-19 vaccination doses might affect stress levels due to the efficacy of preventing infection and severe illness. Older people had less stress due to better experience in stress management. Limitations included that T-CSS cannot determine the cut-off point of stress and nonstress in the population due to multiple factors. However, it might be possible to imply that outlier scores from a normal distribution are likely to be most stressful during the COVD-19 pandemic.

Keywords: Stress, COVID-19, COVID-stress scale, Rural

J Southeast Asian Med Res 2022**:** 6(1):e0133
https://doi.org/10.55374/jseamed.v6i0.133

Correspondence to**:**
Charoensakulchai S, Department of Parasitology, Phramongkutklao College of Medicine, Bangkok 10400, Thailand
Email: karn.skch@gmail.com

Received: 12 July 2022
Revised: 12 September 2022
Accepted: 27 September 2022

Introduction

Currently, the incidence of coronavirus 2019 (COVID-19), which the World Health Organization (WHO) has declared the epidemic of the new coronavirus to be a "pandemic" after the outbreak, has spread to various countries and territories around the world.[1]

In Thailand, the pandemic started in January 2020. As of April 2022, there have been five significant pandemic waves with varying virus strains.[2, 3] Distribution of COVID-19 vaccines was not ready until February 2021 with two major vaccines, CoronaVac and Oxford-Astra Zeneca COVID-19.[4, 5] However, CoronaVac's weak efficacy against the Delta strain shifted the mRNA and viral vector vaccine regimens by October 2021.[5] Therefore, by the beginning of the Omicron outbreak in late 2021 to early 2022, people, especially vulnerable groups, were encouraged to take booster doses due to its effect in preventing severe COVID-19.[6]

The pandemic resulted in problems involving many aspects, including health and the economy. The situation generated impacts including problems in self-isolation at home, follow-up visits to patients with underlying medical conditions and the lack of opportunities for patients with other diseases to receive treatment due to the COVID-19 pandemic.[7-11] Stress might have accumulated from lifestyle changes, altered working patterns, social distancing, lack of daily supplies and consumption supplies, and being informed about the COVID-19 outbreak and lockdowns.[10-13]

These health, economic and social problems affected all groups, families and institutions up to the national level, as well as the mentality of people in the country, especially the working class. Adults in the working class were most likely to be affected by outbreak situations and lockdowns during the COVID-19 pandemic, which can be stressful events.[14]

Previous studies have reported depression and stress in rural areas before the pandemic. [15-17] However, vulnerabilities due to inadequate logistic supplies and infrastructures, poor socioeconomic status, insufficient healthcare coverage and lower support combined with the pandemic situation, might have affected stress among people living in rural areas. Therefore, this study aimed to determine the associated factors of stress during the COVID-19 pandemic among adults in a rural community in Thailand.

Methods

Study design and subjects

A cross-sectional study was carried out to address the associated stress factors during the COVID-19 pandemic among participants residing in Baan Nayao, Chachoengsao, Thailand, from December 2021 to March 2022. Individuals eligible for this study were adults aged 20 to 60 years old and living in Baan Nayao, Chachoengsao, Thailand, during the study. The study focused on working-age people due to the possible impacts of COVID-19 on work and economic status. Participants were excluded if they had difficulties answering the questionnaire, such as people with visual or auditory disabilities and those with psychiatric conditions. Subjects were randomly selected.

This study was approved by the Institutional Review Board of the Royal Thai Army Medical Department. The approval number was M027q/64. Consent was appropriately obtained from all participants.

Baan Nayao is a rural community in Chachoengsao Province in eastern Thailand, located 145 km east of the capital city of Bangkok. The total population is approximately 4200, comprising 1152 households in this area. Of these, 85% are agriculturists. An aging population pyramid represents the population structure.[15]

Questionnaire and data collection

The questionnaire of this quantitative study included two parts, namely, demographic data and the 5-Likert Thai version of the COVID stress scale (T-CSS).[18] The COVID stress scale was translated and modified to Thai. The translators of this questionnaire comprised two linguistic experts. The translation process included translating the questionnaire to Thai by the first translator; the second translator re-translated the Thai questionnaire back to English. The content of

the original English language questionnaire and re-translated English questionnaire were compared. The corrections on discrepancies between the two English versions were made on the Thai questionnaire. Finally, the content of the Thai questionnaire was examined by three psychiatrists from the Department of Psychiatry, Phramongkutklao Hospital.

Demographic data included age, sex, marital status, educational level, tobacco and alcohol use, health issues and comorbidities, living status and COVID-19 vaccine reception. Apart from the original five parts of the COVID stress scale, T-CSS comprised six parts by adding COVID fear of contamination. The six parts included COVID 1) danger, 2) socioeconomic consequences, 3) xenophobia, 4) fear of contamination, 5) traumatic stress, and 6) compulsive checking. Items in each aspect were rated on a 5-point scale ranging from 0 (not at all) to 4 (extremely). Three experts confirmed the validity. Item Objective Congruence (IOC) was more than 0.5. All parts and overall reliability were examined using Cronbach's alpha coefficient, which had values greater than 0.8. Results were then generated to stress scores according to the COVID stress scale.

The questionnaire was carried out using face-to-face interviews, and data were collected on paper and online using Google Forms. Age, sex and marital status were collected from the individual's identity card. In addition, educational level, tobacco and alcohol use, health issues and comorbidities and living status were interviewed. COVID-19 vaccination history was collected via the Moh Prompt application, which stores each person's online vaccination card. Responses from participants were held on Google Sheets.

Operational definition

This study used smoking and alcohol consumption definitions from The Centers for Disease Control and Prevention (CDC) and World Health Organization (WHO). CDC defines smoking as the following: a current smoker can be defined as an adult who has smoked 100 cigarettes in his/her lifetime and who currently smokes cigarettes. A former smoker was an adult who had smoked at least 100 cigarettes in his/her life time but quit smoking at the time of the interview.[19] WHO defined alcohol consumption as the followings: a former drinker is an adult (15+ years) in a given population who did not consume alcohol in the last 12 months but did previously. A current drinker comprises those having consumed a drink containing alcohol in the previous 12 months.[20]

Statistical analysis

STATA 17.0 (Stata Corporation, College Station, TX, USA) was used for statistical analysis. Regression diagnosis found linear relationships between the predictors and the outcome and homogeneity of variance. General characteristics were calculated using descriptive statistics. Associated factors of increased stress score were assessed using linear regression with univariate analysis. Statistically significant factors, p <0.20 and previously significant in other studies, were eligible for multivariate analysis. The final model included sex, age, education level, occupation, alcohol consumption, smoking, diabetes mellitus and COVID-19 vaccine doses. We used the β-coefficient and 95% confidential interval to represent the relationship between variables and outcomes. Statistical significance was considered at $p \leq 0.05$ at a 95% confidential interval.

Results

Demographic data

Participants' demographic data are shown in **Table 1**. The average age of participants was 47.8 ± 0.7 years. Most participants were female (61.0%), married and living with a partner (77.5%), educated to at least a primary level (56.6%), agriculturist (38.7%), had no comorbidities (47.2%), living with family or partner (89.2%), non-smokers (76.3%), non-drinkers (57.5%), vaccinated with two doses of COVID-19 vaccine (80.5%), and received CoronaVac (1st dose) and Oxford-AstraZeneca COVID-19 vaccine (2nd dose) vaccination regimen (52.8%).

Table 1. Demographic data among adults in Baan Nayao Village, Chachoengsao, 2022

Characteristic	n	%
Sex		
Female	260	61.0
Male	166	39.0
Age (year)		
Mean S.D.	47.77 ± 0.65	
≤30	56	13.2
31-40	65	15.3
41-50	104	24.4
51-60	201	47.1
Marital status		
Married/living with a partner	330	77.5
Single	55	12.9
Widowed/Divorce/Separated	41	9.6
Education level		
Illiterate	36	8.5
Primary school	241	56.6
Secondary school and higher	149	35.0
Occupation		
Agriculturist	165	38.7
Business owner	135	31.7
Employee	65	15.3
Unemployed	50	11.7
Government officer	11	2.6
Comorbid illnesses		
Hypertension	84	19.7
Dyslipidemia	57	13.4
Diabetes mellitus	44	10.3
Cardiovascular disease	16	3.8
Chronic kidney disease	10	2.4
Asthma	6	1.4
Emphysema	4	0.9
Cancer	4	0.9
No comorbidities	201	47.2
Living status		
Living with family/partner	380	89.2
Living alone	46	10.8
Smoking		
Non-smoker	325	76.3
Ex-smoker	40	9.4
Current smoker	61	14.3
Alcohol consumption		
Nondrinker	245	57.5
Former drinker	78	17.3
Current drinker	103	24.2

Table 1. Demographic data among adults in Baan Nayao Village, Chachoengsao, 2022 (Cont.)

Characteristic	n	%
COVID-19 Vaccine dose		
0 dose	12	2.8
1 dose	13	3.1
2 doses	343	80.5
3 doses	58	13.6
COVID-19 Vaccine regimen		
Unvaccinated	12	2.8
Incomplete vaccination[A]	13	3.1
SV+SV	13	3.1
SV+AZ	225	52.8
SP+PF	4	0.9
AZ+AZ	35	8.2
SP+SP	3	0.7
SP+AZ	13	3.1
PF+PF	3	0.7
AZ+PF	33	7.8
MDN+MDN	13	3.1
SV+SV+AZ	4	0.9
SV+SV+PF	7	1.6
SV+SV+MDN	6	1.4
SV+AZ+PF	22	5.2
SV+AZ+MDN	3	0.7
SV+AZ+AZ	10	2.4
AZ+AZ+PF	10	2.4

SV = CoronaVac; SP = Sinopharm BIBP COVID-19 vaccine; AZ = Oxford-AstraZeneca COVID-19 vaccine; PF = Pfizer–BioNTech COVID-19 vaccine; MDN = Moderna COVID-19 vaccine
[A] An incomplete vaccination was for individuals receiving only one of any provided

COVID-stress scale

The mean overall score and standard deviation for the COVID-stress scale were 53.8±31.8. The mean score and standard deviation in each domain included COVID danger (10.5±6.6), COVID socioeconomic consequences (5.9±6.9), COVID xenophobia (12.5±8.6), COVID fear of contamination (12.5±6.6), COVID traumatic stress (3.9±6.1), and COVID compulsive checking (8.7±6.3). As shown in **Figure 1**, the histogram of the overall mean score was right-skewed.

Associated factors of increased and decreased stress score

Associated factors for increased stress during the COVID-19 pandemic were illiteracy (adjusted β=18.4, 95% CI 5.9 to 30.1) and agriculturists (adjusted β=13.2, 95% CI 3.1 to 23.4) compared to their counterparts. At the same time, age 51 to 60 (adjusted β=-11.1, 95% CI 3.9 to 27.3) and vaccination with ≥3 doses of COVID-19 vaccine (adjusted β=-8.9, 95% CI -16.4 to -1.5) were associated with decreased stress level. Results are summarized in **Table 2**.

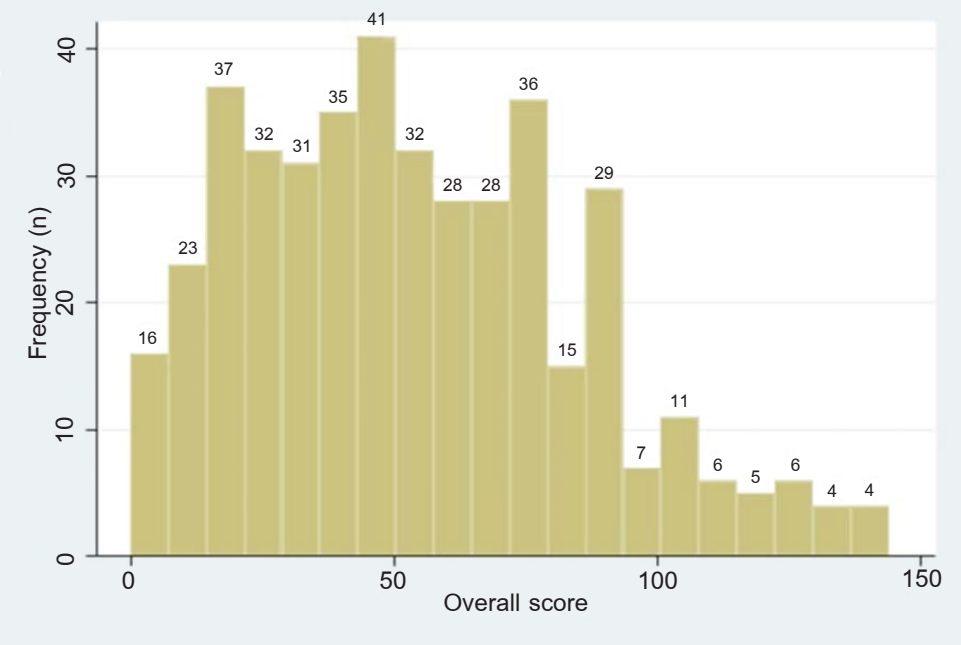

Figure 1. The overall mean score of T-CSS

Table 2. Univariate and multivariate analysis identified the factors that independently affect the T-CSS in Baan Nayao, Chachoengsao, Thailand, 2022

	Univariate analysis		Multivariate analysis	
Characteristic	**Crude β (95% CI)**	***p*-value**	**Adjusted β (95% CI)**	***p*-value**
Sex				
Male (as reference)				
Female	7.8(1.6-14.0)	0.013	6.9(-0.6-14.3)	0.070
Age (year)				
≤30 (as reference)				
31-40	-9.6(-21.5-2.4)	0.116	-10.1(-22.0-1.8)	0.095
41-50	-4.6(-15.3-6.1)	0.401	-9.3(-20.7-2.0)	0.107
51-60	-5.4(-15.1-4.3)	0.275	-11.1(-22.2- -0.3)	0.049*
Marital status				
Single (as reference)				
Married/living with a partner	-4.8(-13.8-4.3)	0.305		
Widowed/Divorce/Separated	6.8(-6.1-19.6)	0.301		
Education level				
Secondary school and higher (as reference)				
Primary school	-0.8(-7.2-5.6)	0.801	-1.2(-8.9-6.3)	0.761
Illiterate	21.2(9.8-32.7)	<0.001	18.4(5.9-30.8)	0.004*
Occupation				
Unemployed (as reference)				
Agriculturist	12.2(2.2-22.2)	0.017	13.2(3.1-23.4)	0.011*
Business owner	-0.7(-10.9-9.5)	0.895	-1.3(-11.5-9.0)	0.808
Employee	9.6(-2.0-21.2)	0.104	9.6(-2.1-21.3)	0.109
Government officer	6.0(-14.7-26.5)	0.569	5.7(-15.4-26.8)	0.596

Table 2. Univariate and multivariate analysis identified the factors that independently affect the T-CSS in Baan Nayao, Chachoengsao, Thailand, 2022 (Cont.)

	Univariate analysis		Multivariate analysis	
Characteristic	**Crude β (95% CI)**	***p*-value**	**Adjusted β (95% CI)**	***p*-value**
Alcohol consumption				
Nondrinker (as reference)				
Former drinker	-7.4(-15.5-0.7)	0.074	-6.1(-14.4-2.2)	0.151
Current drinker	-6.4(-13.7-0.9)	0.086	-3.3(-11.2-4.7)	0.418
Smoking				
Non-smoker (as reference)				
Former smoker	-1.2(-11.7-9.2)	0.817	3.0(-8.4-14.4)	0.607
Current smoker	-9.0(-17.7- -0.2)	0.044	-3.5(-13.8-6.8)	0.504
Living status				
Living with family/partner (as reference)				
Living alone	-0.5(-10.3-9.3)	0.920		
Comorbid illnesses				
Diabetes mellitus				
No (as reference)				
Yes	-7.3(-17.2-2.7)	0.152	-7.4(-17.5-2.8)	0.153
Dyslipidemia				
No (as reference)				
Yes	-2.3(-11.2-6.6)	0.613		
Hypertension				
No (as reference)				
Yes	0.6(-7.0-8.2)	0.879		
Cardiovascular disease				
No (as reference)				
Yes	4.0(-12.0-19.9)	0.626		
Chronic kidney disease				
No (as reference)				
Yes	-11.4(-31.4-8.6)	0.264		
Respiratory disease				
No (as reference)				
Yes	-10.1(-32.5-12.2)	0.373		
Cancer				
No (as reference)				
Yes	-12.2(-43.6-19.3)	0.447		
COVID-19 vaccine doses				
Unvaccinated (as reference)				
2 doses of vaccination	-3.4(-14.1-7.3)	0.533	-4.4(-14.8-6.1)	0.413
≥ 3 doses of vaccination	-9.6(-17.2- -2.0)	0.013	-8.9(-16.4- -1.5)	0.019*

* Statistically significant at $p<0.05$

Discussion

The study identified the associated stress factors during the COVID-19 pandemic lockdown among adults in a rural community in Thailand. Our results showed that the factors associated with stress during the COVID-19 lockdown were illiteracy, working as a farmer and vaccination with COVID-19 vaccine regimens other than CoronaVac (1st dose) and Oxford-AstraZeneca COVID-19 vaccine (2nd dose).

Related studies have addressed varying populations' stress, anxiety and depression during the COVID-19 pandemic.[21-25] Related studies were conducted in China and in Paraguay, using the Depression, Anxiety and Stress Scale (DASS-21) to classify depression, anxiety and stress levels as normal, mild, moderate, severe and highly severe.[21, 25] Stress levels are affected by multiple factors, such as varying severity of situations and measurements.[21, 25] This issue was already considered using the original COVID stress scale as the cut-off point was difficult to determine and the mean score on the scales changed throughout the COVID-19 pandemic.[18, 26] As a result, the cut-off points of 'stress' and 'non-stress' were not absolute and should be interpreted along with the response of a given population to the pandemic at a given time.[26] The higher the score, the higher the stress an individual may exhibit. According to this information, this study collected the total scores of the studied population as continuous data and stratified them on the histogram; the chart was right-skewed. As those with a score over 100 points were outliers from a normal distribution, we assumed they were more likely to be affected by stress than those in the normal distribution.

According to the COVID-stress scale, increased stress levels were strongly associated with illiteracy. Related studies suggest that people with lower educational levels are more likely to experience stress and anxiety.[21, 27, 28] However, other studies showed that during the COVID-19 pandemic, people with higher literacy were more affordable with expenses, had a healthier diet, performed more physical activities, could better use health resources obtained on the Internet, and had better adjustment capabilities.[29, 30] This study also hypothesized that due to uncertainty of pandemic development and public health measures, people with higher literacy could better perceive news from reliable resources than those with lower literacy.

The agriculturist occupation was found to have a relationship with elevated stress levels during the COVID-19 pandemic lockdown. The reason might be that farmers were more pessimistic about income loss.[31] However, farmers also tended to be affected by many factors, including problems in marketing goods, problems in transportation and a lack of financial support from the government.[32]

Increasing age was associated with less pandemic-related stress. A related study also reported a similar result.[33] Gerontologic theories suggest that older people cope with stress better than younger people.[34] The related study hypothesized that the already lonely nature of older people might make them feel less socially isolated than younger individuals who may have experienced a sudden reduction in their social contact due to social distancing measures.[33] Our study also hypothesized that older people were less likely to be affected by the loss of employment during the COVID-19 pandemic than younger, working-age adults; thus, resulting in less stress.

This study discovered that three and more doses of the COVID-19 vaccine influenced lowering stress during the COVID-10 pandemic. Most of the 'booster' dose of COVID-19 in Thailand was the mRNA vaccine. According to related studies comparing the efficacy of vaccine regimens, other vaccine regimens, including mRNA vaccines as second or booster doses, enhance immunogenicity very well.[6, 35, 36] Therefore, it could be possible that people receiving booster doses had lower stress levels during the COVID-19 pandemic because of participants' confidence in vaccine efficiency against infection and severe illness.

The study encountered several significant limitations. First, the questionnaire of this study did not include diagnostic assessments such as DSM-V or ICD-10, which would have helped

evaluate the prevalence of stress. Second, 13 interviewers were involved during data collection. The questionnaire results could be influenced differently because each interviewer had different verbal and nonverbal communication skills. Third, enrolled participants had limited age group variety, with 47.2% of participants in the age group 51 to 60 years. The study was conducted during the Omicron outbreak, two years after the first COVID-19 outbreak. Stress levels could be lower than in the previous waves since the Omicron outbreak in Thailand was less severe, and people might be able to adapt to a new normal lifestyle. Finally, this study's generalizability and external validity might be limited due to the small number of subjects, and being conducted in a single area might not represent the whole country.

The strength of this study was that the COVID stress scale was translated to Thai and tested for validity and reliability. It constituted the first to be used in the epidemiology field. In further studies, T-CSS might be able to be used as a brief measurement of COVID-19-related stress if compared with a standard stress scale or structured diagnostic assessment. The COVID stress scale is recommended to be used in future studies. Total scores should be collected as continuous data and stratified for distribution to determine the stress level of the studied population due to the lack of absolute cut-off point of 'stress' and 'nonstress' because of pandemic situation dynamics.

The COVID-19 pandemic is seemingly a long-run even though the outbreak's status will be shifted from pandemic to endemic in the future. Therefore, health education, financial support and social support for rural communities should be implemented to prevent mental illnesses in this vulnerable group. In addition, government priorities should alleviate burdens on people during the pandemic, such as control of prices of customer products, inexpensive and simple accessibility to healthcare services, adequate distribution of vaccines and clear public communication.

Conclusion

this study showed associated factors of stress levels during the COVID-19 pandemic in a rural community in Thailand. According to the COVID-stress scale, the stress level was significantly affected by age, illiteracy, farmer occupation, and COVID-19 vaccine doses. Overall mean stress score showed some outlying individuals with high-stress scores, which could be associated with other mental illnesses such as depression and anxiety. For healthcare practitioners and organizations, T-CSS can serve to aid in identifying individuals at risk for adverse emotional events during the COVID-19 pandemic and can be used as a brief measure of COVID-related stress.

Acknowledgments

We would like to thank the staff of the Department of Military and Community Medicine, Phramongkutklao College of Medicine, local authorities and public health volunteers of Ban Nayao Community, Chachoengsao Province.

References

1. Cucinotta D, Vanelli M. WHO declares COVID-19 a pandemic. Acta Bio Medica: Atenei Parmensis 2020; 91: 157.
2. Kunno J, Supawattanabodee B, Sumanasrethakul C, Wiriyasivaj B, Kuratong S, Kaewchandee C. Comparison of different waves during the COVID-19 pandemic: retrospective descriptive study in Thailand. Adv Prev Med 2021; 2021.
3. Kuai Y-H, Ser H-L. COVID-19 Situation in Thailand. Prog Biophys Mol 2021; 4.
4. Thanapluetiwong S, Chansirikarnjana S, Sriwannopas O, Assavapokee T, Ittasakul P. Factors associated with COVID-19 vaccine hesitancy in Thai seniors. Patient Prefer Adherence 2021; 15: 2389.
5. Yoda T, Suksatit B, Tokuda M, Katsuyama H. Analysis of people's attitude toward COVID-19 vaccine and Its information sources in Thailand. Cureus 2022; 14.
6. Sritipsukho P, Khawcharoenporn T, Siribumrungwong B, Damronglerd P, Suwantarat N, Satdhabudha A, et al. Comparing real-life effectiveness of various COVID-19 vaccine regimens during the delta variant-dominant

pandemic: a test-negative case-control study. Emerg Microbes Infect 2022; 11: 585-92.
7. Shadmi E, Chen Y, Dourado I, Faran-Perach I, Furler J, Hangoma P, et al. Health equity and COVID-19: global perspectives. Int J Equity Health 2020; 19: 1-16.
8. Ghosh A, Gupta R, Misra A. Telemedicine for diabetes care in India during COVID19 pandemic and national lockdown period: Guidelines for physicians Diabetes Metab Syndr 2021; 14: 273-76.
9. Intawong K, Olson D, Chariyalertsak S. Application technology to fight the COVID-19 pandemic: Lessons learned in Thailand. Biochem Biophys Res Commun 2021; 534: 830-36.
10. Khan N, Jones D, Grice A, Alderson S, Bradley S, Carder P, et al. A brave new world: the new normal for general practice after the COVID-19 pandemic. BJGP open 2020; 4.
11. Nguyen HC, Nguyen MH, Do BN, Tran CQ, Nguyen TT, Pham KM, et al. People with suspected COVID-19 symptoms were more likely depressed and had lower health-related quality of life: the potential benefit of health literacy. J Clin Med 2020; 9: 965.
12. Yan Y, Malik AA, Bayham J, Fenichel EP, Couzens C, Omer SB. Measuring voluntary and policy-induced social distancing behavior during the COVID-19 pandemic. Proc Natl Acad Sci USA 2021; 118.
13. Mongkhon P, Ruengorn C, Awiphan R, Thavorn K, Hutton B, Wongpakaran N, et al. Exposure to COVID-19-related information and its association with mental health problems in Thailand: nationwide, cross-sectional survey study. J Med Internet Res 2021; 23: e25363.
14. Wang C, Tee M, Roy AE, Fardin MA, Srichokchatchawan W, Habib HA, et al. The impact of COVID-19 pandemic on physical and mental health of Asians: A study of seven middle-income countries in Asia. PLoS One 2021; 16: e0246824.
15. Charoensakulchai S, Usawachoke S, Kongbangpor W, Thanavirun P, Mitsiriswat A, Pinijnai O, et al. Prevalence and associated factors influencing depression in older adults living in rural Thailand: A cross-sectional study. Geriatr Gerontol Int 2019; 19: 1248-53.
16. Seangpraw K, Auttama N, Kumar R, Somrongthong R, Tonchoy P, Panta P. Stress and associated risk factors among the elderly: A cross-sectional study from rural Thailand. F1000Research 2019; 8.
17. Chiu E. Epidemiology of depression in the Asia Pacific region. Australas Psychiatry 2004; 12: S4-S10.
18. Taylor S, Landry CA, Paluszek MM, Fergus TA, McKay D, Asmundson GJ. Development and initial validation of the COVID Stress Scales. J Anxiety Disord 2020; 72: 102232.
19. Tobacco glossary: Centers for Disease Control and Prevention; [Available from: https://www.cdc.gov/nchs/nhis/tobacco/tobacco_glossary.htm.
20. The Global Health Observatory: World Health Organization; 2022 [Available from: https://www.who.int/data/gho/indicator-metadata-registry.
21. Khademian F, Delavari S, Koohjani Z, Khademian Z. An investigation of depression, anxiety, and stress and its relating factors during COVID-19 pandemic in Iran. BMC Public Health 2021; 21: 1-7.
22. Torales J, Ríos-González C, Barrios I, O'Higgins M, González I, García O, et al. Self-perceived stress during the quarantine of COVID-19 pandemic in Paraguay: an exploratory survey. Front Psychiatr 2020; 11: 1155.
23. Nwachukwu I, Nkire N, Shalaby R, Hrabok M, Vuong W, Gusnowski A, et al. COVID-19 pandemic: age-related differences in measures of stress, anxiety and depression in Canada. Int J Environ Res Public Health 2020; 17: 6366.
24. Kowal M, Coll-Martín T, Ikizer G, Rasmussen J, Eichel K, Studzińska A, et al. Who is the most stressed during the COVID-19 pandemic? Data from 26 countries and areas. Appl Psychol Health Well-Being 2020; 12: 946-66.
25. Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, et al. Immediate psychological responses

and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. Int J Environ Res Public Health 2020; 17: 1729.
26. Taylor S. COVID stress syndrome: clinical and nosological considerations. Curr Psychiatry Rep 2021; 23: 1-7.
27. Liang L, Ren H, Cao R, Hu Y, Qin Z, Li C, et al. The effect of COVID-19 on youth mental health. Psychiatr Q 2020; 91: 841-52.
28. Monima LA, Usman IM, Kasozi KI, Aigbogun Jr EO, Bassey VA, Ifie J, et al. COVID-19 related mental health burdens: Impact of educational level and relationship status among low income earners of Western Uganda. Front Public Health 2020; 9: 739270.
29. Do BN, Nguyen P-A, Pham KM, Nguyen HC, Nguyen MH, Tran CQ, et al. Determinants of health literacy and its associations with health-related behaviors, depression among the older people with and without suspected COVID-19 symptoms: a multi-institutional study. Front Public Health 2020; 8: 694.
30. Yang BX, Xia L, Huang R, Chen P, Luo D, Liu Q, et al. Relationship between eHealth literacy and psychological status during COVID-19 pandemic: A survey of Chinese residents. J Nurs Manag 2021; 29: 805-12.
31. Sapbamrer R, Chittrakul J, Sirikul W, Kitro A, Chaiut W, Panya P, et al. Impact of COVID-19 pandemic on daily lives, agricultural working lives, and mental health of farmers in northern Thailand. Sustainability 2022; 14: 1189.
32. Chitra A, Gopinath R. A Study On Causes Of Stress To The Farmers During COVID-19 Pandemic. Int J Aquatic Sci 2021; 12: 773-82.
33. Birditt KS, Turkelson A, Fingerman KL, Polenick CA, Oya A. Age differences in stress, life changes, and social ties during the COVID-19 pandemic: Implications for psychological well-being. Gerontologist 2021; 61: 205-16.
34. Charles ST, Carstensen LL. Social and emotional aging. Annu Rev Psychol 2010; 61: 383-409.
35. World Health Organization. Interim recommendations for heterologous COVID-19 vaccine schedules: interim guidance, 16 December 2021. World Health Organization; 2021.
36. Yorsaeng R, Suntronwong N, Phowatthanasathian H, Assawakosri S, Kanokudom S, Thongmee T, et al. Immunogenicity of a third dose viral-vectored COVID-19 vaccine after receiving two-dose inactivated vaccines in healthy adults. Vaccine 2022; 40: 524-30.