Original Research Article

Database System Development of Mental Health Care for Elderly in Situation with Covid-19 Period

Comment [IG1]: This study lacked both
1. a statement of informed consent from the subject
2. ethical approval from any agency.

Abstract

The phenomenal study is to establish the database system development of mental health care for the elderly during the COVID-19 public sentiment by using a geographic information system (GIS) to create a model database system A cross-sectional questionnaire was conducted by an elderly survey using a four-stage stratified random sampling to select 1,647 respondents aged 60 and over from the six subdistrict health promotion hospitals in four provinces, respectively. Descriptive statistics and stepwise multiple regression were used to analyze the data.

The majority of the respondents were female (64.80%), aged 60–65 years (31.90%), and Buddhist (99.60%). Marital status: mostly married, live as a couple, or as a married couple (49.2%); level of education: mostly primary school (4th grade; 54.7%); not working (60.80%); average monthly income less than 1,000 baht (31.2%); with income sources, mostly from pensions (80.6%); income received is mostly inadequate (44.2%); and the majority had chronic diseases (58.8%), with mostly moderate health conditions in the last 6 months (44.3%).

Significant factors affecting mental health problems or associated with stress in the elderly during the COVID-19 period were: participation in religious activities; daily activities (ability to perform basic daily activities); social support (from family, relatives, and friends); income; and anxiety during COVID-19. All of these factors could together predict the preventive behavior against mental health problems in the elderly during the COVID-19 period. Based on the presented results, interdisciplinary healthcare teams should consider social support and access to healthcare when developing interventions for encouraging and promoting health outcomes in order to improve physical and psychological COVID-19 preventive behaviors and for the government in terms of increasing family income, particularly the oldest pension among elderly people during the COVID-19 pandemic.

Comment [IG2]: Please revise. Add background. Aim. Method. Result. Conclusion.

Keywords: COVID-19, Elderly, Mental health, GIS

1. Introduction

The novel Coronavirus disease 2019 (COVID-19), caused by the SARS-CoV-2 virus, has become a pandemic with a growing number of cases globally [1]. With the rapid spread of COVID-19, global health systems are experiencing critical challenges in preventing infections, identifying and managing COVID-19 cases, and ensuring effective strategies to protect public health [2], [3].

These challenges, although primarily emerging from an infectious disease with physical health implications, may also profoundly affect mental health and wellbeing [4], [5]. People around the world are grappling with fear and worry about their personal safety, a lack of an effective vaccine or treatment, and adverse socioeconomic consequences like unemployment and lack of access to necessary commodities resulting from quarantine and lockdown measures in different contexts [6], [7].

However, older people are at higher risk of suffering negative outcomes, including mental and physical health, during the social distancing for COVID-19 [8], which can lead to an elevated rate of mortality, being five times higher than the global average for those older than 80 years old [9]. Over 95% of fatalities due to COVID-19 in Europe and around 80% in China have included people older than 60 years old [8], [10]. In the United States, 80% of deaths were among adults 65 and over [11].

Regarding the previews studies, the mental health in elderly during COVID-19 period suggest that depression, anxiety disorders, a lack of social support, substance abuse, increased suicidal tendencies, and post-traumatic stress disorder (PTSD) commonly follow major economic crises or natural disasters as the most common risk factors that impact mental health problems [8], [12]–[14]. Apart from mental health problems during the COVID-19 pandemic, there are also other complications that can occur in several human organ systems [15], and even more so if elderly people have other chronic disease statuses such as high blood pressure, diabetes, or other complications [16].

In Thailand, the first positive COVID-19 case was identified on January 13, 2020 [17]. From that point on, the government monitored the situation, and on March 22, they enacted lockdown measures. This restricted the mobility of the population in

their communities and the activities of businesses. The country's public health situation had a significant impact on people's lives, particularly the elderly [18]. During the COVID-19 period, several studies have been done regarding the risk factors associated with stress that cause mental health problems [4], [14], [19], Therefore, based on the risk factors identified, in this study we focused on the psychological well-being of Thailand's older population in four provinces, including Ubon Ratchathani, Roi Et, SiSaKet, and Kalasin, during the COVID-19 period. Further, the aim is to determine the prevalence and factors associated with mental health problems among the elderly during the COVID-19 period and, in addition, to apply the Geographical Information System (GIS) to create a model database system for the development of the mental health in the elderly from the lessons uncovered during COVID-19.

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2. Material and Method

2.1 Study setting and population

A descriptive cross-sectional study was conducted during the COVID-19 period in four provinces (Ubon Ratchathani, Roi Et, SiSaKet, and Kalasin) by selecting district and subdistrict health promotion hospitals in each of the four provinces as the study area. The six study areas were: (1) Kham Yai Subdistrict Health Promotion Hospital and (2) Ban Hua Don Subdistrict Health Promotion Hospital in Ubon Ratchathani Province, Districts of City and Khueang Nai; (3) Ban Pha Yom Subdistrict Health Promotion Hospital in Roi Et province, district of Changhan; (4) Pheu Yai Subdistrict Health Promotion Hospital and (5) Sam Rong Pra Sart Subdistrict Health Promotion Hospital in SiSaKet province, districts of Pho Srisuwan and Prang Ku; (6) Dong Ling Subdistrict Health Promotion Hospital in Kalasin Province's Kamalasai district. The total elderly population of 1,038,111 people, aged 60 years and over reside in the study province areas. A prescribed sample size and multi-stage random sampling was applied (stated in 2.2). The criteria for eligible respondents were that they were; aged 60 years and over. All the samples which fitted into the inclusion criteria were chosen as the respondents. A total of 1,674 individuals were invited to participate in the study.

2.2 Sampling technique

The sample size was determined by Krejcie and Morgan's formula (Krejcie and Morgan, 1970 cited in Teerawut Ekakul, 2000) [20].

Comment [IG3]: Please revise. Follow the reference guideline

$$n = \frac{X^2 NP(1-P)}{e^2(N-1)+P(1-P)}$$

where: n = Sample size, N = Population size is the elderly aged 60 years and over in 4 Northeastern provinces, e= estimation error equal to 5 % or 0.0 5, P = the proportion of traits of interest in the given population 0.5 because it requires the largest sample size, X^2= chi-squared at df equal to 1 and 95 % confidence level =3.841. Substitute the values in the formula. The estimated sample size based on the above calculation was 383.94 individuals. Sample size was increased to protect from individual drop outs, by approximately 10 percent. In this research, the target sample group size was 400 people per 1 province, a total of 4 provinces, with recorded total of 1,647 people.

2.3 Sample selection method

A multi-stage random sampling method was used.
Step 1: Randomly select 20 provinces in the north-eastern region and randomly draw out all 4 provinces by simple random sampling (simple random sampling). Step 2: Using a simple random method, randomly sample 1–2 districts from each province. Step 3: Using a simple random method, sample the district at random from each of the three sub-districts. Step 4: Using a simple random method, randomly select villages from each sub-district of 3 villages, totalling 54 villages; Step 5: Random house numbers by taking the house number where the elderly received the pension and doing systematic random sampling with the interval of the sample selection calculated from I=N/n to find the starting point of randomization, elderly for the selection of samples in the research.

Table 1: Number of samples and Number of elderly (population) by province, district, sub-district, village in Ubon Ratchathani Province, Roi Et, Si Sa Ket and Kalasin.

Province	District	Population	Number of samples
Ubon	City	13,391	78

Ratchathani	Khueang Nai	20,822	380
Roi Et	City	29,067	100
Si Sa Ket	Pho Srisuwan	6,098	112
	Prang Ku	13,593	678
Kalasin	Kamalasai	10,950	299

2.4 Research tools

The research questionnaire is composed of five parts. Part 1 is the personal characteristic's questionnaire which consisted of gender, age, marital status, and education level. income per month, underlying disease, number of drugs (alcohol, smoking) taken, etc. The results from the personal characteristics questionnaire were used to analyse the description of the sample.

Part 2 is the Assessment Form for the Ability to Perform Daily Activities. This research used a two-part assessment of the ability to perform daily activities: The Modified Barthel ADL Index, a tool that has been translated into Thai and has been tested on the Thai elderly by Suthichai Jitpankul et al. (Jitapunkul et al., 1994) [21].

Part 3 is the Stress Measurement Form of the Thai Elderly Depression Scale (Suanprung Stress Test-20, SPST-20) consisting of 20 questions with only one answer [1-5]. The cumulative scores range from 0-100, divided by the level of stress among the Thai elderly. A stress score in the elderly of 0-24 points indicates less stressed. A stress score of 25-42 points indicates moderately stressed. High stress seniors score range is 43-62 points. Severely stressed score in the elderly is 63-100 points.

Part 4 is an anxiety screening form for the COVID-19 virus, comprising of 5 questions, each with single-answer [1-3]. The cummulative score is in the range of 5-15 points, divided by the level of anxiety in the Thai elderly. A low level of anxiety stress score for the elderly was 5-6 points. A moderate level of anxiety stress score was 7-11 points. Elderly people with a high level of anxiety have an axiety stress score of 12-15 points.

Part 5 is the Social Contribution Assessment Form using Kattika Thanakhang's Social Support Scale for the Elderly, developed from the conceptual framework of social support for the elderly by Krause and Markides [22][23]. There are 11 items with 3 components: 1) emotional support, 2) concrete support, and 3) information support. Using a 4-point Likert scale, they were 1) never, 2) sometimes, 3) often, 4) regularly. The score ranged from 11-44, with high scores indicating that the elderly received a high level of social support (such as, from a friend or member of the community).

2.5 Data analysis

Descriptive Statistics: including personal data factors by distributing frequency, percentage , mean and standard deviation. Analyze data on stress in the elderly by distributing the mean frequency (Mean) and the standard deviation (Standard deviation). Analyze the relationship between personal data factors, health factors, psychosocial factors. In the analysis of predictive factors, data were analyzed using multiple variate regression statistics.

2.6 Selection context of research study areas and authorities enabling the research

The selection of the research study areas and the timing context of the research were considerate of the intensity of COVID-19 outbreaks, among various other stakeholder interests, factors and the pre-existing landscape of academic literature, public health documentation, including active policies and processes. The selection of the research study areas (research group population) for the elderly, were considerate of the intensity of COVID-19 outbreaks, among various other stakeholder interests, factors and the pre-existing landscape of academic literature, public health documentation, policies and processes. Both government agencies sector and network partners are involved in driving operations that may play a role in the form of a beneficiary group, including influential groups for policy and public communications groups. The operational areas were in 4 contexts in 4 regions of Thailand as follows: (i) Provinces that have not reported COVID- 19 cases since the outbreak was detected in Thailand; (ii) Provinces that have reported COVID- 19 cases and can control the disease in a short period of time; (iii) Provinces that are state quarantine and (iv) Border provinces connected to neighboring countries (Border).

Comment [IG4]: Please revise. Follow the reference guideline

Comment [IG5]: Please revise. Frequency for the total number of subjects, and mean for the average score in quantitative studies. There should be no "mean frequency"

Please delete "(standard deviation)". Standard deviation is a upper and lower score based on the population measurement.

Comment [IG6]: Please revise. What sort of statistical analysis did the author use to determine the correlation between the variables? Bivariate analysis (as shown in the table)?

Comment [IG7]: Please revise. No table regarding regression analysis is presented

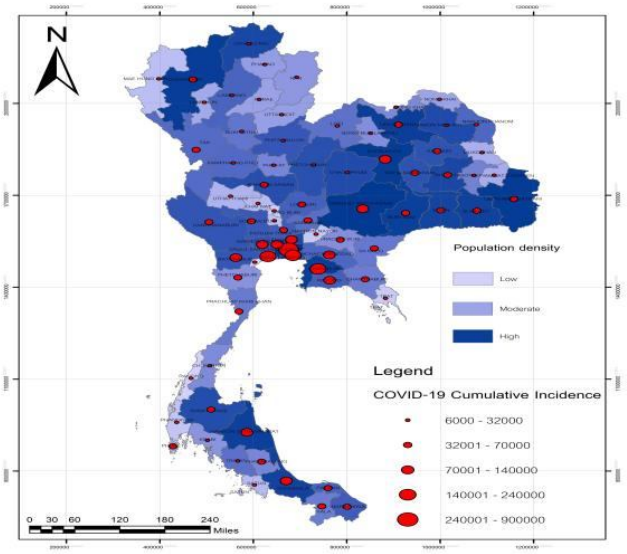

Figure 1 Geographic information COVID-19 Cumulative incidence in Thailand

3 Results

The subject of research is the development of a database system for mental health care for the elderly in situations affected by COVID-19 in the North-eastern region of Thailand. There method for collecting data used a sample survey (survey research) by means of purposive sampling, which involved 1,647 elderly people in the Northeast. Complete questionnaires were obtained. Data were analysed using the computer program SPSS, version 26.0.

The analysis, presentation, and explanation of the data are divided into six parts. Part 1. Personal factors consist of age, gender, religion, marital status, level of education, work, monthly income, etc. Part 2. Daily activities and capabilities evaluation (Barthel ADL Index) and assessment of the ability to perform daily activities continuously. Part 3. Stress Measurement (SPST-20). Part 4. Screening for anxiety concerns about the COVID-19 virus. Part 5. Social support measurement score model. Part 6. Includes the hypothesis test results to analyse the relationship between personal information and stress, and to find significant associations with stress in the elderly. Association factor relationship are also analysed the assessment of ability to perform daily activities, screening for concerns about the COVID-19 virus and measuring social support.

3.1 General information of the sample group from study area obtained

The majority of the 1,647 respondents were female (64.8 percent) rather than male (31.9 percent), aged 60-65 years (31.9 percent), followed by those older than 75 years (28.3 percent), and 99.6 percent were Buddhists (Table 2**)**. Most of the marital statuses were married, married and living with a spouse (49.5%), and most of them graduated from primary school level 4 (54.7%), followed by secondary education or a vocational certificate (20.4%), unemployed (60.8 percent), the majority have an average monthly income of less than 1,000 baht (31.2%), followed by an average monthly income of 1000-2000 baht (26.8%). The majority receive old age allowance (80.6%). Participants have an underlying disease (58.8%), which includes high blood pressure (HBP) (33.7%), followed by diabetes (17%). Take no oral medication (51.5%). General health is moderate. Only 42.5% of people live with their spouse, while 37.4% live with their spouse and another family member. In daily life, the primary caregiver is usually themselves (35.9%), followed by their living partner (couple or married) (25%). Most of them participated in weekly religious activities in the previous year (22.5%), and about 3 times a year or more (21.4%). The majority exercised occasionally or irregularly (63.8%), followed by 21.6 percent regularly or consistently.

Table 2: The number and percentage of the sample group classified by individual factors (n=1647)

Residence	Province	Quantity	Percentage
Kham Yai Subdistrict Health Promotion Hospital	Ubon Ratchathani	78	4.7
Ban Hua Don Subdistrict Health Promotion Hospital		380	23.1
Ban Pha Yom Subdistrict Health Promotion Hospital	Roi Et	100	6.1
Pheu Yai Subdistrict Health Promotion Hospital	Si Sa Ket	112	6.8
Sam Rong Pra Sart Subdistrict Health Promotion Hospital		678	41.2
Dong Ling Subdistrict Health Promotion Hospital	Kalasin	299	18.2

Sex		
Male	580	35.2
Female	1067	64.8
Variables		
Age group (Years) Mean= 68.63, SD= 62.55		
60-65 year	526	31.9
66-70 year	368	22.3
71-75 year	287	17.4
More than75 year	466	28.3
Religion		
Buddhist	1641	99.6
Christ	5	0.3
Islam	1	0.1
other		
Marital status		
Single	87	5.3
Married, have a couple and live with a married couple	810	49.2
Widowed	544	33.0
Divorce	20	1.2
Separate	22	1.3
Married, but not living with spouse	164	10.0
Education Level		
Not studying	101	6.1
Below elementary school grade 4	240	14.6
Primary school 4th grade	901	54.7
Secondary Education / Vocational Certificate	336	20.4
Diploma / High Vocational Certificate	15	0.9
Bachelor's degree	45	2.7
Higher Bachelor's degree	9	0.5
Work		
Not working	1002	60.8
Work	645	39.2
Average monthly income		
Less 1,000 baht	514	31.2
1,000-2,000 baht	441	26.8
2,001-3,000 baht	215	13.1
3,001-4,000 baht	110	6.7
4,001-5,000 baht	106	6.4
More than 5,000 baht	261	15.8
Sources of income (Answer more than 1 answer)		
From work	438	26.6
From son/nephew	811	49.2

Comment [IG8]: Please revise. Table 1 has already provided the quantity of samples collected from each district. Table 2 displayed the same quantity. Merge these tables into a single table.

Comment [IG9]: Please revise.
1. This table did not have any legend
2. There MUST be "n" (in the scond column) and "%" (in the last column)

Comment [IG10]: Please calculate. I believe there was an error in the standard deviation data presented here.

Comment [IG11]: Please revise. Religion "other" without any score? If 0, then delete "other"

Pension	58	3.5
Old age allowance	1327	80.6
The Veterans Fund rents a house.	11	0.7
Rental expenses such as rent, house rent	13	0.8
Deposit interest	16	1.0
Other	48	2.9
The income received		
Enough	498	30.2
Enough but no storage	291	17.7
Enough and can store some	99	6.0
Enough and can be stored all the time	31	1.9
Not enough	728	44.2
Personal pathologic status		
None.	678	41.2
Yes (what disease - can answer more than 1)	969	58.8
Heart disease	69	4.2
Paralysis	13	0.8
Kidney disease	111	6.7
Osteoarthritis, rheumatoid arthritis	68	4.1
Hypertension	555	33.7
Eye disease	47	2.9
Lung disease or asthma	40	2.4
Gastrointestinal diseases or symptoms	54	3.3
Diabetes	285	17.3
Physical pain, back pain, waist pain, muscle pain	203	12.3
Stroke	35	2.1
Other specify	59	3.6
Oral medication		
None	849	51.5
Have	798	48.5
1-10 tablets/day	788	47.8
11-20 tablets/day	10	0.6
General health in the last 6 months		
Very poor	10	0.6
Poor	102	6.2
Moderate	730	44.3
Good	717	43.5
Very good	88	5.3
Currently living with (can answer multiple questions)		
Alone	103	6.3
Live with spouse only	700	42.5
Live with single child	279	16.9
Live with spouse	616	37.4
Nephew or son-in-law/daughter-in-law	610	37.0
Stay with relatives	145	8.8
Living with someone other than a relative	29	1.8
The main caregiver in daily life		
Take care of yourself	592	35.9
Married couple	412	25.0
Children (female, male, stepson)	510	31.0
Nephew / son-in-law / daughter-in-law	99	6.0
Relatives/Brothers	33	2.0
Other than relatives	1	0.1
Participated in religious activities in the last year.		
Never	157	9.5

Comment [IG12]: Please consider revising. This is the subject's perception of the income, so I suggest revising to "subjective income received"

Comment [IG13]: Please revise.
None 678
Yes ➔ delete
Heart disease 69

Please sort the disease according to highest percentage to lower percentage

Comment [IG14]: Please revise.
None 849
Have
1-10 tablets/day 788
11-20 tablets/day 10

Comment [IG15]: Please consider revising. This is the subject's perception of the general health, so I suggest revising to "subjective general health ….."

Once a year	121	7.3
2 times a year	154	9.4
About 3 times a year or more than	353	21.4
Once a month	323	19.6
Every week	370	22.5
Several times a week	169	10.3

Weekly exercise for at least 30 minutes or more, three or more times.		
Never	242	14.7
Occasionally / Irregularly	1050	63.8
Consistently / Regularly	355	21.6

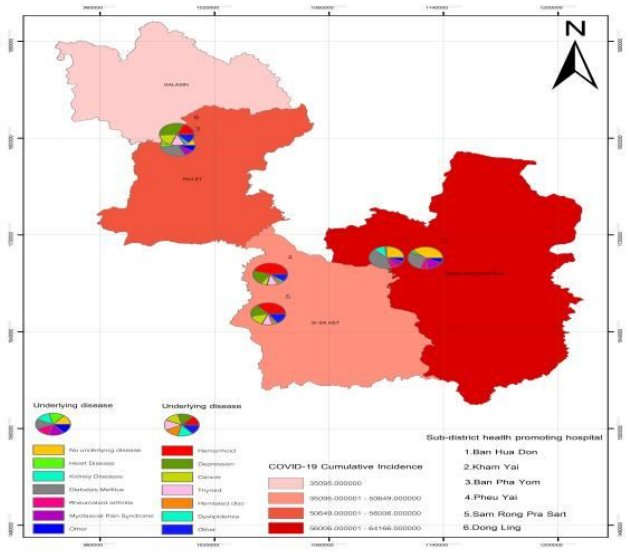

Figure 2: Geographic information: COVID-19 Cumulative incidence with underlying diseases in each sub-district health promotion hospital.

3.2 The ability to perform daily activities of the elderly

Table 3 reports results from part 1 of the Daily Life Activities Barthel ADL score measurements, which assesses dependency level to complete basic daily routines in each study area. Out of 1,647 elderly respondents, the majority reported a score of 12–20 (no dependency) on the ability to perform daily life tasks in all six study areas. Such as Kham Yai Subdistrict Health Promotion Hospital (SHPH), where 96.20% of non-dependency scores were recorded, Ban Pha Yom SHPH (98.0%) of non-dependency scores were recorded, and four other subdistrict hospitals; Ban Pha Yom SHPH, Pheu Yai SHPH, Sam Rong Pra Sart SHPH, and Dong Ling SHPH found that 84.9% or more had a score of 12–20 on the non-dependency scale on the ability to perform basic daily life routines. As a result, the majority of (elderly) respondents received scores ranging from 12 to 20, indicating that they are not dependent and their ability to perform basic daily activities can be assessed as normal and independent.

Table 3: Number and percentage of subjects classified according to the ability to perform basic daily activities

Comment [IG16]: Please revise the order. Based on table 1 and 2 order, Kham yai, ban hua don, ban pha yom, pheu yai, sam rong pra sart, dong ling

Score Dependence level *(basic daily activities)*	Kham Yai (n= 78)		Ban Pha Yom (n=100)		Ban Hua Don (n=380)		Pheu Yai (n= 112)		Sam Rong Pra Sart (n=678)		Dong Ling (n=299)	
	n	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**
0-4 Completely dependent	1	1.3	2	2.0	2	0.4	1	0.9	4	0.6	8	2.7
5- 8 Highly dependent	2	2.6	0	0.0	4	1.1	1	0.9	7	1	15	5
9-11 Moderately dependent	0	0	0	0.0	9	2.4	2	1.8	11	1.6	22	7.4
12-20 No dependency	75	96.2	98	98.0	365	96.1	108	96.4	656	96.8	254	84.9

Table 4 shows results for part 2 of the Daily Life Activities Barthel ADL score measurements, which assesses dependency level to complete complex daily routines. Out of 1,647 elderly respondents, the majority reported a score of "no dependency" (9 points or more) on the ability to perform complex daily routines in almost all six study areas, such as Kham Yai Subdistrict Health Promotion Hospital (SHPH), where 82.10% of non-dependency scores were recorded, Ban Pha Yom SHPH, where 85.0% of non-dependency scores were recorded, and four other subdistrict hospitals; Ban Hua Don SHPH, Pheu Yai SHPH, Sam Rong Pra Sart SHPH, and Dong Ling SHPH found that 56.9% or more of the population had a score of 9 points or more on the non-dependency scale on the ability to perform complex daily routines. As a result, the majority of (elderly) respondents received a score of 9 or higher, indicating that they are not dependent. It means that their ability to perform complex daily routines can be assessed normally and independently.

Table 4:. The number and percentage of the subjects classified according to the ability to perform complex daily routines.

Score Dependence level *(complex daily activities)*	Kham Yai (n= 78)		Ban Pha Yom (n=100)		Ban Hua Don (n=380)		Pheu Yai (n= 112)		Sam Rong Pra Sart (n=678)		Dong Ling (n=299)	
	n	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**
0-2 Completely dependent	3	3.8	1	1.0	0	0	2	1.8	26	3.8	29	9.7
3-5 Highly dependent	2	2.6	2	2.0	4	1.1	11	9.8	39	5.8	42	14
6-8 Moderately dependent	9	11.5	12	12.0	35	9.2	12	10.7	116	17.1	58	19.4
9 or more Non-dependent	64	82.1	85	85.0	341	89.7	87	77.7	497	73.3	170	56.9

3.3 The level of stress (SPST-20) in elderly adults during the COVID-19 period

The stress measurement results followed the SPST-20 scaled test consisting of twenty questions each carrying a score of 1-5 corresponding to an increasing scale of stress; least stressed (1), followed by moderately (2-3), highly (4) and severely stressed (5).

Out of 78 respondents at Kham Yai Subdistrict Health Promotion Hospital, the majority reported moderate stress ($\ddot{X}$ = 2.16, S.D = 0.692). Back pain ($\ddot{X}$ = 2.91, S.D. = 0.996), indicating a high level of stress, was followed by muscle stiffness or pain ($\ddot{X}$ = 2.73, S.D. = 0.921), indicating a high level of stress, and feeling tired easily ($\ddot{X}$ = 2.46, S.D. = 0.833), indicating moderate stress.

In Ban Pha Yom Subdistrict Health Promotion Hospital**,** there were 100 respondents, most of whom had moderate stress ($\ddot{X}$= 1.90, S.D. = 0.624). Most reported insufficient money ($\ddot{X}$=2.55, SD=1.158), causing high stress, and were followed by people who were concerned about toxins or pollution in the air, water, noise, and soil ($\ddot{X}$ = 2.26, SD = 1.16) experiencing moderate stress.

However, in Ban Hua Don Subdistrict Health Promotion Hospital, out of 380 respondents, the majority had low stress level ($\ddot{X}$=0.710, SD=0.718). Most of them had back pain ($\ddot{X}$=1.95, SD = 0.977) with moderate stress, followed by feeling tired easily ($\ddot{X}$=1.87, SD = 0.918) with moderate stress.

In Pheu Yai Subdistrict Health Promotion Hospital, out of 112 elderly respondents, the majority of them had moderate stress ($\ddot{X}$=1.93, SD=0.852), most of them had back pain ($\ddot{X}$=2.31, SD=1.074) with moderate stress, and they felt tired easily ($\ddot{X}$=2.03, SD=1.078) with moderate stress.

In Sam Rong Pra Sart Subdistrict Health Promotion Hospital, out of 678 elderly participants, the majority had a moderate level of stress ($\ddot{X}$=1.91, SD = 0.810). Most reported insufficient money ($\ddot{X}$=2.29, SD=1.170) with moderate stress, followed by back pain ($\ddot{X}$=2.25, SD=1.124) with moderate stress.

Of 299 elderly patients at Dong Ling Subdistrict Health Promotion Hospital, the majority had low stress levels ($\ddot{X}$ = 1.48, SD = 0.491). With a moderate level of stress ($\ddot{X}$ =1.85, SD=0.989) caused for the majority of them due to insufficient money.

As a result of this analysis conducted in the northeast of Thailand, there were four provinces (Ubon Ratchathani, Roi Et, SiSaKet, and Kalasin) with six study area differences indicating that the stress level in the elderly was moderate during the

COVID-19 period.

3.4 Screening for anxiety regarding COVID-19 virus

The anxiety level screening results per question are in the range [1-3], corresponding to low (1), moderate (2) and high (3) anxiety. Out of 78 respondents at Kham Yai Subdistrict Health Promotion Hospital, the majority reported having low anxiety ($\bar{X} = 1.56$, SD=0.514). Mostly, the COVID-19 virus affected daily lives ($\bar{X} = 1.67, SD. = 0.658$) with low anxiety, followed by low anxiety over the chance to be infected with the COVID-19 virus ($\bar{X} = 1.65, SD. 0.651$) and feeling anxious about preparations to prevent infection of the COVID-19 virus, such as hoarding food, wearing masks, etc.($\bar{X} = 2.46$, S.D. 0.833) with high anxiety. In Ban Pha Yom Subdistrict Health Promotion Hospital, there were 100 respondents, most of whom had low anxiety (Ẍ=1.51, SD=0.446). COVID-19 virus (Ẍ=1.74, SD=0.733) was the most common with moderate anxiety, followed by COVID-19 virus affects daily life (Ẍ=1.69, SD=0.692) with moderate anxiety. However, in Ban Hua Don Subdistrict Health Promotion Hospital, out of 380 respondents, the majority had a low anxiety level (Ẍ=1.52, SD=0.499). Most of them presented the COVID-19 virus (Ẍ=1.56, SD=0.567) with a low anxiety level, followed by COVID-19 affecting daily life (Ẍ=1.56, SD=0.562) with a low level of anxiety.

In Pheu Yai Subdistrict Health Promotion Hospital, out of 112 elderly participants, the majority had a low level of anxiety (Ẍ=1.65, SD=0.544). Mostly, the COVID-19 virus affected their daily lives (Ẍ=1.75, SD=0.717) with a moderate level of anxiety, and most of them had the COVID-19 virus (Ẍ=1.73, SD=1.71) with moderate anxiety. Similarly, in Sam Rong Pra Sart Subdistrict Health Promotion Hospital: out of 678 elderlies, the majority had a low level of anxiety (Ẍ=1.6, SD=0.529). Mostly, the COVID-19 virus affected their daily lives (Ẍ=1.72, SD=0.683) with a moderate level of anxiety, and most of them had COVID-19 (Ẍ=1.7, SD=0.529) with moderate anxiety. Furthermore, in Dong Ling Subdistrict Health Promotion Hospital, out of 299 respondants, the majority had a low anxiety score (Ẍ= 1.38, SD=0.436), and the majority presented COVID-19 virus with a low level of anxiety (Ẍ=1.45, SD=0.436). As a result of this analysis, the majority of respondents (1,647 elderly) reported a low level of anxiety.

3.5 Measure the social support via social support scale for the elderly

The Social Support Scale for the Elderly is comprised of 11 questions concerning access to three kinds of support: emotional, concrete, and informational support. Each is scored on the 4-point Likert scale, never (1), sometimes (2), often (3), regularly (4).

Out of 78 respondents at Kham Yai Subdistrict Health Promotion Hospital, most received overall social support from family or relatives at a high level (Ẍ = 3.27, SD= 0.8 28). Emotional support (Ẍ = 3.27, SD= 0. 828) was high; concrete help (Ẍ = 3.26, SD=0.920) was at a high level; and information support (Ẍ = 3.27, SD= 0.712) was also high.

Within the sample, most of them received social support from friends or neighbours at a fair level (Ẍ = 1.93, SD= 1.032). Emotional support (Ẍ = 1.89, SD= 1.099) at a fair level; concrete assistance (Ẍ = 1.70, SD = 1.024) low level of social support; and information support (Ẍ = 2.20, SD = 1.156) at a moderate level.

In Ban Pha Yom Subdistrict Health Promotion Hospital, there were 100 respondents, and it was found that most received social support from family or relatives overall at a high level (Ẍ = 2.94, SD= 0.888). Emotional support (Ẍ = 2.94, SD= 0. 921) was high; Concrete assistance (Ẍ = 2.95, SD= 0. 938) was high and information support (Ẍ = 3.27, SD= 0.712) was high level. While this area demonstrates that social support from family and relatives is high, it is also believed that support from friends and a neighbour is comparable.

In Ban Hua Don Subdistrict Health Promotion Hospital, out of 380 respondents, the majority received overall social support from family or relatives at a high level (Ẍ = 2.69, SD= 0.983). Emotional support was high (Ẍ = 2.7, SD= 0.972); concrete assistance (Ẍ = 2.69, SD= 1.000) was high and support for information (Ẍ = 2.667, SD= 1.003) was also high. Within the sample, most of them received social support from friends or neighbours at a moderate to high level (Ẍ = 2.46, SD= 0.824); emotional support (Ẍ = 2.48, SD= 0.824) was moderate; concrete assistance (Ẍ = 2.42, SD = 0.836) was at a fair to moderate level and information support (Ẍ = 2.48, SD = 0.86) was at a moderate level.

In Pheu Yai Subdistrict Health Promotion Hospital, out of 112, the majority received social support from family or relatives at a very high level (Ẍ = 3.3, SD= 0.757). With high emotional support (Ẍ = 3.37, SD = 0.760). Concrete help (Ẍ= 3.23, SD = 0.833) was high, and information support (Ẍ = 3.3, SD = 0.798) was very high. A high level of social support from a friend or neighbor (Ẍ = 3.12, SD= 0.782).

However, in the Sam Rong Pra Sart Subdistrict Health Promotion Hospital, out of 678, all of them received social support from family or relatives (Ẍ = 2.84, SD = 0.839) at high levels, including friends or neighbors and (Ẍ = 2.57, SD = 0.836).

Furthermore, in Dong Ling Subdistrict Health Promotion Hospital, out of 299, the majority received social support from family or relatives at a very high level (Ẍ = 3.75, SD = 0.5). Emotional support (Ẍ= 3.78, SD = 0.500) and concrete assistance (Ẍ= 3.75, SD = 0.562) have very high social support, and information support (Ẍ = 3.72, SD = 0.592) also was very high from family and relatives. However, the level of social support from a friend or neighbor, including emotional support, concrete assistance, and information support, is overall at a fair or low level (Ẍ = 2.17, SD = 0.466).

According to the findings of this analysis, the majority of social support received by all elderly participants during the COVID-19 period was provided by family or relatives.

3.6 Related factors in the mental health problems' causation and statistics for measuring the significance of the risk factors presented

After obtaining scores for each item of the questionnaire, the data was further analysed by using the correlation coefficient model to measure the significance of the risk factors obtained with stress in the elderly in each of the six study areas, and the results revealed a few risk factors as most significant. Pearson's r correlation statistical test with a critical alpha of 0.01 (2-tailed) determines the significance of risk factors, as follows:

Kham Yai Subdistrict Health Promotion Hospital, the risk factors that were most significant in causing stress (n=78) were psychological and psychosocial, such as participation in religious activities and social support from friends or neighbours. Whereas, health and illness factors such as the ability to perform basic daily activities, the ability to perform complex daily routines, and concerns about the COVID-19 virus were the significant risk factors in Ban Pha Yom Subdistrict Health Promotion Hospital (n=100).

However, in Ban Hua Don Subdistrict Health Promotion Hospital (n=380) it was demonstrated that the most significant factors correlated with stress were demographic, economic, and social factors; health and illness factors; and psychological and psychosocial factors such as income; the main administrator; the ability to perform basic daily activities; the ability to perform complex daily routines; concerns about the COVID-19 virus; participation in religious activities; and the social support of family, relatives, and friends or neighbours.

Furthermore, in Pheu Yai Subdistrict Health Promotion Hospital (n=112), the significant risk factors more commonly found were: demographic, economic, and social factors; health and illness factors such as income, the ability to perform basic daily activities, the ability to perform complex daily routines, and concerns about the COVID-19 virus.

At Sam Rong Pra Sart Subdistrict Health Promotion Hospital (n=678), the significant factors more closely correlated with stress in the 678 elderly were: demographic, economic, and social factors; and health and illness factors, such as income, work, the main administrator, the history of personal pathology (congenital diseases) or associated with chronic diseases, the ability to perform basic daily activities, and the ability to perform complex daily routines, including concerns about the COVID-19 virus. Nevertheless, at Dong Ling Subdistrict Health Promotion Hospital (n=299) the most significant risk factors analysed were health and illness factors, psychosocial factors such as a history of pathologic personal or congenital diseases, concerns about the COVID-19 virus, and social support from family or relatives.

Therefore, all of these statistically significant risk factors will be considered as good predictors of mental health problem causation in the elderly during the COVID-19 period in each area. Each factor's impacts are reported in Table 5; the following procedure will analyse the significant risk factors' associations via multiple variate analysis.

Table 5: Correlation coefficients (r) and tested p-value (p) between population, economic and social factors, health and morbidity factors, psychological factors with stress in the elderly (n= 1647),

Variable	Kham Yai (n=78)		Ban Pha Yom (n=100)		Ban Hua Don (n=380)		Pheu Yai (n=112)		Sam Rong Pra Sart (n=678)		Dong Ling (n=299)	
	Stress in the elderly		*Stress in the elderly*		*Stress in the elderly*		*Stress in the elderly*		*Stress in the elderly*		*Stress in the elderly*	
	r	**p**	**r**	**p**	**r**	**p**	**r**	**p**	**r**	**p**	**r**	**p**
Demographic, economic and social factors												
Sex	-0.063	0.584	0.082	0.416	-0.033	0.515	-0.053	0.579	0.061	0.112	0.000	0.995
Age	-0.191	0.094	0.069	0.496	0.007	0.890	0.172	0.07	0.06	0.117	0.099	0.086
Income	0.221	0.052	**-.201 ***	**0.045**	**-.184 ****	**0.000**	**.304 ****	**0.001**	**-.0178****	**0.000**	0.058	0.314
Education level	0.034	0.764	-0.149	0.139	-0.075	0.147	-0.084	0.379	**-.085 ***	**0.026**	0.055	0.341
Marital status	-0.104	0.365	0.024	0.809	0.023	0.661	0.065	0.493	0.066	0.086	-0.26	0.655
Religion	0.157	0.171							0.009	0.817	-0.061	0.294
Working	-0.082	0.476	-0.185	0.065	-0.026	0.609	-0.109	0.254	**-.156 ****	**0.000**	-0.108	0.062
Main administrator	-0.101	0.38	0.106	0.292	**.291 ****	**0.000**	0.087	0.361	**.119 ****	**0.002**	0.093	0.108
Health and illness factors												

Congenital disease	0.085	0.459	**.237 ***	**0.017**	0.03	0.558	0.123	0.195	**.159 ****	**0.000**	**.158 ****	**0.006**
Amount of medication received	0.112	0.328	-0.001	0.995	0.023	0.651	0.093	0.331	**.090 ***	**0.019**	0.057	0.322
Ability to perform basic daily activities	-0.095	0.407	**-.457 ****	**0.000**	**-.254 ****	**0.000**	**-.315 ****	**0.001**	**-.188 ****	**0.000**	-0.029	0.620
Ability to perform complex routines	-0.064	0.575	**-.361 ****	**0.000**	-0.046	0.374	**-.243 ****	**0.010**	**-.219 ****	**0.000**	-0.032	0.584
Exercise	**-.225***	**0.048**	-0.011	0.912	**-.148 ****	**0.004**	-0.102	0.284	**-.136 ****	**0.000**	0.026	0.648
Concerns about the COVID-19 virus	0.21	0.064	**.573 ****	**0.000**	**.779 ****	**0.000**	**.758 ****	**0.000**	**.686 ****	**0.000**	**.553 ****	**0.000**
Psychological factor												
Participation in religious activities	**-.386 ****	**0.000**	-0.048	0.632	**-.234 ****	**0.000**	-0.121	0.203	-0.044	0.250	0.063	0.274
Psychosocial factors												
Social support of family/relatives	**-.250 ***	**0.027**	-0.103	0.309	**.353 ****	**0.000**	-0.009	0.927	0.027	0.486	**-.296 ****	**0.000**
Social support of friends/neighbors	**.395 ****	**0.000**	0.099	0.326	**.244 ****	**0.000**	-0.036	0.708	0.073	0.058	0.1	0.084

**. Correlation is significant at the p-value 0.01 (2- tailed).
*. Correlation is significant at the p-value 0.05 (2- tailed).

Next, the stepwise (multiple variate) regression equation (using SPSS program) is applied to identify the (predictive fit) statistical explanation (measured by the coefficient of determination, R^2) between risk factors and mental health problem causation in the elderly during the COVID-19 period, and how much influence (in percentage) each has in each research area. The most significant risk factors determined in the (above) statistical Pearson correlation analysis in each of the six study areas were selected as variables into the regression equation to determine the predictive mental health problem risk factors. The results of the predictive analyses show that:

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At Kham Yai Subdistrict Health Promotion Hospital, there were psychological and psychosocial factors, such as participation in religious activities and social support from friends or neighbours. Participation in religious activities, at up to 23.3 percent (R^2 = 0.233 and p-value < 0.05), is more predictive in that area than social support from friends or neighbours in causing mental health problems (stress) in the elderly during the COVID-19 period.

However, at Ban Pha Yom Subdistrict Health Promotion Hospital, in accordance with the risk factors, the factors selected as having the most significance were health and illness factors such as the ability to perform basic daily activities, the ability to perform complex daily routines, and the anxiety of the COVID-19 virus. There were up to 44.5% (R^2 = 0.445 and p-value < 0.05) of risk factors assessed for the ability to perform basic daily activities, more than any other factor.

Further, in Ban Hua Don Subdistrict Health Promotion Hospital, regarding risk factors of greater significance, there were demographic, economic, and social factors; health and illness factors; and psychological and psychosocial factors such as income, the main administrator, the ability to perform basic daily activities, the ability to perform complex daily routines, the anxiety of the COVID-19 virus, participation in religious activities, and the social support of family, relatives, and friends or neighbours. More than three other risk factors, social support from family and relatives reached 64.3 percent (R^2= 0.643 and p – value <0.05), of those risk factors assessed as most predictive of the contribution of mental health problems in the elderly during the COVID-19 phenomenon.

At the Pheu Yai Subdistrict Health Promotion Hospital, the significant risk factors selected were demographic, economic, and social factors; health and illness factors such as income, the ability to perform basic daily activities, the ability to perform complex daily routines, and concerns about the COVID-19 virus. Income was found to be the most predictive of mental health problems in the elderly during the COVID-19 period, with an effect of up to 61.9% (R^2= .619 and p – value < 0.05), more than two other factors, such as anxiety about the COVID-19 virus and ability to perform basic daily activities.

At the Sam Rong Pra Sart Subdistrict Health Promotion Hospital, in accordance with the significance of the risk factors assessed, there were demographic, economic, and social factors; and health and illness factors, such as income, work, the main administrator, the history of personal pathology (congenital diseases) or chronic diseases associated with them, the ability to perform basic daily activities, and the ability to perform complex daily routines, including concerns about the COVID-19 virus. During the COVID-19 period in that area, income was more predictive of mental health problem causation in the elderly, with a

percentage of up to 48.5% (R^2= .485 and p - value<0.05), compared to the other two risk factors evaluated.

3.4.7 Factors influencing of Mental health problem.

Furthermore, the difference in occurrence in Dong Ling Subdistrict Health Promotion Hospital was assessed by health and illness factors, psychosocial factors such as a history of pathologic personal or congenital diseases, concerns about the COVID-19 virus, and social support from family or relatives. Social support from family or relatives was the most significant predictor of mental health problem causation in the elderly during the COVID-19 period, with a percentage of prediction up to 34.1 percent (R^2= .341 and p - value<0.05), more than the risk factor of anxiety associated with the COVID-19 virus. Therefore, the main risk factors for mental health problems in the elderly during the period of COVID-19, with more predictive findings in each of the six areas of study selected from four provinces (Ubon Ratchathani, Roi Et, SiSaKet, and Kalasin) in Thailand, will be discussed: participation in religious activities, ability to perform basic daily activities, social support (from family, relatives, and friends), and income.

This study found that even though the anxiety of COVID-19 in each study area was not the most predictive risk factor, nevertheless, almost all of the study areas presented the anxiety of COVID-19 in second place, and almost all presented the anxiety of COVID-19 as more than half of the mean risk factor predictor for mental health problems in the elderly during the COVID-19 period. Therefore, it is considered an important risk factor that will be discussed in this study.

According to the cumulative COVID-19 incidence in each of the six study areas in four provinces in Thailand, it was discovered that most risk factors for mental health problems were found among the elderly in Ubon Ratchathani (n=78, n=380) during the COVID-19 period, which corresponds with the study result and is supported by Roi Et province (n=100). The most predictive risk factors assessed for such an elderly population are illustrated in Figure 3, with the context of COVID-19 cumulative incidence.

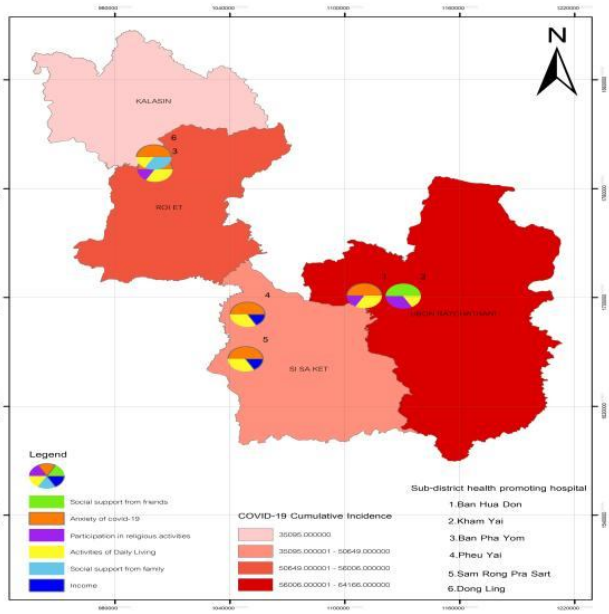

Figure 3: Database system development of mental health in elderly model from the lessons of COVID-19.

3. Discussion

The database system development of the mental health in the elderly model from the COVID-19 lessons has demonstrated that the mental health care of the elderly during the COVID-19 period as the results showed significant mental health problems in four provinces of Thailand, such as Ubon Ratchathani, Roi Et, SiSaKet, and Kalasin. This study found that the stress was mostly at a moderate level in accordance with the risk factors associated. This is consistent with previous studies [5], [13], [24].

The lack of participation in religious activities for mental health problems was significantly associated with the stress of the elderly during the period of COVID-19 in this study. This result, in accordance with several previous studies, evidently shows that if the elderly participate in religious activity, whether physical or social, there is a decreased risk of depression in the elderly [25], and in accordance with Amir *et al.'s* study, there was evidence that elderlies who were remarkably engaged with religious activities had better quality of life and cognitive function as compared to those who were either less engaged or did not practice religious activities [26]**.**

Activity of daily living (ability to perform basic daily activities): It was discovered that one of the risk factors associated with the mental health problems of the elderly in this study which is consistent with Ganz*'s* study results on the social isolation due to COVID-19 in older people in both mental and physical effects, the physical inactivity was identified as one of the main risk factors, as was the ability to perform basic daily activities, including those involving anxiety, depression, and poor sleep quality [8]. In accordance with Kirwan *et al.*, there were reductions in physical activity during the COVID-19 period that have the potential to accelerate sarcopenia, a deterioration of muscle mass and function more likely in older populations, as well as increases in body fat [27]**.**

Social support (Family and Friends) for mental health problem it was a significant association with the preventive behavior against stress of elderly during the period of COVID-19. This is consistent with the concept that social support is the interaction between one person and another, comprising love, concern, trust, objects, and information, which results in mutually good feelings for each other. It involves respect and assistance for each other [28], [29]. This then resulted in the recipient, acting in the way that the giver wanted. The supporter that may be a family member such as parent, husband, wife, or co-worker, fellow students, health volunteer, and public health officer [30].

A lack of income was one of the significant risk factors associated with mental health problems in the elderly during the COVID-19 period, as found in this study. According to Hossain *et al*., income was one of the risk factors associated with a mental health problem during the COVID-19 period, in addition to the other factors that caused a mental health problem [13]. Aside from other factors, sufficient income is one of the important factors associated with good COVID-19 preventive behavior among elderly people [31]**.** During the investigation, however, it was discovered that COVID-19 anxiety had a significant association with stress for mental health problems in the elderly during the COVID-19 period. This finding is consistent with Ganz, Torralba, *and* Oliveira's study, which found that anxiety, depression, poor sleep quality, and physical inactivity occurred during the isolation period of the COVID-19 pandemic [8] and the people affected by COVID-19 may have a high burden of mental health problems, including depression, anxiety disorders, stress, panic attacks, irrational anger, impulsivity, somatization disorder, sleep disorders, emotional disturbance, posttraumatic stress symptoms, and suicidal behavior [13]. Furthermore, a few complications affected multiple human systems, including the hematology and immunology systems, as well as mental health problems, which were primarily stress, anxiety, and depression during long-term and post-COVID-19 health [15]. Therefore, to mitigate this observation, it is critical to develop support systems and strategies through country-guided policies governing health institutions.

During COVID-19, we identified elderly with potentially new or underlying psychological stressors, and intervention may be beneficial.Moreover, for the elderly, we recommend that they maintain a daily schedule and exercise pattern. Have regular habits to maintain good health. Make time for leisure activities and find enjoyable activities (for example, indoor physical activities such as gymnastics, regular maintenance exercises, religious activities), eat a healthy and balanced diet, and get enough sleep.Avoid excessive drinking and drug use. Furthermore, the Ministry of Health should develop new survey technology to identify the high-risk elderly population, as well as mechanisms to address broader aspects of wellness with increased staff social support.

In addition to the suggestions for attention and care for the elderly during the pandemic, it is essential to note that both health organizations worldwide and science should consider an increase in mental impairment in the elderly population worldwide from the conditions listed in this and other studies. Paying attention to these issues is critical for research and methods of understanding and alleviating mental suffering and further harm to the elderly's health.

Conclusion

This study found that the main mental health problem in the elderly during the COVID-19 period presented moderate levels of stress, with associated risk factors including demographic, economic, and social factors (lack of income), health and illness factors (anxiety of COVID-19), psychological factors (participation in religious activities), and psychosocial factors (social support). It supports the need for further planning for the effective psychological well-being of the elderly, which has also been echoed in other similar studies. Based on the present results, interdisciplinary healthcare teams should consider social support and access to

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The prevalence was not shown in the conclusion

healthcare when developing interventions for encouraging and promoting health outcomes in order to improve physical and psychological problem-preventive behaviours in the elderly during the COVID-19 pandemic and for the government in terms of increasing family income, particularly by increasing the oldest pension fee among elderly people for anticipation, even if the next pandemic will happen..

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