

Original Article



# Perceived Risks and Social, Economic, and Health Changes Among Older People in Thailand During the COVID-19 Pandemic

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**Abstract**

**Background:** The coronavirus disease 19 (COVID-19) pandemic and the accompanying restrictions have caused disruptions in the lives of older Thais. The present study aimed to determine the associations of perceived risks with social, economic, and health changes that occurred among people aged 60 years old and over during the implemented lockdown measures.

**Methods:** In this cross-sectional study, data from a survey on the Impact of COVID-19 on Older Persons in Thailand, with a sample size of 1230 collected in July 2020, were used for the analyses. An index was created using factor analysis from a list of perceived risks or worries during the COVID-19 pandemic. The mentioned index was then employed in an ordinary least squares regression model to explore associated factors that involved social, economic, and health changes.

**Results:** The results indicated that older individuals, who were married ( $\beta = -0.141$ ;  $P = 0.030$ ) and resided in rural areas ( $\beta = -0.218$ ;  $P < 0.001$ ), had lower levels of perceived risks or worries. Greater worry was related to individuals who had negative physical health changes during the pandemic ( $\beta = 0.177$ ;  $P < 0.001$ ) and those who had less mobility around their communities ( $\beta = 0.356$ ;  $P < 0.001$ ). Loss of employment ( $\beta = 0.318$ ;  $P = 0.004$ ) and income inadequacy before the pandemic ( $\beta = 0.370$ ;  $P < 0.001$ ) and only during the pandemic ( $\beta = 0.169$ ;  $P = 0.040$ ) had positive associations with perceived risk.

**Conclusion:** Observing psychological health is necessary for the protection of the older population's well-being. The COVID-19 pandemic being an unprecedented event has shown the need to ensure the social and economic protection of this age group as they are highly vulnerable.

**Keywords:** Risk, Healthy aging, COVID-19, Developing economies

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## Introduction

The coronavirus disease 19 (COVID-19) pandemic has urged low- and middle-income countries (LMICs) to strengthen their health systems, including ensuring adequate medical supplies and effective service provisions (1). It has also called for a kind of public health response that mostly centers on limiting people's mobility to mitigate the spread of the virus. In Thailand, for example, national lockdown and sheltering in place were immediately imposed at the onset of the pandemic. Although these methods were central in handling the situation, they gravely obstructed various aspects of social life.

The above-mentioned measures, which were also implemented in other countries, had a significant impact on people's health and well-being (2). For instance, physical distancing was found to negatively affect adults' behaviors such as increased consumption of snacks and alcohol (3) and

decreased physical activity (4). Because of minimal social interactions, employment problems, and generally stressful situations, adults' experience of anxiety, along with other negative emotions such as loneliness, was also observed to have increased during the COVID-19 outbreak (2).

Older people were especially vulnerable during the pandemic because lockdown measures can further strain their health condition (5). Accordingly, it is important to investigate how the pandemic and different means performed by authorities to prevent the transmission of the virus have impacted their health. Additionally, it is essential to focus on the dimensions of health that are not often examined with regard to the COVID-19 outbreak and even specific contexts defined by socioeconomic indicators. For example, mental stress has been generally overlooked in the literature concerning LMIC (6). The relevance of probing it in connection with the public health



crisis brought about by COVID-19 has been emphasized in previous studies, indicating that perceived risk or worry, being a negative manifestation of psychological health, was associated with lower quality of life during the pandemic (7). Another related study conducted in China demonstrated that people with diabetes had a greater perceived risk of being infected with COVID-19 than non-diabetic individuals (8). This line of research only strengthens the need to further probe this issue.

The present study examined perceived risk, as a facet of effect, among older adults in Thailand during the pandemic. In particular, the analysis involved determining the associations of the level of perceived risk, which is also identified as worry, with social characteristics and specific changes they experienced in this regard. The degree of worry was measured as it could be taken as a gauge of emotional resilience whereas the other variables were primarily assessed because the socialization, income, and employment changes caused by the pandemic were unprecedented.

## Materials and Methods

### Data

The current cross-sectional study employed the data derived from the 2020 survey entitled the Impact of COVID-19 on Older Persons in Thailand Survey. Basically, the instrument focused on the influence of the COVID-19 outbreak and lockdown measures on various life aspects of Thais aged at least 60 years old (9). The data were collected via online platforms because even though the national lockdown was lifted by July 2020, person-to-person interaction remained to be avoided as per the government's recommendation. The administration of the survey was approved by the ethics review board of a university. The sampling procedure included multistage and proportionate-to-size probability designs with geographic and administrative stratifications. First, the country was divided into five strata of North, Central, Northeast, South, and Bangkok. Each stratum was further classified into urban and rural categories. Within each region, two provinces were finally selected to represent the older persons in Thailand. Overall, the response rate was 93%, and the resulting number was 1230 valid responses. Upon informing the respondents of the purpose of the survey and after assuring anonymity of identification information, consent was obtained from them.

### Measures

#### Perceived Risk Status

The respondents were asked if they had specific perceived risks or worries regarding the COVID-19 outbreak from March to May 2020. This duration refers to the implementation of national lockdown measures in Thailand. Noting that the perceived risk status during the pandemic has been defined and operationalized differently based on societal factors and age groups (7,8), the set of measures for this study was evaluated for appropriateness,

and it was consequently deemed suitable for older people in Thailand (10,11).

Seven items of the survey were related to fear of being infected by the virus (or a family member getting it), worsening health because of missed medical appointments, unstable family financial status, uncertainty about accessibility to treatment for COVID-19, conflicts with family during the lockdown, living alone if family members become infected, and inability to purchase daily necessities. Respondents could answer yes or no to each survey item; therefore, multiple answers were acceptable if they applied to the individual. When all seven items are taken as a composite, the higher total score pertains to more perceived risks. The survey also had an open-ended item on the causes of worry, but none of the respondents answered it.

#### Social Characteristics

The selected demographic characteristics were included in the analyses. The respondents' ages were categorized into groups of 60-69, 70-79, and 80 years old and above. Gender, urban-rural residence, marital status, and the state of living (living alone or not) were also included in the model. For educational attainment, several categories were used, including lower than the primary level of education or no education, the primary level of education (including the 4-6<sup>th</sup> grade of education), and higher than the primary level of education.

#### Health Changes

The first measure for health changes was mostly based on the respondents' physiological functions. They were asked about their vision, hearing, mobility, communication, memory, and personal care capacities before and during the pandemic. The response options for these items were worse, better, and the same functioning level. The responses to these questions allowed for comparing their functions before and during the outbreak. Responses suggesting that at least one aspect of functioning became worse from March to May 2020 were classified as having had a negative change in health status. It must be noted that these items did not aim to offer official medical diagnoses; instead, the goal was to represent the respondents' perceptions of their health, similar to previous surveys and studies performed in the country (12,13).

The other measure for health change was based on the question about the self-perception of the overall health status: "Compared to before (the pandemic), how would you rate your health during the COVID-19 outbreak?" Although this item had three response options (i.e., same, worse, or better), it was treated as a dichotomous variable to allow for the comparison of those who had worse self-perceived health status and those who had the same or better perceptions of their health condition.

#### Social Engagement Changes

The respondents were asked how the lockdown measures

affected their routines. For the community mobility limitations experienced by older Thais, four indicators were combined, including leaving the house for errands, going grocery shopping, keeping medical appointments, and attending religious ceremonies. The responses affirming that they had experienced limitations with regard to at least one of the four enumerated situations were classified as having decreased mobility during the outbreak. The other aspect of social engagement was socialization, which was measured using indicators such as meeting family and relatives, meeting friends, and participating in community activities. Similar to community mobility limitations, responses indicating that at least one aspect had been affected by the pandemic were interpreted as having decreased the level of socialization.

### *Economic Status Changes*

Employment status was measured with reference to the period before and during the COVID-19 outbreak to determine if older Thais had experienced the loss of employment. They were asked if they worked in any capacity within 12 months before the onset of the pandemic. If they had a job, a subsequent question was asked to determine if their work was affected from March to May 2020. Employment status then had three response categories, including no work before and during the pandemic, employed before and during the pandemic, and lost employment during the pandemic.

The perceived change in income adequacy was measured by asking the respondents to indicate their assessment of the sufficiency of their income before and during the pandemic. It had three categories, including those who remained or elevated to the level of having adequate income, those who remained having inadequate income before and during the pandemic, and those who had adequate income before and experienced income inadequacy during the pandemic.

### *Analytic Method*

Descriptive statistics were employed to present the characteristics of the sample. Then, factor analysis based on principal components was performed to reduce the number of indicators pertaining to perceived risk status. As the primary criterion, an eigenvalue of greater than 1.0 was used to define the number of factors (14). To indicate the level of perceived risk, a composite index was created from the seven items pertaining to the above-mentioned perceived risks. Several tests were performed to identify the suitability of the analytical method. Indicators with factor loadings of  $>0.45$  were within the acceptable threshold (15,16). The Kaiser-Meyer-Olkin measure of the sampling adequacy of 0.813 was above the acceptable limits (17), and the inter-item reliability of 0.731 was within the standards (18).

Principal components analysis was applied to identify and compute a composite score. The initial eigenvalues showed that a one-factor solution was appropriate

because it was the only factor that met the Kaiser criterion whereby the eigenvalue is above 1.0. The mentioned factor explained 40% of the variance. A composite score was then calculated from the one factor based on the means of the items that had corresponding primary loadings (Table 1). As mentioned above, a higher score represented an increased level of perceived risk or worry. The mean score of the generated scale was 4.09.

A composite index of the perceived risk level was generated for use in the succeeding regression analyses. The analyses involved the use of ordinary least squares regression treatment and were conducted for four additive models. Additive model analyses were performed to isolate and demonstrate the effects of variables pertaining to health, social engagement, and economic changes. Model 1 included social characteristics, and negative health changes were added in Model 2. Social engagement factors were included in Model 3. Finally, Model 4 encompassed economic status changes. Wald statistic and Akaike information criterion (AIC) were tested to determine the significance of these sets of factors (15).

### **Results**

Sample characteristics are presented in Table 2. More than half of the respondents were in the range of 60-69 years old. Most respondents were females (55.4%), resided in rural areas (57.9%), and were married (63.7%). Nearly 6% of older Thais were living alone. Most respondents (64%) had a primary level of education.

Changes in health status were reported to have occurred among respondents. Approximately 68% experienced a decline in health functioning, and about 17% rated their health status to have worsened during the pandemic. Social engagement was negatively affected as well. Nearly 76% and 57% had reduced physical movement within their community and decreased socialization, respectively. Economic opportunities also worsened; more precisely, 39% of the sample lost employment, and 17% experienced their income becoming insufficient for their daily needs.

The created latent variable was then utilized for regression analyses. As previously discussed, additive model analyses were applied where four models were tested to identify

**Table 1.** Factor Loading of Indicators for the Perceived Risk Level

	Mean (SD)	Factor Loading
Fear of myself or a family member being infected	41.4 (0.49)	0.593
Worse health status due to missed medical appointment	17.9 (0.38)	0.659
Personal and family finances	28.3 (0.45)	0.645
Accessibility to the treatment for COVID-19	11.5 (0.32)	0.711
Conflicts within the household	4.4 (0.20)	0.599
Living alone if a family member becomes infected	10.0 (0.30)	0.627
Inability to purchase necessities	11.0 (0.31)	0.587

Note. SD: Standard deviation; COVID-19: Coronavirus disease 19.

**Table 2.** Percentage Distribution of Sample Characteristics (N = 1230)

Characteristics	Percent
Age groups	
60-69	57.5
70-79	30.6
80+	12.0
Gender (% female)	55.4
Residence (% rural)	57.9
Marital status (% married)	63.7
Living arrangement (% living alone)	5.5
Education attainment	
Lower than primary level	7.4
Primary level (4-6 years)	68.7
Higher than primary level	23.9
Had at least one negative health change	67.6
Worse self-rated health	17.3
Reduced mobility	76.3
Lessened socialisation	56.3
Employment status	
Continued working during pandemic	8.9
Not working before and during COVID-19	52.8
Loss work during outbreak	38.4
Income adequacy change	
Adequate	36.3
Remained inadequate	46.5
Became inadequate	17.2

Note. COVID-19: Coronavirus disease 19.

Source. Impact of COVID-19 on Older Persons in Thailand Survey.

the effect of different variables on the outcome (Table 3). Subsequent inclusions of factors from Models 1 to 4 were observed to be fit as demonstrated by the increasing Wald static figures and the decreasing AIC values.

Across the four model iterations (Table 3), being in the age group of at least 80 years old, residing in rural areas, and being married were shown to be associated with lower levels of perceived risk. Being female was another characteristic that was observed to be consistently statistically significant across the models, but it was found that there was an increased level of perceived risk for the mentioned population characteristic. In Model 4, both variables depicting negative health changes were demonstrated to increase the level of perceived risks surrounding the pandemic ( $\beta=0.177$ ;  $P<0.001$ ). With regard to social engagement factors, only mobility limitation during the outbreak was positively associated with the outcome ( $\beta=0.356$ ;  $P<0.001$ ). Employment loss ( $\beta=0.318$ ;  $P=0.004$ ) and income inadequacy from before the pandemic ( $\beta=0.370$ ;  $P<0.001$ ) and only during the pandemic ( $\beta=0.169$ ;  $P=0.040$ ) were found to be related to a greater level of worry.

### Discussion

Risk perceptions among older people during the pandemic are not limited to contracting the infection as multifarious social contexts also contribute to psychological or mental stress. As demonstrated in the present study, perceived

**Table 3.** Regression Coefficients of Social Characteristics and Changes in Health, Employment, and Income Status on the Perceived Risk Level

	Model 1		Model 2		Model 3		Model 4	
	$\beta$	95% CI	$\beta$	95% CI	$\beta$	95% CI	$\beta$	95% CI
Age groups								
70-79	-0.070	(-0.193, 0.054)	-0.108	(-0.231, 0.016)	-0.084	(-0.207, 0.039)	-0.035	(-0.60, 0.089)
80+	-0.389***	(-0.571, -0.208)	-0.427***	(-0.609, -0.246)	-0.371***	(-0.551, -0.190)	-0.274**	(-0.460, -0.088)
Female	0.181**	(0.067, 0.295)	0.164**	(0.051, 0.277)	0.159**	(0.047, 0.270)	0.153*	(0.043, 0.262)
Rural residence	-0.308***	(-0.419, -0.196)	-0.224***	(-0.338, -0.111)	-0.265***	(-0.380, -0.149)	-0.218***	(-0.334, -0.102)
Married	-0.120*	(-0.244, 0.003)	-0.110*	(-0.232, 0.011)	-0.112*	(-0.233, 0.009)	-0.141*	(-0.260, -0.021)
Living alone	-0.404	(-0.652, -0.157)	-0.437	(-0.681, -0.193)	-0.424	(-0.666, -0.182)	-0.438	(-0.675, -0.201)
Education attainment								
Primary level	0.099	(-0.117, 0.315)	0.095	(-0.119, 0.309)	0.126	(-0.086, 0.338)	0.069	(-0.142, 0.280)
Higher than primary	0.191	(-0.008, 0.390)	0.160	(-0.037, 0.357)	0.154	(-0.041, 0.349)	0.080	(-0.112, 0.273)
Had negative health change			0.244***	(0.124, 0.365)	0.216**	(0.096, 0.337)	0.170**	(0.050, 0.290)
Worse SRH			0.317***	(0.169, 0.465)	0.254***	(0.105, 0.402)	0.177**	(0.028, 0.326)
Reduced mobility					0.384***	(0.234, 0.534)	0.356***	(0.209, 0.503)
Lessened socialisation					-0.075	(-0.204, 0.053)	-0.122	(-0.249, 0.006)
Employment status								
Not working before and during COVID-19							0.135	(-0.068, 0.339)
Loss work during outbreak							0.318**	(0.111, 0.525)
Income adequacy								
Remained inadequate							0.370***	(0.246, 0.493)
Became inadequate							0.169*	(-0.004, 0.342)
F		9.300***		11.560***		12.140***		13.000***
AIC		3434.87		3400.141		3376.466		3328.978

Note. CI: Confidence interval; COVID-19: Coronavirus disease 19; SRH: Self-reported health;  $\beta$ : Regression coefficient; F: Wald statistic; AIC: Akaike information criterion. \*\*\* $P < 0.001$ , \*\* $P < 0.01$ , \* $P < 0.05$ .

risk was composed of matters of daily life, including tensions among household members and the capacity to purchase daily needs. In the current study, age, residence, and marital status were observed to be associated with lower perceived risk levels. On the other hand, gender, health changes, community movement limitations, and economic inadequacies were related to increased levels of perceived risk or worry.

Being in the oldest age group, living in rural areas, and being married were sociodemographic factors that were associated with decreased levels of perceived risk among older Thais. The results regarding the association between being at least 80 years old and having a lower level of worry are consistent with the findings of other similar studies (19,20). Looking into the heterogeneity of the older population is important because of their different contexts. Adults in Thailand belonging to the older age group receive greater filial support than those in the younger age groups of older adulthood (21). Marital status was another factor that was related to lower levels of worry. This has been linked with having an emotional support mechanism during difficult times (19).

Older Thais living in rural areas were also observed to have lower levels of perceived risk. Although access to health facilities is challenging in the rural areas of Thailand (22), the presence of village health volunteers has been viewed to be an effective public health mechanism (11). Older adults in rural areas may have better knowledge about COVID-19 because of the information they receive from village health volunteers, resulting in the development of a more positive attitude toward the pandemic and their adoption of preventive behaviors.

Gender was found to have an influence on how the pandemic was experienced by an individual. Women had an increased level of perceived risk during the COVID-19 outbreak. This finding conforms to the findings of other studies conducted in other societies (19,20). This may be linked with responsibilities that women have in the household and their resources which are lesser than those of males at older ages (23). Such social and economic burdens were underscored during the period of socioeconomic shock caused by the pandemic.

The changes in social and economic activities that occurred during the pandemic might have had an impact on various aspects of individual health. It is important to understand the relationship between physical and psychological health to determine how they possibly influence mortality (24). In the present study, it was observed that negative changes in health status had an effect on perceived worry, which is in line with the findings of previous research on other psychological outcomes (9,25). People's perceptions of their health were also affected by the COVID-19 outbreak because it disrupted many regular activities (26).

Moreover, mental health was affected by the pandemic because of lesser social contact (27). Based on the findings of the current study, limitations on mobility

within communities increased the level of worry. This is in contrast with the observations among older persons in Thailand whereby both mobility and socialization limitations were not associated with psychological distress (9). This represents how certain psychological symptoms such as anxiety and loneliness may be different from worry as it may be characterized as a cognitive effect that can take its toll on emotions (28).

Economic changes during the pandemic were prevalent among general adults and older people (10). It was found that stress and worry increased among Italians because adults had to continue working despite the pandemic (20). A different finding was observed in the present study where employment loss increased stress. The majority of older adults in Thailand continue to work (29), and most are also not enrolled in the pension system because they are part of the informal labor sector in their younger adult years (30). The level of worry increased during the pandemic because of the precariousness of work and access to financial resources.

Examining psychological health is important, particularly in the context of an emergency such as the COVID-19 outbreak. Several limitations were identified despite the contributions of the current study in exploring the mentioned theme. For instance, this study used cross-sectional data; therefore, causation could not be established. In addition, all health status indicators were self-reported. Considering that changes in the health status were assessed by the respondents based on their experiences and perceptions, these evaluations possibly differed from their actual health conditions. In other words, the recorded responses were not necessarily reflective of the medical diagnoses of physical and cognitive health.

## Conclusion

This study has presented a frequently overlooked aspect of health in LMIC. Various deviations from the status quo occurred among societies, including Thailand, during the pandemic. The demographic characteristics of older individuals, including residing in rural locations, being of the most advanced ages, and being married were associated with lower levels of perceived risk. Financial difficulties, negative health changes, and restrictions on outdoor movements were found to have a reverse influence on the mentioned association with the outcome of risk perception.

Vulnerable populations experience the situation differently as their social, health, and economic status has been at risk even prior to the pandemic. This has negative effects on their psychological disposition, and based on the findings, the level of perceived risk represented an increase, highlighting that it is central to monitor and ensure the well-being of the older population, especially in unprecedented occurrences.

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#### Authors' Contribution

Conceptualization: PMMV; Methodology: PMMV, JCP; Validation: JCP; Formal Analysis: PMMV, JCP; Investigation: PMMV; Resources: JCP; Data Curation: JCP; Writing—Original Draft Preparation: PMMV; Writing—Review and Editing: JCP; Visualization: PMMV.

#### Conflict of Interests

There is no conflict of interests.

#### Ethical Permissions

The survey was reviewed and approved by the Research Ethics Review Committee of Chulalongkorn University. No patient nor the public was directly involved in the design, conduct, or reporting plans of the research.

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#### References

- Bong CL, Brasher C, Chikumba E, McDougall R, Mellin-Olsen J, Enright A. The COVID-19 pandemic: effects on low-and middle-income countries. *Anesth Analg*. 2020;131(1):86-92. doi: [10.1213/ane.0000000000004846](https://doi.org/10.1213/ane.0000000000004846).
- Zacher H, Rudolph CW. Individual differences and changes in subjective wellbeing during the early stages of the COVID-19 pandemic. *Am Psychol*. 2021;76(1):50-62. doi: [10.1037/amp0000702](https://doi.org/10.1037/amp0000702).
- Ammar A, Brach M, Trabelsi K, Chtourou H, Boukhris O, Masmoudi L, et al. Effects of COVID-19 home confinement on eating behaviour and physical activity: results of the ECLB-COVID19 international online survey. *Nutrients*. 2020;12(6):1583. doi: [10.3390/nu12061583](https://doi.org/10.3390/nu12061583).
- Katewongsa P, Widyastaria DA, Saonnam P, Haematulin N, Wongsingha N. The effects of the COVID-19 pandemic on the physical activity of the Thai population: evidence from Thailand's Surveillance on Physical Activity 2020. *J Sport Health Sci*. 2021;10(3):341-8. doi: [10.1016/j.jshs.2020.10.001](https://doi.org/10.1016/j.jshs.2020.10.001).
- Le Couteur DG, Anderson RM, Newman AB. COVID-19 through the lens of gerontology. *J Gerontol A Biol Sci Med Sci*. 2020;75(9):e119-e20. doi: [10.1093/gerona/glaa077](https://doi.org/10.1093/gerona/glaa077).
- Vicerra PM, Pothisiri W. Projecting health needs of late life adults in Thailand: cognition-adjusted dependency and role of education. *J Public Health Dev*. 2020;18(2):37-57.
- Wilson JM, Lee J, Shook NJ. COVID-19 worries and mental health: the moderating effect of age. *Aging Ment Health*. 2021;25(7):1289-96. doi: [10.1080/13607863.2020.1856778](https://doi.org/10.1080/13607863.2020.1856778).
- Yan AF, Sun X, Zheng J, Mi B, Zuo H, Ruan G, et al. Perceived risk, behavior changes and health-related outcomes during COVID-19 pandemic: findings among adults with and without diabetes in China. *Diabetes Res Clin Pract*. 2020;167:108350. doi: [10.1016/j.diabres.2020.108350](https://doi.org/10.1016/j.diabres.2020.108350).
- Pothisiri W, Vicerra PMM. Psychological distress during COVID-19 pandemic in low-income and middle-income countries: a cross-sectional study of older persons in Thailand. *BMJ Open*. 2021;11(4):e047650. doi: [10.1136/bmjopen-2020-047650](https://doi.org/10.1136/bmjopen-2020-047650).
- Pothisiri W, Vicerra PMM, Buathong T. Poverty, noncommunicable diseases, and perceived health risks among older adults during the COVID-19 pandemic in urban Thailand. *Asian Soc Work Policy Rev*. 2022;16(2):126-35. doi: [10.1111/aswp.12253](https://doi.org/10.1111/aswp.12253).
- Vicerra PMM. Disparity between knowledge and practice regarding COVID-19 in Thailand: a cross-sectional study of older adults. *PLoS One*. 2021;16(10):e0259154. doi: [10.1371/journal.pone.0259154](https://doi.org/10.1371/journal.pone.0259154).
- Vicerra PMM. Self-determination and physical functioning as mediators of the association between self-reported sensory impairments and happiness among older adults. *Exp Aging Res*. 2022;48(3):274-86. doi: [10.1080/0361073x.2021.1980286](https://doi.org/10.1080/0361073x.2021.1980286).
- Teerawichitchainan B, Pothisiri W, Knodel J, Prachuabmoh V. Thailand's Older Persons and Their Well-Being: An Update Based on the 2017 Survey of Older Persons in Thailand. *HelpAge International*; 2019. <https://scholarbank.nus.edu.sg/handle/10635/157050>.
- Hair JF, Black WC, Babin BJ, Anderson RE. *Multivariate Data Analysis*. 7th ed. New Jersey: Prentice Hall; 2010.
- Pothisiri W, Vicerra PMM. Cognitive function, co-residence, and social participation among older persons in Thailand. *Soc Sci J*. 2021;1-14. doi: [10.1080/03623319.2020.1851076](https://doi.org/10.1080/03623319.2020.1851076).
- Doolittle A, Faul AC. Civic engagement scale: a validation study. *SAGE Open*. 2013;3(3):2158244013495542. doi: [10.1177/2158244013495542](https://doi.org/10.1177/2158244013495542).
- Reba K, Birhane BW, Gutema H. Validity and reliability of the Amharic version of the World Health Organization's quality of life questionnaire (WHOQOL-BREF) in patients with diagnosed type 2 diabetes in Felege Hiwot Referral Hospital, Ethiopia. *J Diabetes Res*. 2019;2019:3513159. doi: [10.1155/2019/3513159](https://doi.org/10.1155/2019/3513159).
- Streiner DL, Norman GR, Cairney J. *Health Measurement Scales: A Practical Guide to Their Development and Use*. USA: Oxford University Press; 2015.
- Whitehead BR, Torossian E. Older adults' experience of the COVID-19 pandemic: a mixed-methods analysis of stresses and joys. *Gerontologist*. 2021;61(1):36-47. doi: [10.1093/geront/gnaa126](https://doi.org/10.1093/geront/gnaa126).
- Mazza C, Ricci E, Biondi S, Colasanti M, Ferracuti S, Napoli C, et al. A nationwide survey of psychological distress among Italian people during the COVID-19 pandemic: immediate psychological responses and associated factors. *Int J Environ Res Public Health*. 2020;17(9):3165. doi: [10.3390/ijerph17093165](https://doi.org/10.3390/ijerph17093165).
- Knodel J, Kespichayawattana J, Saengtienchai C, Wiwatwanich S. How left behind are rural parents of migrant children? Evidence from Thailand. *Ageing Soc*. 2010;30(5):811-41. doi: [10.1017/s0144686x09990699](https://doi.org/10.1017/s0144686x09990699).
- Quashie NT, Pothisiri W. Rural-urban gaps in health care utilization among older Thais: the role of family support. *Arch Gerontol Geriatr*. 2019;81:201-8. doi: [10.1016/j.archger.2018.12.011](https://doi.org/10.1016/j.archger.2018.12.011).
- Knodel J, Chayovan N. Gender and ageing in Thailand: a situation analysis of older women and men. In: Devasahayam TW, ed. *Gender and Ageing: Southeast Asian Perspectives*. Institute of Southeast Asian Studies (ISEAS); 2014. p. 33-67.
- Downer B, Crowe M, Markides KS. Influence of type II diabetes and high depressive symptoms on the likelihood for developing activities of daily living (ADL) disability and mortality in older Puerto Ricans. *J Aging Health*. 2017;29(6):1079-95. doi: [10.1177/0898264317708882](https://doi.org/10.1177/0898264317708882).
- Gómez-Salgado J, Andrés-Villas M, Domínguez-Salas S, Díaz-Milanés D, Ruiz-Frutos C. Related health factors of psychological distress during the COVID-19 pandemic in Spain. *Int J Environ Res Public Health*. 2020;17(11):3947. doi: [10.3390/ijerph17113947](https://doi.org/10.3390/ijerph17113947).

26. Satici B, Gocet-Tekin E, Deniz ME, Satici SA. Adaptation of the Fear of COVID-19 Scale: its association with psychological distress and life satisfaction in Turkey. *Int J Ment Health Addict*. 2021;19(6):1980-8. doi: [10.1007/s11469-020-00294-0](https://doi.org/10.1007/s11469-020-00294-0).
27. Zysberg L, Zisberg A. Days of worry: emotional intelligence and social support mediate worry in the COVID-19 pandemic. *J Health Psychol*. 2022;27(2):268-77. doi: [10.1177/1359105320949935](https://doi.org/10.1177/1359105320949935).
28. Zebb BJ, Beck JG. Worry versus anxiety. Is there really a difference? *Behav Modif*. 1998;22(1):45-61. doi: [10.1177/01454455980221003](https://doi.org/10.1177/01454455980221003).
29. Adhikari R, Soonthorndhada K, Haseen F. Labor force participation in later life: evidence from a cross-sectional study in Thailand. *BMC Geriatr*. 2011;11:15. doi: [10.1186/1471-2318-11-15](https://doi.org/10.1186/1471-2318-11-15).
30. Suwanrada W, Wesumperuma D. Development of the old-age-allowance system in Thailand: challenges and policy implications. In: Handayani SW, Babajanian B, eds. *Social Protection for Older Persons: Social Pensions in Asia*. Asian Development Bank; 2012. p. 153-67.