


Factors Associated with Good COVID-19 Preventive Behaviors Among Older Adults in Urban Communities in Thailand

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Abstract

Introduction/Objectives: The coronavirus disease 2019 (COVID-19) pandemic has affected mobility and mortality entire age, especially older adults. The COVID-19 preventive behaviors among older adults during the pandemic should be determined. To our knowledge, little is known about the preventive behavior during the COVID-19 pandemic among older adults living in urban areas in Thailand and the factors predicted to their behavior. Hence, the present study aimed to assess COVID-19 preventive behaviors among older adults and to identify the associated factors. **Methods:** This cross-sectional study included 421 participants aged ≥ 60 years. Data were analyzed using descriptive statistics, binary and multiple logistic regression analysis. **Results:** We found that 321 (72.6%) of the participants had good COVID-19 preventive behaviors. Moreover, 83.4% of the participants had good family support and 58.2% had easy access to health information. Only sufficient income (odds ratio [OR]: 1.76, 95% confidence interval [CI]: 1.04-2.97), easy access to health services (OR: 3.66, 95% CI: 1.42-9.45) and protective material (OR: 1.98, 95% CI: 1.14-3.45), and good family support (OR: 2.05, 95% CI: 1.10-3.82) were associated with good COVID-19 preventive behaviors. In contrast, health literacy, access to health information, and neighbor and health personnel support were not associated with COVID-19 preventive behaviors. **Conclusion:** Based on the present 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, particularly among elderly people living in urban communities during the COVID-19 pandemic.

Keywords

COVID-19, health literacy, health behavior, social support, access to health services, urban communities

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Introduction

The coronavirus disease 2019 (COVID-19) pandemic is a public health concern, affecting all age groups.¹ Within a year, the causative virus has infected approximately 130 million individuals and caused over 2.8 million deaths worldwide.² A high proportion of deaths has been reported in older adults and individuals with poor health conditions. It is known that several countries, including Thailand, have aging or aged societies and a high proportion of older adults.³ The severity of COVID-19 and the resultant death of older adults are issues of public concern, and it is important to find ways to resolve the same.^{4,5} COVID-19 preventive behaviors include using masks correctly, washing hands frequently, maintaining social distance, and staying at home are importance to prevent COVID-19 infection.⁶

Health behaviors have been discussed in relation to health promotion over the past decade.⁷ In the past, we have provided health education through direct communication such as face-to-face counseling or group health education.⁸ During the COVID-19 pandemic, health education has changed.^{9,10} Most people get their knowledge through online media and referrals from close people. With previous

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study, Yodmai¹¹ indicated that poor attitudes in media use for health care and counseling among the elderly and their family members in Southeast Thailand. Even those participants used their smartphones regularly, but not for health care. While, a study of Horne et al,¹² indicated that health personal can be a motivator to only initial change the behavior in older adult but not a long time or maintain their practices. In Thailand, media campaigns and home visits by public health volunteers and public health workers have resulted in the successful prevention of COVID-19 to a large extent.¹³ Nevertheless, elderly people continue to be a high-risk group.⁴ In the past, most elderly people have received health promotion information from healthcare professionals during physician visits, elderly club activities, and routine home visits.⁷ However, they continue to have adverse health problems and behaviors, as evidenced in past health surveys.⁷ The COVID-19 preventive behaviors among elderly people in Thailand during the pandemic and the associated factors remain unknown.

With literature review, the health care behavior among older adults was acceptable.

Previous studies indicated that factors association with healthcare behaviors such as exercise, eating healthy food, and continue health follow-up were associated their health literacy,^{14,15} social support,¹⁶ and accessible to health information.¹⁷ Individuals with inadequate health literacy are more likely to have health risk behaviors, such as substance use, poor physical activity,^{14,18} health risk behavior,¹⁹ and influenza vaccination.²⁰ Therefore, many studies have used the concept of health literacy to promote individual health. However, some studies have reported that health behaviors and health outcomes are not solely associated with health literacy. For instance Kim et al,²¹ reported that adequate health literacy is not associated with health behaviors. In their study, individuals with adequate health literacy and those with inadequate health literacy who received health education did not exhibit significantly different health behaviors and health management.²¹ Individuals with adequate health literacy seem to have an understanding of health and have some, albeit not all, healthy habits. However, the relationship between health literacy and health behaviors remains unclear. Although most studies have identified the association between health literacy and health behaviors, such as diabetes management,^{22,23} few studies have been conducted on this topic during the COVID-19 pandemic.

In epidemiology, social support was focused on relationship, function, and network in a personal, which influence to the individual knowledge, perception, and healthcare behaviors such as exercise, eating healthy food, and vaccination. By the social support theory of Cobb²⁴ and House et al,²⁵ divided the social support into 4 domains, instrument, emotional, information, and appraisal supports. A study of Wu and Sheng²⁶ demonstrated that social support

especial family and neighbors was improved the individual self-efficacy which was related to self-care and health behaviors. However, the source of social support is an important factor that contributes to different health behaviors. Several studies indicated source of social support in older adult were family, friends or neighbors, and health persons were related to their health behaviors.^{7,26,27} A study of Harvey and O'Hanlon²⁸ found that positive friend support was associated to physical activities, while family member was not associated with it. While a study of Lindsay et al,²⁹ indicated that social support, especially family support was associated with physical activities in older adults. With previous study, Yodmai, Somrongthong, Nanthamongkolchai, and Suksatan²⁷ demonstrated older adults who received good social support from family improved their healthcare behaviors and their quality of life. Indeed, social support is an indicator of improving knowledge, attitude, and practice on health in the general population, including older adults. During the pandemic and limitation of the source of information may influence their short time changing behavior in an older adult that it might influence their behavior.

As mentioned above, access health information and services associated with individual healthcare behaviors such exercise, eating healthy food, and vaccination. Accessibility of healthcare and information was mentioned in several studies. It means having timely use personal health services to achieve health outcome. During pandemic, accessibility refers to protection materials such as mask, alcohol gel, soup, and clean water, to health services including routine services and COVID-19 screening services, and to health information such as how to prevention disease, how to contact health personal when get health problem. Environment factors such as healthcare services, protection equipment, and information were associated to health behaviors. In current situation, several factors have been changed due to the pandemic such as limitation to access healthcare services and processing to access to care was difference. Methods of access to health information may change in some society and using the internet to communication may be difficult to assess health information especially in older adults. According to the PRECEDE-PROCEED model,³⁰ this study was exploring the factors association with COVID-19 prevention behavior by using the third and fourth stage of model to understand situation of behavior and factors to related with it, then, to recommendation for further health promotion during this pandemic.

Materials and Methods

Study Design and Sample

The present cross-sectional study was conducted at 3 urban communities in Ubon Ratchathani Province (northeast

region), Thailand. Older adult aged 60 years both genders who were able to speak and read the official language of Thailand, and who resided study area were randomly selected and included in the study. Older adult with unable communication or diagnostic with cognitive impairments was excluded.

A suitable sample size for statistical analysis was calculated using the G*Power program,³¹ which estimated the sample size for the multiple logistic regression analysis following Hsieh et al,³² and Bujang et al,³³ recommendations. Three hundred seventy participants were required to perform a multiple logistic regression analysis yielding a power of 0.80, at a 2-sided significance level of .05, with approximately 13% being added considering potential incomplete responses. Hence, the final sample size was set to 421 participants who met the inclusion criteria and were willing to participate in the study.

Sampling technique was used by multi-stage sample technique, first, sampling was started by selected 1 district in each district health zone (there are 3 district health zones). Second, there are 1 urban community as known as municipal area in each district was selected. Finally, there were simple randomly selected the target population by using community name list. After Institutional Review Board approval, we met with participants and explained the study aims and procedures, as well as sample rights protection. Signed informed consent was obtained from all participants willing to participate. Participants spent approximately 15 to 20 min completing the self-reported questionnaire. After participants completed the questionnaire, we checked the completeness of the questionnaire information. If an incomplete questionnaire was found, we informed the respondents to complete the questionnaire. All respondents were free to withdraw anytime, and confidentiality of the participants was ensured.

Research Measurements

For data collection, structural questionnaires were developed on the basis of theory and literature reviews. Five types of questionnaires with Thai version were used for collecting the participants' data. All measurements were content validated by 3 expertise in public health and aging's health. The overall of content validity of all instruments were judged 1.00 by a panel of 3 experts and the interrater reliability was assessed for 30 participants with the self-reported questionnaire between principal investigator (PI) and co-principal investigator (Co-PI) in all settings, identifying acceptable values of 0.77 to 0.93.

Sociodemographic questionnaire. The general characteristics of the participants were assessed using a 5-item questionnaire consisting of multiple-choice and open-ended questions on the participants' sex, education level, marital status,

income sufficiency, and presence or absence of chronic illness. Income sufficiency and currently chronic illness were self-rating and perception.

Health literacy scale (HLS). The 24-item HLS version 2020 developed by the Health Education Division, Department of Health Services Support, Health Education Department Ministry of Public Health³⁴ was used to assess health literacy. It consists of 5 answer options, namely strongly disagree, disagree, neither agree nor disagree, agree, and strongly agree, which correspond to 1, 2, 3, 4, and 5 points, respectively. The total score is between 24 and 120 points, with scores of 60 to 120 points indicating adequate health literacy. Cronbach's alpha was .93 in the present study.

Social support scale (SSS). The SSS, which was developed using the social support theory of Cobb²⁴ and House et al,²⁵ was used to assess social support. This scale assesses family support, neighbor support, and health personnel support. Family support is assessed using 8 items with 4 rating scales. The total score is 8 to 32 points, with a score of 25 to 32 points indicating good social support. Neighbor support and health personnel support are assessed using 7 items with 4 rating scales. The total score is 7 to 28 points, with a score of 22 to 28 points indicating good social support. The psychometric properties of the SSS were satisfactory, with Cronbach's alpha being .79 in the present study.

Access to health information scale (AHIS). The 9-item AHIS was developed on the basis of theory and literature reviews. It assesses the ease to access health services, protective material, and health information using yes-no questions; for example, "Did you regularly access health information from public health officials?" The answer "yes" corresponds to 1 point. The total scores range from 0 to 9 points, with a score of 7 to 9 points indicating good access to health information. Cronbach's alpha was .71 in the present study.

COVID-19 preventive behavior scale. The COVID-19 Preventive Behavior Scale was developed on the basis of purpose of study and recommendation of COVID-19 prevention by Ministry of Public Health, Thailand. It consists of 15 items with 3 answer choices, namely never, sometimes, and always, which correspond to 1, 2, and 3 points, respectively. A score of 36 to 45 points (scored 15-45 points) indicates good preventive behavior. Cronbach's alpha was .77 in the present study.

Data Collection

In the present study, data collection was performed between January 2021 and February 2021. After obtaining institutional review board (IRB) approval, researchers and well-train data collectors met the participants, described the

study aims and procedures, and informed them of their rights and protection. Signed informed consent was obtained from all participants who were willing to participate in the study. Both Thai and Esan languages were used during data collection. The participants spent around 15 to 20 min in answering the questionnaires. However, the participants were informed that they could withdraw anytime if they preferred to leave or felt uncomfortable in completing the questionnaires. After the participants completed providing their responses, the PI and Co-PI checked the completeness of all the questionnaires; incomplete questionnaires were excluded. The confidentiality of the participants was ensured; the information obtained in the present study is not publicly available on account of the data that may compromise the participants' privacy.

Data Analysis

All the data were analyzed using Statistical Package for the Social Sciences version 21 (SPSS, Chicago, IL). The data are presented as the frequency, percentage, mean, and standard deviation (SD). Binary logistic regression analysis was performed to examine the association between dependent and independent variables. Good COVID-19 preventive behaviors, adequate health literacy, good social support from family, neighbor, health personal, and easy access to health services in care settings, to protective materials, and to health information were code as 1, and 0. Only significant factors at the binary logistic regression were entry to multiple logistic regression analysis. Crude and adjusted odds ratios (CORs and AORs) with 95% CIs were calculated to show the strength of associations. A *P*-value of $<.05$ was considered statistically significant.

Results

Participants' Characteristics

Most participants were female (62.7%), had attended primary school (63.4%), and were married (64.1%). The average age of the participants was 70 (± 6.5) years (range, 60-82 years). In total, 69.6% of the participants had sufficient income, while the remaining 30.4% had insufficient income. Over 60% of the participants were diagnosed with at least 1 chronic disease, such as diabetes, hypertension, dyslipidemia, and chronic kidney disease.

The health literacy of 72.9% of the participants was adequate, while that of the remaining 27.1% was inadequate. Regarding social support, 83.4% of the participants had good family support, 67.9% had good neighbor support, and 70.1% had good health personnel support. Moreover, 12.6% of the participants had easy access to health services in care settings, 31.1% had easy access to protective materials, and 58.2% had easy access to health information.

Regarding COVID-19 preventive behaviors, 321 (76.2%) participants had good preventive behaviors, 89 (21.1%) had fair preventive behaviors, and 11 (2.6%) had poor preventive behaviors. When considered in each item of good preventive behaviors, most of participants was always wash their hands before and after eating (85.3%, $n=359$) and participants always eat freshly cooked food (84.1%, $n=354$). Followed by always wearing a mask when going out of the house and cover their mouth and nose when coughing or sneezing (83.8%, $n=353$) (Table 1).

Factors Associated with Preventive Behaviors

We found that predisposing factors, such as sufficient income and health literacy; reinforcing factors, such as social support; and enabling factors, such as easy access to health services, were significantly associated with COVID-19 preventive behaviors among elderly people ($P < .05$). Participants with sufficient income were almost 2 times more likely to have good preventive behaviors than those with insufficient income (OR: 1.67, 95% CI: 1.04-2.67, $P < .05$). Adequate health literacy was more than twice as likely to result in good preventive behaviors (OR: 2.23, 95% CI: 1.38-3.59, $P < .01$). In addition, more than 3 times as many participants with good family support (OR: 3.51, 95% CI: 2.04-6.01, $P < .01$) had good preventive behaviors. Similarly, almost 3 times as many participants with good neighbor support (OR: 2.78, 95% CI: 1.75-4.47, $P < .01$) had good preventive behaviors. Moreover, more than twice as many participants with good health personnel support (OR: 2.16, 95% CI: 1.36-3.46, $P < .01$) had good preventive behaviors. Over twice as many participants with easy access to health services (OR: 2.69, 95% CI: 1.11-6.49, $P < .05$) and protective material (OR: 2.54, 95% CI: 1.51-4.28 $P < .01$) had good preventive behaviors, while 1.82 times as many participants with easy access to health information (OR: 1.82, 95% CI: 1.15-2.85 $P < .01$) had good preventive behaviors (Table 2). In contrast, the participants' sex, education level, marital status, and chronic illness did not have a significant association with their COVID-19 preventive behaviors (Table 2).

The results of multiple logistic regression analysis revealed that only sufficient income, easy access to health services and protective material, and good family support were associated with good COVID-19 preventive behaviors ($P < .05$). We found that participants with sufficient income were 1.76 times more likely to have good preventive behaviors than those with insufficient income (OR: 1.76, 95% CI: 1.04-2.97, $P < .05$). Moreover, participants with easy access to health services were over 3 times more likely to have good preventive behaviors than those without easy access to health services (OR: 3.66, 95% CI: 1.42-9.45, $P < .01$). Almost twice as many participants with easy access to protective material had good preventive behaviors (OR: 1.98, 95% CI: 1.14-3.45, $P < .05$). In addition, participants with

Table 1. Number, Percentage, Mean and Standard Deviation (SD) of Good COVID-19 Preventive Behaviors.

Good COVID-19 prevention behavior	Mean \pm SD	Never	Sometimes	Always
1. Wear a mask when going out of the house.	3 \pm 0.44	9 (2.1%)	59 (14.0%)	353 (83.8%)
2. Cover your mouth and nose when coughing or sneezing.	3 \pm 0.42	6 (1.4%)	62 (14.7%)	353 (83.8%)
3. Wash your hands with soap or alcohol when coughing or sneezing.	3 \pm 0.46	8 (1.9%)	75 (17.8%)	338 (80.3%)
4. Eat freshly cooked food	3 \pm 0.42	7 (1.7%)	60 (14.3%)	354 (84.1%)
5. using medium spoon or divide the soup into the cup before eating	3 \pm 0.52	10 (2.4%)	117 (27.8%)	294 (69.8%)
6. Wash your hands before and after eating.	3 \pm 0.40	5 (1.2%)	57 (13.5%)	359 (85.3%)
7. No use other personal equipment such glass, spoon, and hankie.	3 \pm 0.59	27 (6.4%)	84 (20.0%)	310 (73.6%)
8. Avoid going to crowded places.	3 \pm 0.51	11 (2.6%)	97 (23.0%)	313 (74.3%)
9. Take shower and change clothes when you get home from outside	3 \pm 0.54	13 (3.1%)	117 (27.8%)	291 (69.1%)
10. Keep a distance of at least 2 meters when with other people.	3 \pm 0.46	6 (1.4%)	86 (20.4%)	329 (78.1%)
11. Avoid touching face, rubbing eyes in public	3 \pm 0.45	8 (1.9%)	70 (16.6%)	343 (81.5%)
12. Wash hands with alcohol gel every time you touch things or money.	3 \pm 0.51	10 (2.4%)	113 (26.8%)	298 (70.8%)
13. Wash hand with soap or alcohol gel when touching mask	3 \pm 0.50	10 (2.4%)	96 (22.8%)	315 (74.8%)
14. Not eat with another person	3 \pm 0.50	11 (2.6%)	92 (21.9%)	318 (75.5%)
15. Take rest or sleep at least 6-8 hours per day	3 \pm 0.46	8 (1.9%)	77 (18.3%)	336 (79.8%)

good family support were more likely have good preventive behaviors than those without good family support (OR: 2.05, 95% CI: 1.10-3.82, $P < .5$). Adequate health literacy, easy access to health information, and good neighbor and health personnel support were likely to predict preventive behaviors; however, the association was not statistically significant ($P > .05$) (Table 2).

Discussion

The present study focused on assessing and strengthening the COVID-19 preventive behaviors among elderly people living in urban areas during the COVID-19 pandemic.

We found that sufficient income was associated with good COVID-19 preventive behaviors among the study participants. Previous studies have reported high income to be significantly associated with better preventive behaviors among older adults.^{35,36} In other words, older adults with adequate income have a better chance at reaping the benefits of healthy habits and preventive behaviors than those with low income.³⁵ Wang and Tang³⁷ reported that adequate income or financial security is associated with health behaviors because adequate income is important for health-promoting behaviors among elderly people. However, several families have faced adversity in their businesses during the COVID-19 pandemic, which may have affected the family income and health-promoting behaviors,^{38,39} particularly among older adults living in urban communities. Therefore, adequate income is a significant factor for promoting and encouraging the health behaviors of older adults living in urban communities.

We found that social support was a reinforcing factor influencing preventive behaviors among older adults. Moreover, good family support was significantly associated with good COVID-19 preventive behaviors among

older adults. Similarly, previous studies have revealed family support to be a significant factor that can improve an individual's well-being.^{40,41} Son et al,⁴² reported family support to be associated with improved physical and mental well-being and improved exercise adherence in older adults. Interestingly, the current family support among older adults is significantly lesser than that during the previous phase of the COVID-19 pandemic.⁴³ Reduced family support among older adults is associated with increased psychological problems (such as stress and anxiety) and decreased mental well-being and quality of life;⁴³ this is likely to explain our findings. However, neighbor support has been reported to be important for communicating health information; this serves as a role model for behavior change and can be useful for promoting health.^{44,45} These data indicate that older adults who belong to families with good health-promoting behaviors will have good health behaviors to prevent COVID-19 and improve their health outcomes.

We also found that access to health services and access to protective material were associated with COVID-19 preventive behaviors among older adults. The ability to access health services is a fundamental variable that correlates with health behaviors and enabling factors, including environmental factors, which directly influence health behaviors and play a role in preventing illnesses associated with individual behavior.¹⁹ Similarly, previous research has revealed that accessibility is a factor that explains the relationship between the individual and healthcare system.⁴⁶ For instance, it mediates the relationship between seeking and accessing health services.⁴⁷ Access to health services is one of the principal factors for analyzing the performance and quality of health systems.⁴⁸ Moreover, access to public health programs in health systems is in itself a significant social determinant.⁴⁷

Table 2. Factors Associated with Good COVID-19 Preventive Behaviors Among Older Adults.

Variables	Behavior; n (%)		COR (95%CI)	P-value	AOR (95% CI)	P-value
	Total	Good				
Sex						
Male	157 (37.3%)	118 (75.2%)	1		1	
Female	264 (62.7%)	203 (76.9%)	1.10 (0.69-1.75)	.68	1.02 (0.61-1.70)	.94
Education level						
Primary school	267 (63.4%)	201 (75.3%)	1		1	
Higher	154 (36.6%)	120 (77.9%)	1.16 (0.72-1.86)	.54	1.00 (0.58 -1.72)	.99
Marital status						
No	151 (35.9%)	120 (79.5%)	1		1	
Married	207 (64.1%)	201 (74.4%)	0.75 (0.47-1.22)	.25	0.68 (0.39-1.17)	.16
Sufficient income						
No	128 (30.4%)	89 (69.5%)	1		1	
Yes	293 (69.6%)	232 (79.2%)	1.67 (1.04-2.67)	.03*	1.80 (1.04-3.10)	.035*
Chronically illness						
No	162 (38.5%)	122 (75.3%)	1		1	
Yes	259 (61.5%)	199 (76.8%)	1.09 (0.69-1.72)	.72	1.20 (0.72-2.00)	.48
Health literacy						
Inadequate	114 (27.1%)	74 (17.6%)	1		1	
Adequate	307 (72.9%)	247 (80.5%)	2.23 (1.38-3.59)	.01*	1.52 (0.88-2.64)	.13
Received high family support						
No	70 (16.6%)	38 (54.3%)	1		1	
Yes	351 (83.4%)	283 (80.6%)	3.51(2.04-6.01)	<.01*	2.06 (1.09 -3.88)	.025*
Received high neighbor support						
No	135 (32.1%)	85 (63.0%)	1		1	
Yes	286 (67.9%)	236 (82.5%)	2.78 (1.75-4.42)	<.01*	1.71 (0.96-3.04)	.07
Received high health personal support						
No	126 (29.9%)	83 (19.7%)	1		1	
Yes	295 (70.1%)	238 (55.5%)	2.16 (1.36-3.46)	<.01*	1.24 (0.70-2.21)	.46
Access to health services						
No	368 (87.4%)	274 (65.1%)	1		1	
Yes	53 (12.6%)	47 (88.7%)	2.69 (1.11-6.49)	.02*	3.89 (1.49-10.17)	<.01*
Access to protection material						
No	265 (62.9%)	187 (70.6%)	1		1	
Yes	156 (37.1%)	134 (85.9%)	2.54 (1.51-4.28)	<.01*	1.93 (1.10-3.39)	.02*
Access to health information						
No	176 (41.8%)	123 (29.2%)	1		1	
Yes	245 (58.2%)	198 (47.0%)	1.82 (1.15-2.85)	.01*	1.105 (0.64-1.90)	.72

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; COR, crude odds ratio.

*Significant association in univariate and multivariate analysis, 1 = reference.

Interestingly, we found that easy access to protective material was associated with COVID-19 preventive behaviors among older adults. However, during the COVID-19 pandemic, it is difficult for patients, including older adults, to access health services because outpatient clinics are closed and healthcare providers and resources are mostly limited to urgent care areas. Buenaventura et al,⁴⁹ reported that older Filipinos have very limited access to health services because of the lockdown during the COVID-19 pandemic. In such a situation, older adults with chronic illness have no access to healthcare resources.

Consequently, they worry about their health and future and hope that nothing unexpected happens to them during the COVID-19 pandemic.⁴⁹ Interestingly, access to information from social media can pose an additional risk.⁵⁰ Inappropriate information can be accessed from social media and considered to be true; this may result in unhealthy behaviors and increase physical and psychological issues, particularly among older adults.^{51,52}

However, we found that sex, education level, marital status, and chronic illness did not significantly improve the COVID-19 preventive behaviors among older adults. In

contrast, previous research has revealed that socioeconomic status indicators, such as education levels, can affect health outcomes, such as morbidity and mortality, and are associated with health behaviors.⁵³ For example, highly educated people can take care of themselves, protect themselves against risk factors,⁵⁴ and seek health information to manage their chronic illness,⁵⁵ and reduce the risk of mortality.⁵⁶

In summary, the present study revealed that sufficient income, easy access to health services and protective material, and good family support were associated with good COVID-19 preventive behaviors among older adults living in urban communities in Thailand during the COVID-19 pandemic. Therefore, preventive COVID-19 infection behaviors become important for individuals, particularly older adults. Yet, intentions aside, individuals are generally able to recognize the likelihood that they will adopt that health behavior when other intervening factors are considered, for example, their ability to adapt the behavior and access health information and services, and how the behavior will be regarded by others in their social context and so on. During the COVID-19 pandemic, the Thai government also have been established to prevent the spread, control, and resolve COVID-19 pandemic for people who live in Thailand, including older adults. Raising the awareness of individual responsibility is a campaign for everyone who live in Thailand to take action according to the DMHTT measure consisted of (1) D: Distancing; keeping social distance of 1 to 2 m and avoid being in crowded places, (2) M: Mask wearing; wearing a cloth mask or a hygienic mask at all times, (3) H: Hand washing; regular hands washing thoroughly with soap and water or alcohol hand sanitizer, (4) T: Testing; temperature screening and testing for COVID-19 infection when having had the activities which might have been at risk of being infected, and (5) T: Thai Cha Na; using Thai Cha Na application or the Center for COVID-19 Situation Administration (CCSA) of registering oneself when entering infected risk area, places, buildings, and access to personal travel information. These measures have considerably influenced older adult's lives, such as changing their health habits, lifestyle, and slowing down the economy. Therefore, when healthcare providers plan programs to encourage and promote preventive behaviors and health outcomes among older adults, these programs also have an impact on the patients' physical and mental status. Interdisciplinary healthcare teams should focus not only on the physical health of older adults but also on their psychological well-being. Otherwise, the outcomes of the treatment plans may not be achieved. In addition, future studies that implement programs or activities to increase health literacy and preventive behaviors and to promote access to health information among older adults during the COVID-19 pandemic are recommended,

particularly focusing on older adults living in urban communities.

The present study has 3 potential limitations. First, data were collected only from urban communities within a single province in Thailand; therefore, the findings may not be generalizable to the entire older adult population. In addition, the present cross-sectional study had a female predominance (62.7%). Future studies should adopt a more diverse approach and target other populations, such as individuals belonging to different sexes, cultures, communities, provinces, and countries, in order to better understand how COVID-19 affects their health outcomes. Second, in the present study, the association of demographic data, socioeconomic status, health literacy, social support, and access to healthcare with COVID-19 preventive behaviors among older adults was assessed only using self-reported questionnaires. We recommend using longitudinal or randomized control trials in future studies to identify the long-term outcomes among older adults. Finally, sociodemographic characteristics, including the participants' sex, education level, monthly income, and marital status, were assessed in the present study; it could be more informative to include environmental health or residence condition and other social determinants of health, which have an important effect on COVID-19 preventive behaviors among older adults.

Conclusion

The present findings revealed that sufficient income, good family support, and easy access to health services and protective material were associated with good COVID-19 preventive behaviors among older adults living in urban areas during the COVID-19 pandemic. An individual with proficient preventive behaviors could experience a healthy life free from infectious diseases. Based on these results, healthcare providers 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, particularly among elderly people living in urban communities during the COVID-19 pandemic.

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Author Contributions

KY, KP, WK, and WC drafted the article and conducted a review of the literature. KP, KY, and WS performed the data collection and data analysis. All authors contributed to the design and concept, were involved in writing the manuscript, and have approved the submitted and published versions.

Declaration of Conflicting Interests

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Ethical Considerations

The present study was approved by the Ethics Review Committee of the Faculty of Public Health, Mahidol University (COA no. MUPH 2020-156, protocol no. 136/2563, approved on December 17, 2020). Written informed consent was obtained from all the respondents. The study was conducted in accordance with the Declaration of Helsinki.

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Data Sharing Statement

The datasets generated during and/or analyzed, and questionnaires during the current study are available from the corresponding author on reasonable request.

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