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# Preventive Behaviors during Coronavirus Disease 2019 (COVID-19) Pandemic: Application of the Health Belief Model in Thailand

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**Abstract** This study aimed to investigate COVID-19 preventive behaviors, patterns of the Health Belief Model (HBM), and factors affecting COVID-19 preventive behaviors among Thai people. This cross-sectional survey study was conducted in Thailand. Thai people with age above 18 years old were enrolled using convenience sampling method. They completed the questionnaire through a web-based survey in August 2020 and April 2021. Descriptive statistics were used to explain the characteristic data, preventive health behaviors, and HBM constructs. Multiple regression analysis was analyzed to measure the association between the preventive behaviors and predictor variables. Statistical significance was defined at p-value <0.05. Total of 268 persons participated in this study. Most respondents were female (n=189, 70.5%), their mean of age was 32.14±10.73 years. Regarding preventive behaviors from COVID-19, the highest of mean score of preventive behaviors were wearing a facemask (4.20±1.38), do not go to crowded areas (4.16±1.35), and keeping a social distancing (4.08±1.38), respectively. Overall, mean HBM score was 3.99±0.50. The highest score was "perceived severity" (4.44±0.62), followed by "perceived susceptibility" (4.29±0.78), "self-efficacy" (4.27±0.64), and "perceived benefits" (4.24±0.73), respectively. All six HBM constructs did not correlate to the COVID-19 preventive behaviors. In conclusion, the respondents performed good preventive behaviors of COVID-19. All HBM constructs were not associated with COVID-19 preventive behaviors. In the Thai population, the HBM is not a powerful analytical tool for predicting COVID-19 preventative behaviors.

***Keywords*: Coronavirus disease 2019; COVID-19; Health Belief Model; Thailand**

## Introduction

Coronavirus disease 2019 (COVID-19) has significant mortality and morbidity. The spread of COVID-19 occurs because of human-to-human transmission.[1] To control the infection, various behavioral precautions have been recommended by World Health Organization and local government. These social and behavioral containment measures are effective measures in suppressing the growth in COVID-19 cases.[2]

In Thailand, the first known case of COVID-19 was reported on January 13th, 2020. The number of cases increase in March 2020 because of several case clustering events.[3] So far, Thailand's technology and public health infrastructure may not be as good as several developed countries. The capability is limited. At the time of this research, COVID-19 has no vaccine or effective therapy. To prevent the transmission of the COVID-19 and minimize its impact in the community, basic hygiene standards and vigorous public health measures are required. These methods were widely used during an earlier outbreak and found to be successful too.

Proper preventive behavior is the key to infection control. The individuals' behaviors are influenced by multifactor such as knowledge, skills, beliefs, values, tendencies, and habits. Individuals take various action to avoid an illness depending on their level of belief in the disease's susceptibility and severity. One of the health psychological approaches that can be used to identify the root causes of improper health behaviors related to prevent the spread of disease infections is the Health Belief Model.[4]

The Health Belief Model (HBM) is one of the most well-known conceptual frameworks in public health research.[4,5] HBM is enormous acceptance and appeal can be attributed to its excellent predictive capacity.[6-8] Originally, HBM comprises four key constructs; perceived susceptibility, perceived severity, perceived benefits, and perceived barriers.[5] Recognizing some weakness in the HBM, the extended model has implemented the concepts of "cues to action", a stimulus to perform behavior, and "self-efficacy", confidence in one's capability to perform an action.[9,10]

The HBM has been used to describe and predict individual changes in health behaviors[11-14] and also be useful for determining preventive behaviors during the COVID-19 era.[10,15-17] Nevertheless, to the best of our knowledge, the application of the HBM to COVID-19 precautionary behaviors has not been empirically established in Thailand. Therefore, this study aimed to investigate COVID-19 prevention behaviors, patterns of the Health Belief Model, and factors affecting COVID-19 prevention behaviors among Thai people. The finding of the present study may shed light on finding promotion strategies to enhance behavioral adherence to COVID-19 prevention measures.

## Material and Methods

### Design and participants

This cross-sectional study was conducted in Thailand. The general population was Thai people with age overed 18 years old. The participants were enrolled using web-based survey that was disseminated trough social media platforms, including Facebook, Twitter, and Instagram. Completion of the questionnaire by the participants was an indication of consent to participate. The protocol was approved by the University of Pha-

yao human ethics committee (Ref. No. 1.1/006/63). Data was gathered in two timeframes of COVID-19 pandemic in Thailand. The first collection was conducted in August 2020, and the second was in April 2021.

**Instruments**

The instrument used in this study was an online questionnaire applying the concept of the HBM via Google forms. The study questionnaire included three parts. The first part included demographic questions, including gender, age, education level, marital status, occupation, medical history, history of COVID-19 infection in the family and residence community. The second part included 30 questions on structures of the HBM. The five-point Likert scale was used to response to the items of HMB from strongly agree=5 to strongly disagree=1. The third part included questions on COVID-19 preventive behaviors. This part was assessed with 10 items. The response to items were scored using a five-point Likert scale from never = 1 to always =5.

The questionnaire was tested for content validity by 5 specialists in the field of health education and health promotion (n=3), infectious diseases (n=1), and research instrument development (n=1). Comments were wording adjustments to build a clear and understandable final questionnaire. A pilot study was undertaken to measure the reliability by Cronbach's alpha value. The overall Cronbach's alpha was 0.945.

**Data analysis**

The data were analyzed using statistical software. The demographic data, HMB questions, and preventive behaviors were evaluated and summarized using the descriptive statistics. Quantitative data were presented as means, standard deviations, frequency, and percentage. Intercorrelations of HMB constructs and the COVID-19 preventive behaviors was performed by Pearson's correlation test. The correlation between HBM constructs and preventive behaviors was evaluated by the multiple regression analysis. P-values <0.05 was considered as the significant level.

## Results

**General Characteristics of respondents**

The demographic characteristics of the 268 respondents were showed in Table 1. The mean of age was 32.14±10.73 years. The majority was female (n=189, 70.5%). About half of the respondents were residents of the north of Thailand.

**Preventive behaviors**

Regarding preventive behaviors from COVID-19, 68.3% of participants "always" observed "wearing a mask", 64.2% observed "eating freshly cooked food", 57.8% observed "avoiding travelling to pandemic areas", 57.1% observed "do not share items with others", 55.9% observed "do not stay closely with persons who have flu-like symptoms", respectively. Means of preventive behavioral score was 3.99±1.18. The highest of mean score of preventive behaviors from COVID-19 were wearing a mask (4.20±1.38), do not go to crowded areas (4.16±1.35), and keeping a social distancing (4.08±1.38), respectively (Table 2).

**HBM Constructs**

Overall, mean HBM score was 3.99±0.50. The highest score was "perceived severity" (4.44±0.62), followed by "perceived susceptibility" (4.29±0.78), "self-efficacy" (4.27±0.64), "perceived benefits" (4.24 ± 0.73), "cues to action" (4.07±0.74) and

**Table 1 Demographic variables of the participants (n=268)**

| Variables | Groups | No. | % | Variables | Groups | No. | % |
|---|---|---|---|---|---|---|---|
| Age; mean±SD | | 32.14±10.73 | | Salary per month | <5,000 | 43 | 16.0 |
| Gender | Male | 79 | 29.5 | | 5,001-10,000 | 55 | 20.5 |
| | Female | 189 | 70.5 | | 10,001-20,000 | 59 | 22.0 |
| Residence Place | Bangkok | 45 | 16.8 | | 20,001-30,000 | 46 | 17.2 |
| | Central | 19 | 7.1 | | >30,000 | 65 | 24.3 |
| | North | 105 | 39.2 | Marital Status | Single | 195 | 72.8 |
| | North-East | 79 | 29.5 | | Others | 73 | 27.2 |
| | East | 13 | 4.9 | Underlying diseases | Yes | 60 | 22.4 |
| | South | 7 | 2.6 | | No | 208 | 77.6 |
| Education | Under Bachelor | 62 | 23.1 | Experiences of COVID-19 infections | | | |
| | Bachelor's degree | 162 | 60.5 | Self-Infection | Yes | 2 | 0.8 |
| | Master and Higher | 44 | 16.4 | | No | 266 | 99.2 |
| Employments | Students | 67 | 25.0 | Family infection | Yes | 2 | 0.8 |
| | Government officers | 70 | 26.1 | | No | 266 | 99.2 |
| | Private officers | 52 | 19.4 | Community infection | Yes | 40 | 14.9 |
| | Business owners | 26 | 9.7 | | No | 228 | 85.1 |
| | Freelances | 29 | 10.8 | | | | |
| | Farmers | 7 | 2.6 | | | | |
| | None | 17 | 6.3 | | | | |

Note: SD = standard deviation

**Table 2 Frequency of answer to questions of COVID-19 preventive behaviors; (n=268).**

| Behaviors | Frequency | | | | | | | | | | Mean | SD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Never | | Rarely | | Sometimes | | Often | | Always | | | |
| | No. | % | No. | % | No. | % | No. | % | No. | % | | |
| 1. I wear a mask properly every time when I leave my house. | 29 | 10.8 | 15 | 5.6 | 12 | 4.5 | 29 | 10.8 | 183 | 68.3 | 4.20 | 1.38 |
| 2. I do not stay closely with persons who have a cough, sneezing, runny nose, sore throat, or breathlessness. | 29 | 10.8 | 17 | 6.4 | 15 | 5.6 | 59 | 22.0 | 148 | 55.2 | 3.83 | 1.20 |
| 3. I wash my hand regularly with soap and water or alcohol hand rub before eating food or after touching anything. | 21 | 7.8 | 20 | 7.5 | 31 | 11.6 | 107 | 39.9 | 88 | 33.2 | 3.94 | 1.36 |
| 4. I keep a distance of at least two meters from others. | 18 | 6.7 | 27 | 10.1 | 55 | 20.5 | 88 | 32.8 | 80 | 29.9 | 4.08 | 1.38 |
| 5. I do not touch my eyes, nose, mouth, and face by hands. | 24 | 9.0 | 19 | 7.1 | 35 | 13.1 | 84 | 31.3 | 106 | 39.6 | 3.80 | 1.47 |
| 6. I do not go to crowded areas. | 30 | 11.2 | 16 | 6.0 | 26 | 9.7 | 63 | 23.5 | 133 | 49.6 | 4.16 | 1.35 |
| 7. I avoid travelling to pandemic areas. | 31 | 11.6 | 17 | 6.3 | 13 | 4.9 | 52 | 19.4 | 155 | 57.8 | 4.06 | 1.39 |

**Table 2 Frequency of answer to questions of COVID-19 preventive behaviors; (n=268) (cont.)**

| Behaviors | Frequency | | | | | | | | | | Mean | SD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Never | | Rarely | | Sometimes | | Often | | Always | | | |
| | No. | % | No. | % | No. | % | No. | % | No. | % | | |
| 8. I do not share items such as glasses, handkerchiefs with others. | 32 | 11.9 | 18 | 6.7 | 0 | 0.0 | 65 | 24.3 | 153 | 57.1 | 4.06 | 1.36 |
| 9. I always use the dish-spoon when sharing meals with others. | 29 | 10.8 | 48 | 17.9 | 0 | 0.0 | 62 | 23.1 | 129 | 48.10 | 3.85 | 1.27 |
| 10. I eat freshly cooked food and drink clean water. | 25 | 9.3 | 21 | 7.8 | 11 | 4.1 | 39 | 14.6 | 172 | 64.2 | 3.69 | 1.19 |
| **Overall** | | | | | | | | | | | **3.99** | **1.18** |

"perceived barriers" (2.65±0.84), respectively. All HBM constructs were not difference between two timeframes of COVID-19 pandemic (Table 3).

The finding of the Pearson's correlation test indicated that all HBM constructs did not correlate to the COVID-19 preventive behaviors (Table 4). As well as the results of multiple linear regression analysis showed that all HBM constructs and demographic

**Table 3 Overall score of HMB and preventive behaviors**

| Variables, means±standard deviation | Overall (n=268) | Variables, means±standard deviation | Overall (n=268) |
|---|---|---|---|
| HBM | 3.99±0.50 | Perceived Benefits | 4.24±0.73 |
| Perceived Susceptibility | 4.29±0.78 | Self-efficacy | 4.27±0.64 |
| Perceived Severity | 4.44±0.62 | Cues to action | 4.07±0.74 |
| Perceived Barriers | 2.65±0.84 | Preventive Behaviors | 3.99±1.18 |

Note. * Comparison between mean scores of the first and second of data collection (t-test analysis)

**Table 4 Intercorrelations of HMB constructs and the COVID-19 preventive behaviors**

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| HMB constructs | | | | | | | |
| Perceived Susceptibility | 1 | | | | | | |
| Perceived Severity | 0.6409* | 1 | | | | | |
| Perceived Barriers | 0.0176 | 0.0912 | 1 | | | | |
| Perceived Benefits | 0.4784* | 0.5622* | -0.0254 | 1 | | | |
| Self-efficacy | 0.5337* | 0.5515* | -0.0588 | 0.7053* | 1 | | |
| Cues to action | 0.4237* | 0.4507* | 0.0188 | 0.7499* | 0.6397* | 1 | |
| Preventive Behaviors | -0.0240 | -0.1076 | -0.0515 | -0.0209 | 0.0093 | -0.413 | 1 |

Note. *Significant at p<0.001 level (Pearson's correlation analysis);
1 = perceived susceptibility; 2= perceived severity; 3= perceived barriers; 4= perceived benefits; 5= self-efficacy; 6= cues to action; 7= preventive behaviors

variables such as gender, age, and educational levels were not associated with preventive behaviors from COVID-19 (Table 5).

## Discussions

In this study, all HBM constructs were not associated to COVID-19 preventive behaviors. These were not consistent to previous studies.[10,18,19] A study from Iran[18] indicated that the self-efficacy, barriers, benefits, fatalism, cues to action, gender, and place of residence had substantial influence on COVID-19 preventive behaviors. Consistent with previous finding in Nigeria[19], the results demonstrated that age, COVID-19 knowledge and risk perception were related to precautionary behaviors. In addition, a study in Ethiopia[10] found that poverty, perceived barriers, cues to action, and self-efficacy were all related to COVID-19 preventive practice. This discrepancy might be attributed to the variation in the research population, and a lower number of respondents than the calculated sample size.

Our study indicated that perceived susceptibility was related to perceived benefits, self-efficacy, and cues to action, but was not related to COVID-19 preventive behaviors. Different results were shown by the study of Barakat et al.[16] They identified a relationship between the perceived susceptibility and COVID-19 preventive behaviors, attributed to the high number of illnesses reported. In Thailand, the exhaustive measures for prevention and control the COVID-19 were implemented.[16] The number of new confirmed cases dropped and returned to single digits.[3] These circumstances led participants in this study believe they became less likely to have contracted the disease.

The participants obtained high scores from perceived severity. However, this structure was not significant determinants of COVID-19 preventive behaviors. On the contrary, a previous study[20]including understanding of the public's emotion and behaviour

**Table 5 Effect of HBM constructs and demographic variables on COVID-19 preventive behaviors**

| Predictors | B | SE | t | p-value | 95%CI |
|---|---|---|---|---|---|
| **HMB constructs** | | | | | |
| Perceived Susceptibility | 0.07 | 0.12 | 0.57 | 0.569 | -0.18 - 0.32 |
| Perceived Severity | -0.32 | 0.17 | -1.89 | 0.060 | -0.65 - 0.01 |
| Perceived Barriers | -0.01 | 0.09 | -0.08 | 0.937 | -0.19 - 0.17 |
| Perceived Benefits | 0.06 | 0.18 | 0.34 | 0.732 | -0.29 - 0.41 |
| Self-efficacy | 0.18 | 0.15 | -0.71 | 0.302 | -0.16 - 0.52 |
| Cues to action | -0.11 | 0.17 | 1.03 | 0.479 | -0.41 - 0.19 |
| **Demographic variables** | | | | | |
| Gender | 0.28 | 0.17 | 1.69 | 0.093 | -0.05 - 0.61 |
| Age | 0.00 | 0.01 | 0.55 | 0.585 | -0.01 - 0.02 |
| Educational levels | -0.29 | 0.19 | -1.51 | 0.131 | -0.68 - 0.09 |

Note: n=268, multiple regression analysis: dependent variable: COVID-19 preventive behaviors;
B = unstandardized coefficients; SE = standard error; CI = confidence interval

and their antecedents from the psychological perspectives. Drawing upon the cognitive appraisal theory, this study examined three cognitive appraisals (i.e., perceived severity, perceived controllability, and knowledge of COVID-19) demonstrated high correlation between perceived severity and protective behaviors of COVID-19. It could be due to a growth in the number of infected patients reported by the Thai government. Consequently, as respondents' perceptions of susceptibility increased over time, they considered more likely to contract the disease.

This current study, perceived barriers had the lowest score among other structures and the participants obtained high scores from perceived benefits. Perceived barriers and benefits did not relate to COVID-19 protection. Previous studies showed that strong perceived benefits, low perceived barriers, and high self-efficacy were all key determinants in following COVID-19's recommended preventative measures[15] and MERS [17]. However, Tang and Wong found that perceived barriers had no effect on whether Chinese adults wearing facemasks during the SARS outbreak. [21] In this study, the most significant perceived barriers were hand washing, wearing facemask, and curfew. The fact is that COVID-19 is now complex threat in Thailand and other counties. Strongly environmental barriers included a shortage of facemasks, alcohol rubs, and disinfectants. During the COVID-19 pandemic, most regions of the world were facing a shortage of facemasks.[22,23]

Our analysis demonstrated that self-efficacy did not reveal any significant relationship in predicting COVID-19 preventive behaviors (p=0.302). The finding of Barakat et al.[16], and Shahnazi et al,[18] studies showed significant relationship between self-efficacy and COVID-19 preventive behaviors in Egyptians and Iranian, respectively.

This study showed the significant association between cues to action and perceived susceptibility, perceived severity, perceived benefits, and self-efficacy, but it failed to show the significant association to COVID-19 preventive behaviors. Our study was different from a study conducted in Addis Abba, Ethiopia[10], the results showed that cues to action was one of significant predictors for COVID-19 prevention practice.

The HBM is a behavioral science paradigm that focuses only on the individual's cognitive and decision-making processes. And hence, there are several health behaviors that cannot be described or adjusted using attitudes and beliefs such as: addictive behaviors (e.g., smoking, drinking); behavior that cannot be described in terms of cause and effect (e.g., Anorexia Nervosa); and behaviors that are the result of economic, social, and environmental factors. Therefore, HMB may be limited in its ability to explain and modify an individual's health behavior comprehensively. This current study indicated that the HBM constructs were not associated to COVID-19 preventive behaviors. This may be due to the fact that COVID-19 is a newly emerging infectious disease, and the government has enacted legal measures to combat the pandemic that the public is required to observe.

**Limitations**

The authors would like to report the limitations of this study. First, the data were gathered from an online survey, some people might not have accessed to the internet, smartphones or computers and not be assessed.

Second, the current study only investigated a limited number of intrapersonal factors based on HBM, while various factors such as culture, structural context, and health recourses have not been included. Third, this study relied on self-reporting, data generalization should be considered. Different mechanisms were used to reduce potential bias in the study.

**Conclusion**

The respondents demonstrated a high degree of the preventive behaviors of COVID-19. Above 50% of respondents always wearing a facemask, eating freshly cooked food, avoiding travelling to pandemic areas, do not share items with others, and following social distancing. Perceived severity in COVID-19 had the highest mean score, followed by perceived susceptibility, self-efficacy, and respectively. Although all HBM constructs were not associated with COVID-19 preventive behavior, but this study also illustrates the importance of considering belief systems and perception in developing control behaviors against COVID-19.

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**Conflicts of interest**

This study did not receive any specific grants form any funding agencies in the public, commercial, or not-for-profit sectors. The authors declare they have no conflicts of interest.

**Authors' contribution**

OM, ST, NS and KO contributed to study conceptualization and research instrument development. ST and NS collected data. OM performed the data curation, formal analysis and writing the manuscript (original draft). KO assisted in data analysis, editing, and reviewing the manuscript. All authors reviewed and edited the manuscript.

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**บทคัดย่อ: พฤติกรรมป้องกันตนเองในช่วงที่มีการแพร่ระบาดของโรคติดเชื้อโคโรนาไวรัส 2019 (โควิด-19): การประยุกต์แบบแผนความเชื่อทางสุขภาพในประเทศไทย**

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การศึกษานี้มีวัตถุประสงค์เพื่อศึกษาปัจจัยที่มีผลต่อพฤติกรรมการป้องกันตนเองจากโรคโควิด-19 ในประชาชนชาวไทยโดยใช้แนวคิดแบบแผนความเชื่อทางสุขภาพ การศึกษานี้เป็นการศึกษาเชิงสำรวจแบบภาคตัดขวาง เก็บข้อมูลในประเทศไทย กลุ่มตัวอย่าง คือประชาชนชาวไทยที่มีอายุมากกว่า 18 ปี สุ่มตัวอย่างด้วยวิธีสุ่มแบบตามสะดวก เก็บข้อมูลโดยใช้แบบสอบถามออนไลน์ วิเคราะห์ข้อมูลทั่วไปของผู้ตอบบสอบถาม พฤติกรรมป้องกันสุขภาพ และแบบแผนความเชื่อทางสุขภาพด้วยใช้สถิติเชิงพรรณนา วิเคราะห์ปัจจัยที่มีผลต่อพฤติกรรมป้องกันตนเองโดยใช้การวิเคราะห์ถดถอยพหุคูณ กำหนดระดับนัยสำคัญที่ $p<0.05$ มีผู้ตอบแบบสอบถามทั้งสิ้นจำนวน 268 คน ส่วนมากเป็นเพศหญิง (จำนวน 189, ร้อยละ 70.5) อายุเฉลี่ย 32.14±10.73 ปี คะแนนเฉลี่ยสูงสุด ด้านพฤติกรรมป้องกันตนเองจากโรคโรควิด-19 ได้แก่ การสวมหน้ากาก (4.20±1.38) การหลีกเลี่ยงไปในพื้นที่แออัด (4.16±1.35) และการรักษาระยะห่างทางสังคม (4.08±1.38) ตามลำดับ คะแนนเฉลี่ยโดยรวมของแบบแผนความเชื่อทางสุขภาพ เท่ากับ 3.99±0.50 ด้านที่มีคะแนนเฉลี่ยสูงสุดคือ การรับรู้ความเสี่ยง (4.44±0.62) การรับรู้ความไวต่อโรค (4.29±0.78) และ การรับรู้ความสามารถแห่งตน (4.27±0.64) และการรับรู้ประโยชน์ (4.24±0.73) ตามลำดับ องค์ประกอบของแบบแผนความเชื่อทางสุขภาพทั้ง 6 ด้านไม่สัมพันธ์กับพฤติกรรมป้องกันตนเองจากโรคโควิด-19 สรุปได้ว่าในประชาชนชาวไทย แบบแผนความเชื่อทางสุขภาพไม่สัมพันธ์กับพฤติกรรมป้องกันตนเองและไม่สามารถใช้เป็นเครื่องมือในการทำนายพฤติกรรมในการป้องกันตนเองจากโรคโควิด-19 ได้

***คำสำคัญ:*** **โรคติดเชื้อไวรัสโคโรนา 2019; โควิด-19; แบบแผนความเชื่อทางสุขภาพ; ประเทศไทย**