Factors Related to Health Risk Communication Outcomes among Migrant Workers in Thailand during COVID-19: A Case Study of Three Provinces

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Abstract: Coronavirus disease 2019 (COVID-19) is a newly emerging infectious disease, and risk communication is one of several public health emergency responses. During the pandemic, many migrant workers in Thailand experienced barriers that hamper access to health information. This study aims to explore factors related to the outcomes of health risk communication, including awareness of public health measures and preventive practices. We conducted a cross-sectional survey on migrants between January and April 2021 using cluster sampling in Phuket, Ranong, and Samut Sakhon. In the descriptive analysis, we presented the median, proportion, and ratio, while in the inferential analysis, we employed a logistic regression with robust standard errors. Although a total of 303 participants were initially included in this study, the final number was narrowed down to 288 samples due to insufficient information required for the analysis. Frequent reception of health information and primary school education showed a statistically significant association with preventive practices. Middle-aged migrant workers demonstrated a significantly lower level of preventive practices than younger migrant workers. A longer stay in Thailand was significantly related to a lower degree of awareness toward public health measures. Thus, it is necessary to promote the accessibility of health information among migrant workers in Thailand, especially those who have lived in Thailand for more than eight years, are older, and have no formal education.

Keywords: risk communication; migrants; practice; awareness; COVID-19; Thailand

1. Introduction

The coronavirus disease 2019 (COVID-19) was first recognized in late 2019 [1–3] and was later declared by the World Health Organization (WHO) on 30 January 2020 to be a Public Health Emergency of International Concern (PHEIC) [4]. In response, the WHO aimed to launch a global coordinated effort for effective preparedness and response to COVID-19. According to a WHO report on 20 October 2021, the COVID-19 pandemic has affected over 241 million people and caused 4.9 million deaths in more than 200 countries [5].

Thailand was the first country outside China to report the presence of COVID-19. The first wave of COVID-19 in Thailand started with clusters of infections related to imported cases from other countries and local transmission [6]. In response to this, the Thai Government introduced several non-pharmaceutical interventions to curb the outbreak, for instance, international travel bans and social distancing [7]. Risk communication was included in the Incident Command System (ICS) as an essential component for health emergency preparedness and response [8]. The Thai Government established the Center for
COVID-19 Situation Administration (CCSA) as the governing body of the ICS [9]. Due to these combined measures and a resilient health system, Thailand succeeded in containing the first wave of COVID-19 in 2020 [10,11].

However, from late December 2020, Thailand faced a new wave that was more severe than the previous one [12]. This second wave was believed to have originated from migrant workers in the inner city of Samut Sakhon [13], a province within the vicinity of Bangkok and a major residential area hosting a large number of migrants. Thailand is known as one of the popular cross-border destinations in Southeast Asia, and the number of migrants in Thailand was approximately 4.9 million in 2018; most of the migrants relocated from neighboring countries, including Cambodia, Lao PDR, Myanmar, and Vietnam (CLMV nations) [14], with the greatest number of migrants coming from Myanmar [15].

The vulnerability of migrants has been highlighted during the COVID-19 pandemic. Most migrants live in crowded housing with poor hygiene and have limited capacity for social distancing, leading to the spread of infection [16]. Migrants may also experience difficulties in accessing health information and services due to financial hardship and language barriers [17].

Prior studies in Thailand have found that migrant health workers (MHWs), migrant health volunteers (MHVs), and village health volunteers (VHVs) were utilized in the Government’s initiative to provide access to health information to migrants, especially for pandemic preparedness in previous emerging diseases such as influenza (H1N1) [18,19]. They also found that while most migrants had a high level of knowledge about the disease, they did not agree with preventive measures such as border control or social distancing. Moreover, education and reception of information from MHW and television were significantly associated with higher knowledge about health issues. During COVID-19, the International Organization for Migration conducted rapid studies in 2020 and found that approximately one-third of migrants did not understand health information [20–22]. Studies that explore factors relating to behavioral outcomes and health risk communication specifically among migrants in Thailand during COVID-19 are also lacking.

To address this gap in knowledge, it is necessary to investigate factors influencing the reception of health information. The health belief model (perceived risk, perceived severity, perceived benefits, and perceived barriers) was used as an overarching concept for this study [23]. Therefore, this study aims to explore the outcomes of health risk communication, including the level of awareness and self-reported COVID-19 prevention among migrants, along with other associated factors. It is hoped that the findings from this study will provide impactful contributions toward public health research on migrant health in Thailand and result in more comprehensive migrant health policies.

2. Materials and Methods

2.1. Study Design and Setting

A cross-sectional survey was conducted between January and April 2021 on migrant workers aged 15 years and above in the three provinces of Phuket, Ranong, and Samut Sakhon. These provinces were chosen since they have some of the most densely migrant-populated areas in Thailand. Surveys were distributed to survey participants in the main district of each province.

2.2. Sample Size and Sampling Method

Cluster sampling was used as the basis for obtaining our samples. We purposively selected two main migrant communities in each province that were identified by local providers or representatives of non-government organizations (NGOs) who were familiar with the field. Then, we randomly selected households based on the proportion of households in the community compared with the total number of households in the study. We randomly selected a migrant from each household (likely to be either the household head or the household head’s spouse). The sample size calculation was based on the following formula, \( n = \text{deff} \times (Z^2 P(1 - P)) / e^2 \) where \( \text{deff} \) (design effect) = 2; \( Z \) for 5% type-1 error = 1.96;
According to this formula, the calculated sample size was 242 but we expanded the sample size to 303 to account for a 20% non-response rate or incomplete responses.

2.3. Data Collection

A bilingual (Thai and Myanmar) interviewer-assisted questionnaire was used in this study. We asked MHWs and MHVs in the field to help with the interviews. The interviewers described the purpose, risks, and benefits of the study and obtained informed consent from participants before collecting data. The questionnaire was mainly paper-based, but online questionnaires were also provided to participants for their convenience.

2.4. Questionnaire Design

The questionnaire consisted of three sections: (i) personal information; (ii) awareness toward public health measures on COVID-19 and self-reported practices during COVID-19; (iii) questions about health literacy levels, modes, and frequency to obtain health information, the health belief model, and other potential confounders such as knowledge about disease and attitude toward public health measures.

Personal information consisted of questions about gender, age, ethnicity, family status, occupation, education, income, length of stay in Thailand, medical insurance, Thai language fluency, and resources supporting access to information and practices.

Questions about knowledge and self-reported practices for COVID-19 were adapted from the Department of Disease Control (DDC), Thailand’s website [25], while attitude and awareness of public health measures on COVID-19 were adapted from CCSA’s announcement [26]. Health literacy questions were adapted from Osborne et al. [27] and questions for assessing constructs of the health belief model were modified from the version found in Jones et al. [23].

The questionnaire was pilot tested and underwent content validation by five experts. Then, we calculated the index of item objective congruence (IOC) and revised the questionnaire until each question had an IOC score of more than 0.5. We conducted a 30-participant pilot survey in Phuket to test the questionnaire’s reliability and clarity. We calculated Cronbach’s alpha coefficient for each set of questions based on the theme and found that all of them exceeded 0.7, reflecting satisfactory reliability. An instructional manipulation check (IMC) question was placed in the middle of the questionnaire to ensure that the participants had adequately read the instructions for all questions.

2.5. Data Analysis

For descriptive analysis, we used median and percentiles for continuous data, and proportions and ratios were used for categorical data. In the inferential analysis, we used logistic regression with robust standard error for both univariate and multivariate analyses. STATA® version 14 was used for the calculation. In the multivariate analysis, we selected only variables that had a p-value ≤ 0.1 from the univariate analysis into the model and presented the results in the form of an adjusted odds ratio (AOR) with a 95% confidence interval (CI).

The analytic part consisted of two main strands: (i) awareness of public health measures and (ii) self-reported preventive practices during COVID-19. For the first strand, demographic data and sources of information were designated as independent variables, whereas awareness of public health measures on COVID-19 served as a dependent variable. For the latter strand, the independent variables covered demographic data, resources for supporting preventive practices, the overall frequency of receiving health information from all sources, health literacy, knowledge about the disease, awareness, and attitudes toward public health measures, and the four constructs of the health belief model (perceived risk, perceived benefit, severity of illness, and perceived barriers), while self-reported preventive practices toward COVID-19 was considered a dependent variable (Table 1). The arrangement of each variable is presented in Table 2.
Table 1. Dependent variables and independent variables for analytic study.

| Dependent Variables | Independent Variables |
|---------------------|-----------------------|
| Awareness of public health measures on COVID-19 | • Demographic data  
• Source of information  
○ From health professionals  
○ From community members  
○ From mass media  
○ From social media |
| Self-reported preventive practices during COVID-19 | Demographic data  
Resources for supporting preventive practices  
Health literacy  
Overall frequency of receiving health information from all sources  
Knowledge about disease  
Awareness and attitudes toward public health measures  
The four constructs of the health belief model (perceived risk, perceived benefit, severity of illness, and perceived barriers) |

Table 2. Characteristics of the variables and variable management.

| Theme | Variables | Type of Variable | Classification |
|-------|-----------|------------------|----------------|
| Demographic data | Gender | Categorical | • Male  
• Female |
| Age (years) | Continuous, then changed to Categorical | | • ≤24  
• 25–59  
• ≥60 |
| Ethnicity | Categorical | | • Myanmar  
• Non-Myanmar (Karen, Mon, Dawei, etc.) |
| Length of stay in Thailand (years) | Continuous, then changed to categorical (cut point by median) | | • ≤8  
• >8 |
| Education | Categorical | | • No formal education  
• Primary school  
• Secondary school and above |
| Occupation | Categorical | | • Unemployed  
• Factory worker  
• Agriculture/fishery  
• Construction worker  
• Business/housemaid/waiter/other |
| Family members (aged 15 years or above) | Continuous then changed to categorical (using the median as the cut-off point) | | • <2 people  
• ≥2 people |
| Income (minimum wage: Phuket 336, Ranong 315, Samut Sakhon 331 Baht/day) | Categorical then changed to categorical | | • Lower than minimum wage  
• Equal to minimum wage  
• Higher than minimum wage |
| Thai Reading Comprehension | Categorical | | • Fully understand  
• Partially understand  
• Cannot understand |
| Thai Listening Comprehension | Categorical | | |
| Theme | Variables | Type of Variable | Classification |
|-------|-----------|------------------|----------------|
| Health insurance | Categorical | • Social Security Scheme \(^a\)  
• Health Insurance Card Scheme \(^b\)  
• No insurance/unknown |
| Access to resources | Resources supporting access to information (Total score for access to electricity, phone signal, and internet signal: 1–3 for each) | Categorical (using the median as the cut-off point) | • Low access  
• High access |
| Resources supporting access to information (Total score for access to electricity, phone signal, and internet signal: 1–3 for each) | Categorical (using the median as the cut-off point) | • Low access  
• High access |
| Health literacy | Health literacy (Total score for health literacy questions: 1–3 for each question, 12 questions in total) (Example: I can find information on health problems that concern me. (Agree/Neutral/Disagree)) | Categorical (cut-off point of 60% of total score \(^\gamma\)) | • Low health literacy  
• High health literacy |
| Sources | Health professional (Thai staff)  
MHW/MHV/VHV  
Family/friends  
Community/religious leader  
Boss/employer  
Television/radio  
Newspaper/posters/leaflets  
Social media (Facebook, YouTube, etc.) | Categorical | • Did not receive (score 1)  
• Sometimes (score 2)  
• Frequently (score 3) |
| Source of information | Score of health information sorted by source  
• From health personnel (Total score for health professional and/or MHW/MHV/VHV: 1–3 for each)  
• From community members (Total score for family/friends, community/religious leader, and boss/employer: 1–3 for each)  
• From public mass media (Total score for television and radio, newspaper, posters, and leaflets: 1–3 for each)  
• From social media (score of 1–3) | Categorical (using the median as the cut-off point) | • Infrequent  
• Frequent |
| Theme                           | Variables                                                                 | Type of Variable                                                                 | Classification                      |
|--------------------------------|---------------------------------------------------------------------------|----------------------------------------------------------------------------------|------------------------------------|
|                               | Overall score for frequency of receiving health information from all sources (Total score for all sources: 1–3 for each question, 8 questions in total) | Categorical (using the median as the cut-off point)                              | • Infrequent                      |
|                               | Knowledge                                                                 | Categorical (using the median as the cut-off point)                              | • Frequent                         |
|                               | Knowledge about disease (Total score: 0–1 for each question, 12 questions in total) (Example: Loss of smell or taste is a symptom of COVID-19. (Yes/No)) | Categorical (using the median as the cut-off point)                              | • Low level of knowledge          |
|                               | Awareness of public health measures (Total score: 0–1 for each question, 5 questions in total) (Example: If people visit Thailand from other countries, they must quarantine for at least 14 days. (Aware/Unaware)) | Categorical (using the median as the cut-off point)                              | • High level of awareness         |
|                               | Attitude toward public health measures (Total score: 1–3 for each question, 5 questions in total) (Example: Public gatherings are prohibited during COVID-19 outbreaks. (Agree/Neutral/disagree) | Categorical (using the median as the cut-off point)                              | • Low level of positive attitude  |
|                               | Self-reported preventive practices for COVID-19 situation (Total score: 0–1 of each, 7 questions in total) (Example: I always wear a mask when I go outside. (Yes/No)) | Categorical (using the median as the cut-off point)                              | • High level of positive attitude  |
|                               | Perceived susceptibility (Total score: 1–3 for each question, 3 questions in total) (Example of questions: I consider myself to be at risk of COVID-19. (Agree/Neutral/Disagree)) | Categorical (cut-off point at the 75th percentile \(^{\ast}\))                  | • Low/moderate                    |
|                               | Perceived severity (Total score: 1–3 for each question, 3 questions in total) (Example: If I get COVID-19, I will probably die. (Agree/Neutral/Disagree)) | Categorical (cut-off point at the 75th percentile \(^{\ast}\))                  | • High                             |
|                               | Perceived benefits (Total score: 1–3 for each question, 3 questions in total) (Example: I think that public health measures are good for me and my family. (Agree/Neutral/Disagree)) | Categorical (cut-off point at the 75th percentile \(^{\ast}\))                  | • Low/moderate                    |
|                               | Perceived barriers (Total score: 1–3 for each question, 3 questions in total) (Example: I think that public health measures are problematic for my work. (Agree/Neutral/Disagree)) | Categorical (cut-off point at the 75th percentile \(^{\ast}\))                  | • High                             |

\(^{\ast}\) A mandatory scheme financed by payroll taxes where employers, employees, and the government contribute equally. Migrants who have work permits are fully covered by this scheme. \(^{\ast}\) A health insurance scheme for undocumented migrants managed by the Ministry of Public Health, Thailand. Migrants have to pay for the annual premium. \(^{\ast}\) Source: Ministry of Labor, Thailand, data on 1 January 2020 [28]; \(^{\gamma}\) adapted from Simpson et al. [29]; \(^{\delta}\) adapted from Didarloo et al. [30].
3. Results
3.1. Descriptive Analysis

A total of 303 participants were recruited, but 15 were excluded from the analysis due to failure to follow protocol such as not following the IMC question or not providing their age. Consequently, the final number of participants was 288; of those, 8 were from Phuket (3%), 76 were from Ranong (26%), and 204 were from Samut Sakhon (71%). The median age of the participants was 30 (25th percentile = 27, 75th percentile = 37), and the male-to-female ratio was 1:2.1. The median length of stay in Thailand was eight years. In terms of ethnicities, most of the participants were Myanmar (63%), followed by Mon (27%), Dawei (8%), and Karen (2%). Most of them had completed primary school (58%). Regarding occupation, factory workers (49%) constituted the majority of the participants. Most of the participants (65%) had income levels lower than the provincial minimum wage. In terms of Thai comprehension, 55% of the participants were partially fluent in speaking Thai, while 62% of the participants could not read Thai. For insurance, the majority of participants (64%) were insured by the Social Security Scheme (the main public insurance scheme for formal-sector workers). About one-fifth (22%) were uninsured, and approximately 13% were insured by the Health Insurance Card Scheme (the main public insurance scheme for informal-sector migrants, managed by the Ministry of Public Health).

A large proportion of participants exhibited a high level of access to resources supporting exposure to health information. Approximately 99% of participants had access to electricity, 94% had phone signals, and 92% had internet connectivity. Access to resources supporting preventive practices was also high, with 99% of the participants having access to face masks and about 88% having access to alcohol-based sanitizers; access to soap and tap water was also high, at approximately 97% and 94%, respectively. In terms of information dissemination, social media was the most common source of health information (67%); the second and third most common sources were from MHW/MHV/VHV (63%) and health professionals (56%), respectively (see Figure 1).

![Figure 1. Proportion and frequency of health information received based on communication channels: MHW, migrant health worker; MHV, migrant health volunteer; VHV, village health volunteer.](image-url)
The majority of participants reported a high score on many questions such as awareness of public health measures (85%) and preventive practices (77%), followed by knowledge (68%), attitude (63%), and health literacy (58%). The percentage of participants that reported receiving health information frequently from all sources combined was 54%. For the health belief model constructs, most participants had low scores for perceived susceptibility (75%), perceived barriers (71%), and perceived severity (66%). More details are shown in Figure 2.

Figure 2. Proportion of scores for the variables.

3.2. Inferential Analysis

Univariate analysis found a significant variation in the awareness of public health measures based on the length of stay in the country ($p$-value = 0.03). Other independent variables for awareness of public health measures did not show statistically significant associations (see Table 3).

Table 3. Univariate analysis on awareness of public health measures on COVID-19.

| Independent Factors | High Level of Awareness, n (%) | Low Level of Awareness, n (%) | $p$-Value |
|---------------------|--------------------------------|-----------------------------|----------|
| Gender              |                                 |                             |          |
| Female              | 157 (83)                        | 33 (17)                     | 0.59     |
| Male                | 83 (89)                         | 10 (11)                     |          |
| Age (years)         |                                 |                             |          |
| <25                 | 31 (82)                         | 7 (18)                      | 0.42     |
| 25–59               | 207 (85)                        | 36 (15)                     |          |
| ≥60                 | 3 (100)                         | 0                           |          |
| Ethnicity           |                                 |                             |          |
| Myanmar             | 155 (87)                        | 24 (13)                     | 0.72     |
| Non-Myanmar         | 84 (82)                         | 19 (18)                     |          |
| Province            |                                 |                             |          |
| Phuket              | 4 (80)                          | 1 (20)                      | 0.59     |
| Ranong              | 68 (91)                         | 7 (9)                       |          |
| Samut Sakhon        | 169 (83)                        | 35 (17)                     |          |
Table 3. Cont.

| Independent Factors                              | High Level of Awareness, n (%) | Low Level of Awareness, n (%) | p-Value |
|--------------------------------------------------|-------------------------------|-------------------------------|---------|
| Length of stay in Thailand (years)               |                               |                               |         |
| ≤8                                               | 135 (91)                      | 13 (9)                        | 0.03    |
| >8                                               | 103 (77)                      | 30 (23)                       |         |
| Education                                        |                               |                               |         |
| No formal education                              | 29 (88)                       | 4 (12)                        | 0.44    |
| Primary school                                   | 135 (82)                      | 29 (18)                       |         |
| Secondary school and upper                       | 77 (89)                       | 10 (11)                       |         |
| Occupation                                       |                               |                               |         |
| Unemployed                                       | 41 (77)                       | 12 (23)                       | 0.27    |
| Factory worker                                   | 119 (84)                      | 22 (16)                       |         |
| Agriculture/fishery                              | 25 (93)                       | 2 (7)                         |         |
| Construction worker                              | 38 (95)                       | 2 (5)                         |         |
| Business/housemaid/waiter                        | 18 (78)                       | 5 (22)                        |         |
| Thai Reading Comprehension                       |                               |                               |         |
| Cannot understand                                | 143 (81)                      | 33 (19)                       | 0.15    |
| Partially understand                             | 84 (89)                       | 10 (11)                       |         |
| Fully understand                                 | 13 (100)                      | 0                             |         |
| Thai Listening Comprehension                     |                               |                               |         |
| Cannot understand                                | 46 (90)                       | 5 (10)                        | 0.41    |
| Partially understand                             | 134 (87)                      | 20 (13)                       |         |
| Fully understand                                 | 60 (77)                       | 18 (23)                       |         |
| Income                                           |                               |                               |         |
| Lower than minimum wage                          | 153 (83)                      | 32 (17)                       | 0.26    |
| Equal to minimum wage                            | 13 (100)                      | 0                             |         |
| Higher than minimum wage                         | 75 (87)                       | 11 (13)                       |         |
| Health insurance                                 |                               |                               |         |
| No insurance/unknown                             | 48 (76)                       | 15 (24)                       | 0.10    |
| Health Insurance Card Scheme                     | 30 (83)                       | 6 (17)                        |         |
| Social Security Scheme                           | 163 (88)                      | 22 (12)                       |         |
| Resources supporting access to information       |                               |                               |         |
| Low access                                       | 23 (85)                       | 4 (15)                        | 0.96    |
| High access                                      | 217 (85)                      | 38 (15)                       |         |
| Family member (aged ≥ 15 years)                  |                               |                               |         |
| <2 people                                        | 14 (100)                      | 0                             | N/A     |
| ≥2 people                                        | 168 (82)                      | 38 (18)                       |         |
| Receiving health information from health professionals |               |                               |         |
| Infrequent                                       | 117 (87)                      | 18 (13)                       | 0.37    |
| Frequent                                         | 124 (83)                      | 25 (17)                       |         |
| Receiving health information from community members |                 |                               |         |
| Infrequent                                       | 54 (84)                       | 10 (16)                       | 0.62    |
| Frequent                                         | 186 (85)                      | 33 (15)                       |         |
| Receiving health information from public mass media |                 |                               |         |
| Infrequent                                       | 20 (80)                       | 5 (20)                        | 0.75    |
| Frequent                                         | 220 (86)                      | 37 (14)                       |         |
| Receiving health information from social media   |                               |                               |         |
| Infrequent                                       | 76 (80)                       | 19 (20)                       | 0.42    |
| Frequent                                         | 165 (87)                      | 24 (13)                       |         |

For preventive practices, gender \( (p = 0.04) \), age groups \( (p = 0.03) \), education \( (p = 0.05) \), occupation \( (p = 0.03) \), Thai reading comprehension \( (p < 0.01) \), health insurance \( (p < 0.01) \), frequency of receiving health information \( (p < 0.01) \), and perceived barriers \( (p = 0.03) \) showed statistically significant associations. More details are described in Table 4.
Table 4. Univariate analysis on self-reported preventive practices during COVID-19.

| Independent Factors                        | High Level of Preventive Practices, n (%) | Low Level of Preventive Practices, n (%) | p-Value |
|-------------------------------------------|------------------------------------------|------------------------------------------|---------|
| Gender                                    |                                          |                                          |         |
| Female                                    | 140 (73)                                 | 51 (27)                                  | 0.04    |
| Male                                      | 79 (85)                                  | 14 (15)                                  |         |
| Age (years)                                |                                          |                                          |         |
| <25                                        | 35 (95)                                  | 2 (5)                                    | 0.03    |
| 25–59                                      | 182 (74)                                 | 63 (26)                                  |         |
| ≥60                                        | 3 (100)                                  | 0                                        |         |
| Ethnicity                                  |                                          |                                          |         |
| Myanmar                                    | 145 (81)                                 | 34 (19)                                  | 0.09    |
| Non-Myanmar                                | 74 (70)                                  | 31 (30)                                  |         |
| Province                                   |                                          |                                          |         |
| Phuket                                     | 8 (100)                                  | 0                                        | 0.45    |
| Ranong                                     | 56 (77)                                  | 17 (23)                                  |         |
| Samut Sakhon                                | 156 (76)                                 | 48 (24)                                  |         |
| Length of stay in Thailand (years)         |                                          |                                          |         |
| ≤8                                         | 117 (78)                                 | 33 (22)                                  | 0.90    |
| >8                                         | 101 (77)                                 | 31 (23)                                  |         |
| Education                                  |                                          |                                          |         |
| No formal education                        | 21 (64)                                  | 12 (36)                                  | 0.05    |
| Primary school                             | 128 (77)                                 | 38 (23)                                  |         |
| Secondary school and upper                 | 71 (83)                                  | 15 (17)                                  |         |
| Occupation                                 |                                          |                                          |         |
| Unemployed                                 | 34 (65)                                  | 18 (35)                                  | 0.03    |
| Factory worker                             | 111 (79)                                 | 30 (21)                                  |         |
| Agriculture/fishery                        | 18 (64)                                  | 10 (36)                                  |         |
| Construction worker                        | 38 (93)                                  | 3 (7)                                    |         |
| Business/housemaid/waiter                 | 19 (83)                                  | 4 (17)                                   |         |
| Thai Reading Comprehension                 |                                          |                                          |         |
| Cannot understand                          | 126 (71)                                 | 51 (29)                                  | <0.01   |
| Partially understand                       | 80 (85)                                  | 14 (15)                                  |         |
| Fully understand                           | 13 (100)                                 | 0                                        |         |
| Thai Listening Comprehension               |                                          |                                          |         |
| Cannot understand                          | 38 (73)                                  | 14 (27)                                  | 0.65    |
| Partially understand                       | 123 (80)                                 | 31 (20)                                  |         |
| Fully understand                           | 58 (74)                                  | 20 (26)                                  |         |
| Income                                     |                                          |                                          |         |
| Lower than minimum wage                    | 142 (76)                                 | 44 (24)                                  | 0.16    |
| Equal to minimum wage                      | 5 (38)                                   | 8 (62)                                   |         |
| Higher than minimum wage                   | 73 (85)                                  | 13 (15)                                  |         |
| Health insurance                           |                                          |                                          |         |
| No insurance/unknown                       | 39 (62)                                  | 24 (38)                                  | <0.01   |
| Health Insurance Card Scheme               | 30 (83)                                  | 6 (17)                                   |         |
| Social Security Scheme                     | 151 (81)                                 | 35 (19)                                  |         |
| Resources supporting access to preventive practices | | | | |
| Low access                                 | 37 (77)                                  | 11 (23)                                  | 0.39    |
| High access                                | 181 (77)                                 | 54 (23)                                  |         |
| Family member (age ≥ 15 years old)         |                                          |                                          |         |
| <2 people                                  | 12 (86)                                  | 2 (14)                                   | 0.31    |
| ≥2 people                                  | 149 (72)                                 | 58 (28)                                  |         |
Table 4. Cont.

| Independent Factors                                                                 | High Level of Preventive Practices, n (%) | Low Level of Preventive Practices, n (%) | p-Value |
|-------------------------------------------------------------------------------------|------------------------------------------|-----------------------------------------|---------|
| Overall frequency of receiving health information (all sources combined)             |                                           |                                         | >0.01   |
| Infrequent                                                                          | 88 (68)                                  | 42 (32)                                 |         |
| Frequent                                                                            | 129 (85)                                 | 22 (15)                                 |         |
| Health literacy                                                                     |                                           |                                         | >0.73   |
| Low health literacy                                                                 | 91 (77)                                  | 27 (23)                                 |         |
| High health literacy                                                                | 127 (77)                                 | 37 (23)                                 |         |
| Positive attitude toward public health measures                                     |                                           |                                         | >0.69   |
| Low level of positive attitude                                                     | 80 (78)                                  | 23 (22)                                 |         |
| High level of positive attitude                                                    | 136 (77)                                 | 41 (23)                                 |         |
| Knowledge about disease                                                             |                                           |                                         | >0.33   |
| Low level of knowledge                                                              | 65 (72)                                  | 25 (28)                                 |         |
| High level of knowledge                                                             | 155 (79)                                 | 40 (21)                                 |         |
| Awareness of public health measures                                                |                                           |                                         | >0.33   |
| Low level of awareness                                                              | 28 (65)                                  | 15 (35)                                 |         |
| High level of awareness                                                             | 188 (79)                                 | 50 (21)                                 |         |
| Perceived susceptibility                                                             |                                           |                                         | >0.08   |
| Low/moderate perception                                                             | 160 (75)                                 | 52 (25)                                 |         |
| High perception                                                                     | 60 (83)                                  | 12 (17)                                 |         |
| Perceived severity                                                                  |                                           |                                         | >0.10   |
| Low/moderate perception                                                             | 140 (74)                                 | 49 (26)                                 |         |
| High perception                                                                     | 79 (83)                                  | 16 (17)                                 |         |
| Perceived benefits                                                                  |                                           |                                         | >0.83   |
| Low/moderate perception                                                             | 102 (76)                                 | 33 (24)                                 |         |
| High perception                                                                     | 117 (79)                                 | 32 (21)                                 |         |
| Perceived barriers                                                                  |                                           |                                         | >0.03   |
| Low/moderate perception                                                             | 149 (74)                                 | 53 (26)                                 |         |
| High perception                                                                     | 70 (85)                                  | 12 (15)                                 |         |

We included the length of stay in Thailand and health insurance status in the multivariate analysis, as both variables had a p-value of less than or equal to 0.10 in the univariate analysis. The multivariate analysis revealed that a long length of stay in Thailand (more than 8 years (median)) was significantly associated with low awareness of public health measures to tackle the COVID-19 situation (AOR = 0.43, 95% CI 0.19–0.95) (Table 5).

Table 5. Multivariate analysis on the awareness of public health measures during COVID-19.

| Selected Factors | Adjusted OR (95% CI) | p-Value |
|------------------|-----------------------|---------|
| Length of stay in Thailand |                       |         |
| ≤8 years         | reference             |         |
| >8 years         | 0.43 (0.19–0.95)      | 0.04    |
| Insurance        |                       |         |
| No insurance/unknown | reference           |         |
| Social Security scheme | 2.02 (0.81–5.06)   | 0.13    |
| Health insurance card scheme   | 1.78 (0.54–5.85) | 0.35    |

For the effects on preventive practices, being between 25 and 59 years of age was associated with low preventive practices (compared with being less than 25 years of age) (AOR = 0.15, 95% CI 0.03–0.72). In contrast, achieving primary education (compared with a migrant worker with no formal education) (AOR = 3.24, 95% CI 1.18–8.93), and frequent
acquisition of health information from all sources (AOR = 4.20, 95% CI 1.95–9.03) were significantly associated with high levels of preventive practices (Table 6).

Table 6. Multivariate analysis on self-reported preventive practices during COVID-19.

| Selected Factors | Adjusted OR (95% CI) | p-Value |
|------------------|----------------------|---------|
| Gender           |                      |         |
| Female           | reference            |         |
| Male             | 1.08 (0.46–2.54)     | 0.86    |
| Age (years)      |                      |         |
| <25              | reference            |         |
| 25–59            | 0.15 (0.03–0.72)     | 0.02    |
| ≥60              | NA                   | NA      |
| Ethnicity        |                      |         |
| Myanmar          | reference            |         |
| Non-Myanmar      | 0.63 (0.29–1.35)     | 0.24    |
| Education        |                      |         |
| No formal education | reference           |         |
| Primary school   | 3.24 (1.18–8.93)     | 0.02    |
| Secondary school and upper | 2.64 (0.85–8.16) | 0.09 |
| Occupation       |                      |         |
| Unemployed       | reference            |         |
| Factory worker   | 0.46 (0.09–2.49)     | 0.37    |
| Agriculture/fishery | 0.38 (0.09–1.59) | 0.18    |
| Construction worker | 2.20 (0.31–15.51) | 0.43    |
| Business/maid/waiter | 0.77 (0.16–3.59) | 0.74    |
| Thai Reading Comprehension |        |         |
| Cannot understand | reference           |         |
| Partially understand | 1.71 (0.72–4.05) | 0.22    |
| Fully understand | NA                   | NA      |
| Insurance        |                      |         |
| No insurance/unknown | reference      |         |
| Health insurance card scheme | 2.46 (0.64–9.43) | 0.19 |
| Social Security scheme | 2.49 (0.58–10.62) | 0.22 |
| Overall frequency of receiving health information (all sources combined) | | |
| Infrequent | reference | |
| Frequent  | 4.20 (1.95–9.03)    | <0.01   |
| Perceived susceptibility | | |
| Low/moderate perception | reference | |
| High perception | 0.98 (0.37–2.60)    | 0.97    |
| Perceived severity | | |
| Low/moderate perception | reference | |
| High perception | 1.18 (0.47–3.00)    | 0.72    |
| Perceived barriers | | |
| Low/moderate perception | reference | |
| High perception | 0.97 (0.38–2.48)    | 0.95    |

Note: NA = dropped from the analysis due to perfect prediction.

4. Discussion

Overall, we found that participants had high levels of awareness toward public health measures and preventive practices. The most common source of health information was social media. Based on the multivariate analysis, we found that a longer stay in Thailand had a significant association with lower awareness of public health measures. Frequent reception of health information and primary school completion showed a statistically significant association with a high level of preventive practices, relative to those who rarely
received health information and had no formal schooling. However, being middle-aged (compared with being young) was significantly associated with fewer preventive practices.

Our study also found that a longer stay in Thailand was associated with lower awareness about public health measures. One possible explanation might be that migrants who have lived in the host country for a longer period were more familiar with the lifestyle and may be less sensitive to new information. In addition, a longer stay was associated with multiple morbidities. To date, there is no clear explanation about this phenomenon but some studies in the literature have ascribed this to chronic stress, discrimination, or other factors associated with post-migration experiences [31,32].

A high frequency of receiving health information likely amplified the perception of risk and led to higher levels of preventive practices. Frequent communication via various channels had both direct and indirect effects on preventive behaviors, especially during the pandemic [33]. Therefore, the government should not overly rely on the delivery of health messages through a single particular channel but should distribute the information through multiple channels to ensure migrants engage in desired preventive behaviors.

From the findings above, middle-aged participants were likely to have lower levels of preventive practices compared with younger participants. According to the association between longer stay and low level of public health measure awareness, it could be inferred that as older migrants were more likely to have longer stay in the host country, they probably ignored or did not follow the public health measures. Evidence from other countries showed that migrants with a longer stay or those of older age tended to face greater health risks, compared with younger migrants [34]. Migrant workers with primary education were likely to exhibit higher degrees of preventive practices, compared with those with no formal education; having no formal education leads to low comprehension or misunderstandings about health messages, which may ultimately result in low levels of preventive practices [35]. Therefore, risk communication should not overlook migrants who have difficulties in accessing information due to low literacy, as well as those who are most likely to ignore or not conform to public health measures such as older migrants and migrants who have stayed in Thailand for more than 8 years.

This study was among the first studies to explore the importance of health risk communication for migrants during the COVID-19 pandemic. The use of empirical data was one of the main strengths of the study. However, it also contained certain limitations. First, we chose to use the median as a cut-off value to transform a multilevel categorical variable into a binary variable. Although this approach was able to facilitate the interpretation of results to a wide range of audiences, it might have also caused residual confounding. This issue also flags the need for further research, as there are no standard questionnaires to assess the level of health information reception among migrants thus far. Second, generalization of the findings is quite limited as the migrants in this study were mostly from Myanmar, while migrants in other settings (for example, those in the northeast or north of Thailand) are likely to have their own demographic characteristics and behaviors. Third, we could not guarantee our samples were free from selection bias. Despite our intent to ask local coordinators to randomly select migrants in the community to take part in the study, it is possible that the coordinators may have selected participants who were closer to them.

5. Conclusions

Among migrant workers in Thailand, the frequent reception of health information through various channels is positively linked with better preventive practices against COVID-19. Further initiatives to promote the education and health literacy of migrants should focus more on migrants with no formal education and migrants who are likely to ignore or not comply with public health measures. The government should deliver health messages through various channels to encourage migrants to engage in desired preventive behaviors. Further qualitative studies may overcome the limitations of this study.
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Data Availability Statement: The datasets used in this article are not available publicly; however, they may be available upon reasonably request to IHPP.

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References

1. Huang, C.; Wang, Y.; Li, X.; Ren, L.; Zhao, J.; Hu, Y.; Zhang, L.; Fan, G.; Xu, J.; Gu, X.; et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet 2020, 395, 497–506. [CrossRef]
2. Jee, Y. WHO International Health Regulations Emergency Committee for the COVID-19 outbreak. Epidemiol. Health 2020, 42, e2020013. [CrossRef] [PubMed]
3. World Health Organization. Listings of WHO’s Response to COVID-19. Available online: https://www.who.int/news/item/29-06-2020-covidtimeline (accessed on 15 February 2021).
4. World Health Organization. Statement on the Second Meeting of the International Health Regulations (2005) Emergency Committee Regarding the Outbreak of Novel Coronavirus (2019-nCoV). Available online: https://www.who.int/news-room/detail/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-(2005)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-(2019-ncov) (accessed on 19 May 2021).
5. World Health Organization. WHO Coronavirus (COVID-19) Dashboard. Available online: https://covid19.who.int/ (accessed on 21 October 2021).
6. Doung-Ngern, P.; Suphanachimat, R.; Panjangampatthana, A.; Janekrongtham, C.; Ruampoom, D.; Daochaeng, N.; Eungkanit, N.; Pisitpayat, N.; Srisong, N.; Yasopa, O.; et al. Case-Control Study of Use of Personal Protective Measures and Risk for SARS-CoV 2 Infection, Thailand. Emerg. Infect. Dis. 2020, 26, 2607–2616. [CrossRef] [PubMed]
7. Namwat, C.; Suphanachimat, R.; Nittayasoot, N.; Iamsirithaworn, S. Thailand’s Response against Coronavirus Disease 2019: Challenges and Lessons Learned. OSIR 2020, 13, 33–37.
8. World Health Organization. Risk Communication. Available online: https://www.who.int/risk-communication/PIP_brochure_EN_lo.pdf (accessed on 30 May 2021).
9. Ministry of Public Health. COVID-19 Infodemic Management: Thailand Experience. The 75th Session of the General Assembly of the United Nations, 23 September 2020; WHO: Geneva, Switzerland, 2020. Available online: https://www.who.int/docs/default-source/coronaviruse/risk-comms-updates/thailand-unga-presentation-infodemic-thailand-21sep2020-final.pdf?sfvrsn=d757509e_6 (accessed on 30 May 2021).
10. Tabari, P.; Amini, M.; Moghadami, M.; Moosavi, M. International Public Health Responses to COVID-19 Outbreak: A Rapid Review. Iran. J. Med. Sci. 2020, 45, 157–169. [PubMed]
11. Marome, W.; Shaw, R. COVID-19 Response in Thailand and Its Implications on Future Preparedness. Int. J. Environ. Res. Public Health 2021, 18, 1089. [CrossRef] [PubMed]
12. WHO Thailand Country Office Coronavirus Disease 2019: Situation Report. Available online: https://cdn.who.int/media/docs/default-source/searo/thailand/2021_1_25_eng_sitrep_135-covid19.pdf?sfvrsn=a034c3d5_3 (accessed on 15 February 2021).
13. Luksamijarulkul, P.; Suknongbung, S.; Vatanasomboon, P.; Sujirarut, D. Health status, environmental living conditions and microbial indoor air quality among migrant worker households in Thailand. Southeast Asian J. Trop. Med. Public Health 2017, 48, 396–406. [PubMed]
14. United Nations. Thematic Working Group on Migration in Thailand. Thailand Migration Report 2019; Bangkok, Thailand, 2019. Available online: https://thailand.iom.int/sites/thailand/files/document/publications/Thailand%20Report%202019_22012019_HiRes.pdf (accessed on 14 April 2021).
15. Heydari, S.T.; Zarei, L.; Sadati, A.K.; Moradi, N.; Akbari, M.; Mehralian, G.; Lankarani, K.B. The effect of risk communication. *Occup. Environ. Med.* **2020**, *77*, 634–636. [CrossRef] [PubMed]

16. Koh, D. Migrant workers and COVID-19. *Occup. Environ. Med.* **2020**, *77*, 647–651. [CrossRef] [PubMed]

17. World Health Organization. Interim Guidance for Refugee and Migrant Health in Relation to COVID-19 in the WHO European Region. Available online: [https://www.euro.who.int/__data/assets/pdf_file/0008/454978/Interim-guidance-refugee-and-migrant-health-COVID-19.pdf](https://www.euro.who.int/__data/assets/pdf_file/0008/454978/Interim-guidance-refugee-and-migrant-health-COVID-19.pdf) (accessed on 17 June 2021).

18. Hickey, J.; Gagnon, A.J.; Jitthai, N. Pandemic preparedness: Perceptions of vulnerable migrants in Thailand towards WHO-recommended non-pharmaceutical interventions: A cross-sectional study. *BMC Public Health* **2014**, *14*, 665. [CrossRef] [PubMed]

19. Hickey, J.E.; Gagnon, A.J.; Jitthai, N. Knowledge about pandemic influenza preparedness among vulnerable migrants in Thailand. *Health Promot. Int.* **2016**, *31*, 124–132. [CrossRef] [PubMed]

20. International Organization for Migration, Thailand. Rapid Assessment: COVID-19-Related Vulnerabilities and Perceptions of Non-Thai Populations in Thailand; Bangkok, April 2020. Available online: [https://thailand.iom.int/rapid-assessment-covid-19-related-vulnerabilities-and-perceptions-non-thai-population-thailand](https://thailand.iom.int/rapid-assessment-covid-19-related-vulnerabilities-and-perceptions-non-thai-population-thailand) (accessed on 10 April 2021).

21. International Organization for Migration, Thailand. Rapid Assessment: COVID-19 Related Vulnerabilities and Perceptions of Non-Thai Populations in Thailand (round 2); Bangkok, June 2020. Available online: [https://reliefweb.int/report/thailand/rapid-assessment-round-2-covid-19-related-vulnerabilities-and-perceptions-non-thai](https://reliefweb.int/report/thailand/rapid-assessment-round-2-covid-19-related-vulnerabilities-and-perceptions-non-thai) (accessed on 16 April 2021).

22. International Organization for Migration, Thailand. Rapid Assessment: COVID-19 Related Vulnerabilities and Perceptions of Non-Thai Populations in Thailand (round 3); Bangkok, November 2020. Available online: [https://reliefweb.int/report/thailand/rapid-assessment-round-3-covid-19-related-vulnerabilities-and-perceptions-non-thai-populations](https://reliefweb.int/report/thailand/rapid-assessment-round-3-covid-19-related-vulnerabilities-and-perceptions-non-thai-populations) (accessed on 16 April 2021).

23. Jones, C.L.; Jensen, J.D.; Scherr, C.L.; Brown, N.R.; Christy, K.; Weaver, J. The Health Belief Model as an explanatory framework in communication research: Exploring parallel, serial, and moderated mediation. *Health Commun.* **2015**, *30*, 566–576. [CrossRef]

24. Bauza, V.; Sclar, G.D.; Bisoyi, A.; Owens, A.; Ghugey, A.; Clasen, T. Experience of the COVID-19 Pandemic in Rural Odisha, India: Knowledge, Preventative Actions, and Impacts on Daily Life. *Int. J. Environ. Res. Public Health* **2021**, *18*, 2863. [CrossRef] [PubMed]

25. Department of Disease Control. Corona Virus Disease (COVID-19). Available online: [https://ddc.moph.go.th/viralpneumonia/eng/index.php](https://ddc.moph.go.th/viralpneumonia/eng/index.php) (accessed on 1 March 2021).

26. Thai Government. Centre for COVID-19 Situation Disease. Available online: [https://www.moicovid.com/](https://www.moicovid.com/) (accessed on 1 March 2021).

27. Osborne, R.H.; Batterham, R.W.; Elsworth, G.R.; Hawkins, M.; Buchbinder, R. The grounded psychometric development and initial validation of the Health Literacy Questionnaire (HLQ). *BMC Public Health* **2013**, *13*, 658. [CrossRef] [PubMed]

28. Ministry of Labor. Minimum Wage. Available online: [https://www.mol.go.th/en/minimum-wage](https://www.mol.go.th/en/minimum-wage) (accessed on 1 March 2021).

29. Simpson, R.M.; Knowles, E.; O’Cathain, A. Health literacy levels of British adults: A cross-sectional survey using two domains of the Health Literacy Questionnaire (HLQ). *BMC Public Health* **2020**, *20*, 1819. [CrossRef] [PubMed]

30. Didarloo, A.; Nabilou, B.; Khalkhali, H.R. Psychosocial predictors of breast self-examination behavior among female students: An application of the health belief model using logistic regression. *BMC Public Health* **2017**, *17*, 861. [CrossRef]

31. Doamekpor, L.A.; Dinwiddie, G.Y. Allostatic load in foreign-born and US-born blacks: Evidence from the 2001–2010 National Health and Nutrition Examination Survey. *Am. J. Public Health* **2015**, *105*, 591–597. [CrossRef]

32. McEwen, B.S. Protection and damage from acute and chronic stress: Allostasis and allostatic overload and relevance to the pathophysiology of psychiatric disorders. *Ann. N. Y. Acad. Sci.* **2004**, *1032*, 1–7. [CrossRef] [PubMed]

33. Heydari, S.T.; Zarei, L.; Sadati, A.K.; Moradi, N.; Akbari, M.; Mehralian, G.; Lankarani, K.B. The effect of risk communication on preventive and protective Behaviours during the COVID-19 outbreak: Mediating role of risk perception. *BMC Public Health* **2021**, *21*, 54. [CrossRef] [PubMed]

34. Lee, C.H.; Yun, J.M.; Han, J.S.; Park, S.M.; Park, Y.S.; Hong, S.K. The Prevalence of Chronic Diseases among Migrants in Korea According to Their Length of Stay and Residential Status. *Korean J. Fam. Med.* **2012**, *33*, 34–43. [CrossRef] [PubMed]

35. Gilder, M.E.; Moo, P.; Hashmi, A.; Praisaengdet, N.; Wai, K.; Pimanpanarak, M.; Carrara, V.I.; Angkurawaranon, C.; Jiraporn-charoen, W.; McGready, R. “I can’t read and don’t understand”: Health literacy and health messaging about folic acid for neural tube defect prevention in a migrant population on the Myanmar-Thailand border. *PLoS ONE* **2019**, *14*, e0218138. [CrossRef] [PubMed]