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Uncovering the underlying aspects of successful COVID-19 prevention and control in Thailand through factor analysis: Lessons we have not yet learned from village health volunteers

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Abstract

Background: The COVID-19 pandemic has posed a global challenge, leading different nations to adopt diverse strategies for prevention and control. In Thailand, Village Health Volunteers (VHVs) have played a pivotal role in the fight against the virus. As the pandemic unfolded, the critical role of VHVs became apparent, prompting a closer examination of their practices and the underlying factors contributing to their effectiveness.

Objective: This study aimed to uncover the underlying factors and indicators contributing to the successful prevention and control of COVID-19 by VHVs in Thailand.

Methods: The sample group included 10,400 VHVs nationwide. Data were collected from October 2020 to February 2021 using five-point Likert rating scale online questionnaires. Data were analyzed using the Exploratory Factor Analysis technique, with Principal Component Analysis and the orthogonal Varimax method.

Results: The study revealed nine effective factors and 52 indicators contributing to the prevention and control of COVID-19 in Thailand. The identified factors are as follows: 1) Personal precautions, 2) Proactive disease control strategy, 3) Awareness of COVID-19 severity, 4) Pride and job motivation, 5) Adequate medical equipment and support, 6) Communication, planning, and monitoring processes, 7) Self-care for health, 8) Data collection, record maintenance, and report submission, and 9) Proper hand washing.

Conclusion: This research emphasizes the importance of a holistic approach to community-based health interventions. It highlights the crucial role of VHVs in disseminating information, ensuring preparedness, and fostering a sense of responsibility among community members. This strategic approach will effectively contribute to ongoing efforts to successfully prevent and control the spread of COVID-19 and potential future outbreaks.

Keywords

COVID-19; village health volunteers; prevention; control; community health; successful factors; factor analysis; Thailand

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Background

Thailand has been recognized as one of the top-ranking countries for its high-quality healthcare services due to the overall quality of its healthcare system, including infrastructure, healthcare professionals' competence, cost, availability of quality medicine, and government readiness. As stated in Thailand's 20-Year National Strategy, the well-being of the population is considered a priority (Sumriddetchkajorn et al., 2019). The country is focusing on developing a modern public healthcare system with the integration of advanced technology, including artificial intelligence development, a remote healthcare service system, and tax reformation. Our research study responds to the 20-Year National Strategy in strengthening public health and enhancing the capacity to address preventive and controlling measures of emerging infectious diseases. The main goal is to build a body of knowledge on disease prevention and the ability to deal with disease outbreaks.

According to the Centers for Disease Control and Prevention (2020), Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus in December 2019. As reported by the Thailand Ministry of Public Health and World Health Organization Thailand (2020), it was found that more than 2.97 million people from 185 countries were infected with COVID-19. More than 2.4 million

deaths worldwide have become a serious public health problem globally (Deng & Peng, 2020; Güner et al., 2020).

Even though the exact source of the new virus remains unknown, some hypotheses have connected the coronavirus with the seafood market in Wuhan City, China (Li et al., 2020). It has caused a worldwide pandemic of respiratory illness. The virus spreads from person to person through droplets released into the air by those infected when they cough or sneeze (Meyerowitz et al., 2021). COVID-19 mainly affects the respiratory tract and can lead to acute respiratory distress syndrome, sepsis, and septic shock (Huang et al., 2020; Parhizkar Roudsari et al., 2020). The signs and symptoms include cough, fever, difficulty breathing, muscle aches, sore throat, loss of taste or smell, diarrhea, headache, nausea or vomiting, weakness, and pneumonia in severe cases (Hidayati et al., 2022; Tsai et al., 2021; UNICEF, 2020).

The successful management of the COVID-19 pandemic in Thailand depends on several crucial factors. Among these, a robust and adequately equipped medical and public health system is paramount (Kuhakan & Wongcha-um, 2020). Additionally, adherence to cultural norms and public compliance with preventive measures, such as wearing face masks, practicing social distancing, maintaining proper hand hygiene, and avoiding social gatherings, play a vital role. Thailand has recently initiated a comprehensive endeavor to enhance healthcare facilities, empower personnel to respond effectively to COVID-19, and strengthen the overall healthcare system. This proactive initiative, known as the "New Normal Model," seeks to establish a resilient framework. Moreover, the invaluable contribution of village health volunteers has been instrumental in the battle against COVID-19.

According to Narkvichien (2020), Village Health Volunteers (VHVs) in Thailand are recognized as the "unsung heroes" safeguarding our communities from COVID-19 across the country. With a nationwide count exceeding 1 million volunteers, these dedicated individuals used to serve without remuneration until recently. Now, they receive a minimum compensation of 1,000 Thai Baht ($32) per month for their invaluable efforts. These heroes work tirelessly to alleviate community anxieties and control disease outbreaks. Their responsibilities include educating and informing local communities about the causes and prevention of infectious diseases. Amidst the COVID-19 outbreaks, VHVs have played a crucial role by providing guidance, distributing face masks and hand sanitizers to every household, conducting health surveys, collecting data, maintaining family health records, and supporting national prevention campaigns (Na Pathalung & Thepaksorn, 2017).

During the surveillance and control operations conducted by the VHV Club of Thailand, VHVs actively searched for potential cases of COVID-19. They visited more than 12 million households within a short timeframe from March to April 2020. To minimize the risk of new outbreaks, it is crucial to elevate preventive standards to a high level consistently. Despite the severity of the COVID-19 pandemic in Thailand, there have been limited studies focusing on the role of VHVs and the successful factors and indicators of the prevention and control of the disease. To address this gap, this study aimed to uncover the underlying factors and indicators contributing to the successful prevention and control of COVID-19 by VHVs in Thailand.

Methods

Study Design

Exploratory Factor Analysis (EFA) was employed.

Participants/Samples

The target population comprised 1,040,000 registered healthcare volunteers in each community under the Ministry of Public Health Thailand (MOPH). From this population, a sample of 10,400 healthcare volunteers was selected using an accidental sampling technique applied via an online questionnaire. The group size was determined at 1% of the population in cases exceeding 150,000 people (Neuman, 2014).

Instruments

The instrument used for this study was a questionnaire developed by the researchers based on a literature review that included the role and responsibilities of VHVs, VHVs' responsibilities in family care, VHVs' role in conducting COVID-19 surveillance (Department of Health Service Support Ministry of Public Health, 2019, 2020), and COVID-19 Prevention Guidelines (Ministry of Public Health, 2020). Subsequently, the questionnaires were provided to three experts: a doctor specializing in epidemiology, a doctor specializing in public health, and a professor from a university specializing in public health for the content validity test. The Index of Item Objective Congruence (IOC) ranged between 0.67-1.00. The questionnaires were then pilot-tested by a group of 30 VHVs with similar characteristics to the sample group. The Cronbach Alpha's Coefficient scores ranged from 0.717-0.917.

The questionnaire consists of two sections: Section 1 provides demographic data of the VHVs, while Section 2 is a Five-Point Likert's Rating Scale Questionnaire on the Successful factors and indicators of Coronavirus Disease (COVID-19) Prevention and Control in the Community by Village Health Volunteers (VHVs) in Thailand.

Data Collection

The researchers conducted data collection by clearly stating the objectives and ensuring the rights of the sample group in the questionnaire. Subsequently, data were gathered through an online survey by sending the questionnaire online to representatives in each region for further distribution using the Line application to representatives in each province from October 2020 to February 2021. This was done to then pass it on to the sample group. After sending out the online questionnaire, the researchers monitored the number of respondents and the completeness of the questionnaire on a daily basis. The online system was closed once the data reached 10,400 complete sets per the predetermined sample size. This process took one week.

Data Analysis

Data obtained from this study were analyzed using Statistical Package for the Social Science Version 23 (SPSS). Exploratory Factor Analysis (EFA) was employed to determine the number of factors that could effectively represent all variables. This was achieved through the Principal Component Analysis (PCA) method, the most suitable and widely used

technique for reducing the number of variables to the smallest while retaining the highest explanatory power. Orthogonal rotation, specifically Varimax, was applied to the factors to achieve a clearer separation of each factor by rotating the axes at right angles. This aims to enhance the factor loadings of the variables, making them either higher or lower, thereby facilitating the distinct interpretation of each factor. The factor loadings of the correlations between the variables and the factors in this study were set above 0.50, indicative of factor loadings with practical significance (Hair et al., 2019). The tested assumptions are outlined as follows: 1) The Normality test, which was determined by a histogram. Collected data were found to be normally distributed; 2) Kaiser-Meyer-Olkin (KMO) test was used to test the suitability of the collected data for factor analysis. The KMO value of 0.967 was considered remarkably high, indicating a strong correlation. Additionally, the Chi-Square result from Bartlett's Test of Sphericity was equivalent to 367567.037 with a significance level of 0.05. This suggests that the correlation matrix of the population is not unique, and the interrelationships among all variables are sufficiently significant for use in subsequent component analysis (Hair et al., 2019). The collected data were suitable for EFA.

Ethical Consideration

Ethical approval was granted by the Ethics Committee of Boromarajonani College of Nursing Songkhla, Thailand (Ref No. BCNSK26/2563 on 17 April 2020). The study participants were treated with dignity and respect, and no harm was caused to them. Measures were in place to safeguard their privacy, confidentiality, and personal information. Informed consent was obtained from all participants, and they were provided with clear explanations regarding the study and their right to withdraw until data collection was concluded without facing any negative consequences.

It is worth noting that this research represents a parallel investigation to a previous study published elsewhere (Singweratham et al., 2023). That study had an entirely distinct research objective and a different statistical analysis compared to the content presented in this manuscript.

Results

Participants Characteristics

Out of the total questionnaires distributed, 10,400 responses were received and utilized for the analysis. The demographic data of the sample group indicated that the majority, 88.3%, were female. The average age of the VHVs was 48.7 years, and they had an average of 13 years of experience. Regarding geographical distribution, 68.0% of the VHVs resided in the southern region of Thailand. Regarding education level, 90.1% of the VHVs had below a bachelor's degree, and 75.9% were single. Additionally, 42.5% of the VHVs were engaged in the fields of agriculture and the fishing industry.

Successful Factors and Indicators of COVID-19 Prevention and Control in the Community

The analysis results revealed the presence of 10 factors with eigenvalues greater than 1. However, two of the indicators in factor 10 had factor loadings exceeding 0.5, and the difference in factor loadings did not exceed 0.2. Consequently, these indicators were removed following the rationale of Costello and Osborne (2005) and Osborne (2014). This resulted in only two indicators remaining in factor 10. According to Costello and Osborne (2005), if there are fewer than three indicators in a factor, the factor should be removed to refine the factors of success.

The success of VHVs in preventing the transmission of COVID-19 in the community was attributed to nine primary factors, comprising a total of 52 indicators. Collectively, these factors accounted for 62.63% of the explained variance, with respective eigenvalues of 17.65, 4.68, 3.67, 2.96, 2.30, 1.59, 1.22, 1.19, and 1.07. Among these factors, the "Personal precautions" factor had the highest percentage of variance, contributing to 30.43% of the explained variance. It was followed by the "Proactive disease control strategy" factor, which accounted for 8.07% of the variance. Additionally, the factor related to the "Awareness of COVID-19 severity" contributed to 6.33% of the variance, as indicated in **Table 1** and **Figure 1**.

Table 1 Eigenvalue variance, percentage, and cumulative percentage of the variances of the successful factors and indicators of COVID-19 prevention and control in the community by VHVs in Thailand

Factors	Eigenvalue	Variance Percentage	Cumulative Percentage
Factor 1 Personal Precautions	17.65	30.43	30.43
Factor 2 Proactive Disease Control Strategy	4.68	8.07	38.49
Factor 3 Awareness of COVID-19 Severity	3.67	6.33	44.83
Factor 4 Pride and Job Motivation	2.96	5.10	49.93
Factor 5 Adequate Medical Equipment and Other Supports	2.30	3.97	53.90
Factor 6 Communication, Planning, and Monitoring Process	1.59	2.74	56.64
Factor 7 Self-Care for Health	1.22	2.09	58.74
Factor 8 Data Collection, Records Maintenance, and Report Submission	1.19	2.05	60.78
Factor 9 Proper Hand Washing	1.07	1.85	62.63

Subsequently, the researchers examined the similarity of the indicators within each factor before naming each factor. Details of the indicators in each factor are presented in **Table 2**. Factor 1 (Personal Precautions) includes eight indicators and accounts for the highest variance percentage at 30.43%. Notably, wearing a surgical mask when leaving home is the most influential indicator of this factor. Factor 2 (Proactive Disease Control Strategy) comprises nine indicators and explains the highest variance percentage at 8.07%. Strict adherence to wearing masks within the community and following curfew guidelines are highly weighted indicators of this factor.

Table 2 Factor loadings of successful factors and indicators of COVID-19 prevention and control

Factors	Indicators	Factor Loading
Factor 1 Personal Precautions	1) Shower as soon as entering the home after work	0.562
	2) Using a personal serving spoon when eating with others	0.565
	3) Maintain at least 1-2 meters of social distance when talking to another person	0.645
	4) Eating healthy food	0.651
	5) Wearing a surgical mask when feeling unwell	0.661
	6) Eating hot food, well prepared serves as soon as it has been cooked	0.661
	7) Eating hygienic food	0.744
	8) Wearing a surgical mask/cloth mask when going out of residence	0.765
Factor 2 Proactive Disease Control Strategy	1) Teach the people in the community to observe the signs and symptoms of COVID-19 infection	0.523
	2) Home visits to provide education regarding COVID-19 prevention to the house that is their responsibility	0.539
	3) Promptly notify healthcare team or teamwork if a problem occurs while working to prevent COVID-19 in the community	0.570
	4) Providing knowledge to the people in the community on how to prevent COVID-19 infection	0.598
	5) Inform the government officer if noticing any risk that would lead to the infection/spread of COVID-19 in the community	0.657
	6) Personal health assessment prior to working in the community to prevent COVID-19	0.690
	7) Strictly ensure that the people in the community follow the province's official announcements to prevent the spread of COVID-19	0.755
	8) Ensure that the people in the community wear a mask strictly	0.786
	9) Ensure that the people in the community follow the curfew guideline, which is to be at their residence strictly	0.786
Factor 3 Awareness of COVID-19 Severity	1) Perception of COVID-19 infection could be spread through liquid droplets from infected person's saliva, snot, phlegm, or when they cough or sneeze	0.688
	2) The aging population is more likely to die when infected with COVID-19	0.755
	3) Having an underlying disease would cause COVID-19 infection to be more severe and a change which could cause a person to be dead	0.778
	4) Perception of COVID-19 is a dangerous infectious disease	0.798
	5) Perception of COVID-19 infection is a dangerous disease and could be fatal to death	0.798
	6) Perception of COVID-19 infections would cause severe lung infection	0.800
Factor 4 Pride and Job Motivation	1) Feeling proud that you are one of the persons in the community who could help in preventing COVID-19 from spreading in Thailand, resulting in very few people being infected with COVID-19 infection and dying due to COVID-19 when compared to other countries	0.646
	2) Feeling proud when your community is free from COVID-19 infections	0.669
	3) This is the responsibility of the Village Health Volunteer	0.702
	4) A feeling of being a worker ant who has a vital role in preventing COVID-19 infection at the community level	0.731
	5) The feeling of being one of the members of the public health care team who is important in helping to prevent COVID-19 infection	0.751
	6) Working for the country and repaying the motherland	0.756
	7) Working for the good health of the people in the community	0.766
Factor 5 Adequate Medical Equipment and Other Supports	1) The organization provides sufficient equipment and medical supplies for working to prevent COVID-19	0.752
	2) The organization provides sufficient disinfectant	0.784
	3) The organization provides equipment that has standard quality to use in the prevention of COVID-19	0.820
	4) The organization provides sufficient equipment, such as masks, face shields, and thermometers, to use for screening and preventing COVID-19	0.859
Factor 6 Communication, Planning, and Monitoring Process	1) Communication about COVID-19 infection disease among community healthcare volunteers	0.658
	2) Provide knowledge and training on COVID-19 infection regularly	0.690
	3) Has consistent supervision for Village Health Volunteers working to prevent COVID-19 infection	0.695
	4) Has clear assignment for Village Health Volunteers in working to prevent COVID-19	0.710
	5) Has a proper and reliable work plan for Village Health volunteers in working to prevent COVID-19 infections	0.736
Factor 7 Self-Care for Health	1) Regular health checkups according to the guideline	0.572
	2) Exercise regularly more than 3-4 times/week and at least 30 minutes each time	0.609
	3) Eating minerals that are good for health and could boost the body's immune systems	0.780
	4) Eating vitamins and mineral supplements to boost the body's immune systems	0.816
Factor 8 Data Collection, Records Maintenance, and Report Submission	1) Inquiring about COVID-19 infection basic symptoms in the community	0.577
	2) Provide daily records of work in preventing COVID-19 in the community and report to the affiliated organization every day	0.714
	3) Having updated traveling data of the people in the responsible area	0.724
Factor 9 Proper Hand Washing	1) Wash hands with soap and water for at least 20 seconds or use alcohol gel (with more than 70% alcohol) before eating or touching foods	0.651
	2) Wash hands correctly every time (7 steps)	0.663
	3) Wash hands with soap and water for at least 20 seconds or use alcohol gel (with more than 70% alcohol) after touching sharing items	0.694
	4) Wash hands with soap and water for at least 20 seconds or use alcohol gel (with more than 70% alcohol) after using the toilets	0.695

Factor 3 (Awareness of COVID-19 Severity) consists of six indicators, with the highest variance percentage explained at 6.33%. The most significant indicator of this factor is the understanding that COVID-19 can severely affect the lungs. Factor 4 (Pride and Job Motivation) includes seven indicators and explains the highest variance percentage at 5.10%. Feeling a sense of working for the community's health is the most influential indicator of this factor. Factor 5 (Adequate Medical Equipment and Other Supports) consists of four indicators and explains the highest variance percentage at 3.97%. The availability of sufficient equipment, such as masks and thermometers, is a crucial indicator of this factor.

Factor 6 (Communication, Planning, and Monitoring Process) comprises five indicators, explaining the highest variance percentage at 2.74%. Having a reliable work plan for VHVs is the most influential indicator of this factor. Factor 7 (Self-Care for Health) consists of four indicators, explaining the highest variance percentage at 2.09%. Taking vitamins and supplements to boost the immune system is the most significant indicator of this factor. Factor 8 (Data Collection, Records Maintenance, and Report Submission) includes three indicators, explaining the highest variance percentage at 2.05%. Maintaining updated travel data for the assigned area is a crucial indicator of this factor. Factor 9 (Proper Hand Washing) comprises four indicators, explaining the highest variance percentage at 1.85%. The most influential indicator of this factor is proper hand washing after using the toilet.

Discussion

The findings revealed that personal precautions received the highest score. Given that COVID-19 can be easily transmitted through bodily secretions like mucus, saliva, and phlegm from an infected individual, the most effective means to prevent the spread of COVID-19 in the present circumstances involve self-protective measures. These include wearing face masks, practicing regular handwashing with soap and warm water, and adhering to physical distancing guidelines (World Health Organization, 2020). Additionally, it is well-established that hand washing is a practical and cost-effective procedure that should not be neglected (Juthamanee, 2020).

VHVs play a vital role in promoting health and preventing the transmission of infectious diseases. They educate their community members, following the principles of "verifying misinformation, delivering accurate news, recommending health services, and coordinating public health efforts." VHVs assist individuals in maintaining their health, thereby reducing unnecessary healthcare expenses for the nation. This is relevant to a study conducted in Indonesia that found that citizens with a high level of knowledge and positive levels of health belief models led to good prevention practices (Winarti et al., 2021).

Their deep understanding of the community they serve fosters trust and makes them essential in assessing local areas. Currently, the Ministry of Public Health employs 1,040,000 VHVs (Primary Health Care Division - Ministry of Public Health, 2019). The successful implementation of COVID-19 control operations with VHVs involves serving as role models in disease prevention. This includes using personal utensils, consuming freshly cooked food, maintaining physical distance, and wearing face masks consistently. Similarly, a study conducted in Indonesia revealed that the effective distribution of information and active involvement of community leaders as role models for healthy behaviors led to a significant enhancement in the community's adherence to preventive health measures against COVID-19 (Rosidin et al., 2022).

One notable finding from the study is that utilizing a proactive disease control strategy received the second-highest score. This can be attributed to the significant role played by VHVs as frontline public health workers in conducting surveillance and controlling the spread of COVID-19 within the community. VHVs actively engage in on-the-ground operations, visiting households, conducting health surveys, providing health education, checking body temperatures, assessing initial symptoms, recording data on high-risk individuals, reporting findings, and coordinating with public health officials and relevant agencies. Moreover, they serve as role models in practicing self-protection by strictly adhering to face mask usage and consistently monitoring curfews (Department of Health Service Support Ministry of Public Health, 2020). This exemplary behavior by VHVs has led to a steady decline in the number of COVID-19 cases in rural areas of Thailand. Many countries recognize Thailand as having an efficient healthcare system and often reference it as a success story. During the COVID-19 outbreak, in addition to their primary mission of disease prevention education, VHVs continued to screen individuals in the community and foreigners entering the area, providing continuous information updates.

Furthermore, they assisted healthcare personnel in delivering medications to patients with chronic conditions like diabetes and hypertension, aiming to reduce crowds and the risk of COVID-19 transmission associated with hospital visits (Tejativaddhana et al., 2020). The success in COVID-19 prevention lies in proactive and direct engagement with rural communities, aligning with the guidelines set by the Thai Department of Disease Control under the Ministry of Health Thailand (Department of Disease Control - Ministry of Public Health Thailand, 2018). This approach mirrors the effective actions taken by VHVs during previous health crises, such as reducing health hazards related to haze-affected individuals, where VHVs played a crucial role by personally visiting each patient's home.

Lessons We Have Not Yet Learned

Despite the numerous papers published about COVID-19 to date, what sets this study apart and can be particularly valuable are: 1) This study highlights the significant role played by VHVs in preventing and controlling COVID-19 in Thailand. It emphasizes the importance of community-based healthcare workers during a pandemic. 2) This research highlights the significance of a holistic approach to community-based health interventions. This implies that addressing multiple aspects of healthcare, including personal precautions, communication, data collection, and more, is crucial for effective disease prevention and control. 3) This study identified nine factors that effectively contribute to COVID-19 prevention and control in Thailand. These factors included personal precautions, proactive disease control strategies, awareness of COVID-19 severity, job motivation, adequate medical equipment, communication, self-care, data collection, and proper

handwashing. 4) The findings emphasized the role of VHVs in disseminating information, ensuring preparedness, and instilling a sense of responsibility among community members. This highlights the importance of involving the community in prevention and control efforts for success. 5) Proper data collection, record maintenance, and report submission are significant factors. This emphasizes the importance of accurate data in monitoring and responding to a pandemic. 6) The study stressed the need for proactive measures and a high awareness of the disease's severity for effective prevention and control. It highlights the importance of ongoing education and preparedness efforts. 7) Self-care for health is one of the identified factors. This suggested that individuals and healthcare workers must prioritize their own health to combat a pandemic effectively.

Figure 1 Successful factors of COVID-19 prevention and control in the community by VHVs in Thailand

Recommendations for Future Research

Further research is needed to explore the role of village health volunteers in managing and preventing non-communicable diseases (NCDs). While this study emphasized their importance in health protection during the pandemic, additional investigation is required to understand how they can effectively contribute to the prevention of various health issues. Moreover, future research should focus on potentially integrating digital and technology platforms within public health initiatives. Examining the utilization of these tools can provide valuable insights into their efficacy and impact on healthcare delivery, disease surveillance, health education, and overall public health outcomes. Such studies would help identify innovative approaches to leverage technology for improved health outcomes and enhanced support for community health workers like village health volunteers.

Conclusion

Thailand's success in recovering from and preventing the transmission of COVID-19 can be attributed to various factors. One crucial aspect is the overall quality of the country's healthcare system, which includes robust infrastructure, competent healthcare professionals (such as doctors, nurses, and other health workers), affordable and accessible healthcare services, availability of quality medicines, and a prepared government. The findings of this study identified nine successful factors and 52 indicators for the prevention and control of COVID-19. Additionally, Thailand has implemented strict adherence to basic precautions, following a "New Normal Model," which has been instrumental in combating the outbreak of this deadly coronavirus. The efforts of VHVs have played a significant role in supporting these preventive measures. The collaboration between VHVs and the broader healthcare system has strengthened the country's response to the pandemic, enabling Thailand to combat the spread of the virus effectively. The collective implementation of these strategies, along with the active involvement of VHVs, has contributed to Thailand's recognition as one of the best countries in terms of recovering from and preventing the transmission of COVID-19.

Declaration of Conflicting Interest

The authors had no conflict of interest to declare.

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Authors' Contributions

All authors equally contributed to the study, were accountable for each step, and critically reviewed and approved the final version of the article.

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Data Availability

The datasets generated during and analyzed during the current study are not publicly available due to privacy and ethical concerns but are available from the corresponding author upon reasonable request.

Declaration of Use of AI in Scientific Writing

Nothing to declare.

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