



A Cross-Country Comparison of Village Health Volunteer's Role in Managing COVID-19 in Thailand

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Abstract

The GHS Index 2021 ranked Thailand first in virus detection and rapid reporting of COVID-19. However, the spread still continues across the country. Although more than 1,040,000 Village Health Volunteers (VHVs) are the key to Thailand's success, no previous investigation into a cross-country comparison of how VHVs manage COVID-19. This study was based on a mixed-method approach. The results revealed differences between VHVs in the seven locations (namely Bangkok, Central, Northern, Northeastern, Eastern, Western, and Southern) in managing COVID-19 in effectiveness of COVID-19 health service management and problems with the operation of COVID-19 control. The findings revealed insights into which topic areas and indicators are effective or ineffective for which locations. The findings have practical implications for VHVs and the general public in all locations. For policymakers, the insights practically imply what topic areas and indicators need to be further developed for more effective management at the local levels. The lessons from Thailand also provide a trajectory for other developing countries to follow for future outbreaks.

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1. Introduction

According to the GHS Index 2021, Thailand was ranked 1st in virus detection and rapid reporting, the only developing country among the top ten countries for the past 2 years, and the 5th out of 195 countries for "health security" (GHS Index, 2021). However, the virus still spreads around Thailand. Statistics revealed that Thailand has encountered twists and turns

in the crisis. As of May 16th, there are approximately more than 5,000 new infections and 50 deaths every day. This may be a result of the prevalent and widening insufficiency and inequality of health facilities and professionals in different locations of Thailand. Insufficiency and inequality pose challenges to the 1,040,000 village health volunteers (VHVs) who are key to Thailand's success.



Without VHV's, it is impossible for Thailand to track all local cases and provide necessary health services nationwide (Bezbaruah et al., 2021), and Thailand would have failed in this outbreak (Marddent & Arporn, 2021). Due to the insufficiency of health professionals in Thailand, VHV's are invaluable assets in this crisis (Nittayasoot et al., 2021) as they have made contributions to COVID-19 crisis management as community primary health service providers (Tantrakarnapa et al., 2020; Krassanairawiwong et al., 2021) and intermediaries between health professionals and their community members (Aung et al., 2021; Naprathansuk et al., 2021) in promoting the health activity participation of local communities nationwide. Their contributions significantly reduce the burden placed on health professionals (Tejativadhdana et al., 2020). VHV's perform a role in providing health services in support of health professionals to reduce constraints and challenges such as differences in health inequality, disease burden, and ecological disparities of the locations. To understand Thailand's success, it is interesting how VHV's in Thailand manage COVID-19.

As little attention has been paid to this issue and no previous studies have investigated how VHV's across Thailand manage COVID-19 and how they deal with the constraints and challenges, this study attempted to understand the theoretical and research gap by comparing VHV's roles in managing COVID-19 across Thailand to draw insights on VHV's roles in managing COVID-19 in each location. The insights will have implications for each location and for Thailand as a whole in preparation for the subsequent outbreaks. Overall, the key findings will teach other developing countries how to stop outbreaks in the future.

This article consists of six parts. Part I (Introduction) describes a research gap and the rationale for the study. Part II (Literature Review) presents a literature review of VHV's role in managing COVID-19, a theoretical and conceptual framework of the study, and research questions. Part III (Research Method)

illustrates the research approach. Part IV (Results of the Study) summarizes the research findings. Part V (Conclusion) describes the conclusion of the study. Part VI (Discussion) compared the results of this study with those of previous studies; discussions of how this study extends the previous studies; limitations of this study; suggestions of future studies to be carried out; and recommendations for policy implications for policy makers.

2. Literature Review

The literature review and previous studies below provide background on the VHV's role in managing COVID-19 in Thailand.

2.1 Previous research on the role of VHV

VHV's role in managing COVID-19 is multifaceted. Below are details of each duty.

2.1.1 Providing health services as a health assistant to health professionals

VHV's make it possible for Thailand to provide essential and timely medical care for health surveillance activities nationwide. They are responsible for performing a regular daily screening test (Tangkitvanich, 2021), collecting daily health data and statistics (Viwattanakulvanid, 2021), and making a regular daily visit to record and monitor a local 14-day quarantine (Kaweenuattayanon et al., 2021). The daily collected data is essential for procuring medical equipment, conducting an assessment of the local transmission, and decision-making on relevant activities (Marome & Shaw, 2021).

2.1.2 Promoting health education to members of the community

VHV's raise public health awareness to follow guidelines and measures on the prevention of COVID-19. A major campaign is 'door-knocking'. In this campaign, they give advice on self-protective guidelines and measures (Chinnapha, 2020). Due to shortages of protective medical equipment, they produce self-made protective equipment.

2.1.3 Collaboration among all parties involved



VHVs play a vital role as coordinators to provide support and enforce public health policies (Langkulsen & Rwodzi, 2021; Shadmi et al., 2020). They also voiced community health concerns (Kitchanapaibul et al., 2021) and other concerns (Pongpirul, 2020).

2.1.4 Promoting community wellness

Due to the uncertainty of the COVID-19 outbreak, the community members psychologically suffer from constraints, stress, and anxiety caused by the absence of vaccine and insufficiency of protective equipment (Sagaon-Teyssier et al., 2020) and personal health problems and aging (Jamjumrus, 2021). They provide emotional support to wellness through informal counseling as community health leaders (Kertesz et al., 2020; Osewe, 2021; Laochankham et al., 2021). Counseling is effective as it is based on a trust-based relationship (Triukose et al., 2021).

In performing their regular duties, VHVs experience a myriad of challenges. It is also essential to look at how they manage the challenges in the next part.

2.2 Prior research on VHV's managing COVID-19 challenges

Health workers all over the world experience myriad challenges. Below are key challenge.

2.2.1 Managing health emergencies and health risks

COVID-19 exacerbates disease and social inequality in rural areas, necessitating increased emergency and risk (Righi et al., 2021). Due to the vaccine and protective equipment shortages, VHVs resort to alternative medicine (e.g., *Andrographis paniculate*) and self-made masks for medical masks. Moreover, geocentric and anthropological approaches were adopted to reduce risks (Nath et al., 2021). The insufficiency adversely affected the VHVs' workload and psychologically discouraged and depressed (Jiratchayaporn et al., 2022).

2.2.2 Managing massive COVID-19 control measures

Several scholars (Tobyn, 2021; Sardar et al., 2020) indicated that all involving sectors

must manage challenges using the initiated massive measures (Gaskin et al., 2021; da Silva, 2021), domestic and cross-border travel and transportation restrictions (Mishra & Rath, 2020), and lockdown (Kumar & Choudhury, 2021; Glover et al., 2020). These measures were inflexible, so health workers in Thailand needed to deal with these measures.

2.2.3 Dealing with paradigm shifts

Due to the abruptness of COVID-19, no measures could be decided beforehand. All measures involved radical changes and paradigm shifts for all sectors and all citizens, such as responsible transport (Budd & Ison, 2020), public transport (Thombre & Agarwal, 2021), and contactless delivery (Kunovjanek & Wankmüller, 2021). Scholars (Mogaji, 2020; Marsden & Docherty, 2021) suggest guidelines for operations and management for health workers (Mogaji, 2020). However, such guidelines are impractical for all locations. Managing the paradigm shifts involves unprecedented challenges, which affect everyone adversely.

2.2.4 Managing communication and information-sharing

Obtaining reliable information (e.g., reporting test results) in a timely manner is impossible without communication and information-sharing technology (Kaweenuttayanon et al., 2021). (Zhou et al., 2020) Technologies like Geographic Information Systems (GIS), Big Data technologies, and data-driven systems help people quickly learn new things.

2.2.5 Managing Life Effects

Scholars have attempted to effect COVID-19 on life such as daily life (Chirisa et al., 2021), food insecurity (Delbiso et al., 2021), a change in human-social relationships (Fatmi et al., 2021), intense fear (Gupta et al., 2021), unemployment (Koch et al., 2021), and online learning (Maqableh & Alia, 2021). Managing the effects of life is a burden to vulnerable and marginalized groups such as age-related groups (Naughton et al., 2021), migrant workers (Georgios & Barraí, 2021), and indigenous



communities and children (Spagnolo et al., 2020).

2.3 Research gap

As the previous studies are limited to some locations, the results are not evident. This was a research gap that needed further investigation. This study was, therefore, conducted in various parts of Thailand, using a location-based approach following the studies by O'Connor

(2021), Agnoletti et al. (2020), and Malatzky et al. (2020), to understand how VHV's role in managing the local transmission of COVID-19.

2.4 Conceptual framework of the study and research questions

2.4.1 Conceptual framework of the study

The conceptual framework of the study can be photographically as shown in Figure 1.

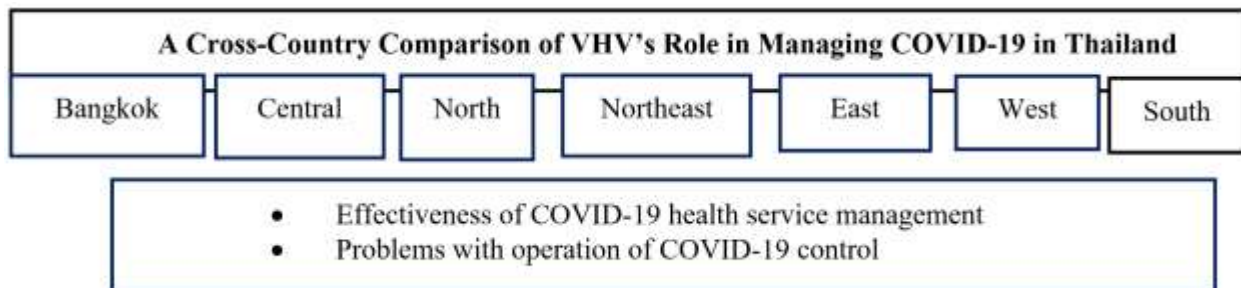


Figure 1 Theoretical and conceptual framework of the study

Figure 1 illustrates the framework for the study. The seven locations to be compared included Bangkok, Central Thailand, Northern Thailand, Northeastern Thailand, Eastern Thailand, Western Thailand, and Southern Thailand. The comparison focused on two areas (namely effectiveness of health service management and problems with operation of COVID-19 control).

2.4.2 Research questions

The research questions (RQs) were determined as follows:

RQ 1: What are the insights of VHVs' effectiveness of health service management in seven locations?

RQ 2: What are the insights of VHVs' problems with operation of COVID-19 control in seven locations?

3. Research Method

3.1 Design

The design of this study was based on a mixed-method approach. This study aimed to draw the insights of VHVs' role in managing COVID-19 control across Thailand. The focus group was purposefully chosen for this study as this method can retain rich meaning and detailed descriptions of VHVs' role in managing COVID-19 and preserving their perspective in natural settings. The 40 key informants in two focus groups were drawn from all locations, including Bangkok. The key informants' experience was needed due to a shortage of prior knowledge of how to manage this pandemic. The focus group discussion helped to preserve the key informants' voices and perspectives, and the researchers were able to adjust quickly if new issues, ideas, or patterns arose. As this study aimed to compare the insights of VHVs' role in managing COVID-19 across the country, a survey questionnaire was constructed from the data of the two focus groups. The population of the survey was VHVs. In the absence of VHVs in Bangkok, health volunteers (HVs) perform the same role as VHVs, so they were included in the



population. The sample selection was based on stratified random sampling. The sample size was calculated by the Taro Yamane formula. The samples were 416 VHVs and the proportions of the samples in each location were as follows: BKK (14%, n = 60), Central Thailand (18%, n = 74), Northern Thailand (20%, n = 83), Northeastern Thailand (17%, n = 68), Eastern Thailand (9%, n = 37), Western Thailand (8%, n = 33), and Southern Thailand (14%, n = 61).

3.2 Data collection

The data collection was conducted from July–August, 2021. The collection began with the focus groups. Each of which consisted of 20 key VHV informants. These two focus groups were designed to compare insights of VHVs' management of COVID-19 control drawn upon the discussions of 40 samples as key informants. Their discussion involved these topic areas (namely, the effectiveness of COVID-19 health service management in your area; problems with the operation of COVID-19 control in your area; strategies, measures, and practices to control the outbreak; and so on). The insights were used to set up the study's conceptual framework and make the survey questions. Then, the survey questionnaire was administered to the samples from October–December, 2021. Five-point rating scale questionnaire (namely strongly disagreeing, disagreeing, neutral, agreeing, strongly agreeing) aimed to evaluate VHVs' role in managing COVID-19 across the country.

3.3 Data analysis, validity, and reliability check

The data were qualitatively and quantitatively analyzed. The qualitative data from the focus groups were analyzed based on a triangulation principle. The discussions were recorded, transcribed, and decoded by all three researchers, and a conclusion was drawn upon consensus. Then, major themes were carefully identified, categorized, and interpreted in relation to one of the major six topic areas. Descriptive statistics was used for qualitative data analysis from the rating scale questionnaire. The levels of satisfaction were interpreted based on these criteria: lowest (average 1.00-1.50), low (average 1.51-2.50), moderate (average 2.51-3.50), high (average 3.51-4.50), and highest (average 4.51-5.00).

3.4.2 Validity and reliability checks

For content and construct validity checks, the questionnaire was constructed in response to the purposes of the study. As this study was a joint research project between the UK and Thailand, this questionnaire was sent to 10 reviewers, 5 in the UK and 5 in Thailand. Then, researchers adjusted accordingly. For a reliability check, the questionnaire was tried out with 30 respondents and tested by the Alpha Cronbach's Coefficient was 0.92, indicating a strong value.

4. Results of the study

4.1 Differences in a comparison of VHV's role in managing COVID-19

The results can be presented in Table 1.

Table 1 The comparison of VHV's role in managing COVID-19

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Key topic areas of COVID-19 health service management	BKK	Central Thailand	Northern Thailand	Northeastern Thailand	Eastern Thailand	Western Thailand	Southern Thailand
	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)
1. Effectiveness of COVID-19 health service management in the location	3.4679 (0.9813)	3.6287 (0.9273)	3.5375 (0.8221)	3.6354 (1.1099)	3.6882 (1.2068)	3.6583 (1.2060)	3.6881 (1.2064)
2. Problems of operation of COVID-19 control in the location	3.0475 (1.1726)	3.2473 (1.1726)	2.9898 (1.0801)	2.7702 (1.3752)	2.7565 (1.3878)	2.7911 (1.3817)	2.7553 (1.3864)
3. Strategies, measures and practices to control the outbreak	3.3444 (1.0400)	3.4744 (1.0400)	3.3075 (0.9234)	3.2789 (1.2521)	3.5263 (1.2904)	3.5710 (1.2963)	3.5282 (1.2962)
4. Leadership in public health and control of the COVID-19	3.9888 (0.8233)	3.9102 (0.8233)	3.6301 (0.8537)	4.0077 (0.8262)	4.1859 (0.8776)	4.2235 (0.9046)	4.1916 (0.8802)
5. Needs for additional development and training	3.6833 (0.7307)	4.1066 (0.7307)	3.8000 (0.7099)	4.1681 (0.6993)	4.2631 (0.6035)	4.3176 (0.6000)	4.2750 (0.5981)
6. Location-related issues	3.5396 (0.9892)	3.7829 (0.9892)	3.5463 (0.9496)	3.5362 (1.1405)	3.5571 (1.1841)	3.5740 (1.2145)	3.5597 (1.1884)
Total	3.4794 (1.0434)	3.6458 (1.0262)	3.4231 (0.9663)	3.4629 (1.2224)	3.5389 (1.2748)	3.5619 (1.2856)	3.5412 (1.2777)

Table 1 shows the results of the cross-country comparison of VHV's role in managing COVID-19 in Thailand in six key topic areas. The overall mean scores of the seven locations are arranged from the highest to the lowest as follows: Central Thailand ($\bar{X} = 3.6458$, S.D.= 1.0262), Western Thailand ($\bar{X} = 3.5619$, S.D.= 1.2856), Southern Thailand ($\bar{X} = 3.5412$, S.D.= 1.2777), Eastern Thailand ($\bar{X} = 3.5389$, S.D.= 1.2748), Bangkok ($\bar{X} = 3.4794$, S.D.= 1.0434), Northeastern Thailand ($\bar{X} = 3.4629$, S.D.= 1.2224), and Northern Thailand ($\bar{X} = 3.4231$, S.D.= 0.9663) respectively. Four locations (Central Thailand, Western Thailand, Southern Thailand, and Eastern Thailand) have a high level of satisfaction, while the remaining three (Bangkok, Northeastern Thailand, and Northern Thailand) have a moderate level of satisfaction. This indicates that there are differences between VHVs' roles in managing COVID-19 in the seven locations. Four locations are effective, while the other three need further development. It is noted that all locations experience problems with the operation of COVID-19 control in their locations. Northern Thailand and Northeastern Thailand are also having issues with outbreak control strategies, measures, and practices.

4.2 Problems in managing COVID-19 health service

The results can be presented in Table 2.

Table 2 The comparison of problems with operation of COVID-19 control in seven locations



Problems of operating COVID-19 health service management in the community	BKK	Central Thailand	Northern Thailand	Northeastern Thailand	Eastern Thailand	Western Thailand	Southern Thailand
	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)
1.The community has adequate numbers of VHVs.	3.7833 (0.7612)	3.6133 (1.1258)	3.0238 (1.1921)	3.5797 (1.1168)	3.7368 (0.8601)	3.6471 (0.8486)	3.7143 (0.8467)
2.The community can support the current outbreak.	3.7000 (0.6715)	3.6933 (0.8695)	3.2976 (0.8471)	3.7826 (0.8020)	3.8421 (0.5939)	3.8529 (0.6096)	3.8393 (0.5963)
3.The community has adequate inspection and test kits.	3.7500 (0.8362)	3.3867 (1.0767)	2.7738 (0.9613)	2.8116 (1.3749)	3.0789 (0.9118)	3.0000 (0.9211)	3.0357 (0.9138)
4.The community has sufficiently distributed inspection and test kits.	3.4500 (0.7903)	3.3200 (1.0418)	2.9286 (1.0388)	2.7826 (1.3158)	3.1053 (0.9806)	3.0882 (0.9331)	3.0893 (0.9775)
5.The community need more and new equipment.	3.7167 (0.8253)	4.1333 (0.8275)	3.9167 (0.8945)	4.2754 (1.2113)	4.3158 (1.0425)	4.4118 (0.8916)	4.3036 (1.0431)
6.There are excessive COVID suspects and new infections in the location .	2.8167 (0.8732)	3.2533 (1.2530)	3.0833 (1.2726)	1.7826 (1.0829)	2.0000 (1.0398)	2.1176 (1.0376)	2.0179 (1.0356)
7.Not all new infections people can be tested.	2.7167 (0.8253)	2.9600 (1.1323)	2.5952 (0.9584)	1.8406 (1.1327)	1.9474 (1.2934)	2.0000 (1.3484)	1.9643 (1.2928)
8.There are time and psychological constraints in detection and follow up.	2.6833 (0.7700)	3.1200 (1.1620)	3.0833 (1.0437)	2.2174 (1.2232)	2.3158 (1.5787)	2.4118 (1.6352)	2.3393 (1.5757)
9.There is difficulty in referring the COVID suspects, new infections and the patients.	2.5833 (0.8294)	2.7867 (1.1888)	2.7381 (1.0427)	2.1449 (1.0186)	2.0000 (0.9864)	2.0588 (1.0133)	2.0179 (0.9815)
10.There are problems of coordination and communication in the VHV group.	2.4333 (0.8707)	2.7067 (1.2710)	2.4881 (1.0810)	1.7971 (1.0085)	1.5789 (0.7581)	1.6471 (0.7739)	1.5714 (0.7594)
11.There are problems of coordination and communication between VHV and the suspects, new infections and the patients.	2.4000 (0.7855)	2.7467 (1.1040)	2.6310 (0.9913)	2.0145 (1.0072)	1.5789 (0.7581)	1.5882 (0.7831)	1.5714 (0.7594)
12.There are problems of coordination and communication between VHV and community members.	2.2167 (0.7612)	2.6533 (1.1210)	2.5595 (0.9982)	2.0000 (0.9701)	1.5263 (0.7618)	1.5294 (0.7876)	1.5179 (0.7626)
13.There are problems of coordination and communication between VHV and new community members or visitors.	2.6000 (0.8477)	2.9067 (1.2858)	2.5595 (0.9861)	2.0725 (1.0192)	1.6842 (0.7391)	1.7059 (0.7600)	1.6786 (0.7412)
14.There are problems of coordination and communication between VHV and local public health officers.	2.3833 (1.0266)	2.4533 (1.1542)	2.1429 (0.8523)	1.8841 (1.1316)	1.4737 (0.5060)	1.5294 (0.5066)	1.4821 (0.5042)
15.There are problems of coordination and communication between VHV and administrative officers.	2.3833 (0.9037)	2.7733 (1.2145)	2.3452 (0.8849)	2.2029 (1.1578)	1.6316 (0.4889)	1.7059 (0.4625)	1.6429 (0.4835)

Table 2 shows a cross-country comparison of VHV's role on problems of operation COVID-19 in the location. The overall mean scores of the

seven locations are arranged as follows: Central Thailand (\bar{X} =3.2473, S.D.= 1.1726), Bangkok (\bar{X} =3.0475, S.D.= 1.0400), Northern Thailand (\bar{X} = 2.9898, S.D.= 1.0801), Western Thailand



(\bar{X} =2.7911, S.D.= 1.3817), Northeastern Thailand (\bar{X} =2.7702, S.D.= 1.3752), Eastern Thailand (\bar{X} =2.7565, S.D.= 1.3878), and Southern Thailand (\bar{X} =2.7553, S.D.= 1.3864) respectively. All locations fall into this moderate level. This indicates that all locations need further development in this topic area in these indicators: “the community has sufficiently distributed inspection and test kits,” “there are excessive COVID suspects and new infections in the location,” “not all new infections patients can be tested,” “there are time and psychological constraints in detection and follow up,” “there is difficulty in referring the COVID suspects, new infections, and the patients,” “there are problems of coordination and communication in the VHV group,” “there are problems of coordination and communication between VHV and the suspects, new infections, and the patients,” and “there are problems of coordination and communication between VHV and community members.”

In more detail, the top three indicators with the highest and high levels of satisfaction in each location are as follows. In Bangkok, the top three are ‘the community has adequate numbers of VHVs’ (\bar{X} =3.7833, S.D.= 0.7612), “the community has adequate inspection and test kits” (\bar{X} =3.7500, S.D.= 0.8362), “the community need more and new equipment” (\bar{X} =3.7167, S.D.= 0.8253), and “you are confident that the code of conduct is sufficient for the current situation” (\bar{X} =3.7167, S.D.= 0.8847). In Central Thailand, the top three are “you have enough safety equipment” (\bar{X} =4.1733, S.D.= 0.8601), “the community need more and new equipment” (\bar{X} =4.1333, S.D.= 0.8275), and “the community can support the current outbreak” (\bar{X} =3.6933, S.D.= 0.8695). In Northern Thailand, the top three are “you have enough safety equipment” (\bar{X} =3.9286, S.D.= 0.9667), “the community need more and new equipment” (\bar{X} =3.9167, S.D.= 0.8945), and “you are confident in your own safety practices” (\bar{X} =3.7857, S.D.= 0.7616). In Northeastern

Thailand, the top three are ‘the community need more and new equipment’ (\bar{X} =4.2754, S.D.= 1.2113), “you have enough safety equipment” (\bar{X} =4.2029, S.D.= 0.8328), and “you are confident in your own safety practices” (\bar{X} =4.0580, S.D.= 0.7453). In Eastern Thailand, the top three are “you are confident in your own safety practices” (\bar{X} =4.3684, S.D.= 0.4889), “the community need more and new equipment” (\bar{X} =4.3158, S.D.= 1.0425), and “you have enough safety equipment” (\bar{X} =4.3158, S.D.= 0.6619). In Western Thailand, the top three are “the community need more and new equipment” (\bar{X} =4.4118, S.D.= 0.8916), “you have enough safety equipment” (\bar{X} =4.4118, S.D.= 0.6089), and “you are confident in your own safety practices” (\bar{X} =4.4118, S.D.= 0.4996). In Southern Thailand, the top three are “you are confident in your own safety practices” (\bar{X} =4.3750, S.D.= 0.4885), “you have enough safety equipment” (\bar{X} =4.3214, S.D.= 0.6635), and “the community need more and new equipment” (\bar{X} =4.3036, S.D.= 1.0431). This indicates that the top three indicators are strengths of each location. This means that these indicators provide best practice and lessons for other locations.

However, all locations need to develop several indicators, indicating by moderate and low levels of satisfaction. Bangkok needs to develop these indicators: “the community has sufficiently distributed inspection and test kits” (\bar{X} =3.4500, S.D.= 0.7903), “there are excessive COVID suspects and new infections in the location” (\bar{X} =2.8167, S.D.= 0.8732), “not all new infections people can be tested” (\bar{X} =2.7167, S.D.= 0.8253), “there are time and psychological constraints in detection and follow up” (\bar{X} =2.6833, S.D.= 0.7700), “there are problems of coordination and communication between VHVs and new community members or visitors” (\bar{X} =2.6000, S.D.= 0.8477), “there is difficulty in referring the COVID suspects, new infections and the patients” (\bar{X} =2.5833, S.D.= 0.8294), “there are problems of coordination and communication in



the VHV group" (\bar{X} =2.4333, S.D.= 0.8707), and "there are problems of coordination and communication between VHV and the suspects, new infections and the patients" (\bar{X} =2.4000, S.D.= 0.7855).

Central Thailand needs to develop these indicators: "you are confident that the code of conduct is sufficient and effective for the future" (\bar{X} =3.4833, S.D.= 0.9828), "you are confident that the code of conduct is sufficient and effective for the future" (\bar{X} =3.4133, S.D.= 0.7727), "the community has adequate inspection and test kits" (\bar{X} =3.3867, S.D.= 1.0767), "the community has sufficiently distributed inspection and test kits" (\bar{X} =3.3200, S.D.= 1.0418), "you and your family are affected by work" (\bar{X} =3.2667, S.D.= 1.2738), "you and your family are affected by work" (\bar{X} =3.2667, S.D.= 1.1547), "there are excessive COVID suspects and new infections in the location" (\bar{X} =3.2533, S.D.= 1.2530), "not all new infections people can be tested" (\bar{X} =2.9600, S.D.= 1.1323), "there are problems of coordination and communication between VHV and new community members or visitors" (\bar{X} =2.9067, S.D.= 1.2858), "there is difficulty in referring the COVID suspects, new infections and the patients" (\bar{X} =2.7867, S.D.= 1.1888), "there are problems of coordination and communication between VHV and administrative officers" (\bar{X} =2.7733, S.D.= 1.2145), "there are problems of coordination and communication between VHV and the suspects, new infections and the patients" (\bar{X} =2.7467, S.D.= 1.1040), "there are problems of coordination and communication in the VHV group" (\bar{X} =2.7067, S.D.= 1.2710), "there are problems of coordination and communication between VHV and community members" (\bar{X} =2.6533, S.D.= 1.1210), "there are problems of coordination and communication between VHV and local public health officers" (\bar{X} =2.4533, S.D.= 1.1542), "there are problems of coordination and communication between VHV and local public health officers" (\bar{X} =2.3833, S.D.= 1.0266), "there are problems of

coordination and communication between VHV and administrative officers" (\bar{X} =2.3833, S.D.= 0.9037), and "there are problems of coordination and communication between VHV and community members" (\bar{X} =2.2167, S.D.= 0.7612).

Northern Thailand needs to develop these indicators: "you are confident that the code of conduct is sufficient for the current situation" (\bar{X} =3.4048, S.D.= 0.5833), "you and your family are affected by work" (\bar{X} =3.2619, S.D.= 0.9954), "you are confident that the code of conduct is sufficient and effective for the future" (\bar{X} =3.2500, S.D.= 0.6744), "there are excessive COVID suspects and new infections in the location" (\bar{X} =3.0833, S.D.=1.2726), "there are time and psychological constraints in detection and follow up" (\bar{X} =3.0833, S.D.= 1.0437), "the community has adequate numbers of VHV" (\bar{X} =3.0238, S.D.= 1.1921), "the community has sufficiently distributed inspection and test kits" (\bar{X} =2.9286, S.D.= 1.0388), "the community has adequate inspection and test kits" (\bar{X} =2.7738, S.D.= 0.9613), "there is difficulty in referring the COVID suspects, new infections and the patients" (\bar{X} =2.7381, S.D.= 1.0427), "there are problems of coordination and communication between VHV and the suspects, new infections and the patients" (\bar{X} =2.6310, S.D.= 0.9913), "not all new infections people can be tested" (\bar{X} =2.5952, S.D.= 0.9584), "there are problems of coordination and communication between VHV and community members" (\bar{X} =2.5595, S.D.= 0.9982), "there are problems of coordination and communication between VHV and new community members or visitors" (\bar{X} =2.5595, S.D.= 0.9861), "there are problems of coordination and communication in the VHV group" (\bar{X} =2.4881, S.D.= 1.0810), "there are problems of coordination and communication between VHV and administrative officers" (\bar{X} =2.3452, S.D.= 0.8849), and "there are problems of coordination and communication between VHV and local public health officers" (\bar{X} =2.1429, S.D.= 0.8523).



Northeastern Thailand needs to develop these indicators: "the community has adequate inspection and test kits" (\bar{X} =2.8116, S.D.= 1.3749), "you and your family are affected by work" (\bar{X} =2.8116, S.D.= 1.3315), "the community has sufficiently distributed inspection and test kits" (\bar{X} =2.7826, S.D.= 1.3158), "there are time and psychological constraints in detection and follow up" (\bar{X} =2.2174, S.D.= 1.2232), "there are problems of coordination and communication between VHV and administrative officers" (\bar{X} =2.2029, S.D.= 1.1578), "there is difficulty in referring the COVID suspects, new infections and the patients" (\bar{X} =2.1449, S.D.= 1.0186), "there are problems of coordination and communication between VHV and new community members or visitors" (\bar{X} =2.0725, S.D.= 1.0192), "there are problems of coordination and communication between VHV and the suspects, new infections and the patients" (\bar{X} =2.0145, S.D.= 1.0072), "there are problems of coordination and communication between VHV and community members" (\bar{X} =2.0000, S.D.= 0.9701), "there are problems of coordination and communication between VHV and local public health officers" (\bar{X} =1.8841, S.D.= 1.1316), "not all new infections people can be tested" (\bar{X} =1.8406, S.D.= 1.1327), "there are problems of coordination and communication in the VHV group" (\bar{X} =1.7971, S.D.= 1.0085), and "there are excessive COVID suspects and new infections in the location" (\bar{X} =1.7826, S.D.= 1.0829).

Eastern Thailand needs to develop these indicators: "the community has sufficiently distributed inspection and test kits" (\bar{X} =3.1053, S.D.= 0.9806), "the community has adequate inspection and test kits" (\bar{X} =3.0789, S.D.= 0.9118), "you and your family are affected by work" (\bar{X} =2.7368, S.D.= 1.3494), "there are time and psychological constraints in detection and follow up" (\bar{X} =2.3158, S.D.= 1.5787), "there are excessive COVID suspects and new infections in the location" (\bar{X} =2.0000, S.D.= 1.0398), "there is difficulty in referring the

COVID suspects, new infections and the patients" (\bar{X} =2.0000, S.D.= 0.9864), "not all new infections people can be tested" (\bar{X} =1.9474, S.D.= 1.2934), "there are problems of coordination and communication between VHV and new community members or visitors" (\bar{X} =1.6842, S.D.= 0.7391), "there are problems of coordination and communication between VHV and administrative officers" (\bar{X} =1.6316, S.D.= 0.4889), "there are problems of coordination and communication in the VHV group" (\bar{X} =1.5789, S.D.= 0.7581), "there are problems of coordination and communication between VHV and the suspects, new infections and the patients" (\bar{X} =1.5789, S.D.= 0.7581), "there are problems of coordination and communication between VHV and community members" (\bar{X} =1.5263, S.D.= 0.7618), and "there are problems of coordination and communication between VHV and local public health officers" (\bar{X} =1.4737, S.D.= 0.5060).

Western Thailand needs to develop these indicators: "the community has sufficiently distributed inspection and test kits" (\bar{X} =3.0882, S.D.= 0.9331), "the community has adequate inspection and test kits" (\bar{X} =3.0000, S.D.= 0.9211), "you and your family are affected by work" (\bar{X} =2.7647, S.D.= 1.3271), "there are time and psychological constraints in detection and follow up" (\bar{X} =2.4118, S.D.= 1.6352), "there are excessive COVID suspects and new infections in the location" (\bar{X} =2.1176, S.D.= 1.0376), "there is difficulty in referring the COVID suspects, new infections and the patients" (\bar{X} =2.0588, S.D.= 1.0133), "not all new infections people can be tested" (\bar{X} =2.0000, S.D.= 1.3484), "there are problems of coordination and communication between VHV and new community members or visitors" (\bar{X} =1.7059, S.D.= 0.7600), "there are problems of coordination and communication between VHV and administrative officers" (\bar{X} =1.7059, S.D.= 0.4625), "there are problems of coordination and communication in the VHV group" (\bar{X} =1.6471, S.D.= 0.7739), "there are problems of coordination and communication



between VHVs and the suspects, new infections and the patients" (\bar{X} =1.5882, S.D.= 0.7831), "there are problems of coordination and communication between VHVs and community members" (\bar{X} =1.5294, S.D.= 0.7876), and "there are problems of coordination and communication between VHVs and local public health officers" (\bar{X} =1.5294, S.D.= 0.5066).

Southern Thailand needs to develop these indicators: "the community has sufficiently distributed inspection and test kits" (\bar{X} =3.0893, S.D.= 0.9775), "the community has adequate inspection and test kits" (\bar{X} =3.0357, S.D.= 0.9138), "you and your family are affected by work" (\bar{X} =2.7143, S.D.= 1.3445), "there are time and psychological constraints in detection and follow up" (\bar{X} =2.3393, S.D.= 1.5757), "there are excessive COVID suspects and new infections in the location" (\bar{X} =2.0179, S.D.= 1.0356), "there is difficulty in referring the COVID suspects, new infections and the patients" (\bar{X} =2.0179, S.D.= 0.9815), "not all new infections people can be tested" (\bar{X} =1.9643, S.D.= 1.2928), "there are problems of coordination and communication between VHVs and new community members or visitors" (\bar{X} =1.6786, S.D.= 0.7412), "there are problems of coordination and communication between VHVs and administrative officers" (\bar{X} =1.6429, S.D.= 0.4835), "there are problems of coordination and communication in the VHVs group" (\bar{X} =1.5714, S.D.= 0.7594), "there are problems of coordination and communication between VHVs and the suspects, new infections and the patients" (\bar{X} =1.5714, S.D.= 0.7594), "there are problems of coordination and communication between VHVs and community members" (\bar{X} =1.5179, S.D.= 0.7626), and "there are problems of coordination and communication between VHVs and local public health officers" (\bar{X} =1.4821, S.D.= 0.5042).

This indicates that these indicators were the weaknesses of each location. the indicators that need to develop in all locations are similar and dissimilar. This means that each location can learn best practices from other locations in

order to reduce risks of its weaknesses.

5. CONCLUSIONS

This study aimed to compare VHV's role in managing COVID-19 across Thailand. The seven locations under this investigation included Bangkok, Central Thailand, Northern Thailand, Northeastern Thailand, Eastern Thailand, Western Thailand, and Southern Thailand. The two areas of management were effectiveness of COVID-19 health service management and problems with operation of COVID-19 control.

The VHVs' satisfactions of effectiveness of health service management in seven locations were different. The VHVs in Central Thailand, Western Thailand, Southern Thailand, and Eastern Thailand are highly satisfied with the management, while the VHVs in Northeastern Thailand, Northern Thailand, and Bangkok are moderately satisfied.

Specifically, their satisfactions of problems of operation COVID-19 control in seven locations are moderately satisfied. All locations do not share the top three indicators. However, the indicators that need to develop in all locations are similar and dissimilar. All locations need further development on these indicators: "the community has sufficiently distributed inspection and test kits," "there are excessive COVID suspects and new infections in the location," "not all new infections patients can be tested," "there are time and psychological constraints in detection and follow up," "there is difficulty in referring the COVID suspects, new infections, and the patients," "there are problems of coordination and communication in the VHV group," "there are problems of coordination and communication between VHV and the suspects, new infections, and the patients," and "there are problems of coordination and communication between VHV and community members." However, each location needs further development on different indicators.

6. DISCUSSION

This part discusses a comparison of the



results of this study with those of previous studies; discussions of how the findings of this study can extend the findings of previous studies; explains conclusive results, describes the limitations of this study; suggests future studies that need to be carried out; and recommends practical implications for policy makers.

The findings of this study lend support to those of the previous studies that found the VHVs in all locations are highly satisfied with leadership in the public health service and management of the COVID-19 in their locations. However, this study extends the previous studies by detailing insights into differences in VHV's role in managing COVID-19 across Thailand. Above all, the insights specify which locations require further development, including Bangkok (namely, adequately distributed inspection and test kits), excessive new infections in the community, inability to test all new infections, and so on); Central Thailand (namely, adequate inspection and test kits, and so on); Northeastern Thailand (namely, adequate inspection and test kits, and so on).

The findings of this study lend support to those of the previous studies on providing health services as a health assistant to health professionals, such as conducting a regular daily screening test, (Tangkitvanich, 2021), collecting daily health data and statistics of new infections among community members and home returnees (Viwattanakulvanid, 2021), reporting the members and returnees with symptoms (Kaweenuttayanon et al., 2021), and monitoring the patients in the quarantine by making a regular daily health visit to record and monitor a local 14-day quarantine (Bandaranayake et al., 2021). However, this study extends the previous studies by detailing insights into differences in VHV's role in managing COVID-19 across Thailand. Above all, the findings show that the VHVs in Central Thailand, Western Thailand, Southern Thailand, and Eastern Thailand are highly effective at managing COVID-19, whereas the VHVs in Northeastern Thailand, Northern Thailand, and Bangkok are moderately effective.

Moreover, this study gives detailed insights into the effectiveness in each area. The insights also extend previous studies by providing details of indicators that require further development in each location, including Bangkok (namely appropriateness of the daily workload for VHVs, difficulty in performing your tasks, and the same practice as last year, weaknesses in the practice, and so on); Central Thailand (namely crowdedness of the service point, difficulty in performing tasks, difficulty of the practice, and so on); and Northeastern Thailand (namely crowdedness of the service point, difficulty in performing tasks, difficulty of the practice, and so on).

The findings of this study are consistent with those of the previous studies on promoting health education to community members, such as raising public health awareness to follow guidelines and measures on the prevention of COVID-19 (Krassanairawiwong et al., 2021) using health activities (Tejativaddhana et al., 2020) and anti-virus campaigns (Marddent & Arporn, 2021) such as the 'door-knocking' campaign (The Nation Thailand, 2020), advice on self-protective guidelines and measures (Chinnapha, 2020; Kaweenuttayanon et al., 2021), and producing self-made protective equipment (Vongsayan & Nethipo, 2021; Bezbaruah et al., 2021; Chinnapha, 2020).

However, this study extends the previous studies by detailing insights into differences in VHV's role in managing COVID-19 across Thailand. For example, Bangkok needs to develop this indicator to show a gap in the level of knowledge on COVID-19 between older adults from rural areas and those in urban areas, while Northeastern Thailand needs to develop this indicator to show an unequal level of knowledge about COVID-19. Almost all locations need to develop these indicators. There is a gap in the level of knowledge on COVID-19 between rural older adults and those in urban areas, a COVID-19 knowledge-behavior gap; and no observation of community members' knowledge and their behavior on self-prevention. However, this study extends



the previous studies by detailing insights into differences in VHV's role in managing COVID-19 across Thailand. Above all, the insights specify which problems require further development, including Bangkok (namely, adequately distributed inspection and test kits), Central Thailand (namely, confidence in the code of conduct sufficient and effective for the future), adequate inspection and test kits, and so on), Northeastern Thailand (namely, adequate inspection and test kits, sufficiently distributed inspection and test kits, effects on family, confidence in the code of conduct sufficient and effective for the future), and so on.

This study lends support to the previous studies (Vongsayan & Nethipo, 2021; Langkulsen & Rwodzi, 2021; Shadmi et al., 2020) that found VHVs play a vital role in connecting community members, health professionals, local heads and authorities, and external involving sectors to provide support and enforce public health policies (Vongsayan & Nethipo, 2021; Langkulsen & Rwodzi, 2021; Shadmi et al., 2020) and voicing their community health concerns (Kitchanapaibul et al., 2021) and other concerns such as food shortages (Pongpirul, 2020). This study found problems with coordination and communication in the VHV group, between VHV and the suspects, between VHV and new infections and patients, between VHV and community members, between VHV and new community members or visitors, between VHV and local public health officers, and between VHV and administrative officers.

This study gained detailed insights into each location using a survey questionnaire and quantitative data. Study is limited to multiple systems of inquiry and logical and statistical procedures. The results clearly explain the "what" of VHVs' role in managing COVID-19. Therefore, after the survey, it is necessary to conduct qualitative research to seek an in-depth understanding of the "why" of problems of managing COVID-19 and location-related issues with a focus on observation of their direct experiences in their everyday duties in their

natural setting in each location. Future research should fill this research gap.

However, the findings of this study have practical implications for the general public in all locations under investigation. The findings provide policy implications for Thailand for more effective management of subsequent outbreaks. This study proposed insights for policy-makers in developing best practices for COVID-19 management in each location that can be applied appropriately to each location. In addition, this study proposed insights for policy-makers in developing best practices for COVID-19 management for Thailand as a whole, involving (1) effectiveness of COVID-19 health service management in your area, and (2) problems with the operation of COVID-19 control in your area.

This study attempted to understand the theoretical and research gaps of differences in COVID-19 management in all seven locations across Thailand by comparing VHVs' roles in managing COVID-19. Although the attempt cannot provide a conclusive understanding due to the aforementioned limitation, this study reaches the conclusion that there are differences in VHVs' management of COVID-19 across the country. The insights and practical implications from Thailand provide a trajectory for other developing countries for future outbreaks.

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