

# COVID-19 State Quarantine Operation at a Local Setting: Implementation Evaluation

Pensri Wongputh<sup>1,\*</sup>, Anusorn Udplong<sup>2</sup>, Tawatchai Apidechkul<sup>2,3</sup>

<sup>1</sup>Mae Chan Hospital, Chiang Rai Province, Thailand

<sup>2</sup>School of Health Science, Mae Fah Luang University, Thailand

<sup>3</sup>Center of Excellence for the Hill tribe Health Research, Mae Fah Luang University, Thailand

Received April 6, 2021

Accepted April 17, 2021

Published April 29, 2021

\*Corresponding author: Pensri Wongputh, Mae Chan Hospital, Chiang Rai, Thailand 57110

e-mail: [wpensriw@gmail.com](mailto:wpensriw@gmail.com)

© 2021 School of Health Science, Mae Fah Luang University. All rights reserved.

## ABSTRACT

**Purpose and objectives:** This study aimed to evaluate the effectiveness of the coronavirus disease 2019 (COVID-19) state quarantine implemented at the local border between Thailand and Myanmar in the aspects of the satisfactions of people involving the operation and new infected cases from the people attending the quarantine. **Intervention approach:** A state quarantine in a local border of Thailand and Myanmar setting, which was a community intervention approach, was implemented. **Evaluation methods:** A qualitative method was used to assess the effectiveness of the state quarantine operation. Selected participants were invited to provide information through in-depth interviews. Questionnaires were developed and tested for their validity before commencement of the interviews. Mobile phone and face-to-face interviews were conducted, which lasted 45 minutes each. **Results:** Seventeen participants were interviewed. The attendees were highly satisfied with the infrastructure and process of the operation. The community where the quarantine facility was built needed essential information about the state quarantine operation. Two challenges were detected during the quarantine operation: public health officers who were insufficiently trained for working in the quarantine facility and some workers working in the quarantine facility were highly vulnerable to COVID-19. **Implications for public health:** A state quarantine in the local area, particularly in Chiang Rai Province, Thailand, is highly effective as confirmed by 55 participants who were free of COVID-19 after completing the 14-day quarantine period in the facility.

**Keywords:** State quarantine; Local setting; Implementation evaluation; Border area

## Introduction

Coronavirus disease 2019 (COVID-19) has been recognized as a major threat to humans, with a millions of individuals infected and dead worldwide, since its detection in December 2019. Since March 4, 2021, more than 114 million people have been infected with COVID-19, and 2.5 million people have already died. In Southeast Asia, more than 13 million people are infected with COVID-19, with 26,108 infected cases reported in Thailand [1]. Considering the specific characteristics of the disease, which spreads rapidly through people mobilization, people living in one country can be infected by people traveling from another country. Therefore, state quarantine is recommended by the World Health Organization (WHO) to control the COVID-19 pandemic [2].

State quarantine has been used as one of the major prevention and control measures to minimize the

impact of COVID-19 globally, including in Thailand. Thailand has a long border area with three different countries: Myanmar, Laos, and Cambodia. Since late August 2020, Myanmar has experienced severe COVID-19 epidemic, with more than 144,000 infected cases and 3,199 deaths [3]. With the severe epidemic in Myanmar, numerous people crossed the border to Thailand. Subsequently, state quarantine has been introduced to control the disease at the border areas, particularly in Chiang Rai Province, Thailand, which has more than two official ports and a long unofficial port along the border.

In late November 2020, a large cohort of COVID-19 cases was reported along the border between Thailand and Myanmar [4]. The Chiang Rai Public Health Office had decided to implement state quarantine at Num Jum Village, Pong Pha Subdistrict, Mae Sai District, Chiang Rai Province, Thailand. The

facility was operated by various healthcare professionals from five districts in Chiang Rai Province.

### **Purpose and objectives**

This study primarily aimed to evaluate the effectiveness of the COVID-19 state quarantine in a local setting in the border area of Chiang Rai, Thailand, and Tachileik District, Myanmar, in the aspects of the satisfactions of people involving the operation and new infected cases from the people attending the quarantine which was operated between December 16, 2020, and January 31, 2021.

### **Intervention approach**

State quarantine in a local setting having three components: input, process, and output.

#### ***Input***

Several factors were required to be used as criteria in selecting the facility used in the present study. The facility should be located in an area where electricity and communications infrastructures are easily accessible, including the presence of transportation facilities in case of an emergency. The standard infrastructure of the facility was strictly required for the management of COVID-19 patients. Inside the facility, a one-way walking facility was required for case management, including during specimen collection. Air-conditioners were not allowed, and only electric fans were used inside the rooms. Moreover, drinking water and disinfectants were sufficiently provided inside the room for 14 days. Communication with relatives was allowed; however, posting any information on social media platforms was not allowed.

All participants had a mobile phone and were required to report through the central medical number for essential information, including reports on their health status such as body temperature and signs and symptoms related to the disease. Individual body temperature was obtained daily to regularly monitor each participant's temperature. Food and drinks were provided to all participants.

The facility that could be used for the state quarantine operation required emergency rooms, standard infrastructures, electricity, and communications infrastructure. An appropriate safeguard system and waste management were also required.

#### ***Medical staff***

Several healthcare professionals, such as medical doctors, nurses, pharmacists, epidemiologists, and psychiatric nurses, were required for the quarantine operation. A manager was appointed for the quarantine operation under the law and regulations for disease control in Thailand. The manager was the focal point of contact when managing and monitoring all work systems in the local setting. Initially, the organizational structure was developed, including several role and job

descriptions. The workflow was developed and deployed for all the relevant individuals. The communication system was specifically developed for use during work.

#### ***Medicines***

General medicines for urgent treatment were provided. However, medicines for respiratory tract infection were not available in the facility. Participants who had signs and symptoms of the disease were assessed by a medical doctor before receiving proper treatment and management.

### **Environmental management**

Ventilation was the primary concern in the quarantine facility. Only electric fans were allowed in all rooms. Wastes from a room were properly managed by the developed waste management system. Several disinfectants were provided, such as sodium hypochlorite, alcohol gel, and soap. Facemasks were required on the day of the specimen collection. The nasopharyngeal swab collection was conducted outside the facility. Chlorine was added into the wastewater before it passed through the public area.

### **Process**

#### ***Quarantine setting and facility***

The facility was chosen based on the standard requirements of the COVID-19 quarantine. Ventilation, spaces, standard wastewater, and solid waste management were used as the basic criteria for setting the state quarantine. Transportation facility and communications infrastructure availability were also used as the standard criteria for setting the state quarantine. Regarding the rooms inside the facility for the participants, the toilet availability inside the room was a must. Community acceptance was also one of the selection and operation criteria for the quarantine operation.

#### ***Community preparation***

Mutual understanding with community leaders was a critical point of concern. The manager discussed with community leaders regarding the COVID-19 pandemic. Information regarding several immigrants crossing the border to Thailand daily, which has a significant effect on economy and society, was also discussed by the manager and community leaders. Establishing an agreement with community members and leaders before starting the project was an important point.

#### ***Workflow system development***

The specific workflow system was developed among hospital leaders, district public health officers, and community leaders. The workflow had been cleared, especially according to the hierarchical order and role of each position and team. Thus, the three sections of the workflow were medical and epidemiological, safety, and environmental management.

### Staff recruitment and orientation

Medical staff from five district hospitals and district public health offices in Chiang Rai Province worked in this setting. The Chiang Rai Public Health Officer acted as a leader in working with the local quarantine manager. All medical staff were instructed to voluntarily work in this setting.

### Daily monitoring system development

The manager monitored the working staff daily, especially in coping with urgent problems and system-related problems they encountered. The manager was also responsible for the management of the facility, including waste management. Each participant's health status was assessed daily by an assigned medical staff using a specific designed form. However, participants experiencing the major signs and symptoms of COVID-19 could directly contact the medical staff any time.

### Client entry

Individuals who crossed Thailand at the official border and unofficial ports were invited to attend the state quarantine. All relevant information were provided to the participants and informed consent form was obtained from them before their entry into the quarantine facility, including the channel of communication for 14 days. At the state quarantine, all individuals were identified by the Thai identification card. Individuals' general health status was assessed, including the first polymerase chain reaction test for COVID-19 on the 0th–1st day, the second test that was performed on the 5th day, and the last test that was performed on the 13th day. The specimens were sent and tested at the Chiang Rai Medical Laboratory Center. Laboratory results were obtained 2–3 days after the test.

### Medical requirement flow

Along with staying at the state quarantine, all participants were regularly assessed to obtain essential information, while supporting their mental health. Participants were able to communicate with their friends and family members; however, they were not allowed to post any information in social media. The participants measured and recorded their body temperature twice a day by themselves, and they were requested to report this information to the communication channel provided.

### Food and water

Food and drinking water were provided to everyone who were quarantined. The quality and quantity of food and drinking water were controlled and monitored by the public health staff. Personal things for daily use were also sufficiently provided during the quarantine.

### End of quarantine

In the early morning on the 15th day of the quarantine, individuals who met the criteria for leaving the quarantine were finally assessed for general health, that is, physical examination and body temperature assessment. Moreover, individuals who finished their

14-day quarantine and left the facility were advised to continue wearing face mask and observe social distancing.

### Waste management and disinfection management

Daily wastes from the participants were carefully packed and managed by only one person who had been sufficiently trained for managing infectious waste. All wastes were treated at Mae Fah Luang University Medical Center with advanced technology for waste management.

### Final report

Final reports were provided by the public health staff members working at the quarantine facility, whereas daily reports were provided by the team leaders. The following two forms were used in this study: general information form at the beginning of recruitment (general information) and daily health monitoring and assessment form. Subsequently, the information was reported directly to the provincial committee weekly.

### Output

A total of 55 individuals attended the state quarantine between December 16, 2020, and January 31, 2021, of which 50.9% were male, 67.3% were aged 20–44 years (mean=25.7, standard deviation=12.4), 49.1% resided in Chiang Rai Province, and 10.9% resided in Chiang Mai Province (Table 1).

**Table 1** General characteristic of attendees at the state quarantine, Mae Sai District, Chiang Rai Province between 16 December 2020 and 31 January 2021

Characteristics	n	%
<b>Sex</b>		
Male	28	50.9
Female	27	49.1
<b>Age (years)</b>		
3-19	12	21.8
20-44	37	67.3
45-74	6	10.9
<i>Mean = 25.7, SD= 12.3</i>		
<b>Hometown</b>		
Chiang Rai	27	49.1
Chiang Mai	6	10.9
Bangkok	4	7.3
Other	18	32.7
<b>Region</b>		
Northern	36	65.5
Central	10	18.2
North East	8	14.5
Southern	1	1.8

### Evaluation methods

A qualitative method was used to evaluate the effectiveness of the state quarantine operation.

A questionnaire was developed that included different items for different key performances. The following five questions were asked to gather information from the Chief of Chiang Rai Public Health Office, district public health officer, and manager: (1) What do you think is the significance of state quarantine to public health? (2) In the state quarantine, how did you allocate health resources? (3) Did you have any trouble managing the state quarantine? How did you address these problems? (4) What were your expectations? Were your expectations achieved at the end of the project? (5) Do you have any specific policy in disease control and prevention along the border areas?

The following five questions were asked to gather information from public health and medical staff: (1) Were you ready to work at the state quarantine before it started? (2) Did you have any worry before entering into work at the state quarantine? (3) How did you adapt while working at the state quarantine (4) Did you have any problems? If yes, how did you cope with those problems? (5) In this state quarantine operation, were there aspects that need to be improved? The following six questions were asked to gather information from participants who attended the state quarantine: (1) Did you have any worry before participating in the state quarantine (2) Did you have any problems during the 14-day state quarantine, (3) What were the aspects that allowed you to be satisfied in this state quarantine? Why? (4) What were the aspects that you are dissatisfied with in this state quarantine? Why? (5) Could you please provide an example of a situation observed during the state quarantine that really needs improvement? (6) Could you please provide the advantages of a state quarantine?

The following three questions were asked to gather information from the participants' relatives: (1) Did you worry about your relative attending the state quarantine? Why? (2) How did you help your relative who attended the state quarantine? (3) What is your opinion on the procedure performed by the medical staff during the state quarantine? The following five questions were asked to gather information from community leaders: (1) Did you worry that your community was possibly assigned as a state quarantine facility? (2) How did your fellow community members feel about setting up the state quarantine facility in your community? (3) Did you face any problems during the state quarantine? If yes, how did you solve these problems? (4) In what way do you think that the government has supported the operation? (5) What are the points that need improvement?

Finally, the following four questions were asked to gather information from community health volunteers: (1) How did you help the state quarantine operation? (2) How did you help community leaders operate the system? (3) How did you help the participants? (4) Please provide the advantages and

disadvantages of running a state quarantine in your community.

All questions were validated before use by three experts according to the item congruence techniques (IOC); public health professional, epidemiologist, hospital director. Each question was scored in three options; -1 refers to the question did not reflect the context of the study, 0 refers to the question was reflected to the study context but it's required some improvement before use, and +1 refers to the question was completely reflected to the context of the study. Finally, a sum score from three experts were pooled and interpreted; if the sum score was less than 0.5, the question did not suitable to use in the study; the sum scores equal 0.51-0.70, the question was required improvement before use; if the sum score more than 0.7, the question was ready to use.

All selected key informants were invited to the interview. The interviews were conducted 3 days in advance. The interviews were conducted via phone calls, which means that the interviewer and interviewee were blinded each other. The interviewer was an expert in conducting qualitative studies and was knowledgeable in the entire process of the state quarantine operation. However, the interviewer was not involved in any section or stage of the operation. All interviews were recorded and complemented with field notes.

All records were typed and corrected before the analysis. Data were analyzed using the NVivo program (NVivo, qualitative data analysis software; QSR International Pty Ltd., version 11, 2015).

### **Ethical consideration**

All study concepts and protocols were approved by the Chiang Rai Provincial Public Health Research Ethics Committee on Human Research (CRPPHO No.32/2564). All participants were provided information regarding the study before obtaining their informed consent. All participants were interviewed in a private and confidential setting. The interviews lasted 45 minutes each.

### **Results**

Seventeen (3 [project leaders], 5 [public healthcare professionals], 3 [community members], 6 [attendees of the quarantine and their respective relatives]) participants were interviewed. The participants were of Thai and other nationalities, but all the participants were able to speak the Thai language. Two participants had no mobile phone and subsequently encountered several challenges with communication during their stay.

#### ***Infrastructure and communication***

Readiness and satisfaction with the infrastructure, including building, room, and sanitary materials, were reported at a significant level by participants and medical staff. The facility where the state quarantine was implemented was new and located in a quiet area.

Participants were highly satisfied with communications infrastructure and transportation facilities in the state quarantine facility. Moreover, communications infrastructure and transportation facilities were considered effective.

#### ***Procedure of the operation***

The command and communication chain among the public health staff and participants were considered effective in this study. Two-way communication and regular meetings were properly implemented throughout the entire process. A decision was made based on this evidence. The procedures performed during the state quarantine operation were found to be challenging considering that the quarantine facility was constructed in a limited amount of time. Major challenges were observed during the state quarantine operation: time constraints in the preparation of medical staff working in the quarantine facility and inadequate essential documents in the state quarantine operation. There was no standard public health training program provided to improve the knowledge and skills of medical staff working in the quarantine facility in Thailand. Further, some young insufficiently trained medical professionals were assigned to work in the quarantine facility. Changing of medical staff who worked in the quarantine facility over time had a significant effect on communication and effective care in the quarantine facility.

Another challenge was that the documents used for the operation were incomplete. Due to the urgent requirement of performing this state quarantine operation in the border area where a cluster of COVID-19 cases was reported, some documents and guidelines were not completely developed and effectively used at the initial steps.

#### ***Medical care and support***

Medical care and support for both physical and mental health problems, which were provided in the state quarantine facility, were considered effective. The quarantine was operated in an area close to two large hospitals: Mae Sai Hospital and Mae Chan Hospital. Subsequently, participants in the state quarantine operation received sufficient physical and mental care and support from medical professionals and public health staff who worked in the quarantine facility. Mental health care was not directly to support attendees but also to public health staff.

#### ***Food and daily support***

Food, drinking water, and other personal things were sufficiently provided. Different food and drink items were provided during the whole quarantine generation, which greatly satisfied the participants. However, three food and drink providers were at the highest risk of COVID-19 infection because of their access to the quarantine facility.

#### ***Communication***

There were communication channels between the public health staff and participants in the quarantine facility. First an online application, was used as the

major communication channel to communicate on daily temperature reports, laboratory specimen collection appointments, feedback of the results, and daily personal requests. This channel was created and used by those who had smartphones. The second channel was a common mobile phone and post-it notes (small piece of paper), which were used to communicate needs.

#### ***Community agreement***

The project public health leaders were responsible for allowing the community members to understand and trust the state quarantine operation. The community leaders discussed to villagers the essential information on performing state quarantine operation, including the safety precautions undertaken to prevent viral transmission. During the discussion, public health leaders from the provincial level joined in the discussion so that villagers further understand the state quarantine operation.

#### ***Outcomes***

Positive COVID-19 cases were not observed among the participants, and secondary infections were not noted in those who attended the state quarantine in Mae Sai District. Participants' information was not released to the public to avoid social stigma. None of the public health staff working in the state quarantine facility was COVID-19 positive. Villagers were significantly satisfied with the state quarantine operation. In early February 2021, the leader of Chiang Rai Province announced that the province was free of COVID-19.

#### ***Implications for public health***

This study showed that state quarantine can be effectively implemented in a local setting. It is essential to control and prevent diseases at the port and in the border areas. Establishing a state quarantine facility in a local setting could reduce the disease management cost and risk of spreading the disease. State quarantine is one of the best procedures performed to reduce all public health and medical expenses from disease control implementation and case management at a hospital. A strong collaboration between community and health institutes throughout the integrative work on state quarantine could have a tremendous impact on the health and economy of a country.

#### ***Discussion***

There was an urgent need to establish a state quarantine facility at Mae Sai District, the border areas of Thailand and Myanmar in early December 2020, considering a number of COVID-19 cases reported among individuals crossing the border back to Thailand during the severe COVID-19 epidemic in Myanmar. It was an urgent policy that needed to be immediately implemented to prevent disease transmission along the border areas. Several key

success factors were detected, such as the central government's significant commitment to prevent the spread of COVID-19 and the provincial team's quick response to the COVID-19 pandemic. Communication between stakeholders in both the vertical and horizontal lines was excellent and effective. Allowing villagers to understand the importance of state quarantine operation before the actual operation was one significant point addressed in this study. Eventually, the villagers were able to understand the clinical importance of a quarantine facility, and they accepted and cooperated in the state quarantine operation. Finally, the local public health team was able to demonstrate their leadership ability in managing a significantly difficult task of operating the quarantine facility. Teamwork observed from public health staff working in the quarantine facility was one of the outstanding capacities detected; however, other departments did not fully cooperate in the state quarantine operation.

A few challenges were detected during the state quarantine operation. First, several of the public health staff who participated in the quarantine operation were insufficiently trained in managing severe COVID-19 patients. Only a short guideline and limited information were provided in the quarantine operation, with only one mentor in the quarantine facility to guide the quarantine operation. Some documents were not developed and designed properly, which led to confusion during the quarantine operation. Some staff, particularly those who provided food and drink to the participants, were at the greatest risk of infection. This problem should be considered in future quarantine operations. In addition, mental health issue in both attendees and staff were detected. This coincides with a study Brooks, et al [5] which reported that the psychological impact was an important challenge in implementing a state quarantine.

The state quarantine operation has been accepted by the WHO [6] and Centers for Disease Control and Prevention when managing the COVID-19 pandemic [7]. The Ministry of Public Health, Thailand, has also recommended and implemented state quarantine operations at the national and local levels, particularly in areas or provinces with port entries [8]. Moreover, the guidelines and protocols of these operations met the criteria and requirements for the standard hotel quarantine, which was developed by the National Review of Hotel Quarantine, Australia Government [9]. The process of the quarantine operation has also met the international standard of quarantine operation, which was reported by Tognotti [10].

In our study, the state quarantine operation at a local setting in Chiang Rai Province has been found to be highly effective, although this is the first quarantine operation performed in Chiang Rai Province bordered with Myanmar at Tachileik District, with both official and unofficial ports or crossing borders. In this study, the effectiveness of the quarantine operation was

confirmed considering that COVID-19 cases were not detected in the quarantine facility in the present study. This concurs with the report from China [11], which showed that state quarantine was a key factor in eliminating COVID-19 in China.

This study has a few limitations. Some of the primary participants were not interviewed. Some information provided by the participants was relatively inaccurate considering that they could not clearly and appropriately answer the questions asked since the study was conducted from late March to early April 2021.

## Conclusion

State quarantine is one of the most effective prevention and control measures to prevent the spread of COVID-19 in border areas. However, several factors need to be considered while managing the state quarantine operation. Community agreement is a crucial factor. Before starting a state quarantine operation in a community, an agreement should be obtained from community members, particularly community leaders. Designing an organizational structure is of crucial importance when managing the state quarantine operation. The effective structure includes having public health staff in all relevant fields and creating a well-established workflow daily, especially when assessing the health status of all participants in the state quarantine. Monitoring participants' health and specimen collection requires a specific procedure, including the availability of a specific medical technician. Mental support to participants participating in the quarantine operation is an important factor that all medical staff should consider both during the quarantine and after being discharge from the quarantine facility.

Based on the state quarantine operation in Mae Sai District, Chiang Rai Province, we recommend some points. First, at the national level, there should be an effective training program to handle crises or severe conditions so that public health staff can effectively respond to the crisis. The standard guidelines used to respond to a crisis should be developed and provided to all concerned individuals.

## References

- [1] World Health Organization (WHO). COVID-19: Global situation. Available from: <https://covid19.who.int>
- [2] World Health Organization (WHO). Considerations for quarantine of individuals in the context of containment for coronavirus disease (COVID-19). Available from: [https://apps.who.int/iris/bitstream/handle/10665/331497/WHO-2019-nCoV-IHR\\_Quarantine-2020.2-eng.pdf](https://apps.who.int/iris/bitstream/handle/10665/331497/WHO-2019-nCoV-IHR_Quarantine-2020.2-eng.pdf)

- [3] World Health Organization (WHO). COVID-19: Myanmar situation. Available from: <https://covid19.who.int/region/searo/country/mm>.
- [4] Muangmor H, Upala P, Apidechkul T. COVID-19 outbreak in the Chiang Rai border area due to illegal immigration to Thailand: a field investigation. *Journal of Health Science and Alternative Medicine*. 2020; 2(3): 22-28.
- [5] Brooks SK, Webster R, Smith LE, Woodland L, Wessely S, Greenberg N, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *The Lancet*. 2020; 359(10227): 912-920.
- [6] World Health Organization (WHO). Considerations for quarantine of individuals in the context of containment for coronavirus disease (COVID-19). Available from: [https://apps.who.int/iris/bitstream/handle/10665/331497/WHO-2019-nCoV-IHR\\_Quarantine-2020.2-eng.pdf](https://apps.who.int/iris/bitstream/handle/10665/331497/WHO-2019-nCoV-IHR_Quarantine-2020.2-eng.pdf).
- [7] Centers for Disease Control and Prevention (CDC). Order for quarantine. Available from: [https://www.cdc.gov/quarantine/pdf/Public-Health-Order\\_Generic\\_FINAL\\_02-13-2020-p.pdf](https://www.cdc.gov/quarantine/pdf/Public-Health-Order_Generic_FINAL_02-13-2020-p.pdf)
- [8] Ministry of Public Health, Thailand. Alternative state quarantine. Available from: <http://www.hsscovid.com/files/A%20State%20Quarantine%2017.4.63.pdf>
- [9] National Review of Hotel Quarantine, Australia Government. National review of hotel quarantine. Available from: <https://www.health.gov.au/sites/default/files/documents/2020/10/national-review-of-hotel-quarantine.pdf>
- [10] Tognotti E. Lessons from the history of quarantine, from plague to influenza A. *Emerging Infectious Diseases*. 2013; 19(2): 254-259.
- [11] Tang B, Xia F, Tang S, Bragazzi NL, Li Q, Sun X, et al. The effectiveness of quarantine and isolation determine the trend of the COVID-19 epidemic in the final phase of the current outbreak in China. *International Journal of Infectious Disease*. 2021; DOI: 10.1016/j.ijid.2020.03.018.